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The Eco-classroom project

Fostering student participation through
education for sustainability

A thesis

submitted in partial fulfilment
of the requirements for the degree

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Abstract

This thesis investigates learning and other outcomes in participants, particularly students (9-11 years), as a result of their involvement in an education for sustainability (EfS) co-design and build project at their primary school, in New Zealand, which was conducted within the Enviroschools Programme. The research focused on four areas that distinguished the project: sustainability learning as the issue, participatory practice as the method, design as the process and community partnerships as the sphere of involvement. Each of these was considered in terms of its influence on learning that was either cognitively-based (knowledge), psychomotor (skills) or affective (attitudes and values). This led to the set-up of a matrix to collect qualitative data that was gathered using a narrative inquiry method of collecting participants stories. This included focus groups with students who were part of the Eco-building Working Party, interviews with key adults from the school and the wider community, survey questionnaires to parents of the focus group students, and other observations and materials.

Findings demonstrated a correlation between the set-up and execution of the eco-classroom project and the Danish-developed pedagogical EfS concept of Action Competence. This was indicated through the authentic, relevant and democratic action-taking focus of the eco-classroom project that is linked to making learning transformations, which have been established as being more likely to lead to genuine changes in behaviour towards the environment. Also in agreement with an action competence approach was the strong focus in the project on both individual and collective learning. This was partly a result of the process-focused nature of the project, which was related to the learning mandate and commitment to a democratic process with students. The project ran for a number of years with annually changing groups of students, who all had different experiences. The teacher used 'peer education' and reflective tools to manage the 'changeover' positively, give depth and breadth to learning and ensure the project was truly collaborative. Student learning occurred in all three learning domains and included EfS learning (particularly about aspects of architecture and the built environment), learning about the process of design, and cross-disciplinary learning that included skills such as leadership, teamwork and public speaking. Adult participants also gained from their involvement in the project. The embedding of learning in the project within the *New Zealand Curriculum*, provided evidence of the flexible and multidisciplinary nature of EfS. Finally, a number of key characteristics were identified as contributing significantly to learning in the project.

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Dedication

**To my parents Judith and Graeme,
who didn't live to see this finished, but always encouraged my learning.**

**To my daughter Abby,
who lived through this ~ may you always love learning!**

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1 Introduction

This thesis presents a case study of children co-designing and co-constructing a building, employing sustainable principles, at their school (the eco-classroom or eco-building project). In this chapter I present a background to environmental education (EE), with particular reference to New Zealand, since both my study and the project it is based on have their roots in EE, as well as being located in New Zealand. This is followed by the rationale, objective and research question for this study. Finally, as the context for this study, I outline the Enviroschools programme (being the umbrella for the eco-classroom project) and background the project itself.

1.1 Environmental Education background

Widespread concern about the environment began to emerge in the 1960s with a growing awareness of the negative impact of human activities on the environment. It was fueled by dismay and righteousness generated by publication of books such as Rachel Carson's (1963) *Silent Spring*, which helped expose the devastating persistence of the insecticide DDT, being used in agricultural practices worldwide. However, at this point it was essentially a grass roots movement that many people felt had little to do with them. Following on from this, events such as the meeting of educators and environmentalists in Belgrade in 1975 (subsequent to the 1972 Human Environment Conference in Stockholm), which resulted in the *Belgrade Charter* (UNESCO-UNEP, 1975), situated environmental issues as something people needed to be educated about. Making it everyone's business¹ has helped the concept of EE become increasingly mainstream. However, it is also likely that increasing evidence of destruction and physical breakdown of ecological systems has similarly had an effect. It is significant to note that the *Belgrade Charter* determined not just that EE was critical, but also that this required development of knowledge, skills, attitudes, motivations and commitment. The objectives of "awareness, development of evaluation ability and participation" were also introduced (UNESCO-UNEP, 1975, p. 3). A case was therefore made for EE as a multi-faceted learning process requiring not only the three identified aspects of learning (cognitive – knowledge, psychomotor – skills, affective – attitudes and values) but also systems of democracy and self-awareness through critique.

The intergovernmental meeting that led to the *Tbilisi Declaration* of 1977 (UNESCO, 1977) built on the *Belgrade Charter* and was groundbreaking in establishing agreement between 66 United Nations member governments

¹ The *Belgrade Charter* at first specifies schools and youth but further into the document it takes a broader stance, including formal and non-formal education, children and adults.

of the essentiality of environmental education. Recommendation for engagement in real EE issues, acknowledgement of its multidisciplinary nature (i.e. encompassing more than one discipline) and a definition that went beyond the physical environment to include aspects such as social and cultural influences were also determined. Both the *Belgrade Charter* and the *Tbilisi Declaration* emphasised that EE needs to constitute life-long learning, therefore recognising its need to be flexible, responsive and values-based. In the spirit of the *Belgrade Charter*, the *Tbilisi Declaration* contains the following objectives in building EE: “awareness, knowledge, skills, attitudes and participation to enable active involvement” (UNESCO, 1977, p. 3).

Ten years later the World Commission for Environment & Development commissioned the *Brundtland Report* (WCED, 1987), which famously defined ‘sustainability’ as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (p. 1). Sustainable development had already been gaining traction as a concept and pedagogical focus through the World Conservation Strategy in 1980, (Tilbury, 1995). The World Conservation Strategy was a joint World Conservation Union (IUCN), United Nations Economic Programme (UNEP) and World Wildlife Fund (WWF) initiative, which stated that humanity, nature and conservation are inextricably linked, and therefore conservation and development must proceed together, rather than being viewed as mutually exclusive (IUCN, 2010).

The recognition in the *World Conservation Strategy* that people need nature but are not likely to conserve it from a position of poverty and misery, or a belief that conservation could lead them there, led to an acceptance that EE needs to have an economic proviso. The stage was therefore set for a shift towards education for sustainable development (ESD) or education for sustainability (EfS). The momentum for this shift came in the form of the *Earth Summit* (UNESCO, 1992) in Rio de Janeiro, which championed sustainable development (often abbreviated as sustainability) as the focus of environmental education, and schools as one important agent of dissemination. Its programme of action, called *Agenda 21*, therefore acted internationally to redirect EE towards this emphasis on sustainable development (UNESCO, 1992). Through *Agenda 21* it was also agreed to implement the teaching of EE, woven across other educational subjects in schools, within three years (Chapman & Eames, 2007). This decisively positioned environmental education (EE), or education for sustainability (EfS), as belonging (although not exclusively) in the school, or formal education environment. The terms EE and EfS are therefore both used in this thesis, the former being used to denote earlier work and the latter more recently, representing the recent shift in New Zealand towards calling environmental education, education for sustainability. In Europe the

frequently used term is education for sustainable development (ESD), which Laessle (2010) confirms historically grew out of EE.

It is ironic that although these meetings and resulting documents (hereafter called global documents) significantly influenced the worldview in terms of the focus of environmental education, Tilbury (1995) asserted that in the school environment there was a lag in correctly interpreting what this meant, with schools tending to treat EE as a facts-based learning experience, if at all. This is discussed further in the following paragraph. In New Zealand other authors (e.g. Bolstad, Cowie, & Eames, 2004; Chapman & Eames, 2007) have highlighted the ambivalence generally shown in the formal education sector towards carrying out the recommendations of the global documents. This is discussed in the next Section (1.1.1).

1.1.1 School-based Environmental Education in New Zealand

The influence of the global documents that have shaped EE internationally are clearly evident in the New Zealand government's documents that deal with EE. In addition, New Zealand was a signatory of the *Earth Summit* in 1992 (Ministry of Education, 1999). However as Chapman & Eames (2007) point out, New Zealand did not achieve the agreed time frame of rolling out EE programmes within three years of Agenda 21. The following paragraphs will chart the development of EE in New Zealand schools through government legislative provision.

There are two documents that are unique to New Zealand and deal with relationships between land and people. They therefore relate fundamentally to EE. The first is the *Treaty of Waitangi*, the founding partnership document of New Zealand, which was signed in 1840 and defines our bicultural society (The Treaty of Waitangi Information Programme, 2006). Particularly since the mid-1980s, honouring the Treaty has positioned *Maori* as *tangata whenua* (people of the land) and their complex interrelationships with the land is held in high regard (Mein Smith, 2005). This makes it essential to respect and integrate responsibilities of partnership between *Maori* and *pakeha* towards our natural resources, as well as to include *Maori* environmental knowledge, cultural perspectives and special rights into environmental learning in *Aotearoa*/New Zealand (e.g. see Ministry for the Environment, 1998, p. 12; Ministry of Education, 1999, p. 11). Respecting the *Treaty of Waitangi* underpins all official documents in New Zealand. This is especially the case in the second document, which is the *Resource Management Act* of 1991 (*RMA*). This vanguard piece of legislation had far-reaching effects in terms of promoting the sustainable use and integrated management of New Zealand's natural and physical

resources (Environmental Defence Society, 2009). According to the *Guidelines for Environmental Education in New Zealand Schools* (Ministry of Education, 1999, p. 11), the four key EE concepts of “interdependence, sustainability, biodiversity, personal & social responsibility for action” are also embodied in the *RMA*, making the link explicit between EE and the legislative framework for management of our resources.

The *New Zealand Curriculum Framework* was an official statement of policy regarding teaching and learning in New Zealand schools, (Chapman & Eames, 2007). The framework, released in 1993, fell short of establishing EE as a required subject (Bolstad et al., 2004). However, in 1995 the New Zealand Ministry for the Environment released the government’s strategy on the environment, ironically called *Environment 2010 Strategy (E2010)*, to establish priority issues as represented by different aspects of the environment (Ministry for the Environment, 2010). Again the claim is made that the aforementioned four key concepts (interdependence, sustainability, biodiversity, personal & social responsibility for action) are reflected in this Strategy (Ministry of Education, 1999, p. 11). This strengthens the connection between government environmental policy and EE, especially as promoting environmental education was part of *E2010*’s agenda for action (Ministry for the Environment, 2010).

As a result of *E2010* and the identified need for all New Zealanders to show understanding and respect for the environment and their impact on it, the government released their national strategy for environmental education entitled *Learning to Care for Our Environment: Me Ako ki te Taiao* (Ministry for the Environment, 1998). This document focused on sustainability, and similar to the *Belgrade Charter* and the *Tbilisi Declaration*, there was an emphasis on the necessity for changes of behaviour, equated with attitudes. By defining EE as, “A multi-disciplinary approach to learning that develops the knowledge, awareness, attitudes, values and skills that will enable individuals and the community to contribute towards maintaining and improving the quality of the environment” (Ministry for the Environment, 1998, p. 7), the influence of the EE goals & objectives of Belgrade/Tbilisi are evident. *Learning to Care for Our Environment: Me Ako ki te Taiao* identified five priorities for the following three to five years. Three of these were relevant to formal education (summarised as incorporating, integrating, coordinating & evaluating EE activities across the curriculum), which set the scene for subsequent EE initiatives (e.g. see Ministry for the Environment, 1998, p. 16). These included the publication of guidelines for schools, as outlined in the following paragraph, and the development of professional development programmes for teachers.

The *Guidelines for Environmental Education in New Zealand* (Ministry of

Education, 1999) were published by the Ministry of Education, in conjunction with the Ministry for the Environment and the Department of Conservation. Their intention was to provide ideas for schools on how to incorporate EE within and across the existing curriculum strands, at all schooling levels, in both English-language and *Maori*-language taught schools. In keeping with preceding documents, both international and local, the *Guidelines* made explicit that learning in EE involves knowledge (cognitive), skills (psychomotor) and attitudes and values (affective). This was evident through the five aims of environmental education for students to develop in relation to the environment (taken from *Belgrade/Tbilisi/Agenda 21*), listed below (Ministry of Education, 1999, p. 9):

1. Awareness and sensitivity.
2. Knowledge and understanding, including people's impacts.
3. Attitudes and values reflecting concern.
4. Skills of identification, investigation & problem solving.
5. Participation and action, leading to a sense of individual & collective responsibility.

Even so, it could be argued that the very fact guidelines were needed to show how to fit EE into the curriculum represents a compromise in terms of government policy regarding the essentiality of EE. In addition, although the *Guidelines* (Ministry of Education, 1999) advocate 'action' in the fifth aim above, they appear to fall short of previous documents by recommending a "balanced environmental education programme address[ing] all three dimensions" (p. 14), rather than focusing on 'action-taking' (i.e. education for the environment). This is subtly different to *Learning to Care for Our Environment: Me Ako ki te Taiao* (Ministry for the Environment, 1998) where it is instead stated: "One of the intentions of this strategy, however, is to encourage increased emphasis on those activities that will influence the way people treat or manage the environment" (p. 9). 'Those activities' are then defined as being focused on "Education **for or with** the environment (their emphasis) - where the activity is directed at influencing environmental concerns". Looking at it differently this broader emphasis could instead be interpreted as recognition that action-taking needs to be informed by values *and* knowledge.

How ever it has been interpreted in the take up of EE in New Zealand schools, or the types of projects and learning students have been exposed to, a report commissioned by the Ministry of Education (Bolstad et al., 2004) and conducted through the middle of 2002 to 2003 on environmental education in New Zealand schools (therefore well-timed to gauge school response to the *Guidelines*), found that the pedagogical focus was too often on education 'about' the environment rather than student-driven education projects 'for' the

environment. The report also identified a lack of environmental education policy co-ordination within key government ministries, poor communication and information dissemination about environmental education to schools, and limitations imposed by environmental education being non-mandatory. Similarly timed, in a presentation at an Asia Pacific Environmental Education Research Seminar, Law (2004, p. 102-103) agreed, saying there was too much 'teaching about' rather than 'projects for' the environment in schools. In addition, he noted the following constraints: EE incorporation into the curriculum was still determined in individual schools by the Board of Trustees, lack of achievement standards for the cross-disciplinary nature of EE, insufficient school time for EE projects with meaningful outcomes, lack of a collaborative overarching vision between educators, over-emphasis on numeracy and literacy coupled with failure to see the potential for teaching this within EE, lack of EE courses within teacher-training programmes, and a lack of *Maori* educators to bring a *Maori* EE perspective, both in *Te Reo* education and mainstream.

Within this litany of shortcomings identified about EE in New Zealand schools, it is important to also record two occurrences of potential change to this situation. The first was the development of both government-led and non-government organisation (NGO) programmes to support EE in schools. An example of the former is the School Support Services, which supplied EE advisors to provide curriculum support for teachers between 2003 and 2009 (NZAEE Auckland Branch, 2009). This helped teachers develop skills in EE and ways to integrate EE into the curriculum, as well as encouraging evaluation through sharing. An example of the latter is the Enviroschools Programme, coordinated by the Enviroschools Foundation, which is the umbrella for the project this research is based on. The Enviroschools programme is part of a genre of NGO environmental education programmes for schools with an action-taking focus, which have been developed worldwide. Others include: Learnsapes in Australia, Eco-Schools in the United Kingdom and the United States, Landscapes for Learning in the UK and the Edible Schoolyard in the United States.

The next development of interest was the release in 2007 of the revised *New Zealand Curriculum*, for implementation in 2010 (Ministry of Education, 2007). Although, like its predecessor, it fails to make environmental education either compulsory or distinct, according to Chapman and Eames (2007) it does present a more flexible and less prescriptive 'guide' that schools can mould to their local context. These authors also point out it names sustainability as a future-focused theme. The new curriculum does implicate EE by its vision of generating young people working towards "a sustainable environmental future

for our country” (p. 8) and espousing values such as “ecological sustainability” (p. 10). However, it did not specifically make EE mandatory for schools. By comparison, Australia has implemented compulsory EE for years 1-10, using the tenets from *Belgrade/Tbslisi/Agenda 21* (Fien, 2004). The examples they include alongside each stated goal provide a useful way of understanding what each represents. These are: “Awareness raising – ‘Does it matter to me?’, Shaping of values – ‘Should I do something about it?’, Developing knowledge and skills – ‘How can I do something about it?’, Making decisions and taking action – ‘What will I do?’” (Fien, 2004, p. 187). A path of values-focused EE for the environment is therefore implicated, with the clear intention of bringing about learning transformations, leading to permanent changes in behaviour.

In summary, the rhetoric from international and New Zealand statements of intent and policy regarding the role (what), importance (why) and implementation (how) of EE are largely consistent in New Zealand but there continues to be a gap in terms of reality. This seems to be led by government decision-making (or indecision-making), for example the persistence of non-compulsory EE in *The New Zealand Curriculum*, while other documents such as *Learning to Care for Our Environment* are indicating a clear commitment to EE learning in schools. A strong case has been made for the importance of formal (i.e. school-based) EE in New Zealand, as evidenced by the *Guidelines* being focused on ways of integrating EE into other subject areas within the curriculum, which reflects its cross-disciplinary (i.e. including learning that crosses disciplines) potential. However in general a poor take-up by schools (Bolstad et al., 2004) is perhaps indication that it has not been encouraging enough, or supported enough (i.e. in terms of teacher support). Looking ahead, Chapman & Eames (2007) presented a position paper for development of new EE guidelines for schools, since the current ones are now out of step with the new curriculum. In it they make a case for EE being well able to assist learning in other subject areas that are currently receiving special focus by the government, such as numeracy and literacy. In support of this it is generally agreed that EE is multidisciplinary by nature (e.g. Bolstad et al., 2004; Ministry of Education, 1999; UNESCO, 1992). By investigating learning in the eco-classroom project, it is hoped with my research to establish the cross-disciplinary learning potential of action-taking EfS projects. In 2003, Bolstad wrote that EE had struggled to become mainstream rather than marginal in New Zealand formal education (Bolstad, 2003). Yet in 2010, it could still reasonably be argued there are insufficient formal education opportunities for New Zealand children to learn experientially about their environments, with a sustainability focus.

1.2 Rationale for research

The previous section presents the EE policy background to my research into an eco-classroom project, being undertaken through the Enviroschools Programme, at a New Zealand primary school. The eco-classroom project (2005-2009 and ongoing) occurred in an environment of EE being in its relative infancy in formal education in New Zealand but growing quickly, especially as programme support increased. It could be viewed as an era of establishment with moderate legislative support.

The aim of the research was to evaluate student learning as a result of participation in an eco-classroom design project. My involvement in the project came about in late 2007. With an emerging interest in participation of children in the design of their environments, I approached the national office of the Enviroschools Foundation in Hamilton, enquiring about a possible project for my thesis towards a Masters in Education. They were enthusiastic about my conducting research into an eco-building or eco-classroom project (these terms will be used interchangeably) that one of their founding Enviroschools was currently working on. The project was a co-design and build project, driven by student ideas and research, facilitated by the Lead EE teacher at the school and working with professionals from the wider community.

The Enviroschools Foundation wanted to develop this project into a case study resource for their *Enviroschools Kit* (Enviroschools Foundation, 2009) and they believed my independent research could enrich this resource as well as provide data to be used in other ways. As a 'New Zealand first' architectural design project with students at a school, they were also interested in seeing it situated both in a New Zealand and international context, and as a reflective process that could lead to recommendations and improvements for future projects.

For myself, although I had initially imagined working on a garden or landscape-focused project, stemming from my horticultural training and early interest in children's gardens (Wake, 2007, 2008), I have enjoyed the broader view afforded by the project being situated in the built environment. This is especially the case because New Zealand schools contain such a rich mix of buildings and surrounding grounds, memories of which will last in the minds of all 'kiwi' children. My own abiding memories are the smell of plastic from boys melting biro pen tops on the pot-belly stoves in the classrooms of my childhood; while outside the preoccupation was creating fantasy nature-based play environments in the generous school grounds. Times have changed some of the activities but not the importance of schools in children's lives. I

have also particularly enjoyed the co-design aspect of this project. I am an educator at tertiary level, teaching about use of plants in design, rather than an educational theorist. I therefore bring a cross-disciplinary perspective to the multidisciplinary natures of EfS, participation and design that this research encompasses.

However, overarching all other motivations for conducting this research is the increasingly urgent issue of climate change, which brings into sharp focus the need to equip children with knowledge, skills, values and attitudes of environmentally sustainable ways of living and behaving. Buildings represent shelter and are therefore a primordial need humans will strive to satisfy. They also link to nature through their materials and their connections to wider landscape systems through access ways (e.g. doors, windows, skylights, pergolas) and management of the environment (e.g. solar energy systems, water collection, heating). The participation of primary school students in the design of their school environments is an exciting prospect due to acknowledged capability, fresh ideas and students' exclusive knowledge of aspects of the school environment. In addition, there is potential to generate ownership through empowerment and increased EfS learning. This is likely to result in greater care of the eco-classroom through the creation of layers of meaning via student involvement. It may also lead to a transformed attitude towards acting sustainably in the future. These ideas are explored more fully in the literature review in Chapter 2.

1.3 Research statement

The objective of this research was to evaluate children's learning experiences as a result of their participation in an eco-classroom design project in their school grounds, carried out within the Enviroschools Programme.

Based on this the research question was as follows:

In the eco-classroom project what are the student learning and other outcomes of an education for sustainability co-design and co-building process within a school?

Inherent in this question is acceptance that learning has three components – cognitive, psychomotor and affective. Implicit within this question is consideration of the following four key aspects of the project: a focus on education for sustainability, observance of a participatory process, being part of a design process, and development of community partnerships. It is also hoped the following sub-questions, which represent more specific outcomes, of particular interest to the Enviroschools Foundation, will also be answerable from the data collected:

1. How important were role models and community input in the project?
2. How important was cross-disciplinary learning in the project?
3. What effect did the long-term nature of the project have on participants' experience and learning?
4. What outcomes were there for adult participants as a result of the project?

1.4 Context for study

The following sections provide background information on the Enviroschools Programme and the eco-classroom project that lay within it. This provides a context for the study.

1.4.1 Enviroschools Programme

The Enviroschools Programme originally began as a pilot in the Waikato region with three schools in 1993, as a collaboration between the schools, Hamilton City Council, Environment Waikato and the Hamilton Community Environmental Programme (Oliphant, 2002). In 1997 when Heidi Mardon took on the role of coordinating the programme, a further pilot was run, developing into a national programme in 2001, with accompanying resources (Heidi Mardon, personal communication, 7 May 2008). Heidi is now the National Director of the Enviroschools Foundation, the coordinating body formed about 2002 in partnership with *Te Mauri Tau* Inc., an organisation promulgating

traditional Maori wisdom in matters of education, environment and health (Enviroschools Foundation, 2010).

The Enviroschools Foundation is an NGO open to all types and levels of schools to join and access the learning resources that form the Enviroschools Programme. A unique feature of the programme is its facilitated nature and every school institution (from daycare centres through to high schools) that joins the programme is allocated an Enviroschools Facilitator for advice and assistance (Mardon, Price, & Dennis, 2005). Facilitators are generally employed through local and regional councils and trained in the philosophy of the Enviroschools Programme and use of its resources, for example the Enviroschools Kit (Enviroschools Foundation, 2010).

An awards scheme operates, based originally on the United Kingdom Eco-schools Programme (Hilary Chidlow, personal communication, 7 March 2008). This scheme was developed through the Auckland Regional Council, in conjunction with the Enviroschools Foundation and schools can build up their environmental education activity by earning bronze, silver and green/gold awards (Mardon et al., 2005). Law (2004) credited the awards scheme, as well as the innovation of the Enviroschools Foundation, as being a key strength in New Zealand EE.

Becoming an Enviroschool is a significant commitment to EfS. After forming a school 'Envirogroup' comprising students and staff, a school Vision Map is created and then different groups take on environmental action projects (under themes such as living landscapes, ecological buildings, healthy water, precious energy and zero waste) that are integrated into the national *Curriculum*. The Action Learning Cycle recommended is shown in Figure 1.1. Participation and community development are foundational principles of the programme, which advocates a 'whole-school approach' to EfS (Mardon et al., 2005). Shallcross & Robinson (2008) confirm that this approach can be useful in EfS driven by contributory action. The 'whole school' approach integrates EfS across all aspects of school life (both in and outside classroom learning) and involves all layers of stakeholders in the school, from the Board of Trustees (governance body) to students (Oliphant, 2002). The programme subscribes to Driskell's (2002) 'shared decision-making' (between children and adults) dimension of participation. The vision of the Enviroschools Programme is to be participatory and have a strong sense of place and purpose (Mardon et al., 2005).

This philosophy is a good match with my interest in investigating both the extent and effect of giving children 'voice' in the sustainable design of their environments.

A previous research project investigated the Enviroschools Programme as a participatory model of environmental education (Wilson-Hill, 2003). This research concluded that the potential of the programme to engender a pedagogy of participation in schools was high, but remained dependent on teachers' abilities to successfully implement participatory learning and teaching strategies. Further research was recommended to test the genuineness of the participatory model espoused by the Enviroschools Programme. My research contributes in this regard. In addition, it may help to substantiate claims made by teachers, which are included in the Ministry of Education report of Bolstad et al. (2004, p. 3). For example: "Environmental education was said to have a positive impact not only on student knowledge and attitudes but also their motivations for learning. It was also said to contribute to ... positive relationships between the school and the community".

1.4.2 The Eco-classroom project

Starting in term four of 2005 an annually-changing group of senior primary school students aged nine to eleven years have participated in the co-design of an eco-classroom at their school. As a project carried out within the Enviroschools Programme, an action-planning approach was taken with students firstly identifying an issue, followed by exploring alternatives, taking action and reflecting throughout (Mardon et al., 2005). The issue in this case was the need for a place to teach EfS, as well as functioning as a welcoming and environmentally friendly space for other school and community groups to use. The building incorporates eco-technology or low impact design (i.e. minimising environmental impact by applying 'green principles'), based on students' research and decisions, in conjunction with a local architectural firm. Learning in the project was all curriculum-based, applying the advice of the *EE Guidelines* (Ministry of Education, 1999) and the subsequently developed Enviroschools Programme to weave the eco-classroom project learning across the *Curriculum* strands in a cross-disciplinary way.

In December 2009 the building was officially opened, although completion and further development work will be ongoing. Students assisted with fundraising, marketing and some aspects of the construction. They were therefore involved in every step of the process, and will continue to be involved in future work and in utilising the building for monitoring experiments. Students have named it 'The Living Room', which reflects its dynamic development and use, as well as recognising the systems and materials it comprises (e.g. recyclable, renewable, non-toxic). Examples of monitoring systems include a view port into the wall insulation (see Figure 1.2 overleaf). It is also intended to view and measure temperature differences between parts of the floor

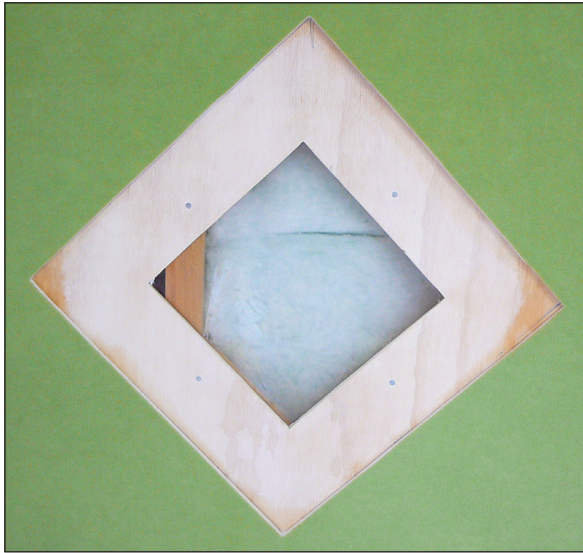


Figure 1.2: Viewing port in the eco-classroom wall showing eco-fleece insulation (2009).

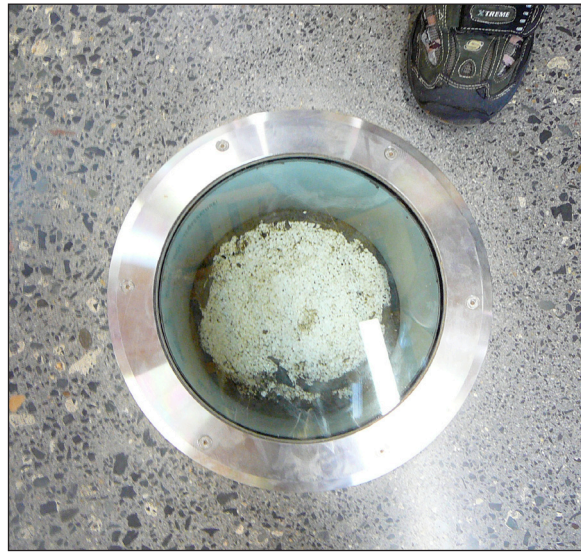


Figure 1.3: Viewing port in the floor showing polystyrene insulation (2009).



Figure 1.4: Eco-classroom newsletter to keep the school community informed (2008).



Figure 1.5: Culture garden at the school is a previous Enviroschools project (2008).

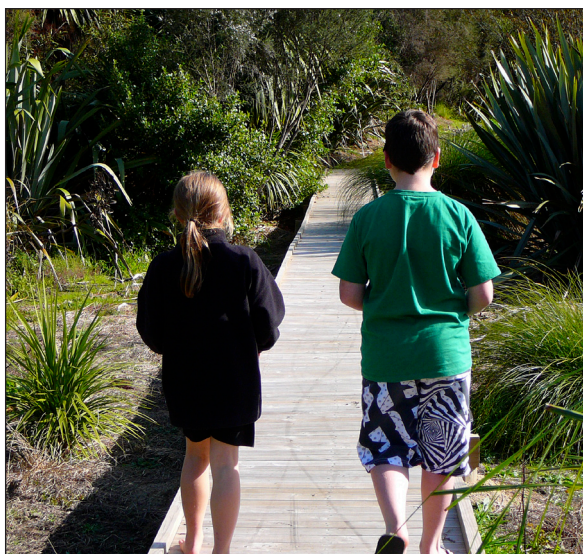


Figure 1.6: Student 'gully guides' show people around the on-going re-vegetation (2008).



Figure 1.7: Shade house is used by students to produce plants for gully planting (2008).

insulated with pumice, wine bottles and traditional polystyrene (see Figure 1.3).

The Environmental Education Coordinator at the school (hereafter called 'the Lead EE teacher' or 'teacher') led the project, with considerable support from the school community, especially the principal and deputy principal. Other senior management, teachers, the school parent-teacher association (PTA) and Board of Trustees (BoT) also lent significant support. The PTA were actively involved with fundraising and the BoT provided some funding, as well as important permission for the project to proceed, following early investigative work and presentations by the students. Community members brought specialist skills to the project e.g. architects, project manager, clay brick-maker, local *iwi* (local tribal *Maori*), graphics and marketing specialists. Parents too became involved in tasks such as helping to produce a regular newsletter updating the school community about the project (see Figure 1.4) and a website to reach into the wider community. The Enviroschools Facilitator assigned to the school also had significant input; likewise representatives from other local agencies kept in contact (e.g. local government environmental groups).

The school has been involved in the Enviroschools Programme since 1997, when it was being piloted. As a result it has developed strength in EfS to the extent that it is now embedded into the school culture through the *School Charter*, which acknowledges it is a priority to develop learners who are committed to using sustainable practices. Further, it states that, "Sustainable principles therefore underpin school operations and school development" ([School name], 2009). The school has an Environmental Committee composed of six staff members. Previous and current environmental projects at the school include the development of a culture garden to represent some of the indigenous backgrounds of students at the school (see Figure 1.5), and a gully restoration and native plant re-vegetation on school land adjoining the playing fields (see Fig. 1.6), using plants produced by students in a school nursery (see Figure 1.7). The school has earned a Green-Gold Award from the Enviroschools Programme, which is the highest achievement.

In summary, the Enviroschools Programme espouses flexibility and inclusivity as important tenets of EfS and the eco-classroom project was set up in this way to tackle a 'real life' situation that focuses on action-taking for the environment.

1.5 Thesis outline

Having introduced the background and stated the intention of this research, in Chapter 2 this thesis will discuss international literature of relevance to this study. This will establish the *status quo* with regard to learning in EE and EfS and the practice of participatory co-design projects that involve local communities. Following on, Chapter 3 will outline the methodology underpinning this research and the specific research methods chosen for gathering data in this project. Chapter 4 will present findings and Chapter 5 will discuss and draw conclusions about these in light of the other chapters, particularly the literature review and the research question.

2 Literature Review

The original impetus for the eco-classroom project came through an environmental education elective at the school where this study is located, and the project was carried out using the Enviroschools Programme resources. It is an on-going school-based education for sustainability (EfS) co-design and build project involving the school and wider community.

Part of the philosophy of the Enviroschools Programme is to be participatory, and as outlined in Chapter 1, a theme area within it is ecological buildings. It is noted by the Enviroschools National Director that there is increasing interest by member schools in tackling projects to do with sustainable building, which embraces the holistic intent of EfS and the Enviroschools Programme, since sustainable design of schools encompasses both buildings and grounds (Mardon, 2007). Traditionally the focus of many Enviroschools projects has been school grounds-based.

Reflecting these different aspects of this research this chapter is divided into three main parts: the first about teaching and learning theory in formal EfS (Section 2.1), the second about the concept of participation (Section 2.2), and the third about design (Section 2.3), with a particular focus on participatory sustainable design with children.

2.1 Pedagogy of Education for Sustainability (EfS)

Sustainable development has been described as: “the major challenge of the twenty-first century” (Heft & Chawla, 2006, p. 464). In the previous chapter, first the global and then the local New Zealand environmental education (EE) policy and that of its successor, education for sustainability (EfS) or education for sustainable development (ESD) was discussed. This positioned its importance for teaching and learning in a formal or school environment. In addition, the United Nations named the decade 2005-2014 the UN Decade of Education for Sustainable Development, with one of its aims being integration of EfS into education policies, programmes and systems (Srinivas, 2010). Although we are now into the second half of the decade, the *New Zealand Curriculum* being implemented from 2010 falls short of making it a compulsory topic in schools. This is despite great interest in the area internationally, accompanied by significant research inroads in EfS pedagogical understanding.

This section firstly considers the role of the natural environment in children’s lives as an introduction to its importance as well as their natural affinity for it. Secondly, concepts for determining pro-environmental behaviour are discussed since it is relevant to consider what may trigger people to adopt

a more sustainable lifestyle. Thirdly, development of learning theories for sustainable development are considered and their relevance to this research is discussed.

2.1.1 The importance of contact with the natural world for children

Many authors have written about the essentiality of contact with nature in children's lives for healthy physical and psychological development (e.g. Kahn & Kellert, 2002; Louv, 2005; Nabhan & Trimble, 1994). However, Faber Taylor and Kuo (2006) point out that this is 'presumed' due to an absence of empirical studies to confirm the premise. Juxtaposed with this is an awareness of diminishing opportunities for children to experience nature first hand in Western societies. This is due, for example, to increasing urbanisation reducing accessible areas of 'wild nature' (Chawla, 2002), and over-structuring or 'adulthood' of children's lives (Francis & Lorenzo, 2002), resulting in loss of freedom for children to explore nature away from adults. Perceived parental anxiety about 'stranger danger' (Blakely, 1994) and traffic risk (Francis & Lorenzo, 2002) are often cited as rationales for managing children's lives in this way, although other researchers have highlighted commodification of childhood (Aitken, 2001) and commercialisation of play (McKendrick, Bradford, & Fielder, 2000) as significant contributors to loss of outdoor experiences for children.

Some researchers have coined phrases to describe the spiraling degradation of nature experiences for children, e.g. Pyle's (2002) 'extinction of experience', Kahn's (2002) 'environmental generational amnesia' and Louv's (2005) 'nature-deficit disorder'. Campaigns have been launched to garner support for a change in the way childhood is lived (e.g. 'No Child Left Inside' in the USA and 'Hold Onto Childhood' in the UK). Alongside this, authors point out that children are drawn to explore aspects of nature, especially the 'wildest' and most neglected pockets in both rural and urban domains (Nabhan & Trimble, 1994; Pyle, 2002). In her research, Blanchet-Cohen (2008, p. 270) found that, "...even in the midst of a city's concrete, children seek and give meaning to the natural environment whatever its size." Although her sample was drawn from early adolescents (10-13 years) attending a children's environment conference, therefore indicating they already had some environmental interest and awareness, other researchers confirm children's general interest in the outdoors. For example, after reviewing the literature Barratt Hacking, Barratt and Scott (2007) concluded children are aware of the importance of nature for their wellbeing and enjoyment and feel concern for it, alongside injustice that their views usually don't count.

Reinforcing this, Kuo and Faber Taylor (2004) conducted research that indicated the significance of green spaces in reducing symptoms of ADHD (attention deficit/hyperactivity disorder) in susceptible children. This could be read as an indication that children are innately attracted to what they need. However, as noted by Piaget (undated, as cited in Hart, 1994, p. 5), this doesn't mean children will necessarily be respectful of systems or fellow creatures of nature, as evidenced by cruel experiments children can conduct on insects and animals. According to Piaget, while they are simultaneously closer to nature (by being less self-conscious), they are also removed from it by considering it is theirs, without responsibility.

In summary, it seems reasonable to assume that children both benefit from and enjoy exposure to the natural environment. However, respect and caring for the environment needs to be taught and modeled for children. This implies the importance of role models, which is a theme this literature review will keep referring to. Acknowledging the contemporary diminishment of time and places to experience nature, a number of researchers express concern for the future if children grow up fearing or diminishing nature due to their isolation from it in their intensely urban lives (e.g. Heerwagen & Orians, 2002; Kong, 2000; Orr, 2002).

2.1.2 Development of environmental sensitivity and empathy in children

It is important to understand how children's nature experiences may be connected with later lifestyle choices. Working on the premise that childhood is a suitably influential time and children have an important future role as environmental stewards, research has been conducted to try and ascertain what may trigger the necessary environmental consciousness required to exhibit environmental sensitivity or empathy. This has followed on from Hungerford and Volk's (1990) model of responsible environmental citizenship, which determined that positive childhood experiences of nature were a common ingredient in the background of adults who later engaged in protecting the environment (through career or voluntary activism). These positive childhood experiences of nature have been collectively called 'significant life experiences' or SLE and research in this area often aligns itself epistemologically with the discipline of ecological or environmental psychology (Chawla, 2008; Horelli, 2006). According to these authors, contextually situating human pedagogical development in an ecological frame, such as that devised by Bronfenbrenner (1979), emphasises the importance of providing opportunities for children to make increasingly responsible environmental decisions, and take action, therefore developing competence. This fits with the concept of action

competence as developed by Jensen and Schnack (1997) in Denmark, which is discussed in Section 2.2.

The development of SLE research has been considerable; from the realisation that it is often a combination of experiences, rather than a single life-changing event, which contributes to generating environmentally responsible citizens (Chawla, 1998); to an acknowledgment of the complexity of developing what Chawla and Cushing (2007) are now calling pro-environmental behavior in young people. These researchers emphasise the critical role of schools and outside-school environmental programmes. They also make a case for the importance of students engaging politically, both personally and collectively, in order to achieve positive environmental goals, by engaging in local projects offering direct experience where they can take personal ownership of the issues. Their recommendation is for this to extend, "... into participation in managing their school and in tackling community projects where they can see for themselves how local government works and feel they are making meaningful contributions" (Chawla & Cushing, 2007, p. 448). Having fun during the process and the importance of adult mentors and role models are also highlighted, the latter of which is also endorsed by others (e.g. Driskell, 2002; Hart, 1997; Iltus & Hart, 1995; Moore & Cooper-Marcus, 2008).

This understanding of EfS being about particular and accumulated significant life experiences is more encompassing than the earlier and narrow view that led Blanchet-Cohen (2008) to criticise SLE methodology for being retrospective and limited. SLE research was initially focused on asking adults who had become involved in environmental activism (e.g. by their career choice, participation in an environmental conference or contribution/membership to an environmental association), what they remembered of significant influences. This privileged specific and retrospective engagement with the environment rather than looking at people's everyday behaviour towards it. In her research, Blanchet-Cohen (2008) asked currently environmentally active young people what had led them down this path. Her results showed both children's capability to act in the environmental arena and the variety of influences acting on them in this regard. These included, "... teachers, peers, parents, the Internet and discovery of special places" (Blanchet-Cohen, 2008, p. 269). This reiterates the importance of role models, as well as indicating the existence of personal triggers for children – both actual and virtual.

In summary, the research presented in this section recommends a focus on collaborative EfS projects that are local, political and real to promote ownership. This process should be shared between children and adults and incorporate fun. This is in accord with a participatory approach, which is discussed in Section 2.2.

2.1.3 Student learning in Education for Sustainability

Emerging since the 1990s, the post-modern construction of childhood has provided a pedagogical and social view of children's lives and learning, which has an interdisciplinary base grounded in philosophy, sociology and psychology (Dahlberg, Moss, & Pence, 1999). This has seen the emergence of a view of children as strong, empowered and full of potential; what Loris Malaguzzi, founder of the Reggio Emilia preschools in Northern Italy, termed a 'rich child' (C. Edwards, Gandini, & Forman, 1993).

As a result Piaget's modernist developmental model for children's learning with its 'hands-off' approach (Raban et al., 2007) has been challenged by socio-constructivist proposals such as Vygotsky's scaffolding (Mooney, 2000) and Rogoff's (2003) co-construction. These emphasise the importance of adult role models to help scaffold learners across the 'zone of proximal development' as Vygotsky (1978) referred to it, in a partnership of co-constructed learning (Jordan, 2004; Rogoff, 2003). Leontiev, following Vygotsky, coined the term 'appropriation' to describe how learners appropriate their understanding via social encounters in a process called 'enculturation' (Hodson & Hodson, 1998), which equates to co-construction.

The symbiosis of learning between adults and children is also highlighted by Bronfenbrenner (1979). His ecological systems show how understanding and engagement with the environment is influenced by maturation and therefore differs between adults and children, who both have a contribution to make. The previously discussed link (Section 2.1.2) between Bronfenbrenner's pedagogical theories, the discipline of environmental psychology and SLE research is likewise connected to the importance of adult role models and co-constructed learning as proposed here.

Constructivist learning theory states that knowledge-building is continual and sequential while social constructivism holds that this learning importantly occurs through social interactions. For example, Oatley (1985, as cited in Fosnot, 1996, p. 25) explains that our constructions of the physical and social world are not static, but continue to change through time and interactions with others. In the process we turn round upon ourselves, re-evaluating and then transforming ourselves, indicating that social constructivism is concerned with learning transformations. In Chapter 1, I discussed the identified importance of an action-oriented teaching and learning approach to EfS that advocates education 'for' the environment. This is believed to potentially result in learning transformations, which are therefore more likely to result in different behaviour towards the environment. Transformative learning is rooted in the work of Paulo Freire (1993), a Brazilian development worker and theorist

who sought empowerment through education for oppressed peoples, and Jack Mezirow (2000) who did pioneering work in adult education with the goal of empowering people to change their world view. Sipos, Battisti & Grimm (2008) name it as critical emancipatory pedagogy and point out it is now only one example of a number of educational theories advocating transformative learning.

Sipos et al. (2008) took Mezirow's work and developed a venn diagram model directed towards transformative sustainability learning (TSL), where they define transformative learning as leading to genuine and permanent changes of worldview. Taking the concept of education 'about' (cognitive), 'in' (psychomotor) and 'for' (affective) the environment (see Chapter 1), and renaming it 'head' (engagement), 'hands' (enactment) and 'heart' (enablement) respectively, Sipos et al. clearly situate EfS as being about transformative learning through this model. However as a pedagogical theory, transformative learning was originally developed for adult education and this model was designed as a tool for EfS projects in the tertiary arena. The established essentiality of involving children with education for sustainability projects means there is a need for a different pedagogical framework for this.

A further learning approach, 'action competence' is a concept originally developed for schools-based environmental education learning. It was proposed by Danish researchers Jensen and Schnack (1997) and is of interest within my research project as potentially illustrative of learning within the eco-classroom project. Rather than becoming action competent these authors suggest a developmental process in students towards demonstrating action competence, which includes the components of: knowledge of the environment, commitment, vision for the future and a focus on action taking. Emphasising its participatory imperative, which is an embedded aspect within the eco-classroom project, they state, "Developing action competence becomes a formative ideal in a democratic approach to education" (Jensen & Schnack, 1997, p. 473). This is explored further in the next section.

In a recent special issue focusing on Scandinavian environmental education research, Mogensen and Schnack (2010) provide an update on action competence by establishing its resilience as international focus has shifted from EE towards education for sustainable development (ESD or EfS). They liken it to the German concept of *Bildung*, which describes development of a higher level of education through socialisation rather than simple knowledge building, therefore connecting it with socio-constructivism. Community collaboration and discussion, alongside role models, are encouraged with an action competence approach (Mogensen & Schnack, 2010), which is of interest

to my investigation of learning in the eco-classroom project. According to Bolstad et al., (2004) the emancipatory approach of both action competence and the pedagogy of critical theory has a strong social context of engagement and empowerment that, in terms of EfS, is regarded as having transformative potential. In agreement, defining 'actions' as intentional and relational, while 'competence' to take action is an 'ableness' to perform appropriately to meet the challenges presented, Mogensen and Schnack (2010, p. 64) propose this leads to students, "... transform[ing] themselves into critical, democratic and political human beings". This latter aligns well with SLE authors such as Chawla and Cushing (2007) who also emphasised the importance in EfS projects of engagement in politics and advocacy.

In the same special issue, Laessoe's (2010) paper takes initial impetus from the gaping difference between the two dominant pedagogical paradigms for EfS. On the one hand the traditional science or transmissive approach to EfS, such as that alluded to by Tilbury (1995) (see Section 1.1). On the other, an empowerment-focused approach that embraces democracy, open-endedness and participation. Laessoe's (2010) argument for participation that goes beyond the classic *cliché* interpretation is discussed further in the next section. However, it is important here to investigate these different approaches further since it helps in situating the pedagogy behind the eco-classroom project. Laessoe (2010) suggests that while the type of knowledge building occurring in the transmissive approach is intended to change or modify behaviour, the rationale behind what is in essence, a 'brow-beating' of information, is uncertain and the permanence of change is dubious. In this regard, Jensen and Schnack (1997) had pointed out that the traditional science-based mode of teaching EfS tends to privilege outlining the overwhelming magnitude of environmental problems without leading to action competence, and even possibly switching students off. Others agree, for example Selby (2008, as cited in Wheeler, 2009b, para. 13.), who suggests that EfS needs to drop its transmissive approach and instead adopt new paradigms such as whole-school approaches and participatory processes. Taking a different angle, Littledyke (2004) defends the place of science in EfS but recommends that it should be taught in an applied way that includes social, moral and environmental aspects as this will give it interest and relevance. However, Mogensen and Schnack (2010, p. 62) caution against over-burdening EfS with moral platitudes, saying, "... education for sustainable development without an action competence perspective very easily becomes dogmatic and moralistic". It is clear from this that a delicate balance needs to be struck and actual or authentic projects 'for' the environment that encourage students to immerse themselves in all aspects, including political, are more likely to be transformative.

This fits well with the dominant EfS discourse in northern Europe, being the 'ecological modernisation' model of environmental consciousness (Laessoe, 2010; Mogensen & Schnack, 2010). A dynamic concept, it views environmental issues as positive opportunities rather than negative problems. According to Mogensen and Schnack (2010), taking this view and applying action competence as a lens through which to view aspects of EfS such as knowledge, skills and action readiness, requires shifting from valuing individualistic facts and skills to holistic embracing of real situations. The subsequent imperative of integrated knowledge, skills, reflection and action is therefore part of an action competence approach to EfS. Again this agrees with Chawla and Cushing's (2007) contemporary SLE research recommendations.

Also of interest to my research is the discussion in Mogensen and Schnack's (2010) paper about evaluation, particularly as indicators of action competence. These authors acknowledge the current educational interest in 'measuring' EfS outcomes. I suggest it may be driven in part by the stated focus of the UN Decade of Education for Sustainable Development, on evaluation and indicators (see Srinivas, 2010). While summative evaluation is not possible for an educational ideal such as action competence, and the complexity of EfS makes development of indicators difficult, Mogensen and Schnack point out that when approached from the perspective of *Bildung* the importance of indicators that focus on learning both at the level of students and school management organisation is highlighted. In this environment, self-evaluation is a continuous process of development and reflection that ensures learning is part of a feedback loop for teachers and learners, individuals and schools.

A set of quality criteria have been developed that are in line with this philosophy and the action competence approach (Breiting, Mayer, & Mogensen, 2005). According to these authors the focus is on quality enhancement rather than quality control, and the concept that critical thinking coupled with positivity (based on individual and collective strengths) can be transformative, i.e. leading to permanent changes in behaviour. Inviting students and teachers to enter a "culture of complexity" (p.10), and celebrating the synergy of school as a collective of individuals working towards a common environmental goal, the resulting guidelines provide schools with clear descriptions of quality criteria for EfS with an action competence approach. Three areas are identified: quality of teaching and learning, school policy and organisation, and community relations (p. 13). These are in common with key aspects of the eco-classroom project. Mogensen and Schnack (2010) recommend the guidelines could be used by schools to help develop their own indicators of action competence, this ownership being essential to avoid a gap between EfS rhetoric and school EfS practice.

In a New Zealand context, Eames and Wilson-Hill (2010a) have presented their work on a framework for developing action competence in EfS. Intended to work similarly to the guidelines of Breiting et al. (2005) in providing help to schools and teachers interested in setting up EfS projects using the action competence approach, it is organised around six key areas, four of which were originally identified by Jensen and Schnack (1997, p. 173) as important components of the action competence concept (see p. 39 this Chapter). Eames and Wilson-Hill (2010a) identify and define their six critical elements of action competence to be:

- Experience – feel, do, react.
- Reflection (critical).
- Knowledge – of the environment.
- Vision – for a sustainable future.
- Actions (direct & indirect) – skills to plan and take action.
- Connectedness - linking attitudes, values and behaviour.

They have linked these to the accepted international conception for EfS of learning *about* the environment being about thinking, learning *in* the environment being about acting and learning *for* the environment being about feeling. This is the ‘head’, ‘hands’ and ‘heart’ utilised by Sipos et al. (2008). Eames and Wilson-Hill’s (2010a) framework also connects to the key competencies of *The New Zealand Curriculum* (Ministry of Education, 2007) and for each of the six elements listed above they provide a full explanation, followed by suggestions (sometimes with suggested links to particular *Curriculum* key competencies) for both learners and teachers, accompanied by suggestions of evidence.

The pulling-out of critical reflection as a key element by Eames and Wilson-Hill frames its importance, as intended by Jensen and Schnack (1997) and emphasised by Mogensen and Schnack (2010) in their support, under a *Bildung* approach, of a move towards self-evaluation and equal importance on the learning of the individual and the institute. By comparison, Blanchet-Cohen (2008) makes no mention of reflection as part of the five sequential stages of EfS interaction in projects, which she identified. These were exhibited by her research set of environmentally active early adolescents taking part in a youth environmental conference. Although an action-taking approach was identified, it was either not accompanied by critical reflection, or not recalled. The importance of embedding evaluation of both student learning and institute-wide learning (i.e. individual and collective) into action-taking EfS projects is relevant to my research because of the iterative process of the Action Learning Cycle used by the Enviroschools Programme (see Mardon et

al., 2005, pp. 18-19 & Fig. 1.1, p. 20) and my study school, the potential role of this school management in the eco-classroom project, as well as the long term nature of the project, which meant individual and collective learning was important (see Chapter 4).

In summary, the post-modern view of childhood situates children as capable and full of potential that is developed through assistance, socialisation and adult role models. This preferences group projects in an environment of co-construction and community involvement. This process of learning is dynamic, emancipatory and transformative – therefore linking strongly to action-focused projects ‘for’ the environment. The action competence approach rolls this together with democracy and politicisation to propose an educational ideal to constantly aspire to, although never become. Demonstrating action competence requires engaging with a vision, showing commitment, having ownership, sharing and reflecting – both within the student body and the school management and organisation.

The emphasis on experiencing and learning from the ‘process’ rather than focusing on the ‘end product’ is clear in all the papers I have read. This is a good match with the eco-classroom project because of its learning-focus. Finally, a clear connection is made in this section between the action competence approach and contemporary views within SLE research.

2.2 Participation

For at least the last decade there has been an increasing regulatory, academic and professional shift, especially in the developed world, towards the importance of children participating in matters affecting them. New Zealand has followed suite in endorsing children’s participation. For example, a report by Biddulph (2004) on children’s rights recognised the importance of participation that is not tokenistic and involves young people in projects from beginning to end. In fact, New Zealand has been somewhat of a leading light in terms of children’s rights, with the government first appointing a Children’s Commissioner to advocate for the best interests of children in 1989; although limited by the incumbent government’s social policy for children (Anonymous, 2010). Norway was the first country to introduce a Children’s Ombudsman in 1981, who has wider powers through authority derived from the law (Tasca, 1999).

The literature reviewed to date is pointing pedagogically towards the importance of a democratic or participatory approach to EfS. In addition, this approach has been linked to action-taking in EfS, which is about education for the environment. Empowering people, especially students, through ownership

of projects and decision-making has greater potential to change attitudes and behaviour towards the environment. In this section I therefore background the history of participation as an emancipatory and learning tool, followed by a consideration of ways that it is applied in a school or formal EfS situation.

2.2.1 Historical background to participation

With its beginnings in the 1990s, the sociology of childhood, or the new social studies of childhood, positioned children as rights-holding members of society, and childhood as a state of being rather than becoming (Holloway & Valentine, 2000; Mayall, 2002). This paradigm helped set the scene for fostering children's active participation in policy and practice of matters affecting them (Hallett & Prout, 2003). Foregrounded by a number of post-modernist assumptions which are summarised below, this notion of participation has begun to enter the mainstream over the last 10-15 years. As a result Waller (2006, p. 97.) stated that, "There has been a shift in both research and practice towards more meaningful participatory methods with children, from one-off listening events to a sustainable participatory culture." The assumptions are:

1. Children are "competent commentators on the details of their everyday lives" (Clark & Moss, 2005, p. 6) and have their own activities, agendas and spaces (Mayall, 2002; Waller, 2006).
2. Children are skilful communicators (Waller, 2006). Malaguzzi coined the phrase 'the hundred languages of children', referring to the many ways children communicate using all senses (C. Edwards et al., 1993).
3. Children are part of society, not only part of a family, and may have separate interests (Dahlberg et al., 1999). Their citizenship needs to be recognised (Hallett & Prout, 2003; Prout, 2003).
4. Children are meaning-makers – "active participants in their own learning" (Waller, 2006, p. 8). Teaching and learning pedagogies in the post-modernist era have therefore also influenced both the commonality and methodology of participation (see Section 2.1.3).

Precipitating this shift was the drafting and widespread ratification by member countries (New Zealand signed in 1993) of the United Nations Convention on the Rights of the Child or CRC (UNHCHR, 1989). As a result, participation of children and young people in matters affecting them is a democratic right covered by Article 12.1. In addition, Article 29.1e of CRC states that: "Children's education shall be directed to the development of respect for the natural environment", placing participation and EE together.

While the essence of participation is widely viewed as endeavouring to increase empowerment levels of marginalized peoples (Reid & Nikel, 2008), in the twenty years following CRC it has come to be almost synonymous with

children. Participation is considered to be 'beyond consultation', being more iterative and implying empowerment, active involvement, power-sharing and interdependency between adults and children (Clark & Moss, 2005; Jans, 2004).

One of the most well-known models indicating types of children's participation is Hart's 'ladder of participation', first published in 1992 in a UNICEF Innocenti essay (Hart, 1997). This has since been widely interpreted, including being applied to projects as a measuring tool, and modified (e.g. Driskell, 2002; Shier, 2001). The model proposed that the bottom three rungs of the ladder (1. Manipulation, 2. Decoration, 3. Tokenism) were 'non-participation'. The top five rungs (4. Assigned but informed, 5. Consulted and informed, 6. Adult-initiated, shared decisions with children, 7. Child-initiated and directed, 8. Child-initiated, shared decisions with adults) are all degrees of 'genuine participation' (Hart, 1997, p. 41.). Driskell (2002) distributed Hart's eight categories across a graph that represented increasing community interaction and collaboration on the x axis and increasing decision-making and change-affect powers on the y axis. The result is more holistically referenced and avoids a linear interpretation that is an inherent weakness of the ladder metaphor.

In a recent book chapter, Hart (2008) emphasised the role of the model was to represent differing degrees to which adults enable children agency of decision-making and involvement, not sequentially reached levels (as is easy to assume with a linear model). Hart states one of his criteria for a participatory project was that participants have volunteered, although he acknowledges this is a contemporary Western nations model of child-rearing, since both in Western cultures historically and non-Western cultures now, a tradition of 'apprentices' prevailed whereby children participated in tasks and skill development under decreasing tutelage of adults. Traditionally, participation therefore happened of necessity, rather than in contemporary Western society where it is separated into a 'right'. This traditional approach focused on role models to teach and hand on skills, which has a connection to my research because of the practical nature and long time frame of the eco-classroom project.

Relevant for the same reasons, Shier (2010) reports on a Nicaraguan participatory project that utilises older children to mentor and pass on knowledge and skills to younger people; empowering all ages by showing them alternatives to the child labour dependancy on coffee plantation work that is the tradition in this rural and impoverished area. Called young community education activists (*promotores* and *promotoras* in Spanish) children pass through six stages, starting at age six, where they are taught by

more experienced *promotores/as*, and at age 12 to 16 (stage 2) they can elect to train to become *promotores/as* themselves – leading groups that teach crafts, theatre, organic farming, folk dance, environmental activism, and health and women’s rights to girls’ groups. Kranzl-Nagl and Zartler (2010) researched selected current school-based participatory projects in Europe. They called the concept of children learning from each other (especially older children acting as role models) as “peer education” (p. 171). These authors also concluded that, “... having fun while working in a participation project is a key principle of a child-friendly project design” (p. 170).

Some researchers have become concerned that the argument associated with participation has become polarized, resulting in a pendulum swing that favours children’s rights in terms of agency in decision-making, at the expense of valuable adult input, thereby feeding the dualism of children as oppressed and adults as oppressors. For example, Mannion (2007) cautions there is a need to balance the picture and work towards a partnership in participation that acknowledges, “... children’s lives are co-constructed by the actions of key adults”, and the importance of developing, “... improved relations between children and adults and a key context: space and place” (p. 417). This acknowledgement of the necessity of both age groups’ involvement fits well with Driskell’s (2002, p. 40.) highest (x and y co-ordinates) participatory category of “shared decision-making” (between children and adults), which is espoused by the EnviroSchools Programme (Mardon et al., 2005).

In summary, participation of children in matters that affect them is a democratic right and a regulatory requirement in signatory countries to CRC. As a result, it has been increasing in commonality over the last 10-15 years, although it is still often little understood or considered. Even where it appears to be, there is great potential for misinterpretation and tokenism – indicating its potential for subjectivity and misuse. There are also some indications of overzealous application of children’s participation where they are given ‘voice’ to the exclusion of other partners in a project (e.g. adults with specialist knowledge). This can lead to missed opportunities of children really being able to contribute usefully, something it is clear from the following examples that they can and want to do. In some ways, contemporary participation of children heralds a return to the ‘apprentice’ situation of the past, as still practiced in non-Western nations where cultures include passing on knowledge and skills from parent to child in this way. The idea of enlisting children themselves to mentor and act as role models for younger children also probably has its roots in traditional societies, especially within poor nations; however when applied in a contemporary way it becomes the exciting prospect of ‘peer education’, which has the potential to increase both depth and breadth of learning and empowerment of children.

2.2.2 Participatory methods in School-based EfS

It is clear school children have an interest in their environment and in being involved in projects and decision-making about it (e.g. Barratt Hacking et al., 2007; Littledyke, 2004; Roe, 2007). A strong case is also made for this involvement to be participatory (Barratt Hacking et al., 2006; Dymont, 2004). There are a number of books and papers dealing with development of participatory methods (e.g. Driskell, 2002; Hart, 1997), although appropriateness of the tools used in order to 'give children voice' depends on the age of the children. For example, Clark and Moss (2005) developed the mosaic approach of listening to pre-school children. Roe (2007) modified this method for use with 6-11 year-olds in ascertaining the contribution they could make to local landscape planning in a rural community. However, results showed the difficulties children encountered in either being listened to or understood by adult decision-makers. Driskell (2002) points out there are a number of key barriers to equitable participation between children and adults. Two common ones he cites are adults believing children do not know enough to contribute, or that it is the role of adults to shield children from the onerous task of decision-making.

Therefore while children's participation is an increasingly used term, the concept is frequently misinterpreted or misunderstood. Fears have been expressed about its vulnerability to become misused or 'jargonized', especially in educational practices (Reid, Jensen, Nikel, & Simovska, 2008). In EfS, Laessoe (2010) identifies there is a real risk, even within 'genuine' (as opposed to 'token') participatory processes, of it becoming a 'set exercise', albeit with a consensual basis, that misses the opportunity to really engage with the EfS issues in a critical and creative problem-solving way. He concludes that, "... there is a need to develop participatory ESD that goes beyond its current limitations, by working with dilemmas, dissensus and deliberative communication" (Laessoe, 2010, p. 54).

Schools interact as a community within the wider community of their situation, and it is recommended that environmental examples for EfS, begin locally, especially with the community (Chawla & Cushing, 2007). In recent research, Barratt and Barratt Hacking (2007) found that while schools are ideal platforms for student engagement in local community environment issues, lack of evidence of this happening in their study indicates there is a need for schools to recognise children's interest and unique knowledge of local environments and encourage greater engagement in local community-based projects that link to curriculum learning. This reinforces Chapman and Eame's (2007) proposal (see Section 1.1.1) that EfS projects can integrate special focus areas within the

curriculum, leading to a win-win situation. Further, Mathar (2006) reviewed and concluded that the EfS programmes run in Green-schools and Eco-schools in Europe were most effective when they were well integrated into the normal life, running and curricula of schools, as well as having an action-taking and self-evaluation focus.

A concept that clearly takes EfS into the participatory realm is that of a 'whole school approach', with the intention of establishing an egalitarian sustainable school community. The Enviroschools Programme, which guided the eco-classroom project, exemplifies this through the formation of an 'Envirogroup' followed by the creation of a 'whole school vision map' with the aim of embracing the whole school community in making and influencing decisions about environmentally sustainable issues within the school (Mardon et al., 2005). Tilbury and Wortman (2006) reviewed examples of 'whole school' approaches to EfS, following on from an earlier report by Henderson and Tilbury (2004) for the Australian government, that stressed the need for further research. The whole school approach is intended as inclusive and democratic of all stakeholders and Tilbury and Wortman (2006) emphasise the community aspect of this approach, saying, "Whole school' programmes will continue to re-orient and connect schools and our communities in a reciprocal relationship of learning for the entire community" (p. 105). Shallcross and Robinson (2008) also researching in whole school approaches, evaluate it to be useful in EfS driven by contributory action.

Eames and Wilson-Hill (2010b) point out that a whole school approach goes hand-in-hand with action competence through the action-taking and inclusive nature of learning it advocates. These researchers are developing a framework to represent what whole school approaches to EfS might be, and have identified twenty-five related aspects of school life under four key aspects of a whole school approach – people (e.g. management processes), programmes (curriculum), practices (operations) and place (physical environment). Of the twenty-five characteristics, ten are people aspects, reflecting the importance of people in a whole school approach, both in terms of inclusivity and their support. Alongside this they include an indicator tool ranging from absent, preparatory, emerging, developing and well developed to enable schools to work up to a whole school approach, with the proviso that the framework be introduced to schools via a trained facilitator.

Reinforcing the importance of people and school structure on successful EfS incorporation in schools, Woollorton (2004) investigated the effect of school governance on participatory EfS enculturation in three different sized schools in Australia. Results showed success was greatest within schools

where, “infrastructure is based on cooperative learning, which is participative and democratic” (p. 606.), reinforcing the importance of empathetic school management to both an action competence and whole schools approach. Community input was also significant; in one school Woollorton claims the high input of local adults, led to strong transformative learning towards EfS within the whole community, although no detail about methodology is given. It does however indicate the potential reciprocal benefits from joint input between schools and communities. An additional point of relevance to my research is Woollorton’s determination of the power of the principal in assisting or resisting a participatory process towards EfS because of the considerable control they wield. For example she points out, “The way the power is exercised is vital to the experience of cultural transformation towards sustainability. Leadership can be a serious tension in the transformation of a school community towards sustainability” (Woollorton, 2004, p. 606).

In summary, a call is made for participation of children in EfS projects, to enable meaningful engagement in real projects that have a local and community focus and require development of political savvy; i.e. debating issues and managing dissention and difficult decision-making. A requisite connection has therefore been established between such action-taking EfS projects and inclusion of a participatory process in the formal or school environment, and approaches such as ‘whole school’ have developed in order to address this in an inclusive way. The ‘whole school’ approach also embraces action competence through the participatory rationale, the action-taking focus, and the inclusivity of people within a school community. The importance of empathetic management systems and operations of the school (especially the support of the principal) are emphasised in both cases. The potential and importance of integrating *Curriculum* learning into action-taking EfS projects is also highlighted.

2.3 Participatory design with children

Participation of children in design of their environments is a relatively new concept and design and management practitioners are therefore often uncertain about it, feeling it untenably lengthens the design process and therefore the budget. Yet there are many advantages to carrying it out, especially in the school environment. One of the most important is it potentially provides participating students² with integrated learning opportunities (e.g. written and oral communication, teamwork, research, maths, science, art, environmental sustainability) during the process of planning, designing and assisting in construction of their built environments (Sorrell, 2008). This

2 The terms ‘students’ and ‘children’ will be used interchangeably.

adds layers of meaning and learning both to the experience and subsequent use of these spaces (Iltus & Hart, 1995). As a result, it is frequently believed it has the potential to empower children by giving them a say in their school environment (Burke, 2007; Koralek & Mitchell, 2005).

In this section I first establish children's capability and value in contributing to the design process, then I consider some general examples before focusing on school-based architectural design examples with a sustainability agenda.

2.3.1 Children and design

As children endeavour to weave themselves into the fabric of an adult world, research shows that they use both different spaces to adults, and shared spaces in different ways. Thomson and Philo's (2004) research indicated children prefer to claim their own spaces, and determine their own activities within these, rather than conforming to adult-designed sites of play (e.g. playgrounds). Francis and Lorenzo (2006) agree, saying that 'planning around children' is partly responsible for the decline of childhood, since because of it children have lost their freedom to explore, as parents prefer the safety of designated play areas. Through their research and practice these authors have compiled a list of characteristics most commonly indicated by children to represent better urban spaces. These include opportunities for accessibility, sociability and participation; and spaces that are small, flexible, natural (e.g. growing and moving) and have place identity.

The ways that children engage with spaces is connected to the way they would manipulate or design the space. This is therefore likely to be different to the way adults would design. For example, Roe's (2007) study showed children understand the environment and value landscape features differently to adults. However, in designing spaces for use by both children and adults (such as schools), Iltus and Hart (1995) caution not to get carried away with the romantic notion of childhood that leads to believing in the need to leave children alone to reveal their innate creativity. Rather it is important for them to collaboratively work with all ages, including adults, to a common end, that is certain to require compromise on all sides. These researchers point out that a problem for many adults is lack of conviction about children's capability to plan, design and build, yet in the examples that follow (see Section 2.3.3), researchers and practitioners unanimously comment that they are impressed with the ideas and ability that children bring to the design table (e.g. Chiles, 2005; Sancar, 2006; Sorrell & Sorrell, 2005).

According to co-constructivists, e.g. Jordan (2004), Rogoff (2003) and

Vygotsky (1978), including adults as role-models and guides to provide specialist knowledge and information can potentially achieve more than children alone. However, the collaborative dynamic involving children and adults, especially from the wider community, is a delicate balance that needs to be well managed (den Besten, Horton, & Kraftl, 2008; Parnell, Cave, & Torrington, 2008). For example, where specialist skills are required such as in the design and urban planning areas, it is essential that although specialist practitioners may work alongside children, their expertise takes precedence in final decision-making in technical areas (Chiles, 2005). Hill (2006) conducted research with children on their perspective of having a voice and his results highlight the importance to children of openness about the process, such as limitations to their participation. This indicates communication and clarity are important in meaningful participation, to avoid misunderstanding that can lead to frustration and disappointment.

While children are natural designers, being free of the constraints adulthood brings (Koralek & Mitchell, 2005) and possessing unique knowledge of the places they inhabit, such as schools (Sorrell & Sorrell, 2005), they also lack skills to achieve a complex built structure. With regard to design education, Anning and Hill (1998, as cited in Chiles, 2005, p. 109) emphasise the importance of the attitude of the school and teacher towards it. If design is marginalised and treated as an 'extra' rather than the functional 'core', children will also not value it.

A number of researchers have considered children's alternative use of otherwise designated spaces such as vacant sites and streetscapes. It is likely that at least part of young people's preference for what Jones (2000) refers to as 'otherable' spaces and Matthews, Limb and Taylor (2000) call the 'street' or 'thirdspace', is because it demonstrates their difference and independence from adults. This difference in the way children view and engage with environments should signal to adults that it would be appropriate to invite their input more in design.

In summary, children have a different perception of space and its use to adults and they also have unique knowledge of the environments they inhabit, making them important to consider in design of their environments. The current contrived physical landscapes of childhood are often a woeful example of our failure to involve children and young people in these processes. Issues of empowerment through ownership are proposed through students participating in design processes, e.g. in schools, although it is emphasised that clear communication of limits to decision-making needs to be made at the beginning, since some decision-making requires specialist knowledge that

students don't have. It is also dangerous to assume that children are adults in their thinking and behaviour, or that they should be treated as a separate set, since the object in any participatory design project is to garner input from all stakeholders. The experience of compromise and working through different needs and foci is therefore an important part of the process.

2.3.2 General participatory design examples and methods

Although the literature points to many positive aspects of children's participation in design projects, my own observations and research (Wake, 2007, 2008) indicate there is often a gap between research recommendations and practice. In the design professions (e.g. landscape architecture, architecture, urban design & planning), anecdotal reasons for this include unawareness of the possibilities or negativity towards it due to time and budget constraints on projects, plus unpreparedness for the length of the participatory process if it is to be meaningful. Freeman, Henderson and Kettle (1999) also found a lack of understanding by design practitioners of the true listening that is required in order for children and young people to genuinely share in a design project in an empowering way that leads to a feeling of ownership. As a result, participation of children in design of their environments is often neither widespread nor genuine (Driskell, 2002; Hart, 1997). This is despite twenty years passing since CRC.

Benefits of children participating in the design of their environments are many. They include acknowledging children's unique needs (Francis & Lorenzo, 2002) and tapping into their intimate knowledge of places they frequent (Ghaziani, 2008; Iltus & Hart, 1995). They bring different perspectives and fresh ideas that adults would probably never think of (Sutton & Kemp, 2006). The resulting space is therefore better utilised by young people, and through generation of greater ownership, less likely to be vandalized (Iltus & Hart, 1995). These authors have also found that what they as adults learnt from the experience of designing with children was able to be fed back into new approaches and initiatives, citing the very successful community garden play areas in the Lower East Side of New York.

Possibly the most common design area that includes children's voice is local government planning, probably due to it being mandated within councils. This is usually by inviting children and youth to be directly involved in the design process (Francis & Lorenzo, 2006), by contributing to mapping processes that chart how youth use cities (e.g. Berglund & Nordin, 2007), or by participating in youth forums (e.g. Freeman, Nairn & Sligo, 2003). It is cautioned that this latter needs to be well planned and managed to avoid becoming 'token' or non-

participatory and the importance of facilitators for the process is emphasised (Freeman et al., 2003). Francis and Lorenzo (2002, pp. 161-162) have produced a useful list of different categories of children's participation called the 'seven realms'. Unlike Hart's model that catalogues degrees of participation, these categorise methods of participation. The 6th realm is called 'institutionalised', represented by an approach of regarding 'children as adults'. They propose this has become the standard model used by institutions (e.g. government and local agencies). They caution it has the disadvantage that adult-set boundaries limit results or produce results contrary to what children want due to the (misguided) expectation that children will behave as adults.

As landscape architecture academics working with children and communities, Francis and Lorenzo (2006) propose a 7th realm as the 'new approach' which they claim as, "a fundamentally different approach to children's [design] participation" (p. 232). Called 'proactive design' they consider it to be, "participation with vision", or, "planning with children" (Francis & Lorenzo, 2002, p. 162). It utilises, "a variety of social science methods such as environmental autobiography as a way for adults to rediscover their own childhood experiences and share them with their children" (Francis & Lorenzo, 2006, p. 232). The process brings together children, designers and planners to develop and design ideas by negotiation. Both the process and the resulting designs have a strong child-centred and naturalistic childhood perspective that aims to overcome the ethical issues of disparate power, control, communication and design skills that are inherent in many participatory examples. One disadvantage they state is the need for special training. Francis & Lorenzo (2002) also suggest that realm four or regarding 'children as learners' frequently applies to participatory projects in EE, and has the disadvantage of often leading to learning or social change but not often changed environments. This should be contrasted with an action competence approach, since these authors are clearly not referring to transformative learning resulting from action-taking projects 'for' the environment.

Iltus and Hart (1995) recommend modeling as a participative design method with children and youth and emphasise the importance of the children annotating their work to avoid wrong interpretation. Other design academics and practitioners have written about the successful use of 'visioning' for long term planning and 'design charrettes' for pressurised generation of design ideas, in projects that include children and youth (e.g. Sanoff, 2001; Sutton & Kemp, 2006). A charrette is a collaborative session to draft a solution to a design problem. It is often used in urban planning as a consultative technique with all stakeholders. Sutton and Kemp (2006) highlight the transformative power of charrettes, in that participants leave thinking differently to how they

arrived. In support of what Iltus & Hart (1995) said about the importance of mixed-age collaboration, Sutton and Kemp believed the community-building aspect of their project with the mixing of people and ages was a great strength, concluding that:

... participants believed the social interactions among many different people created an intergenerational scaffold that promoted visionary thinking. Generally, adults felt the youth helped open up a space for dreaming, even though a few adults stereotyped the students' ideas as impractical (Sutton & Kemp, 2006, p. 272).

The latter sentence in this quote raises the interesting question of what adults are looking to achieve with children's participation in design & planning projects? To parrot what we would do, as adults, or truly acknowledge children's different needs and perspectives? And if the latter, how do we elicit these unique voices within the myriad constraints of societal conditioning and statutory and economic rules? For example, Catling (2003) questions how we know children are giving their own original perspectives on planning decisions when asked, and not just repeating back what their upbringing and experiences to date have taught them (i.e. adults), and which they have learnt will please. This certainly speaks of the criticality of the way a participative process is set up, to the honesty and originality of the result. However, it also implies a set of deeper issues that are less easily resolved and go beyond ethics and terms such as 'meaningful' to question 'difference' and our encouragement of this. Such a discussion is beyond the scope of this literature review.

A final example of participatory design process with children is participatory action research conducted through tertiary design students working with children on community projects (e.g. Knowles-Janez, 2009; Lessard & Torres, 2007; Sutton & Kemp, 2006). Lessard and Torres report on joint UNESCO Growing Up in Cities projects in low-income to working class neighbourhoods in a Canadian and Mexican city. Each tackled four outdoor projects (e.g. parks, playgrounds) using techniques such as ideas tours, brainstorming and charrettes with the children (aged 9-14 years) in order to choose and work on the projects, ensuring children were fully involved with problem identification and visioning. This is something Hart (1997) and Dymont (2004) believe children are too often not involved in. Aside from the advantages identified, such as valuable links and design insight that was made between the universities, children and their local communities; a notable issue raised by all three papers was that of ethics of participation. A concept such as participation of children within the traditional adult domain of design is fraught with potential for power abuse and these researchers all noted that

awareness was heightened by the diminished age gap between the tertiary students and the children.

In summary, there are still relatively few examples of children participating in design projects, even though the identified advantages are significant. Probably the most common way is via contributing to planning decisions since local councils are more likely to have a participatory mandate. However, like any participatory process there is a risk of it being token or under-representative; or being marred by disparate power issues. Different methods have been used such as visioning, charettes, drawings and model making, plus Francis and Lorenzo's proactive approach. Detail on participation methods is substantively missing from the papers reviewed. Of unanimous agreement is the imperative of strong and effective facilitation of the process by skilled adults.

2.3.3 School-based EfS participatory architectural design projects

Increasingly, participatory design projects are being focused on the school environment, often as 'greening projects' in school grounds or via eliciting student perspectives on how they might change their school, using government and non-government (NGO) programmes and competitions (e.g. Carlsson & Sanders 2008; Dymment 2008; Ghaziani 2008). Recently there has been a stronger move towards considering school buildings for EfS projects. For example in huge Western economies such as the United States and United Kingdom, government-led initiatives have begun (Blair, 2004) or been promised (Obama, 2009), to turn schools into environmentally sustainable paragons. It is unclear how much this will involve students in EfS projects. In the case of the United Kingdom this will be discussed in later paragraphs.

Architectural education for children, especially with a sustainable focus, in other countries such as Finland is seen as a priority and has been included in the primary school curriculum since 2006 (Meskanen, 2008). Pihla Meskanen, director of Arkki School of Architecture for Children and Youth, a non-profit organisation fostering research and offering after school architectural environmental education programmes for children and youth aged 3-18 years (see <http://www.arkki.nu/>) explains that, "Architecture education for young people helps us create a deeper understanding of our surroundings and a demand for a better environment in the future" (2008, p. 62). This resonates with the importance of engaging children in architectural projects. The Alvar Aalto Academy in Helsinki has run workshops called 'Soundings for Architecture' that involve children, architects and academics in participatory environmental architecture projects (Parnell, 2004). PLAYCE, an international

association of architecture education was created as a result (see www.playce.org). Even in Turkey, where children are valued but not traditionally given much say in their lives, a programme called 'Children and Architecture Project' under the broader programme of '1000 Architects in 1000 Schools', was instigated to encourage young people's participation in architecture through formal education (Sener, 2006).

The complexity and ethics of involving students in design projects at their school is also touched on in the literature. For example, Dymont (2008) asserts, following her research, that although students were actively involved in the implementation of 'greening projects' at their school, they were under-represented in the earlier phases of the projects such as problem identification, visioning and planning. Likewise, researching into school councils as a participatory arena for EfS, Carlsson and Sanders (2008) found, "... that they do not always automatically promote the development of pupil motivation, engagement, and ownership" (p. 335). These authors emphasised the need for a conducive school culture since, "the role of the teacher and collaborating partners as facilitators ... can be seen as crucial in enabling pupil engagement in the process and for pupils' learning in the process" (p. 331). In the following example, the differing agendas of design versus education manifested as criticism following a participatory process. In this school project funded by the Design Council in the United Kingdom, participatory design decisions were found to be a mismatch with the practicalities of education (Woolner, Hall, Wall & Dennison, 2007). These authors concluded, "... by further complicating and lengthening the design process, the genuine participation of a wide range of people might make it still harder to balance the long-term need of design with the day-to-day requirements of teaching and learning" (p. 247). These examples show that the real essence of participatory processes is sometimes ignored or viewed negatively in design projects.

On the other hand, in searching the literature for examples of participatory EfS architectural projects, the few that I found shared the commonality of being driven by the passionate vision of a community-minded individual/s and were strongly process driven rather than outcome focused. Although methodology details of the processes used are scant, the following three examples serve to give some insight of the particularities and potential of working with children in EfS design projects.

Cengiz Bektas is a Turkish architect with a background in school design and participatory planning who has worked with children in an old neighbourhood in Istanbul for many years, empowering and assisting them to change it according to their agendas of sustainability (Sancar, 2006). In an

interview with Bektas, Sancar recorded the following quotes that highlight his philosophy and experience of designing with children:

Q. What would you recommend for mainstreaming children's participation?

A. Regarding the issues of wider participation and sustainability, one has to be patient, especially with children. The effort should not turn into Boy Scouts, planting a few trees and thinking that it is significant. They should question on their own and decide on their own.

Q. What are the most important lessons that you learned from these experiences?

A. First, children are more agreeable than adults. Second, they are able to change themselves by what they see, hear and do. That means that if these activities are sustained, the new generation will be different. Some of the children who participated grew up to attend art schools; at least three are sculptors. Their perspective broadened (pp. 212, 216, 217).

Peter Hubner is a socially-driven German architect who won a design competition for Gelsenkirchen school in the 1990s, an ex-industrial suburb in the Ruhr with a predominant Turkish population and high poverty and social/family dysfunction rates (Blundell Jones, 2005). Blundell Jones described that Hubner's entry for the competition was a series of drawings of what the school might be like, rather than the norm of a finished plan. The entry also included a fictitious written acceptance speech for the European Environmental Prize in 2034 from Kemal Ozcul, a hypothetical student of the school during its design and construction (which had strongly focused on participation of students), extolling the positive influence of the school on his life (Hubner, 2005). To the judges this indicated Hubner saw the design as a continuous process involving the user, and that he was particularly interested in an narrative that included all stakeholders in the design and build process. Blundell Jones (2005) claims the school and its grounds, as built, are a social and educational lifeline within the community. The design was in strong collaboration with students and teachers, with brainstorming for ideas, followed by the architects working up concepts that were then refined after feedback from the school community. Students also built models of the architectural plans and were involved in practical exercises regarding light and ventilation issues, towards creating a building that is regarded as a model of sustainable architecture. These included insulated concrete foundations, renewable wood frame, passive energy systems for heating and cooling, insulated walls with day lighting incorporated, and a living green roof. Continuing gardening work ensures EfS is ongoing.

In the final example, the architectural team of John and Frances Sorrell have

developed a programme to connect education and design in the United Kingdom, called *joinedupdesignforschools*, that is presented in their book (Sorrell & Sorrell, 2005). Now run as a foundation, the aim is to identify issues students want to change about their school and treat them as clients in a collaborative process with architects and design specialists. The intention is not only to develop design solutions, but also to build life skills such as self-confidence, team building, communication and unlocking their creativity. Although the programme does not specifically include an EfS mandate, it is significant to my research project through the design focus and the process followed, which includes; planning & preparation (including matching schools with architects/designers), the challenge (determination of the design problem), development of the brief, the conversation (between clients & designers towards developing a concept), the design concept (including feedback and reworking) and follow up (to ascertain possibilities of implementation) (Sorrell & Sorrell, 2005, p. 9). It is uncertain how many of the sixty projects featured in the book have been implemented but quotes included indicate it has positively influenced many of the 700 plus students directly involved up to the book's publication. Examples presented also show that a number of projects had a direct sustainability focus or considered sustainability in development of spaces with very varied functions, as e.g. storage, socialising, bathrooms.

The previous examples are evidence that participatory design projects in schools with a sustainable development focus are an increasingly common reality and certain characteristics distinguish these successful examples. It is important however to point out that at least two literature reviews have concluded that such examples, and in general the commonality of participatory design examples connected with learning environments are the exception, not the rule (e.g. Flutter & Rudduck, 2006, as cited in Burke, 2007, p. 364; Koralek & Mitchell, 2005). In the United Kingdom in recent years there has been an attempt to roll out a large scale architecture-based participatory EfS programme of school renewal. Referring to this, Burke (2007) states:

Notions of participation in the design and construction of new or renewed learning environments has become a powerful element in discourses of pupil empowerment. Thus, children's capacities and talents as innovators, researchers and designers, realised in partnership with professional practitioners, has come to be generally regarded as a legitimate and valuable factor in shaping and influencing the school of the future (p. 364).

The quote is in reference to the ambitiously intentioned and funded 'Building Schools for the Future' (BSF) for secondary schools and 'Primary Capital Programme' (PCP) for primary schools in the United Kingdom. BSF

had a target of re-building or refurbishing all secondary schools by 2020 and the more recent PCP was planned to do the same for at least half of all primary schools by about 2023 (Parnell et al., 2008). Being the original programme BSF received considerable academic attention. Of particular interest to this literature review is the intended participatory aspect with students and the school community (Parnell et al., 2008), and the sustainability focus (Wheeler, 2009a). Newman and Thomas (2008) reported the investment in BSF was estimated to be approximately £22 billion by completion.

Although the scale and budget are enormously different to the eco-classroom project it is relevant to consider BSF because of its significance as a government-led EfS co-design initiative, and some of the teething problems it has experienced. It is also important to note that in mid-2010 BSF was effectively scrapped (Curtis, 2010) due to a change of government and recessionary economics, which gives time to reflect on changes for any future programmes. Wheeler (2009b) explains that the Sustainable Development Commission had argued successfully for BSF to be used as an opportunity to simultaneously improve the sustainability of schools and the EfS knowledge of students, through their involvement in the participatory process and concomitant educational activities and research. There was an ambition for all new school buildings to be carbon neutral by 2016, but the scale and speed of the BSF process prompted questions about the relationship between participation, design education and sustainability. For example, Wheeler (2009b) raised the following issues:

The link between participation and sustainable behaviour through concepts such as ownership and belonging is complex ... The participation of children in shaping their environments cannot be simply about educating young people, and certainly not only concerned with teaching young people the design processes of the architect as a means of raising environmental awareness. We need to find ways to engage, to teach and to build with children the quality of relation needed to respond to the social and environmental challenges of climate change, and to a future world crisis the form of which we cannot predict (p. 151).

With reference to this quote, consideration of the principles covered in the guidelines of Breiting et al. (2005), which are based on an action competence approach, could possibly have avoided the fear of student participation and learning in BSF becoming a tokenistic 'box-ticking' exercise, as expressed by some authors (e.g. Frost & Holden, 2008), or potentially making no difference as suggested by others (e.g. Woolner et al., 2007). The BSF programme was ambitious and filled with potential to create newer and more sustainable building stock in the United Kingdom, and also to gear student learning

towards 21st century philosophies regarding EfS and participatory processes. However, as the next paragraphs suggest there was clearly some fine-tuning needed. A significant issue that I identified was that the focus of BSF, as it appeared to be playing out, was on building exemplary schools, rather than involving students in their design.

In their research into aspects of BSF Den Besten et al. (2008) concluded that, at that time, participation seemed to be a tack-on that many of the involved schools and design professionals didn't fully understand how to enact or engage with. Similarly, Wheeler (2009a) wrote that while some architects were calling for more standardisation in order to help meet ambitious BSF targets, others were complaining that, "Habitual reliance on educational specifications, design guidelines, prototypes and exemplars in school design leaves little room for innovation or for community visions" (p.142). This author also pointed out teachers are so used to adhering to government initiatives and complying with excessive assessment as performance measures, they too were calling for more guidelines. In terms of participation in BSF, the paper by den Besten et al. (2008) reported on interviews with a number of local authority officials whose job it was to enact the BSF programme between schools and designers. Their results show that requirements, budgets, issues of debate and personalities, plus other day-to-day limitations were often preventing the ideal of participation. One of the aspects identified by these authors as hindering the process, when projects span several years, was student turnover. This is an issue of direct relevance in my research since the eco-classroom project spanned more than four years. Newman & Thomas (2008) looked at one secondary school example and found schools also had difficulties in negotiating the process – especially the complex triangle of students/teachers, architects and builders.

Parnell et al. (2008) interviewed Local Authority representatives and included architects, builders and facilitators who were involved in the process of school design within the BSF programme. The resulting recommendations indicated a requirement for good interaction between all the parties. Lack of time/resources were repeatedly mentioned by respondents and it was recommended that time invested by the school ascertaining priorities ahead of the design process gave better end results. It was also recommended that architects and builders up-skill in participatory processes so they can specialise in this area, which could lead to future jobs. The importance of a well-trained facilitator to lead the participatory sessions was emphasised and teachers being released to specialise in managing the process was recommended (Parnell et al., 2008; Webb, 2009).

Among the articles I reviewed about the BSF programme there was a notable lack of reference to EfS knowledge and skills among educators, design

professionals and other involved parties in the process. Rather, the focus seemed to be primarily about the participation aspect, even though the aim of the programme was to create sustainable schools via input from students engaged in EfS design projects. While this could reflect the epistemological stance of the researchers it also suggests that the real purpose is being over-run by the chosen process. Such mis-matches between intent and reality seem to be rife in sustainability initiatives such as BSF, reflecting a lack of understanding of the complex issues at play. For example an architect described a project under a BSF pilot programme called 'Classrooms of the Future' for Ballifield School in Sheffield (Chiles, 2005). A sophisticated process of participation with students and teachers was carried out to negotiate and reach design detail decisions with a strong environmental focus, e.g. healthy breathing wall, recycled insulation and natural carpet, which won out over rainwater recycling and wind power operated laptops. However, the architect lamented the paradox of government budgets that often prevented use of sustainable technologies, even though the aim was a carbon neutral building!

In summary, there is growing interest in involving children in design of their learning environments (i.e. schools) – often with an EfS and community focus. This mainly started as projects in school grounds, but increasingly building stock is also being considered in a more encompassing view of school environments. Some countries such as Finland have gone so far as to make architectural education for children a compulsory part of the school curriculum. From reviewing examples of participatory architectural projects, it is clear that successful projects have been driven by socially minded and passionate people – emphasising the importance of the right people being involved, especially those who view participatory design projects as principally being about process. From the book *Architecture and Participation*, Petrescu's (2005) words are therefore particularly fitting here: "As in bricolage, in participation projects, the process is somehow more important than the result, the assemblage more important than the object ..." (p. 45). In the case of schools a requisite for this is having the right culture of organisation and democratic openness from principal and Board of Trustees through to teachers.

In the last five years, school co-design has gathered some political momentum with, for example, the United Kingdom embarking on a very ambitious programme of government-funded school renewal with a sustainability and participatory focus. However, it appears the 'outcome' focus of the BSF programme compromised the participatory importance of 'process'. It has also been raised that teaching students the role of the architect in building design will not lead to changed behaviours in terms of the environment. This suggests consideration of integrating an approach such as action competence into participatory EfS design projects such as those within BSF.

2.4 Summary

This review has canvassed a spread of literature in the areas of learning theories and pedagogies of environmental education/EfS, participation history and application with children, and participatory design practice and research. This has been important in order to situate my research project within current literature.

From this review, it is clear that effective sustainability education (i.e. leading to pro-environmental behaviour) needs to provide children with opportunities to develop sophisticated collaborations that connect with their local environment and community; real projects that engage them politically and democratically in an environment of critical thinking. This type of EfS is more likely to lead to learning transformations, which have the potential to lead to permanent lifestyle or behaviour changes with regard to the environment. Action competence is an approach that supports this type of environmental learning. It is a pedagogical ideal to constantly strive for, rather than become, which reflects the complex, multi-disciplinary and iterative nature of EfS. Although originally developed for EE, action competence has proved resilient in the face of the shift towards EfS or ESD. Action competence also provides a bridge to participatory practice through its democratic imperative, which therefore fits well within participatory approaches such as 'whole school', which the EnviroSchools Programme, and therefore the eco-classroom project, subscribes to.

Participation of children in matters affecting them is a democratic right under CRC in many countries. The literature indicates there are clear advantages to involving children in participatory design projects, and their capability to do so is evident when viewed through the postmodern emancipatory lens of the new social studies of childhood. Research papers report children have much of value to contribute and are keen to do so, in spite of many barriers still being in place, such as adults not believing in participatory processes, poor communication, or systems of organisation that are not conducive to shared decision-making between children and adults. However, by taking an action competence approach it is possible to empower young people through ownership that is generated by shared goal-setting, strategizing and resolution of real issues. While such processes have something in common with historic 'apprenticing' of children to adult role models such as parents, contemporary differences include the conscious effort to minimise power hierarchies and the focus with collaborative EfS projects of this nature on team-building and decision-making, rather than taking orders or following set directions. Also given a contemporary re-invention is the emancipatory potential of harnessing

the multiple-levelled advantages of 'peer education', where older children become role models for younger children, which increases and deepens learning and empowerment for all children involved.

There has been increased interest in recent years for children to work with architects in co-design collaborations in the school environment, often with an EfS agenda. This is, however, still in its infancy with Koralek and Mitchell (2005) pointing out in their review of school co-design design projects in the United Kingdom since the late 1960s that: "... there is still too great a perceptual and professional distance between architects and young people" (p. 129). Having said that, examples from the literature, although generally lacking in detail on methods, do make a clear case for collaborating architects and design professionals to be passionate and social-minded about their work and able to share this in a working environment with children. The case is also made that projects should be strongly focused on the process rather than driven by the outcome. This clashes somewhat with the agendas of the ambitious British BSF building programme, which is possibly the most significant EfS co-design project worldwide to date. Unfortunately the programme was withdrawn recently due to economic reforms, although commenced projects will be completed. One suggestion coming out of research into aspects of the BFS programme that would contribute valuably in terms of helping mainstream future school-based EfS co-design projects, was the specialisation of architects and design professionals in this area.

There is also an essentiality indicated in projects of this nature of having good facilitation of the process. In a school EfS co-design project this is likely to be teaching staff, which places a large expectation on them to manage a complex process as well as having some technical knowledge in a number of disciplines. The importance of the school culture and the power of the school principal in terms of creating a fertile and supportive environment for such projects to flourish is another key point made in the literature.

In conclusion, despite the relative infancy of EfS co-design projects with schoolchildren my literature review has drawn out some clear features of what a participatory EfS design project should include to lead student learning and pointed out some potentially relevant connections to aspects of the eco-classroom project. My study that follows therefore investigates within the eco-classroom project what learning and experiences resulted and how this was linked to the way the project was run.

3 Methodology

3.1 Introduction

In this chapter I outline the methodology behind my research project and the approach I have chosen for data collection and analysis, in evaluating children's learning experiences as a result of their participation in an eco-classroom design project in their school grounds, carried out within the Enviroschools Programme. In addressing my research question, as follows, I have chosen a qualitative data approach, for reasons that are discussed in the next section:

In the eco-classroom project what are the student learning and other outcomes of an education for sustainability co-design and co-building process within a school?

3.2 Methodology for research

Methodology explains the process of research (Cohen, Manion, & Morrison, 2007) and commensurate with research into participatory practice (e.g. Clark & Moss, 2005; Driskell, 2002; Francis & Lorenzo, 2002; Hart, 1997) and the *kaupapa* (spirit) of the Enviroschools Programme (Mardon et al., 2005; Wilson-Hill, 2003), my research project espouses principles of co-sharing, dynamism, unique experience, difference, interdependence and equality. Because this project takes an epistemological or philosophical (i.e. the bounds of knowledge within a discipline) view of the social world (i.e. people and their institutions) as being different to the natural world, it is situated as interpretivist (Bryman, 2004). In terms of its social orientation or ontology, the project is positioned as constructivist due to its interest in the dynamic construction of social situations or phenomena through interaction by participating social actors, and the interpretations of the researcher (Bryman, 2004).

The interpretive paradigm is concerned with individuals and tries to understand the subjectivity of human experience, through an action-taking focus, i.e. intentional and future-oriented behaviour (Cohen et al., 2007). Cohen et al. explain that this meaning-making approach with participants generates theory through collection and understanding of data that is rich with individual participant's experience, purpose and interpretations; the theory being sets of meaning that reflect behaviour of people. It is therefore a good match with my research focus on action-taking projects for the environment.

3.3 Data approach

Because this project is concerned with eliciting participants' views or stories rather than generating numerical data, it is appropriate to utilise a qualitative data approach. However, as Bryman (2004) points out, there is a more fundamental difference between qualitative and quantitative data collection than absence of numbers. For example, the qualitative tradition of 'naturalism', which is possibly the most common, seeks to uncover social reality through detailed analysis of the way people interact with natural surroundings (Lincoln & Guba, 1985). In addition, there are differences in the way qualitative researchers approach their data gathering, depending on their orientation and the research they are undertaking; which can often lead to a mixed-method approach (Bryman, 2004).

The Enviroschools Programme is committed to "children and young people empowered to contribute to a sustainable world in their own unique and creative ways" (Mardon et al., 2005, p. 10). As a consequence the journey towards sustainability chosen at every school is different, as is the resulting story. This, and my interest in giving children 'voice' in the design of their environments, led me to choose narrative inquiry as the main data-gathering approach for this project. Within this I utilised focus groups, questionnaires, interviews, observation and personal communication methods to collect my data; supplemented with document analysis of teaching resources to generate a fuller picture of the learning process that was part of the eco-classroom project. These methods are detailed in a following section.

3.3.1 Narrative inquiry

Clandinin (2007, p. xiv-xv) defines narrative inquiry as "the study of experience", and, "a profoundly relational form of inquiry". In agreement, Bryman (2004, p. 412) refers to it as a shift from, "what actually happened?" to 'how do people make sense of what happened?', which shows the focus on the emotional aspects of an experience. This fits well with the focus of this research project being on students' behaviour changes towards the environment, which is connected with their attitudes and values (i.e. affective learning or attending to the heart).

Pinnegar and Daynes (2007) emphasise the importance of the storying (lived and told) aspect of narrative inquiry, which regards narrative as both the method and subject of study. They describe four 'turns' carried out by researchers exploring narrative inquiry, "the attention to relationships among participants, the move to words as data, the focus on the particular, and the recognition of blurred genres of knowing" (p. 3).

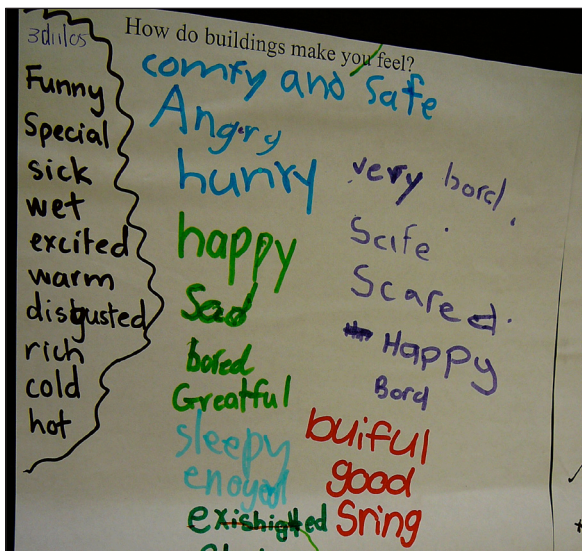


Figure 3.1: Early planning - students' ideas on buildings (Teachers visual diary, or TVD, 2005).

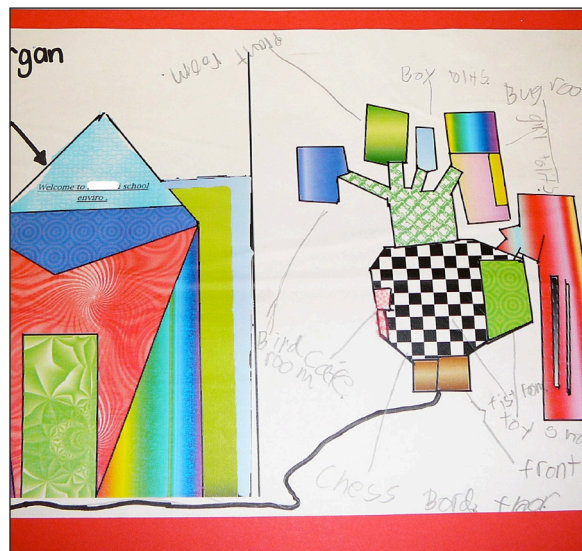


Figure 3.2: Early planning - students' drawing (TVD 2005).



Figure 3.3: Early planning - possible location for eco-classroom (TVD 2005).



Figure 3.4: Early fundraising poster by students (TVD 2005).



Figure 3.5: Exploration of structural strength & materials (TVD 2006).

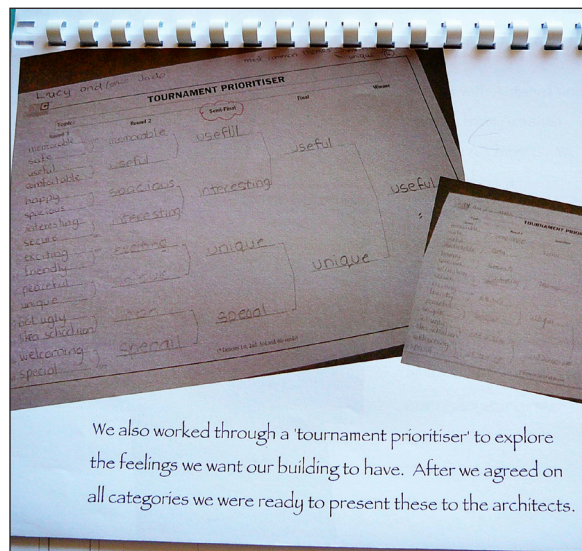


Figure 3.6: "Tournament Prioritiser" activity to refine ideas (TVD 2006).

The use of narrative inquiry with children is documented in the literature. When 'listening to children' in a classroom setting, Tsai (2007) cautions that it is easy for teachers to interpret for children rather than let them tell their own stories. In general there is a common tendency for adults to speak, act or make decisions on behalf of children. Although often well meaning, it is in direct opposition to the spirit of participation. Whether the reason is because adults remember being a child themselves and therefore think they know what children want (Driskell, 2002), or because adults wish to save time or money by short-circuiting a process of equality, the importance of making the time and purpose to collect children's narratives is emphasised (2007). As a result of research experience with narrative inquiry and young children (five to six years old), Tsai recommends adjusting definitions and expectations compared to conducting narrative inquiry with adults, since children use narrative to make sense or meaning, and reflection may be absent. In considering this, the children in my research project are considerably older, being aged 9-11 years, and the particular group chosen for data collection (see Section 3.4.3.1, Focus groups) was articulate and somewhat used to public speaking through their involvement in the eco-classroom project. It does however signal the necessity of letting children speak for themselves during the focus groups and not expecting the same reflective processes that an adult may be capable of.

The eco-classroom project was strongly dependent on relationships between diverse parties who brought different and essential skills and aspects to it. While the project had a focus on giving children 'voice', the decision-making process was shared, as recommended by Driskell (2002), so it was equally important to get the 'voices' of other participants and to make connections between these. This striving for partnership participation, especially in design projects is also emphasised by Mannion (2007). For this reason and because the stakeholders in this project came from different disciplines, perspectives and knowledge bases, narrative inquiry is an appropriately flexible approach, because it is inclusive of different epistemologies or world views (Clandinin, 2007). Another aspect of the eco-classroom project was its time dimension, since the project ran for a number of years, with a changing group of children involved in it. I suggest that the open-ended gathering of data from storytelling, which is encouraged within narrative inquiry, will help with gathering perspectives such as children's experience of being a smaller part of a larger whole and ways the project has been kept 'alive' for them over time.

In support of this, in a recent environmental education study, Hwang (2010) used narrative inquiry particularly to obtain data on underlying issues such as the influence of teachers' pedagogical ideas and approaches on student learning outcomes, including their own environmental values

Environmental Setting
Some of the natural surrounding of the site includes birds, trees, worms and other insects. The man-made objects are the fences, goal posts, paths and the nursery. We will have to consult the neighbours about the noise and the nursery. We will have to consult the children of [redacted] use the area during building. At the moment the children of [redacted] use the area a little at break time. Some special features of this spot are how close it is to the bully and that not many people play there. It is also close to the nursery. The air quality is good because there are not many buildings around this place. The vegetation consists of trees, grass, flaxes and weeds.

Assessment of Effect		
EFFECT	WHO OR WHAT IS EFFECTED	HOW TO MINIMISE THE EFFECTS
Using part of the field	Students Creatures	Put the building where not many people play. Take care not to hurt creatures.
Neighbours boundary	Neighbours	Talk to the neighbours and let them know what will be happening.
Trucks coming in and out of the site	Children Mr. Morris (caretaker) Teachers	Make the track in so it is as close to the fence as possible. Rope off the track for the trucks. Keep the road as one way in and one way out.
Air pollution	Animals Students Teachers	Turn off trucks and other machinery when not in use.

Figure 3.7: Part of an early EIR done by students on the eco-classroom (Teachers visual diary 2006).

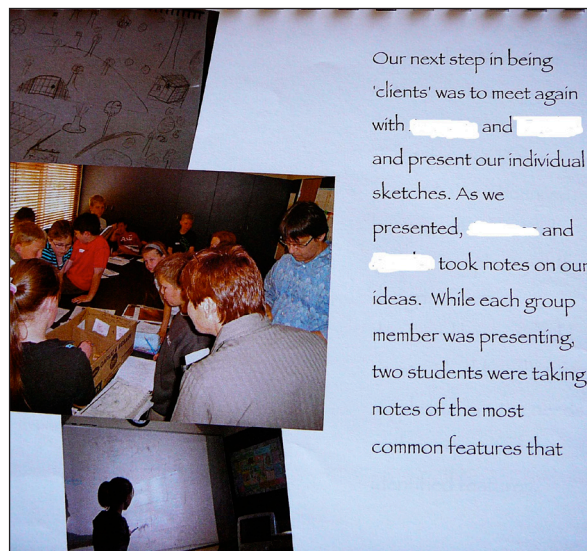


Figure 3.8: Development and presentation of student ideas to architect (TVD 2006).

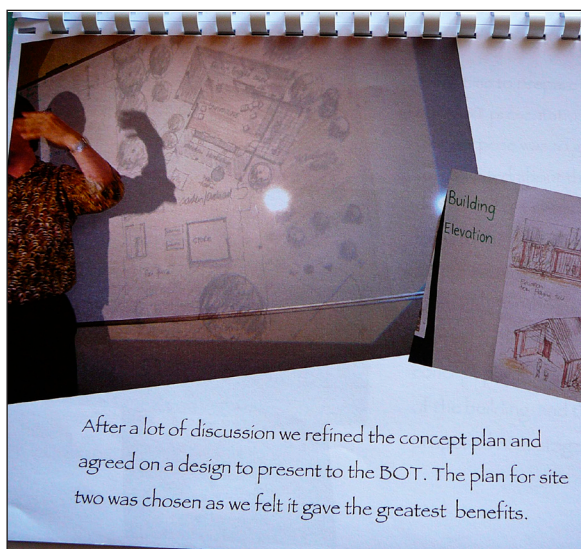


Figure 3.9: Development and presentation of concept by architect (TVD 2006).

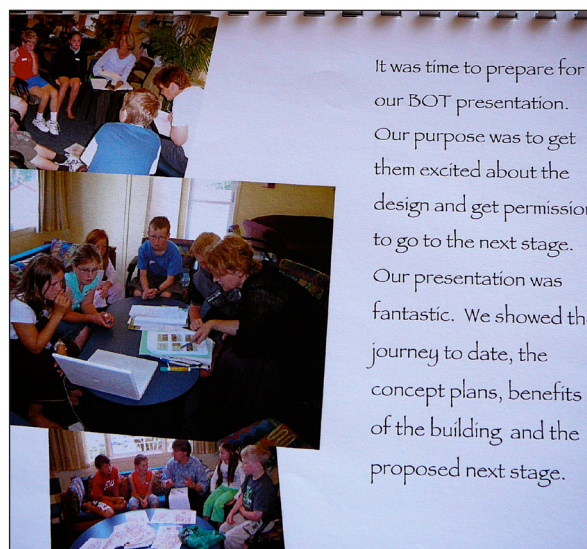


Figure 3.10: Students prepared presentation to give to BoT, for support (TVD 2006).

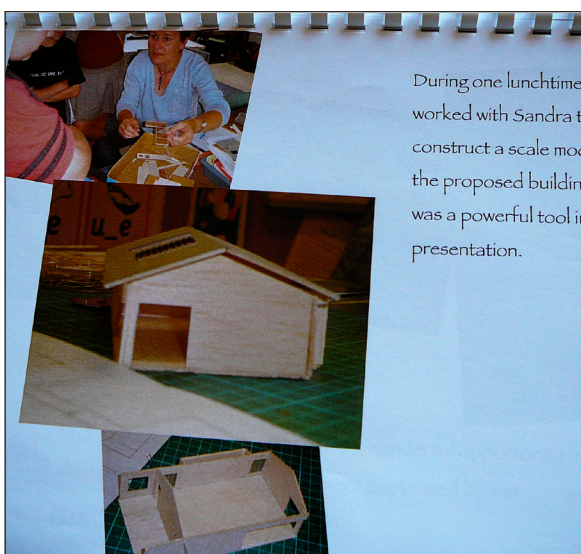


Figure 3.11: Building a model of the eco-classroom for the BoT presentation (TVD 2006).

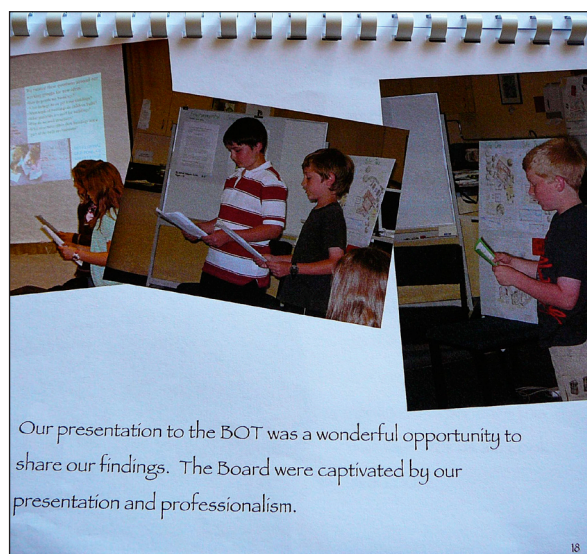


Figure 3.12: Student presentation to the BoT for permission to proceed (TVD 2006).

and attitudes, as compared to gathering data on ‘straight content’ of teaching practice. This author therefore emphasises the validity of narrative inquiry as a method tool in environmental education-based studies, particularly due to its ability to capture not only activities and actions, but also the owner of the story’s interpretations of these. This depth is suited to my analysis of the eco-classroom project, as well as being well matched due to the socio-constructivist aspect of narrative inquiry, that places value on the social and interactive aspect of storying (Hwang, 2010).

3.4 Data Collection

3.4.1 Background to the school and the project

The study school is a public primary school situated in the suburbs of a New Zealand city. At the time of the study, it had 600 enrolments across Years 1-6 (ages 5-11), and its government decile rating of 10 (highest) reflects the high socio-economic neighbourhoods it draws its student body from. My visits to the school occurred between 2008-2009, so I was not involved at the inception of the eco-classroom project. Table 3.1 outlines the key events in the project from beginning until the opening of stage 1 of the building. The project will be on going for student learning and further development of the building and surrounding landscape.

Table 3.1: Timeline of events in the eco-classroom project

Time	Event	Involvement
2005 Term 4	Early discussion of need for environmental special place (round robin, ‘feelings’ of buildings, ideas of features for eco-building). Figs 3.1, 3.2, 3.3, p. 92 Early fundraising by students (Fig. 3.4, p. 92) & trial adobe.	Yr 4,5,6 elective (1 day/wk) & lead EE teacher (teacher) & enviroschools facilitator (EF).
2006 Term 2	Reflection on previous using thinking skills (small group observances). Made newspaper houses (Fig. 3.5, p. 92), completed PMI(Plus/minus/interesting tool), spatial understanding. Awareness of lines. Designed buildings with eco-structures & from this developed key structures desirable in eco-classroom (Fig. 3.6, p. 92). Looked at energy sources. Some students attended Healthy Water workshop. Visited non-eco building site as comparison & wrote Environmental Impact Report (EIR) on potential eco-building (Fig. 3.7). Made solar hot water heaters.	Yr 5 & 6 elective (1 day/wk) & teacher and EF.
Term 3	Meet with architects to scope project.	School management (SM).
Term 4	Group worked with architect (arch.) to develop brief with collective ideas prioritised (Fig. 3.8). Development of concept by architect with feedback from students (Fig. 3.9). Students shared progress with presentation to Board of Trustees (BoT). Figs 3.10, 3.11, 3.12	Eco-building working party (EcoBWP) formed. Teacher & EF.

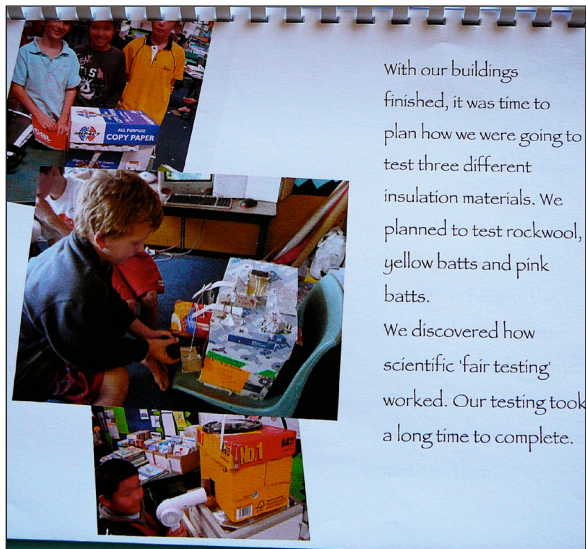


Figure 3.13: Students research, build and test their models of eco-buildings (TVD 2007).



Figure 3.14: Students present their ideas for a promotional brochure (TVD 2007).

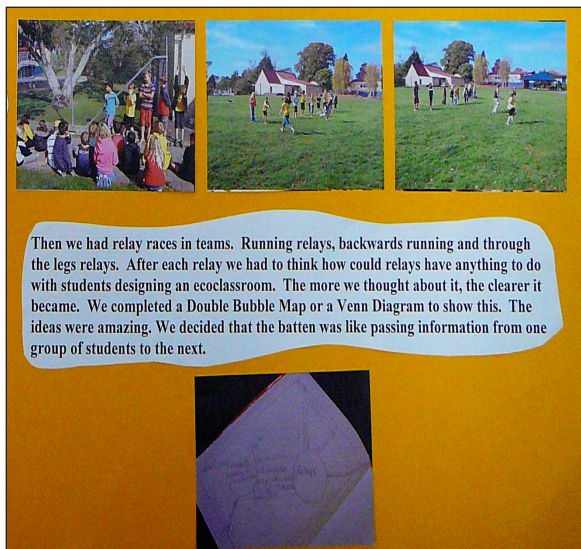


Figure 3.15: Recapping on previous work with new students in 2008 (TVD).



Figure 3.16: Eco-classroom presentation by students to adult stakeholders (2008).

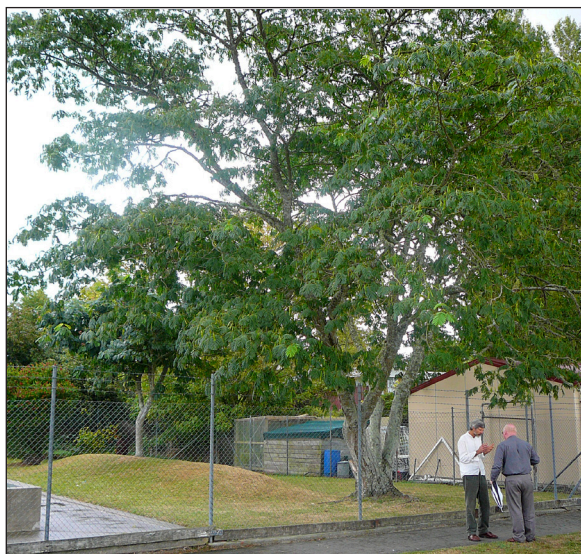


Figure 3.17: Visit to the proposed site for the eco-classroom (Mar 2008).



Figure 3.18: The eco-classroom plan is finalised (2008).

2007 Term 1	BoT confirms support of project. Students review plans and recap.	EcoBWP, teacher & EF.
Term 2	Architect works on design & Quantity surveyor (QS) works on cost Elective on renewable/nonrenewable energy sources with individual research (Fig. 3.13) including visit to architect office & cathedral.	Arch. & QS. Students, teacher & EF.
Term 3	Marketing plan developed followed by production of brochure for fundraising (Fig. 3.14).	EcoBWP, teacher, marketg experts & parents.
Term 4	Brochure sent out to community (comm.) Fund raising committee formed (FRC) Project working group formed (PWG). Reflective questioning in class followed by questionnaires sent home to gather data on student perceptions	Students, teacher, comm. SM & Parent Teacher Assocn (PTA) Teacher, Architect, BoT rep., parents. Students and families
2008 Term 1	New EcoBWP formed with 6 original members, 6 new – recap (Fig. 3.15). Presentation to staff & stakeholders plus site visit (Figs. 3.16 & 3.17) Combined eco-building committees meeting. Newsletter started (Fig 1.4, p.24).	EcoBWP, teacher, EF. All groups for collaboratn. Students & teacher.
Term 2	Study defining student participation into constructing the building. Website created. Fundraising launch lunch.	Year 5 & 6 elective. Staff & parents. EcoBWP, teacher, EF, SM
Term 3	Revised plans presented (Fig. 3.18) Appt of project manager (PM). BoT meeting to ratify plans. Steering committee welcomed PM.	EcoBWP & arch. EcoBWP rep, arch., BoT rep., teacher. Architect & SM.
Term 4	Focus groups run with students Questionnaires sent to parents Students meet PM Meeting with Ministry of Education Finalising sustainable rating for materials & final decisions on cladding & insulation, naming building 'The Living Room'	EcoBWP & S. Wake (SW) SW & EcoBWP parents EcoBWP PM, SM. PM, EcoBWP. Teacher. EcoBWP.



Figure 3.19: Construction begins using non-treated macrocarpa wood (Sept 2009)..



Figure 3.20: Students spent an afternoon making mud bricks (Sept 2009).



Figure 3.21: Gabion baskets under the water tank were filled by students (Dec. 2009)



Figure 3.22: Students send out invites to the opening to all involved people (late 2009).



Figure 3.23: The eco-classroom opens (December 2009).



Figure 3.24: Current members of the EcoBWP speaking at the opening (2009).

2009 Term 1	Interviews held with adults involved in project.	SW & key adults.
Term 2	<p>Further fundraising by students, waste management exploration and development of plan, exploring opportunities for student involvement in construction and monitoring. Reporting back to community. Choosing colour scheme. Test clay bricks made.</p> <p>Tender process for construction.</p> <p>Whole staff workshop to maximise school learning in EfS during construction of Living Room.</p> <p>Site preparation, Blessing and construction commencement (Fig 3.19).</p>	<p>Yr 5 & 6 elective, teacher, EF & brick-making expert.</p> <p>SM, arch., PM. All staff, SM.</p> <p>Taskforce green, whole school, arch., EF, BoT.</p>
Term 3	<p>Whole school focus on EfS using Living Room as example to ensure all pupils have chance to participate in construction.</p> <p>Clay brick-making session with students (Fig. 3.20) doing Water Conservation, Technology and Creativity module to design water feature for one of Living Room downpipes.</p> <p>Waste management plan finalised & presented to contractors & sub-contractors.</p> <p>On-site work induction.</p> <p>Laying wine bottles as insulation.</p> <p>Pre-wiring.</p> <p>Laying insulation.</p> <p>Continued thank you acknowledgements.</p> <p>Continued fundraising.</p> <p>Roof raising party.</p>	<p>Whole school.</p> <p>Yr 5 & 6 elective, teacher, SW, community members.</p> <p>EcoBWP, PM, teacher, SM & contractors. EcoBWP with supervision. EcoBWP “ “ EcoBWP “ “</p> <p>Students, SM, PTA. Students, staff & PTA. School and community.</p>
Term 4	<p>Students help fill gabion walls around back of the Living Room (Fig. 3.21).</p> <p>Continued fundraising & decision-making as well as preparation for opening (Fig 3.22).</p> <p>Opening (Figs 3.23 & 3.24).</p>	<p>EcoBWP & elective students.</p> <p>EcoBWP & whole school for prep. Whole school, community members involved in project and past students.</p>

Adapted from EnviroSchools Foundation draft Eco-classroom Case study & Timeline
(with permission).

3.4.2 Ethics

Ethics approval was granted by the University of Waikato in November 2008 to collect all the data described and discussed in this thesis, including permission to use photographs. To be granted ethics approval I needed to prove that my methods and behaviour during the period of data gathering and in my subsequent write-up would not harm or compromise any of my participants. An important part of this was providing participants with brief but clear information sheets about my research project and their anticipated part in it (see Appendix A for an example). Getting signed consent from participants or their parents or caregivers (for minors) was a further safeguard that clearly laid out everyone's obligations of participation (see Appendix B for an example form).

Behaving ethically was very important in this project, particularly because it involved working with and gathering data from minors, and their comfort and safety was paramount. For example, it was decided to run focus groups during lunchtime to avoid disruption to students' formal learning. In addition, the duration of each focus group was chosen to be approximately forty minutes to allow for the students to eat lunch first. This was also considered a reasonable amount of time to hold their attention.

It was ethically important that my research methods matched up with the philosophy of open, inclusive and genuine collaboration espoused by the Enviroschools Programme, and literature on children's participation. The choice of narrative inquiry as my data approach reflects this due to its focus on contextual meaning, integrity, honesty, flexibility and precision (Clandinin, 2007; Pinnegar & Daynes, 2007; Tsai, 2007). No surnames or identifiable first names for my research participants are used in this thesis in order to preserve anonymity.

3.4.3 Data collection methods

In the following sections I outline the different methods of data collection. It was desirable to collect data from a number of sources for this research to gain as complete a picture as possible. Unifying this, all participants were asked questions about different types of student learning in the project, i.e. development of knowledge (cognitive), skills (psychomotor) and attitudes and values (affective). This was organised under the four key parts of my research project – sustainability (i.e. EfS), participation, design and community connections. The relevance and interrelatedness of these areas was established in the literature review (Chapter 2) but focusing on each of them in the data collection ensured their importance remained at the forefront

of the data gathering. At the same time these areas provided convenient yet relevant subsets for managing the data gathering process. This framework for questioning also became a framework for data analysis, which is discussed in Section 3.5.

3.4.3.1 Focus groups

I chose focus groups or group interviews for data collection from students because ethically it was considered less intimidating for them to tell their stories in a group, rather than participating in individual interviews. Cohen et al. (2007) concur that this method is a practical way of obtaining data from a number of participants in a non-threatening manner. In addition, Bryman (2004) recommends that this method is ideal where members of the focus group are related by their involvement in a particular situation (in this case the eco-classroom design project), and where it is desirable to collect data on the interaction of the group and shared meaning-making, as well as individuals' stories. It has been noted that children in focus groups can challenge and extend each other's answers (Lewis, 1992, as cited in Cohen & Manion, 1994, p. 287). While focus groups or focused interviews usually attend to a reasonably defined issue, they are also intended to be relatively unstructured in order not to stifle valuable contributions and to enable evolution of interaction – both of which will depend heavily on the facilitator or moderator running the focus group (Bryman, 2004).

Two focus group interviews were run sequentially (over two lunchtimes), each with six students (mixed genders in each group) aged 9-11 years, on November 13-14th 2008, lasting between 41 and 42 minutes. The twelve students were all current members of the Eco-building Working Party. Members of the working party are chosen by the Lead EE teacher on the basis of their interest and motivation in previous EE initiatives at the school (e.g. electives, enviro-council members). Having this interest coupled with their subsequent strong involvement in the eco-classroom project does suggest this group of students already had a bias towards being very environmentally savvy and motivated with regards action-taking environmental projects. As Blanchet-Cohen (2008) pointed out with her research, targeting children who are already highly motivated is a potential extrapolation limitation. In her research, she also ascertained these students tended to come from higher socio-economic backgrounds where it was presumed they had been more encouraged and better resourced for taking part in these types of activities. My research school similarly draws its students from higher socio-economic neighbourhoods. The potential bias this represents is however partly offset by the advantage of gathering data from students who were committed enough

towards this project to give up their lunchtime to participate in a focus group and knowledgeable enough to have rich data to contribute.

There was some confusion at the school about the need for an independent adult to also be present at the focus group interviews and in the end the Lead EE teacher was present in the room (but not taking part) for parts of both focus groups. However there was clearly a great deal of trust and relaxation between the students and their teacher, so I don't believe it influenced what they said in a significant way.

The focus groups were structured by the use of 'starter' questions for focus followed by prompt strategies for delving into important narratives, as recommended by Peterson and McCabe (1983). These questions are included in Appendix C. As noted previously, the question framework was based on a matrix that included the four key areas of the research and the three types of learning. Questions were intended as a guide only, to get the 'ball rolling' and to enable some consistency between the two groups for analysis, since it was considered important to let the individual participants contribute their own stories and for the group to generate their unique interactions.

During the focus groups students generally spoke sequentially, moving round in a circle at my invitation to give everyone the opportunity to tell their story, or raised their hand if they had something to tell. While I had wanted to make the focus groups more informal, the method described avoided having students speaking over the top of others, which would have made it difficult for me to transcribe. They also felt comfortable with this since this was standard behaviour both in class and within the eco-building working party meetings.

3.4.3.2 Interviews

Semi-structured interviews were held with a range of adult stakeholders who were very involved with the eco-classroom project. Table 3.2 overleaf summarises the people and their role that I gathered data from in this way. Lincoln and Guba (1985) describe an interview as a conversation that has a purpose and extol its advantage as enabling the interviewee to move throughout the interview between past, present and future – recalling, interpreting and projecting. However, they caution that this does make the data more subjective than that obtained from observation techniques. In my case, while interviews formed a significant data group in my research, they were supported by data gathered from other sources, including some observation. Interviews also offered the most practical way of obtaining rich data from key adult stakeholders in the eco-classroom project.

As recommended by Bryman (2004) a question guide was written (using

the same matrix arrangement as previously described) and the sampling was purposive to ensure the most relevant people were invited to participate. This method of data collection was chosen for its flexibility and potential richness of data generation due to the ability to deviate from the question guide although the development of a question guide was important in order to obtain comparative data from the participants.

Providing participants with the question guide ahead of the interview enabled them to think about and prepare their answers, although most told me at the interview that they had not done so. Interviews took place on 19-20th March 2009, lasting between 47 to 67 minutes. A question guide is included in Appendix D. All participants were generous with their time and enthusiastic about the project. They willingly shared their stories and perspectives with me for this research.

Table 3.2: Summary of Interviewees

Representing	Stakeholder role	Profession of Person interviewed
School community	Lead EE teacher & eco-classroom project facilitator	Educator
School community	Principal	Educator
School & wider community	Board of Trustee (BoT) member	Engineer
Wider community	Enviroschools Facilitator	Educator
Wider community	*Project architect	Architect
Wider community	*Project manager	Environmental engineer

* These two roles are also designated as 'design profession'

3.4.3.3 Survey questionnaires

Survey questionnaires were sent out in November 2008 to the twelve parents or caregivers of members of the eco-classroom working party. Bryman (2004) refers to these as self-completion questionnaires and discusses their use under quantitative data collection. However, in this case they were a combination of tick boxes and more open-ended responses (see Appendix E), so their analysis was included with the qualitative data. The decision to use questionnaires was made because it was deemed essential to the inclusivity of both the eco-classroom project and my research project to include parents and caregivers as key stakeholders in this project, but equally important to make it as easy as possible for them to contribute and for me to keep this research project manageable. Forms were therefore sent home with the research information and consent forms that invited students to participate in the focus groups. The return of the completed questionnaire to the school for my collection was taken as indication of consent to use the questionnaire data. Twelve questionnaires were sent out, with a response rate of 83%.

3.4.3.4 Analysis of teacher and student work

The use of documents as data is considered legitimate in qualitative data collection provided they are relevant to the researcher and meet the general criteria of being authentic, credible, representative and meaningful (Bryman, 2004). In the case of my research project the examination of annotated visual diaries of the project, produced by the Lead EE teacher was invaluable for understanding the process in the eco-building project prior to my involvement in the project. It also helped me understand more fully some references to events that were made during the focus groups and interviews, and to provide another data source to triangulate results. I therefore sometimes refer to this material in my data analysis chapter (Chapter 4).

The visual diaries contained samples of student work and photos of activities resulting from activities that contributed to learning in the eco-classroom project. This work often referenced learning activities from the *Enviroschools Kit* (Enviroschools Foundation, 2009). Reference is made to these activities throughout this thesis and photos of pages of the visual diaries are included (with permission) to illustrate learning activities and show the eco-classroom process.

3.4.3.5 Observations and personal communications

A final data source was the observations and personal communications resulting from visits to the school outside of those for other data collection methods. In the spirit of transparency and co-sharing that both my research and the *Enviroschools Programme* subscribes to, and for understanding the eco-classroom project and earning the trust of the people involved in it, it was important to spend this time. This included acquainting myself with the school, staff and students (and vice versa), and the history of the eco-classroom design project. Having a connection to ethnographic approaches, Bryman (2004) considers participant observation to have certain advantages over other forms of data collection such as interviewing and focus groups. This includes getting insight into the context of the project or event that data is being gathered about, getting a different perspective by seeing through others' eyes, serendipitous occurrences that feed valuably into the research (one of these occurred for me on my third visit to the school – see entry for 22 May 2008 below), and the true-to-reality aspect of actually being there compared to holding interviews etc in a sterile environment.

These visits were as follows:

- **14 March 2008** – Attended an updating presentation by the Eco-building Working Party (EcoBWP) members to adult stakeholders

from the school and community. Met the Lead EE teacher, EnviroSchools facilitator, principal, lead architect and the students in the EcoBWP. I also saw the future site for the eco-classroom.

- **12 May 2008** – Meeting with Lead EE teacher to discuss the eco-classroom project and my research.
- **22 May 2008** – Spent a day in the classroom with students doing an Eco-classroom elective. The Lead EE teacher and EnviroSchools Facilitator were also present. I sought students' feedback on a conference presentation I was preparing to take to the USA on the background to my research into the eco-classroom project. I was also given a guided tour around the school grounds during lunch by students, being shown other environmental projects at the school. At the end of the day the principal visited the class to consult with students about the design of some traditional classrooms soon to be erected at the school (discussed in Chapter 4).
- **12 September 2008** – Spent the afternoon with the Lead EE teacher and students. I presented feedback to them from the conference I had been to in the USA. I then observed during a meeting with the EcoBWP and the Lead EE teacher to discuss interviewing for a project manager.
- **14 November 2008** – After the second focus group with students I observed a meeting with the members of the EcoBWP, the Lead EE teacher and the newly appointed project manager. This was the first time most of the group had met the project manager.
- **11 September 2009** – I spent the afternoon with students, the Lead EE teacher and community members making clay bricks to be a heat retaining and reflecting feature wall behind the fireplace area in the eco-classroom.
- **11 December 2009** – I attended the opening of the eco-classroom.

3.4.3.6 Summary of data collection methods

A mixed method approach to data collection was applied in my research project in order to capture qualitative data from a number of stakeholders in an appropriate and practical way. These methods included focus groups (Appendix C), semi-structured interviews (Appendix D), survey questionnaires (Appendix E), document analysis, observation and personal communication. In the spirit of narrative inquiry this gathering of different perspectives enabled a very complete story to be built up of student learning and experiences in the eco-classroom project.

3.5 Data analysis

A matrix was developed to help frame the research. This is illustrated in Table 3.3, which includes an example of the way the matrix was used to generate a framework for starter questions during the data gathering process. The example presented was used for students in the focus groups; a similar one was generated for developing the semi-structured interview questions.

Table 3.3: Example of research framework matrix and the way it was used to help develop questions for data gathering – in this case from students

Types of student learning Parts to research investigation	Knowledge (cognitive)	Skills (psychomotor)	Attitudes & values (emotive/affective)
Participation	What is your understanding of the process of participation that has been followed in this project?	What sharing or participatory skills can you practice/ demonstrate as a result?	If you agree that the project has been participatory/ equally sharing between adults and children, how has this participatory process made you feel? If you don't agree, how do you think it could have been improved/ better/different?
Community partnerships	What have you learnt from your involvement in this project with experts from the wider community?	What examples can you give of skills you have (been taught) developed as a result?	How has their input made you feel?
Design process	What have you learnt about the process of designing building and landscapes through your involvement in this project?	What design skills have you gained as a result?	How has your involvement in a design process influenced your feelings about design?
Sustainability	What do you understand about the meaning of EfS as a result of this project?	What EfS skills can you demonstrate as a result of your involvement in this project?	How has this project changed your attitudes about caring for the environment?

After each phase of data collection (focus groups, surveys and interviews), results were collated and hand-coded for emerging themes. Data gathered during the focus groups and interviews were recorded digitally and then transcribed before collating and coding. During the initial collation of data it was very helpful to use the structure of the matrix for cataloguing

data under the key areas of: sustainability, participation, design process and community partnerships, since this was the way the questions were arranged. For example, Appendix F shows how some early themes emerged from the data under the area of sustainability, and were catalogued as being focused on cognitive (K), psychomotor (S) or affective (A&V) learning in students. To this, a score of numbers of comments was added to show how strongly it recurred across all the data sets. Appendix G shows an example of taking the analysis a step further and distilling the data for 'design' into clear themes, each with an indication of how strongly it recurred across all the participant groups.

Further distillation of the data led to the four key areas and three kinds of learning becoming integrated into the six emerging themes, as presented in Chapter 4. This transition can be seen on the second table of Appendix G.

Relevant information gained from the other data sources of this research (i.e. reference to the Lead EE teacher's visual diaries, personal communications and observations from my visits to the school) is included in my Chapter 4 discussion, as appropriate. These either provide explanations for the teaching and learning process or serve as further examples of the emerging themes.

As the study group for this research was quite small and came from a tight-knit and supportive environment, the return and acceptance rates from participants were very high. For example, 10 out of 12 surveys were returned and all students and adults invited to focus groups and interviews, accepted. Of all the data collection methods the interviews provided the richest data due to their one-on-one nature. The focus groups were excellent for highlighting group dynamics and collective information. The questionnaires were practical but did not contribute as much as hoped. This was probably due to the limited nature of a questionnaire in a study that is focused on collecting stories and experiences. The open-ended questions asking for comments gave the richest results and the possibility did exist to contact some of the participants by telephone, but it was decided this wasn't necessary.

3.6 Validity and reliability

Lincoln and Guba (1985) explain the translation of validity and reliability in research from quantitative to qualitative studies. According to these authors trustworthiness and authenticity are the equivalent concepts in qualitative studies. Within trustworthiness my research achieves credibility through triangulation or the use of multiple data sources that enable comparison. Bryman (2004) proposes that triangulation is well employed within qualitative studies as a checking mechanism to ensure that what has been interpreted is in fact correct through verification from another source. By formally talking

to students and key adults in the eco-classroom project, as well as seeking input from parents and looking at student work, and personally observing and informally talking to people within the project; I believe I built up a very reliable picture of what was happening within the project during the time I was actively involved. In addition I was able to piece together an accurate picture of events before my research began, through the teacher's visual diaries.

Dependability, another aspect of trustworthiness (Lincoln & Guba, 1985) is assured in my research by the maintenance of full records of the research process, including raw data (under lock and key or within a password protected computer). These are available for inspection by relevant persons. The process of coding data and distilling the results into the final form as presented in Chapter 4 is also recorded and kept transparent (see for example Appendices F and G). Bryman (2004) however points out that this is a rather cumbersome and unrealistic indicator of 'dependability' and therefore not popularly used. He does not offer an alternative.

Finally, in keeping with the 'confirmability' aspect of my research; throughout the research process I strove for an objective perspective in order to not influence the data collection or analysis. This is emphasised by Bryman (2004) as the importance of "act[ing] in good faith" (p. 276).

Authenticity is the fitting of the research into the wider picture and its contribution to aspects such as ontology, education, change affect and action-taking (Bryman, 2004). My research attempts to do this through the different data sources and via dissemination of results within the academic and practitioner realm. The Enviroschools Foundation is interested in my results and will receive a copy of this thesis. Reinforcing the valid contribution of this research, in her research Hwang (2010) emphasises the criticality of teachers' voices in reducing the rhetoric versus reality gap in EfS, and the potential role of narrative inquiry in enabling voice, action and belief to be revealed.

A further aspect of authenticity is ensuring the information collected fairly represents the viewpoint of participants (Bryman, 2004). In my research, all my data-gathering documents for use with research participants were checked by my supervisor and carefully and accurately managed at all times. However there were no debriefing sessions held, nor were individual interview transcripts sent out to interviewees for checking and confirmation of what was said. Since this is a small study with a non-sensitive content I considered these steps of respondent validation to be unnecessary, since as Bryman (2004) points out, such steps can be practically difficult to manage. Instead, with the voice recorded data from the focus groups I personally listened and transcribed relevant parts shortly after running the focus groups,

while the information and context was still fresh in my mind. With the longer interview voice recordings I had the transcripts typed professionally and then I checked them for accuracy of transcribing and for correct interpretation given the context.

In the following chapter I present and discuss the findings from my data collection, as outlined here.

4 Findings

4.1 Introduction

This chapter presents the findings from the study. As described in Chapter 3, the data planning matrix (see Table 3.3) for this research investigated the relationship between the four key areas identified within the eco-classroom project and different types of student learning in the project, i.e. development of knowledge (cognitive), skills (psychomotor) and attitudes and values (affective). The key areas were environmental sustainability (the issue), participation (the method), design (the process), and community connections (the sphere of involvement). The early establishment of the matrix enabled a holistic approach to data analysis through the inclusion of all aspects under study. The findings from different participant groups were organised originally within the cells of the matrix (e.g. Appendix F), but later by emerging learning themes (e.g. Table B of Appendix G). In my findings participants' stories are sometimes linked collectively across the different groups as 'research participants' (i.e. students, staff, parents and community members), and at other times stand alone (e.g. as students) or within another association (e.g. those closely associated with the school, or as design professionals). Findings from other data sources (e.g. observations or visual diaries) are integrated where relevant. Table 4.1 summarises the different data sources and the participant representation from the school under study, the wider community and the design profession.

Table 4.1: Composition and status of different data collection sources

Data collection method	Focus groups	Interviews	Question surveys	Observation & personal communication	Records
Composition	12 Students	6 adult stakeholders	10 parents / caregivers	Visits to the school	Visual diaries
Status	Members of the eco-building working party ² (EcoBWP)	Project architect & Project manager ¹ School principal & Lead EE teacher ² BoT member ³ EnviroSchools Facilitator ⁴	Parents/ caregivers of the EcoBWP members ² (some also involved in project e.g. fundraising via PTA)	14/3/08 presentation 12/5/08 teacher meeting 22/5/08 c/room 12/9/08 c/room 14/11/08 EcoBWP meeting 11/9/09 brick-making 11/12/09 opening	Made by Lead EE teacher

1. Representing the design profession & wider community.
2. Representing the school community.
3. Representing the school and wider community.
4. Representing the wider community.

In analysing the data I found a strong relationship between student participation and community input that is, in turn, linked to learning in the eco-classroom project. This relationship can be described as 'active' and fostered a number of emerging themes, and consequent exemplars, as shown in Table 4.2 (overleaf). In addition, analysis has identified several 'passive' learning aspects to the project that were either pre-existing or pre-determined by the project. These emerging themes, with exemplars, are likewise presented in Table 4.2. Finally, also shown in Table 4.2, a number of 'applied' themes and corresponding exemplars emerged – related to either knowledge and skills-based learning, or attitudes and values-based learning as a result of the project. This chapter presents these findings through the discussion of each emerging theme and its exemplars; supported by narrative data, survey responses, personal observation or communication, and photographs. The data source is included in brackets after the data is presented.

Table 4.2: Summary of themes and corresponding exemplars emerging from data analysis of the eco-classroom project (section number shown in brackets)

	Emerging Theme	Exemplar
PASSIVE	Aspects attributed to the nature of the project. (4.2)	Authentic context. (4.2.1)
		Flexibility and embeddedness of environmental sustainability. (4.2.2)
	Aspects brought by students to the project. (4.3)	Unique sense of aesthetics and functionality. (4.3.1)
		Different experiences and perspectives. (4.3.2)
ACTIVE	Participatory aspects fostered by the project. (4.4)	Student capability. (4.4.1)
		Careful participant selection and facilitation of the process. (4.4.2)
		Different learning approaches, including Enviroschools Programme. (4.4.3)
		Student engagement. (4.4.4)
		Focus on fun, linked to learning. (4.4.5)
		Ownership generated. (4.4.6)
		Skills of advocacy. (4.4.7)
	Community connections fostered by the project. (4.5)	Development of life skills e.g. teamwork, leadership, public speaking. (4.4.8)
		Reciprocal gains between students and adults. (4.5.1)
		Experiencing outside expertise and engagement with community processes. (4.5.2)
		Long-term nature of project widened the sphere of involvement. (4.5.3)
		Awareness & valuing of students' involvement. (4.5.4)
		Appreciation for skills of others e.g. professionals. (4.5.5)
APPLIED	Knowledge and skills-based learning by students due to the project. (4.6)	Development of a design dialogue. (4.6.1)
		Understanding complexities of architecture & building. (4.6.2)
		Drawing and spatial understanding. (4.6.3)
		Principles and skills of environmental architecture. (4.6.4)
		Transference of creative skills to other areas. (4.6.5)
	Attitude and values-based learning by students due to the project. (4.7)	Design perseverance & awareness. (4.7.1)
		Part of a design decision-making team. (4.7.2)
		On-going connection with place and building. (4.7.3)
		Potential influence on future environmental decisions and career choice. (4.7.4)

4.2 Aspects attributed to the nature of the project

This emerging theme is considered 'passive' although it was significant in enabling other aspects that in turn actively led to student learning. There is an important link between this theme and the community connections made through this project, which is described in the following analysis.

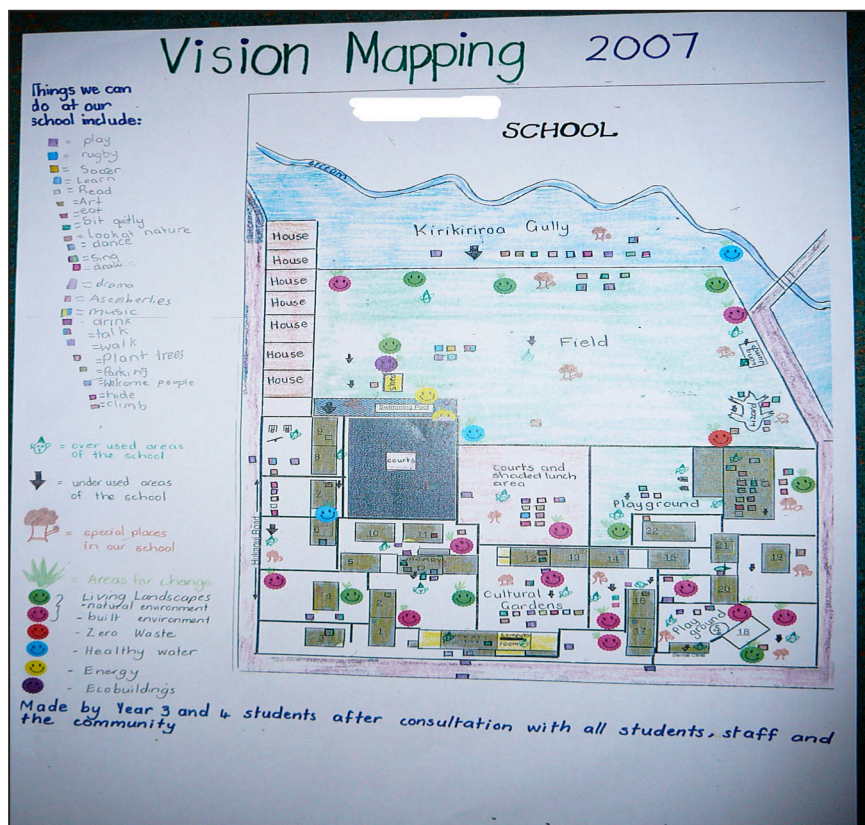


Figure 4.1: School Vision Map is a democratic plan for environmental development (2007).

4.2.1 Authentic context

The eco-classroom project started as an Enviroschools Programme action planning project (Mardon et al., 2005) via an education for sustainability (EfS) elective at the school (Teacher interview), emerging from the school's Enviroschools Vision Map (see Fig. 4.1, for the school's vision map and Table 3.1, p95 for the project timeline). The idea for this project, however, started as a 'place', and not necessarily the building that it became (Teacher interview).

EfS is taught formally in the school through an elective system where students select choices from a number of options that reflect different teachers' particular interest areas, with these options fitted into school curriculum learning (Principal interview). The students (up to 35 per elective) spend a day a week for one or two terms attending their chosen elective (e.g. 'only rain goes down the drain' or 'eco-classroom' electives), which may include students covering several year groups.

A large part of the enthusiasm from participants about this project stemmed from it being a real life project that was also firmly rooted in student learning; engaging children creatively and collaboratively in the multi-disciplinary area of environmental sustainability. It also gave students a tangible result to aim for, for example the architect said, "They have an end point in mind. They have a real project and it helps them focus their thinking on what they are doing" (Architect interview). Further, it was an experience of being empowered, not only in an adult world, but also one of privilege. For example, the principal said, "these children have an architect ... they are going through all this process, they are actually doing things that a lot of adults don't get the chance to do, so that's amazingly valuable" (Principal interview).

Because the project was real, the design process was complex, requiring sophisticated management. While to a degree it mimicked the standard relationship between an adult client (i.e. with limited knowledge of design and construction and a big 'wish' list) and an architect (with specialist design and materials knowledge), and was therefore one of negotiation and compromise, it also differed in some key aspects, which created a number of challenges. These were observed to be as follows:

- There were many more 'clients' (potentially 35 at once).
- The building design process was integrated into school curriculum learning, which added a considerable time factor.
- The second stakeholder layer was large (comprising other students and staff, parents and BoT).
- The clients were children learning about energy conservation and principles of 'green building' (also called 'eco-technology' or 'low



Figure 4.2: Conducting experiments on water heating using solar energy (TVD 2006).

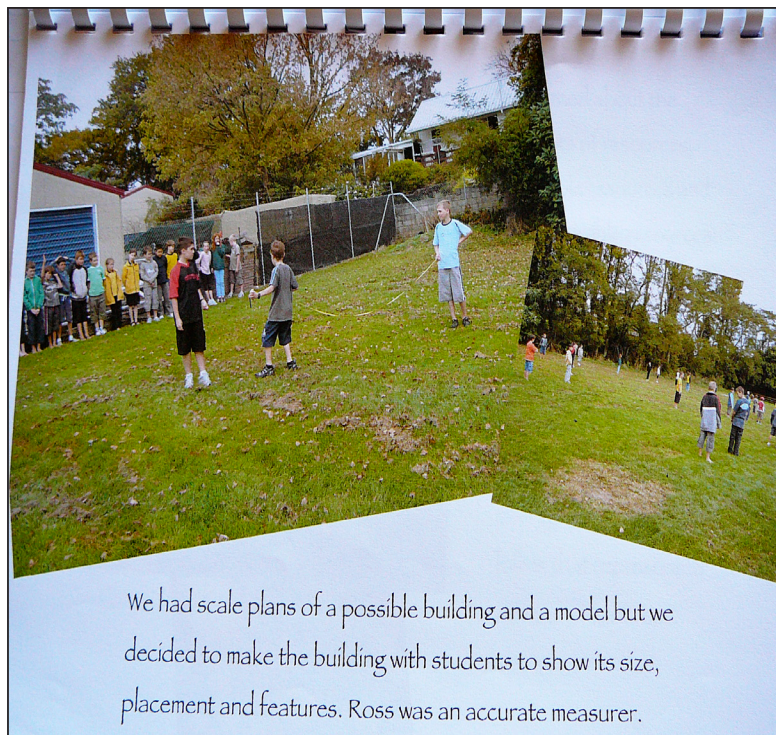


Figure 4.3: Students used their bodies to spatially calculate the building (TVD 2007).

impact design'), who wanted to apply this knowledge in the design process.

- Student groups changed annually, both as children moved off to Intermediate school, and as new students came into the different electives that were run on the eco-classroom.

All research participant groups mentioned the real life and authentic nature of the project, which therefore is an important thread running through this and other sections of the results presented here. As the architect expressed:

I suppose that I think that every school building project should be an educational project for the kids and they should be involved in that. Ultimately the environment is for kids. It's for teaching, it's for learning and the idea [that] when someone comes along and builds a building for them they don't know anything about it until they walk into the finished room, is a real wasted opportunity (Architect interview).

The authenticity was due not only to the project being real in that students helped design and build a structure, but also the fact that it was built to code and therefore stands equally alongside structures created wholly by adults. This was an aspect that all interviewed adults in this study mentioned as being significant, especially that students had experienced the authentic realities of financial and regulatory constraints. For example, the BoT member said, "They have learnt about the phases - ... teamwork, ... how you widen that out into design, ... then you have to move into a design and build approval process" (BoT interview), while the principal highlighted, "They have had to learn ... there are processes that have to be gone through and ... Ministry requirements" (Principal interview).

Student ideas drove a lot of the design work, accompanied by their research and experiments that were designed to test ideas (Architect, BoT, Teacher and Principal interviews). For example, science experiments were conducted to investigate heating ideas (see Figure 4.2) and maths equations and geometry were applied to work out the ecological footprint and spatial area of the proposed building (see Figure 4.3). As the principal highlighted, "It provides a real life context for them to do a whole lot of their own experiments and get involved and deepen their knowledge really" (Principal interview).

Comments made by parents evidenced that this group also felt the 'real life' aspects of the project provided a good experience for their children. For example, one parent exclaimed enthusiastically, "... [the teacher] got the kids to design their own eco-building!" (Parent questionnaire survey). Other comments emphasised students' engagement with, for example, "... cost ..." "... develop concept, speak with architect, new concept developed ...", "Fund-

raising – understanding” (Parent questionnaire surveys). The project manager also felt students had coped well with the cost aspect of the project, for example:

... they were really good at understanding ... we have this much funding and we need to build our classroom in the most low impact way, but we also need to be able to afford it. ... I think that’s a good example of the participatory approach ... because they have been involved in every step ... (Project manager interview).

In contrast students didn’t directly mention the real life nature of the project as being significant to them, although I believe this was because they took the authenticity ‘as read’. It does however seem likely that, while students clearly did grapple admirably with the more onerous aspects inherent in ‘real life’ projects, they were cushioned from the ultimate responsibility that was necessarily carried by the adults involved, especially the architect. This is evidenced by a clear outline of some of the issues by the architect. In the post-leaky building era architects have to be careful about their liability, which the architect felt, among other things, impacted on the design process and ultimate building design. For example, he explained, “...because if the building failed in some way we could end up in court over it. Ultimately, even though it is a student-led project, my responsibility ... is to the Board of Trustees” (Architect interview).

Concurring with Mannion’s (2007) call for greater consideration of the role and voice of adults in children’s participatory projects, it is important to signal some of the dilemmas faced by the architect in his role as the design professional ultimately responsible for the built structure. He was positioned between encouraging the students, and having to dash some of their ideas; promoting sustainability and different philosophies versus a building design that was fail-proof and would get Ministry of Education (MoE) approval. This is reflected in his words:

I feel like a bit of a party-poopers in some ways ... having to say that these are great ideas but we can’t actually achieve all of the things ... at times I didn’t enjoy that tempering process. ... All those things [MoE, codes, costs] which means it has gone from something which might’ve been more creative, more colourful ... more fun. And it’s all come back to a building which people would recognise as a building perhaps. ... we’ve got something really rectilinear ... that’s what I don’t like, it’s an adult building in a way (Architect interview).

Students didn’t however perceive this negatively. For example one said, “Whenever we asked if we could have something like a fish pond [in the wall] he didn’t just go ‘oh no sorry you can’t have that because it’s just not happening’.

He came back with a different idea” (Focus group 1). It is clear from the data that providing an authentic context for children’s learning does require adults managing the process and shielding them from some of the issues and frustrations that would clutter the learning environment. For example, both design professionals brought up the issue of professional time required for a project like this, versus the ‘bill-able’ hours. A significant proportion of the time of both these professionals was donated (also see Sections 4.5.1 and 4.5.5). In addition, because the project was not funded by the MoE, it was reliant on fund-raising and donations, which created its own set of ‘real’ problems, for designers. For example, the architect said, “One of the things that has been hugely limiting is not knowing what materials might be donated” (Architect interview).

There was widespread agreement from adult research participants that it was the process, not the outcome, of the project that was invaluable. For example, “...the building probably doesn’t reflect the spirit of what the whole thing has been about. ... actually the process has been far more important” (Architect interview). The principal echoed this at the opening of the eco-classroom, saying:

It’s cost a lot and we’ve still got to pay for this [what has been built so far] before we can add to it in future projects. But when you think about it in terms of the learning for all those children over five years, it’s cheap. And it’s not about the building, it’s the process. We could really knock this down right now and it wouldn’t matter (Principal, personal communication, 11 December 2009).

This focus on the importance of process is a theme that is repeated throughout these findings.

4.2.2 Flexibility and embeddedness of environmental sustainability

The multi-disciplinary nature of environmental sustainability provided variety and flexibility for teaching and learning, enhanced by the authentic context of this project. This provided a broad base for learning, across a range of disciplines. The lead EE teacher explained:

A hugely significant part of the whole project is it [EfS] offers a core area they can learn from. I think their knowledge in many areas has been extended. Most significantly in sustainable practice. ... I think environmental education is really good ... because you find something for all different children. Not all children want to get their hands dirty. Some of them want a research side - that is their hook, or science. ... it’s not just a topic to be studied, it’s an area to be involved in that can become a way of life, so that’s really good (teacher interview).

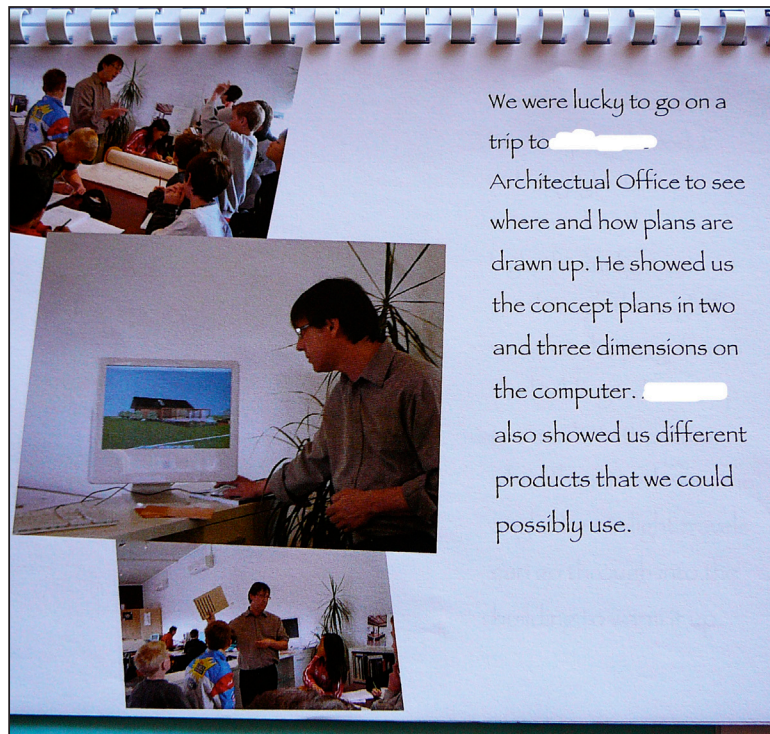


Figure 4.4: Trips were made with students to the architect's office (TVD 2007).



Figure 4.5: Students visited the Sustainable Backyard for ideas (TVD 2005).

According to the Lead EE teacher (personal communication 12 May 2008 and Teacher interview) and my own observations (22 May 2008 and 11 September 2009), students learnt in small and large groups, working on activities that contributed a small part towards the achievement of the eco-classroom. In this way there was a focus on the process of co-designing the eco-classroom. From the visual diaries and interviews with the Lead EE teacher and Enviroschools Facilitator, it was explained that specialists from the community often came into the classroom but sometimes trips were made, for example to the architects office (see Figure 4.4), botanical gardens (see Figure 4.5) and retail showrooms.

Several parents in the survey questionnaires mentioned the broad range of learning. For example one parent enthused, "...it has certainly given her a wider education" (Parent questionnaire survey). The BoT member summarised it as, "It's been a real life experience of learning sustainability concepts and their debates" (BoT member interview). He also proposed that environmental sustainability was a good choice because it, "...has generally got everybody's buy in because it's a heart subject ... Most people have got an affinity with the concept" (BoT interview). This is corroborated by the Lead EE teacher saying, "I am astounded at the response from parents in the community. Parents putting up their hands to take on huge roles [e.g.] fundraising. ... One lady is an editor, ... has no children involved directly in the project, but has put her hand up" (Teacher interview).

An emphasis made by all research participants associated with the school was that environmental sustainability as a concept is embedded in the school culture, via the *School Charter*. This states "Sustainable principles underpin school operations and school developments" ([School name], 2009). The principal elaborated, as follows:

...our school vision is to let people reach their potential, it's not just children, its people. ... The *Charter* is sent home to every family. The *Charter* is personal to our school community. After our consultation with the community, we do a revision of our *Charter* every year. ... Are our learning priorities what we want to be doing? ... One of our learning priorities is that we are [school name] learners who become committed to sustainability and will practice it. This is who we are and this is one of the priorities, it's not just one project ... anymore (Principal interview).

It was therefore pointed out that the eco-classroom project was not a stand-alone project. Rather it was supported by the culture of the school and all the EfS work and learning that has preceded it and has been ongoing throughout its gestation (BoT, Principal and Teacher interviews).

Students were clearly very aware of the environmental focus in the school. For example one said, “I think we started to do [a project] led by us because we’ve got so many enthusiastic environmentalists” (Focus group 1). The Lead EE teacher agreed, saying, “it is a big focus and part of our school culture now. ... Parents have rated it as ... the third most important thing on their list of the things they wanted for their children to get out of education at [this] school, which was huge” (Teacher interview). There was also indication that parents may be choosing to send their children to the school on this basis, with, for example, one parent saying, “[our daughter’s] values and attitudes have not changed [due to the project] as she lives in an environment where we try to be environmentally friendly. ... So the school program compliments what we do at home” (Parent questionnaire survey).

School staff interviewed felt strongly that, “walking the talk” (Principal interview) was important as an example to students, especially with regard to the environmental sustainability aspects of the *School Charter*. Both students and school community research participants spoke about using the knowledge gained by students through the eco-classroom project to guide design changes to a conventional classroom recently constructed at the school (see Section 3.4.3.5). The principal described the experience, in terms of honouring the Charter:

...a practical example of that is when we built our last new classroom. We had to consult with the children. I went and presented to the [eco-classroom elective] and they raised questions about the design of the classroom. ... We had to think about the heating, so it’s got extra insulation, it’s got double glazed windows and things like that. It comes at a greater cost [but] we have to live out what we are saying. The children are challenging us on this. ... And now that we have done that, we have to do it for the next one and for any other building ... I think that the main thing is not the fact that we are doing a better classroom but ... we are listening to what they are saying. That’s what I think is really important (Principal interview).

The last comment in the quote about listening makes a strong connection to participatory practice and links to action-taking EfS projects through the focus, both on process and example setting, that true listening requires.

In focus group 2, students talked about how the way they were treated and consulted over the design for the traditional classroom endorsed the value of their learning, and showed respect for their input. As ‘their’ project, they felt great pride that learning in the eco-classroom project was influencing the school. One student said, “I reckon that the learning at the school has changed” (Focus group 2) and others in this focus group unanimously agreed with this



Figure 4.6: Principal consulting with students over building traditional classroom (2008).

statement. As an observer on the day the principal spoke to the class, I was very impressed by the genuine process of participation undertaken by the principal (see Figure 4.6).

4.2.3 Summary of aspects attributed to the nature of the project.

The eco-classroom project significantly contributed to EfS outcomes at this school, as part of a school-wide focus on teaching EfS, which is reflected in the *School Charter* and followed through to sustainable school practices. It was felt that EfS in general and the eco-classroom project in particular provided an ideal learning platform because of its multidisciplinary nature, its multi-facets that provided choices for students (e.g. hands-on skills versus theoretical knowledge-building), its authentic context both as an actual and commercially-viable project, and its emotional appeal that has ensured a strong community input. The principal sums up the essentiality of this combination:

I wouldn't have bothered doing it unless we did that. ... that's part of the philosophy ... here ... getting children to study big ideas ... also putting them in meaningful contexts. ... You couldn't get a more meaningful context to one that is a bit of life. They're making big decisions" (Principal interview).

Adult participants felt it was important for students to experience the realities of budgets and regulations and were impressed at how they negotiated this, while maintaining interest and enthusiasm. It was logical that, with their perceptions limited by their young ages and experiences, students were somewhat oblivious of the extra effort needed by design professionals and other facilitators and role models in a co-design situation, to ensure the resulting building met budget and building codes. The architect raised some interesting dilemmas about enabling children's creativity and naivety to shine through more clearly in the final design. In summary, these passive aspects clearly contributed significantly to student learning by setting the context and helping to establish the process-focused and participatory nature of this project.

4.3 Aspects brought by students to the project

Students obviously brought their own inputs to the project, which I have therefore considered to be 'passive'. However, these also interacted with the nature of the project to contribute to student learning, as the following exemplars illustrate.

4.3.1 Unique sense of aesthetics and functionality

In the eco-classroom project adult research participants, especially from design professions, felt that the students' input gave a different design perspective. For example, the architect said, "The students' input has been ... a broad range of ideas. Definitely things an adult wouldn't think of. ... different to what you see in the architecture magazines, which is good" (Architect interview); while the project manager acknowledged that the students' input brought, "...definitely a freshness. Yes. Youthfulness. A different type of insight, which I think is really valuable" (Project manager interview). The BoT member also felt the students' influence had led to an improved design, saying, "I think the kids would've impacted on the outcome of the design really well, its functionality for them will be far better [because of] their engagement in the way that the building has been put together with their ideas ..." (BoT interview).

The students clearly believed they had something unique and beneficial to offer the project. For example, one said, "... the kids are the ones thinking of all the ideas, there aren't just adults" (Focus group 1). Another said, "The architect thinks this as well but we think it's a lot more creative if ... kids have designed it I suppose" (Focus group 1). This hint of hesitancy I attributed to possible modesty in front of me as the researcher.

4.3.2 Different experiences and perspectives

The students all brought their different experiences to the project and the design process. Again research participants with design knowledge particularly noted this. For example the architect identified this as a positive contribution, saying:

... all these students have different experiences [e.g.] someone has an uncle who is an architect or draughts person ... Or their idea of what building is about [is different]... They all come with their own perspectives... So you get all these minds coming together with different views, so that side of things is really good (Architect interview).

The project manager agreed that what students brought to the project was



Figure 4.7: Students thought of low windows for when they sit on the floor (Dec. 2009).



Figure 4.8: Bottles with LED lights were a creative student idea for the mud wall (Dec. 2009).



Figure 4.9: Coloured louvre panels were a student idea that adds dramatic colour inside (Dec. 2009)

varied and rich, saying, “That surprised me right from the start. ... how profound some of the questions could be and some of their ideas as well” (Project manager interview). Agreeing with this, students were keen to display both their prior knowledge, for example, “I knew about eco-classrooms before this because my dad, he used to be a teacher ... and he told me about some” (Focus group 1), and their pride in their own ideas. For example, another student said, “...we couldn’t have chickens around the classroom but we’re having a chicken tractor” (Focus group 2), while someone else emphasised, “That was a student’s idea. ... basically all the students’ ideas are making the eco-classroom” (Focus group 2).

4.3.3 Summary of aspects brought by students to the project

These aspects helped create a learning environment that was unique to the project. There is an interesting connection between the different aesthetics and functionality of students (Section 4.3.1), and the architect’s interest (Section 4.2.1) in how to channel this into a building that is more child-influenced (i.e. child-like) and less adult-dictated (by regulations and other constraints).

There is no doubt that aspects the students brought to the project had an influence on the way the project developed, such as their viewing things from child scale (see Figure 4.7) and enjoying effects of light (see Figures 4.8 and 4.9). It is also important to signal that the children in the two focus groups comprised the Eco-building Working Party, (EcoBWP) who were selected for their interest and motivation towards EfS. Their accrued knowledge, experiences and influences in this area may therefore have been richer or deeper than those of other students (see Section 3.4.3.1).

4.4 Participatory aspects fostered by the project

Before presenting the results for this section it is important to re-emphasise the notion of shared decision-making between children and adults, as described by Driskell (2002). The Enviroschools Programme, under which the eco-classroom project was conducted, subscribes to this participatory style (Mardon et al., 2005), and the 'whole school approach' as described by Henderson & Tilbury (2004). Based on my observations from time spent in my research school, as well as data collected during interviews, it is clear the school has, either independently or as a consequence (wholly or partly) of being an Enviroschool, developed a culture of democratic or participatory practice in its teaching and school management practices that goes beyond the eco-classroom project. It is also evident they are modelling a participatory scenario of shared decision-making. The Lead EE teacher explained:

... it's the way the school is. This is what they [students] expect.
... I just think it's our school culture that they will be listened to, their ideas are valued ... and their advice will be often taken. It's not just the eco-building; it's in any aspect. It's really hard to separate out (Teacher interview).

School staff and the BoT member interviewed were anxious, as with the embeddedness of environmental sustainability (see Section 4.2.2), to make it clear to me this was not a stand-alone participatory project. Rather, it was part of a larger whole, which includes a student Enviro-council that annually canvasses student opinion on issues within the school. The *School Charter* also embraces the tenets of participation ([School name], 2009). It is therefore important to acknowledge this is the environment out of which the eco-classroom project was born. The BoT member described the eco-classroom project as follows:

It is an experiment in innovation in terms of kid-led or kid involvement that I think will be used more. It was already used a lot but it will gravitate out to other areas of the school, and that is just one of the fundamentals of the school in the way it operates. ... so it starts off right back at the *School Charter*, ... the eco-building is an example of where we are trying to live the pieces of thinking in the *Charter* (BoT member interview).

As an outsider who has spent some time in the school over the past two years I have experienced the inclusivity and openness to sharing of the eco-classroom project, which is described in the following way by the project manager, "In my experience it's been that everything has been run by the students, the Board of Trustees, the teachers, the principal, so that feels, ... quite encompassing. And everyone has ownership and everyone is supportive

of the project” (Project manager interview). The contributions to learning of the exemplars of different participatory aspects fostered by the project are now discussed.

4.4.1 Student capability is recognised

An important pre-requisite to encouraging a participatory approach with students is recognition of their capability to contribute equally in a project with adults, and even to drive it with their ideas and decision-making. It is evident this project fostered this kind of environment with the architect saying, for example, “I think the fact that they are taken seriously and they are actually driving the process ... is really important to them and they take it very seriously and they enjoy that” (Architect interview). In fact, adult research participants seemed genuinely stunned by the capability of students involved in the project. For example, “... I think just generally as adults involved we are a bit in awe of it all. How children can do that?” (Principal interview). The EnviroSchools Facilitator indicated it had made a profound effect on her personally, saying:

I think I have grown hugely by being involved because ... being part of it and by seeing first hand what the kids were capable of, and we are talking about just ordinary kids. ... I think that it’s reminded me constantly of the potential that children have and that we as adults need to realise that potential in every way that we can ... and never underestimate them (EnviroSchools Facilitator interview).

The belief of adults towards students’ ideas and their involvement in decision-making was a hallmark of this project. The principal summed up such inclusiveness as follows, “It doesn’t matter about their age. [What matters is] that they have skills and ideas and things that they can contribute; and they just need to be listened to” (Principal interview). This is reiteration of the comment about listening that he made in Section 4.2.2, which emphasises its importance in the management philosophy of this school. The children endorsed this confidence, saying, “... even though there are a few adults ... they’re thinking like us, so it’s ... really good” (Focus group 1). They also expressed confident expectation about their continued involvement, for example, “The good thing is now we’ve been part of it, we get to build it next year” (Focus group 2), which is certainly what happened.

The architect was particularly impressed by the capability of two of the students when they represented the wider group during the interview process for the project manager, saying:

I was part of the interview panel and they were incredibly perceptive, astute kids. ... Basically they were the key in choosing the project manager and I think they were able to weigh up the

strengths and weaknesses of the candidates and they did that really, really well. They were very clever actually. It was a really interesting exercise (Architect interview).

The significance of this event as recognition of student's capability to conduct themselves in adult roles was also discussed by the Lead EE teacher, who said, "They have always been involved, even up to employing the project manager. They were there on the panel and ... they didn't feel like children ... actually it was a highlight of my teaching" (Teacher interview). Parents of students who were involved in this also brought this up in the survey on three occasions, highlighting students' learning experiences as, for example, "... selection of project manager, understanding confidentiality issues of job applicants, participation in interviews" (Parent questionnaire survey).

4.4.2 Careful participant selection and facilitation of the process

A widely acknowledged aspect by all research participant groups was the importance of having the right adults involved, especially the skills and enthusiasm of the Lead EE teacher as facilitator, and the architect as designer. The architect described the dynamic as, "...it's kind of a three pronged approach; the kids are leading it in terms of the research and what they are wanting to achieve with the building, being guided by the teacher, and guided by ourselves" (Architect interview).

The BoT member widened this out to include the selection of students to be part of the working party, emphasising their high motivation. During the focus groups, students indicated their pride at being chosen to be part of the EcoBWP. They perceived their invitation as a reward, with one saying, "I was an enviro-councillor last year and [the teacher] saw how enthusiastic I was about the environment so she asked me to join" (Student Focus group 1); while another added, "I've been in quite a few electives and I've been really passionate about what we do, so [the teacher] came up and asked me" (Student Focus group 1).

The BoT member also credited the devolved management style of the principal that supports and enables this kind of project to flourish when a teacher has a particular interest or specialty (BoT interview). The Lead EE teacher agreed, saying that the project would not have been possible without the incredible encouragement and support of the principal and senior management team, including the BoT and Parent-Teacher Association (PTA) (Teacher, personal communication 11 September 2009).

There was unanimous agreement from adult research participants



Figure 4.10: EcoBWP members enthusiastic to answer questions & share their knowledge (2008).

interviewed that adult input is needed because, "... they have to set the context for it" (Principal interview); for example to, "... start them off, get the discussion going" (Project manager interview). The BoT member summarised it as, "... definitely it's kid-led, but ... the processes are adult-crafted..." (BoT member interview). However, it was also emphasised that:

... it was extremely important to have the right sort of adults actually scaffolding it for the kids. I think that was essential, if you hadn't had those adults there ensuring that each step was nurtured, then I don't believe that it would've been as successful in terms of the student participation (Enviroschools Facilitator interview).

The key role of the Lead EE teacher in facilitation and leadership of the project was widely acknowledged. For example the principal emphasised, "... it's a tribute as well to the teachers involved ... it's [their] facilitation that has been really key" (Principal interview). The protocols used for encouraging and managing discussion and questioning among students were praised (see Figure 4.10). In addition, it was felt the teacher was well tuned to the mood of the students, for example, "she's aware if they are getting distracted ... and not to push them too much so they don't get overwhelmed ..." (Project manager interview). The students appreciated the teacher's work, for example one said "... we're actually lucky to have [the teacher] because she's really helped us run this ... I mean we're only kids but she's helped us to get things" (Focus group 1). The important part of this quote is the implication that students felt this was their project and the Lead EE teacher clearly believed in the essentiality of this, while acknowledging the difficulty of maintaining this at times, saying:

... the key thing is that it is their own initiative. It can be very tempting to want to totally direct students. But once you do that they are very quick to realise that it's not their project anymore. It's really important that they have the strong lead. As the teacher we are the facilitator ... there is some guiding for sure. They are in control. ... they like being involved in all the steps ... (Teacher interview).

In this regard students were aware of the decision-making and project-managing responsibilities they held and appreciated being guided rather than directed by both the teacher and other professionals they worked with, as one student said:

... when [the teacher] took me to the PTA meeting and the BoT meeting to do a little speech on the environment ... maybe she would write a little on the speech and then let me write the rest, and [the architect] when he did the plans he would always show us before he made any changes or if we wanted to make changes so we were always making the decisions (Focus group 1).

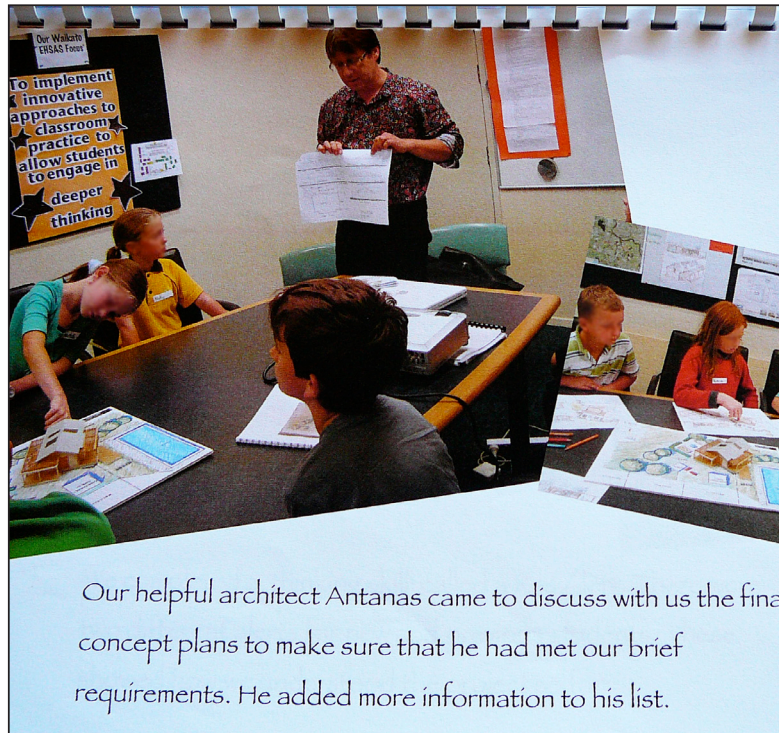


Figure 4.11: Students were treated as clients by the architect (TVD 2007).



Figure 4.12: Time spent with community experts was highly regarded by students (Sept 2009).

The importance of choosing practitioners and experts with the right qualities to work with students was strongly identified by research participants, as the principal said, “They have to buy into the philosophy ... to make it successful ... otherwise it just blows the whole thing apart” (Principal interview), and the Lead EE Teacher noted, “... they need to have faith in the person that is leading them” (Teacher interview). An important element in the success of the project was that these specialists treated the students as they would adults, as the lead EE teacher said:

[The architect] is absolutely the right architect working with the children. Seeing them as equals and going through exactly the same process he would go through with any other client. Called them his clients, consulted at all the different stages, but also revisited every new elective group that came in. They definitely felt part of it [the design process] (Teacher interview). (See Figure 4.11)

The students agreed unanimously with this, feeling that they were encouraged, listened to and part of all decision-making. In response to being asked whether they felt they had a lot of say in the project, someone replied, “Yeah, heaps of voice.” (Focus group 2), while another said, “[the architect] actually takes time with us to include the features we want.” (Focus group 1).

Overall, interaction with experts from the community that were informative and fun were well remembered, for example see Figure 4.12 , and a student said, “You get to learn more about the environment and we get to do presentations and um we learn stuff too from people who see our presentations” (Focus group 2).

4.4.3 Multiple learning approaches used including strong partnership with the Enviroschools Programme

According to the Lead EE teacher the eco-classroom project has used a combination approach to enable evolution of learning. A key part of this has been the partnership with the Enviroschools Programme. She explained as follows:

... the way we have gone about our planning through the Enviroschools Action Learning Cycle and an inquiry model along with thinking skills ... those three things together have made the planning and teaching side a success. ... Learning can evolve through this style of teaching and learning whereas other styles, the evolving wouldn't be as easy to draw out. ... I couldn't imagine teaching it in any other way. I wouldn't change the structure of the Action Learning Cycle... I think that it is very powerful (Teacher interview).

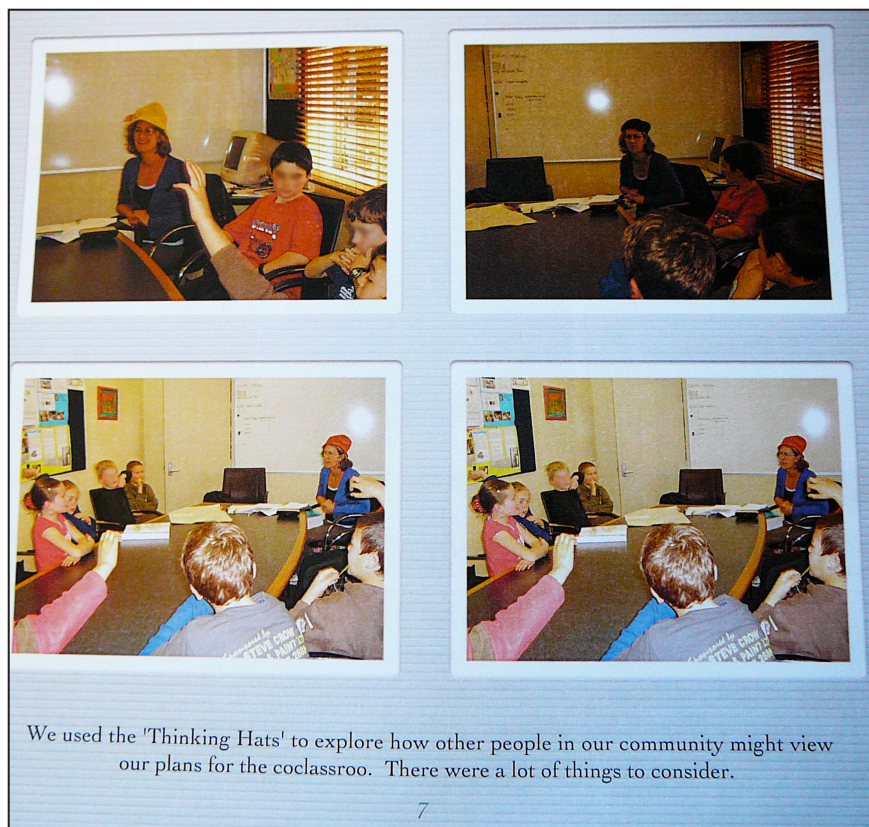


Figure 4.13: Edward de Bono's six thinking hats technique was useful in the project (TVD 2007).

She also highlighted that thinking skills are very participatory and the Action Learning Cycle (see Figure 1.1, p. 20) was a powerful reflective tool she used with students to consider current or future changes in planning. She described its flexibility as follows, “It’s been powerful in this because it has taken in so many different avenues with always the same key focus. But we have always gone ... different ways in getting there” (Teacher interview).

The learning process used was ‘emergent curriculum’, which is an inquiry-based process whereby teachers act as facilitators in providing learning experiences that the students take further (Lead EE teacher, personal communication, 14 March 2008). According to Durno (2009), using an inquiry learning approach, where children, with assistance, determine questions that they want to explore and answer, enables the curriculum to emerge from student interests, rather than being planned entirely by the teacher. Because this project was a New Zealand first, learning activities for the project had to be modified to fit from existing examples in the *Enviroschools Kit* (see Sections 1.4.1 and 3.4.3.4) or created anew.

Development of thinking skills is a fundamental part of this school’s learning agenda. In the *School Charter*, thinking skills are listed as a key competency, and a learning priority, where it is proposed: “To develop [in this school] learners who are critical, caring and creative thinkers” ([School name], 2009). A discussion paper commissioned by the Scottish Executive Education Department concluded that indications point to the value of introducing thinking skills-based learning in schools, although it is cautioned that their success is directly linked to the skills in methods, that teachers have for them (Wilson, 2000). Thinking skills are popular in New Zealand primary education due to *The New Zealand Curriculum* containing a requirement to foster thinking skills in students (Ministry of Education, 2007). This is evidenced by their use in the eco-classroom project, their focus in the school and by the promotion of their use in the *Enviroschools Kit*, all of which are relevant to my research. Jean Edwards (2007) is author of *How to Teach Thinking Skills* and director of Thinkshop, an online shop for thinking skills resources for teachers & homeschoolers. She states there are two types of thinking required; creative thinking (e.g. imagine, invent, design), and critical thinking (e.g. analyse, compare). At their intersection is ‘problem solving’ (e.g. refine, improve, combine).

Thinking skills used in this project included techniques such as Edward de Bono’s six thinking hats (see Figure 4.13), which are black for negative, yellow for positive aspects, white for facts and details, green for imaginative, red for emotions, blue for reflection and metacognition (de Bono, 2007). The

technique is considered useful for brainstorming and problem solving because it encourages students to reflect on different types of thinking in different situations (Dept of Education Tasmania, 2007).

Other research participants interviewed also felt the EnviroSchools Programme aligned well with the eco-classroom project and had been influential in its development. The relationship between the school and the EnviroSchools Programme was described for example as, "...a meeting of the minds" (BoT member interview) and, "A valuable partnership that has been very good for providing links to people and advice" (Principal interview).

4.4.4 Student engagement

It would appear that the participatory aspect, coupled with the authentic nature of the project and its topic of environmentally sustainable design, was a strong combined 'hook' that effectively engaged the students. The architect endorsed this, saying, "I think the intensity of their interest and enthusiasm for design and architecture and creating that building has been really good... It has surprised ... and ... delighted me – getting into the spirit boots and all" (Architect interview).

When students in focus group 1 were asked why they felt, in their words, this project had been, "... the best", they replied unanimously that it was because it was "kid-run" (Focus group 1). When students in the focus groups were asked to compare the eco-classroom learning experience to more traditional classroom learning, they were clear that they were very different. For example someone said:

I think it's really, really different because here we get to say what we want to say, whereas in maths and stuff like that we have a subject and have to do what the teacher says, but here like we have our own say ... and we can incorporate humour into it. Like our motto... 'Green is good' (Focus group 2).

This implies that the greater autonomy and variety afforded by the eco-classroom project gave students greater freedom, and they responded positively in terms of learning by customising that learning with references from their world view. Another student said, "... now we're doing ... eco-things and we're ... building a classroom that's eco-friendly. And in class we just learn to do reading and stuff" (Focus group 2). A further said, "Usually we do tests and stuff. No tests with this" (Focus group 2). Clearly students enjoyed the style of learning of the eco-classroom project, which was more experiential and participatory and embedded different knowledge and skills acquisition in an authentic project rather than them being taught within specific disciplines. This increased their engagement with the project.

People are more engaged when they are enjoying themselves and the parent questionnaire survey result showed that all respondents either completely (7/10) or partly agreed (3/10) that their child enjoyed being involved in the project, and they unanimously agreed that they understood what it was about (Parent questionnaire surveys). Following this thread, the project manager felt a key aspect of students' engagement was both the control given and the responsibility expected. She said, "It's that whole leadership thing ... they have been given a responsibility, it's their project ... they know what's happening so they can answer any questions" (Project manager interview).

The EnviroSchools Facilitator also believed that the students' leadership and engagement in the project led them to feel more relaxed through an increased sense of control. For example, she said, "They are not thinking, 'what are the rules here, or am I allowed to have a silly idea or is my idea silly?' because all ideas are [regarded as] good" (EnviroSchools Facilitator interview). Comments from students confirmed they felt very comfortable about contributing their ideas, saying, for example, "Like ... even if it's a really ... different idea, we're allowed to say it." (Focus group 2).

4.4.5 Focus on fun, linked to learning

Having fun also emerged as an important element from the data. The principal linked this to creativity, saying, "Fun and the chance to be creative ... If they have ideas and get a chance to try those ideas and have some fun along the way" (Principal interview). From my own observations, fun was a key ingredient in this project, acting as a connection and motivator. This is evidenced by a student's excited comment at a mud brick-making session for the eco-classroom construction, saying, "I never knew being eco-friendly was so much fun!" (Observation, 11 September 2009)

Part of the rationale behind the importance of fun in the process is summed up by the EnviroSchools Facilitator saying, "They will remember the fun bits ..." (EnviroSchools Facilitator interview), although the Lead EE teacher emphasised that the focus on fun is carefully managed around solid learning opportunities:

So fun is huge and different learning styles are huge so I like to offer opportunities that are visual, oral and I am really big on hands on. ... So fun to me isn't just doing an activity, fun to me is doing something that they consider fun, but it also has a huge element of learning involved in it. I actually do think we have done this really well throughout this [project] (Teacher interview).

Students agreed with this, particularly about the activities where they



Figure 4.14: Students having fun making mud bricks for the eco-classroom (Sept 2009).

could get dirty, such as the mud brick-making sessions (see Figure 4.14); with one student summing it up for the group, saying, “It’s fun but we’ve probably all of us learnt heaps” (Student Focus group 2).

4.4.6 Ownership generated

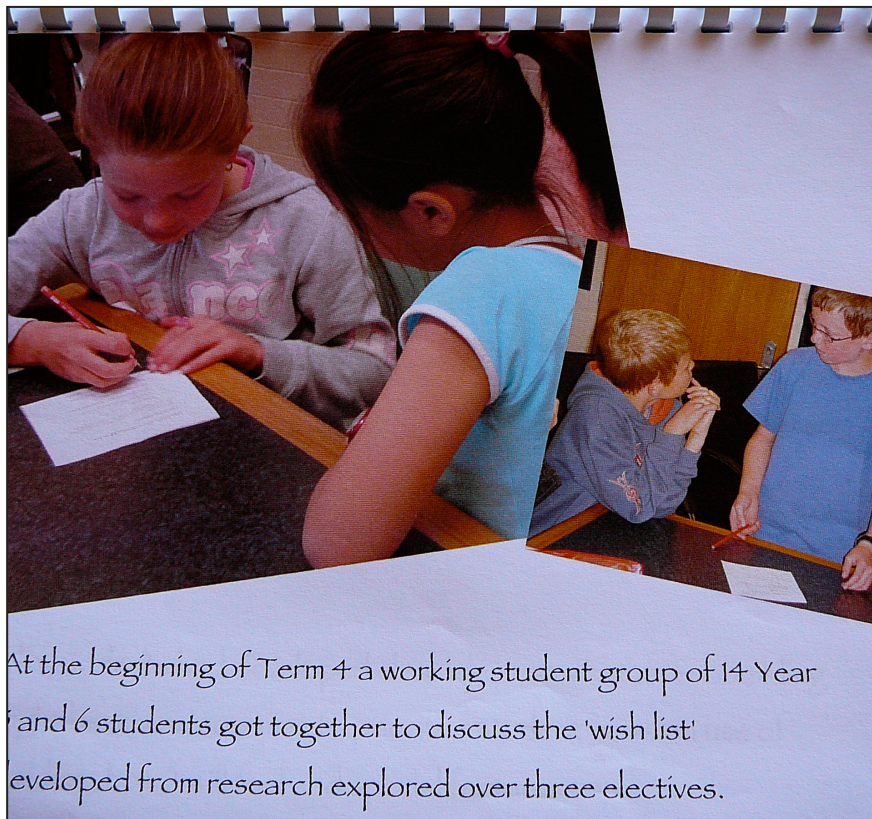
In this project two kinds of ownership were identified which inter-connect. Firstly, there was ownership that was given to students by adults through the egalitarian way the project was run. Evidence of this from the interviewed participants included, for example, “Adults seeing kids as equals” (Teacher interview) and, “... they have a sense of pride about the project. And that has to come from that ownership that has been given to them” (Project manager interview). Students agreed, saying for example, “We’re also making all the choices and ... making decisions” (Focus group 1). The project manager commented that while it would often have been easier to make executive decisions on behalf of the students that would have defeated the purpose of the project, because as she said, “The importance of the project is that the students are involved” (Project manager interview). The project manager also explained that the time factor was the main thing preventing students from making all decisions alone and therefore the essentiality of involving or informing students fully was concomitant with acknowledgement of this constraint. She elaborated as follows:

I guess the students could easily lose ownership if there were a lot of decisions being made and they felt like they were not being informed. Yes, so that has been important all the way through and we have really tried. Most of the major decisions anyway that have been made, the students have an understanding of why that happens or they have been involved in the process of figuring out why (Project manager interview).

The Lead EE teacher agreed, both with the difficulty, and subsequent necessity, of keeping students enfolded in the decision-making heart of the project. For example:

There is a lot happening once the project gets to the ready to build stage. It’s hard to keep them informed all the time. But we have to work really hard to do that and not to make decisions without them. Student-led is the absolute key to the whole project (Teacher interview).

This is not to say children expected to make all decisions. The teacher was clearly very aware of the students’ limitations within the project, saying, “Some things they [students] realise they have to leave up to the experts to make the final decisions” (Teacher interview).



At the beginning of Term 4 a working student group of 14 Year 7 and 6 students got together to discuss the 'wish list' developed from research explored over three electives.

Figure 4.15: Example of a wish list from 2005 being re-addressed in 2007 (TVD 2007).

The second kind of ownership followed the first and was ownership, in the project and in learning, that was generated within students through the giving of responsibility and 'voice'. For example:

... it keeps coming back to that ownership ... [within] individual students but [also] the students as a group seeing value in the project. ... they get pulled out of class to do things. ... they wouldn't complain, they love it, because they are the key participators but also the key leaders of the project. It's a major contributor to the success of the project (Teacher interview).

One student said this extended to a feeling of belonging through common purpose, for example:

At home, since I don't have a brother or sister that's in this project I feel quite alone since I'm the only person who wants to help the environment. But at school it really changes because I've got a whole group of people (Focus group 1).

One important way that the project built ownership was through a continual review process used by the Lead EE teacher to ensure prior students' ideas were not forgotten and the project had continuity. This was essential for such a long-term project as this (see section 4.5.3 – Long-term nature of the project). For example:

Last year's elective group had to really make sure that because we were getting towards the final plan, that the ideas from the original group were in it and that was really exciting and they were checking the previous wish list and they still have some of their own ideas (Teacher interview). (See Figure 4.15)

The principal reinforced this, saying:

The eco classroom project is a really big project and it's the continuity of it that's been really important. That it's passed on from children. ... I think the evidence is that the programme is still really strong after three years, that it's driven by the students and new students who come along feel some ownership with that as well (Principal interview).

4.4.7 Skills of advocacy

In both focus groups, several students mentioned a recent 'Green Lunch' they had organised, with a guest appearance by a prominent member of parliament (MP). The students were disappointed and indignant because the MP arrived late and missed some of their presentation. They interpreted from it that he hadn't felt their project important enough to turn up on time. This is evidence that students had developed awareness of some of the political aspects of environmental sustainability; in this case realising that people they



Figure 4.16: Students in the EcoBWP developed strong presentation skills (2008).

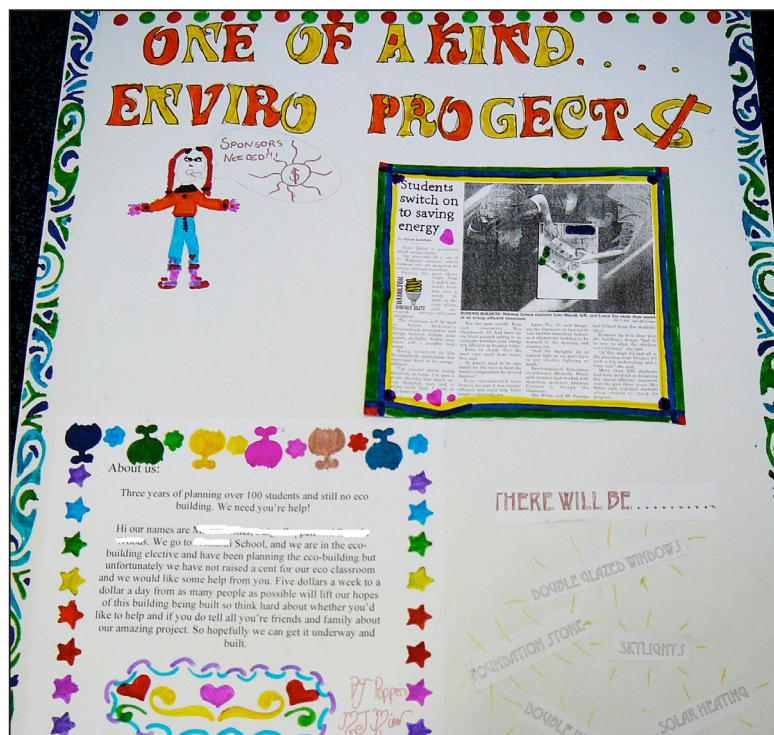


Figure 4.17: Raising awareness and fundraising by students (TVD 2007).

saw as role models might not be as committed as they had first thought.

Students also became strong advocates for their project, having to sell the idea of the eco-classroom project to the BoT and later to funders and other interested parties, which included visitors coming from other schools, sometimes international. This necessitated giving presentations (see Figure 4.16) and running guided tours. My impression of being guided around by students (see Figure 1.6, p. 24) was of enthusiastic, proud and knowledgeable young people (Observation, 22 May 2008). The Lead EE teacher felt that the eco-classroom project had led to students really taking up the mantle of sustainability advocacy within their community, saying:

... participating in the community has had a huge effect on the children. ... They see their role as advocates. That came through in lots of comments from the children ... They want to get that word out to other schools, they want it to be a place where other schools can come and learn from us. They want us to be a role model They see that within themselves (Teacher interview).

The BoT member also saw that the project had provided opportunities for students to understand some very adult concepts within advocacy such as rationalising trade-offs. For example:

... their thinking skills and their confidence and their ability to articulate that's absolutely incredible. ... There is a tree that has to be cut down, really great piece of trade-off discussion. ... And they can say, well we can replant and while we are losing something, that is a short-term loss and we can re-grow and create. So those concepts of time-based decision-making are also critical (BoT member interview).

4.4.8 Development of confidence and skills in public speaking, and other life skills

The eco-classroom project has been particularly effective at developing cross-disciplinary or transferable skills, as evidenced by multiple quotes from all data sets. These skills are directly related to the participatory focus of the project. For example, the scope of the project provided many opportunities for leadership roles to be developed and the participatory focus has encouraged students to take these up and placed them in the public limelight, doing presentations (see Figure 4.16) or joining committees (e.g. fundraising and steering committees – see Figure 4.17) as the project gained momentum and complexity. In turn this has built confidence, as the principal elaborated:

But the skills are the things that blow me away. I mean really you've got all the investigative skills, the questioning skills, the thinking skills. ... the selling of their ideas, the talking over of their ideas ... they've had to plan events, to present their ideas to

the BoT, to present their ideas to parent groups and to the wider community. Plan the 'Green Lunch' that we had, right down to hosting and the food. So all those presentation skills are really important as well and it gives them a confidence (Principal interview).

The long-term nature of the project enabled development of skills that might not have been possible in a shorter project, as the principal explained, "...it is a very strong one that provides them with a really quite deep project with some deep thinking over a period of time It's not something that is over in 5 or 6 weeks" (Principal interview).

Development of presentation skills and confidence were also strongly mentioned by students during the focus groups and parents via the surveys. For example one student said:

Well I think I've got skills from the actual talking in front of everybody because, well that's quite an important skill for most jobs when you're older so, and also for our speeches that is coming up pretty soon...So it's pretty good to be able to be a confident speaker ... (Focus group 1).

Parents were clearly impressed by the obvious development of these 'adult skills' in their children. Their comments on the questionnaire survey included, "Learnt how to interview for project manager role. Learnt how to put a plan in place to raise money", "Presentation skills, working in a group", and "Learning how to co-operate" (Parent questionnaire surveys). I was present for two public presentations made by members of the EcoBWP and can vouch that these students were confident and articulate (observation 14 March 2008 and 11 December 2009).

During their interviews both the architect and the EnviroSchools Facilitator highlighted communication skills as a transferable skill. In addition research was mentioned by the architect, and teamwork by the EnviroSchools Facilitator. The most comprehensive list came, not surprisingly, from the Lead EE teacher who has nurtured and facilitated the whole project and is proud of the students' successes and achievements:

Skill of persistence ... Children have, for their young ages, have been able to persist in heading towards where they want to get. Problem solving real life issues has been the core of the whole study itself ... Co-operation and teamwork is huge... and if you ask any of the children they say confidence to speak in front of audiences which is really, really good. ...Self-belief in themselves and their team ...and the way they can transfer their skills in their roles into other areas of the school and other environmental areas as well as other learning opportunities and different areas.

... some of them have been inspired to take on other challenges within the school, not just environmental challenges; it could be leadership roles in sport, peer tutoring or anything like that. ... to me that's ... equally as important as the whole sustainable aspect, ... if you can achieve that in one area but transfer it to another, it's a 'life skill' (Teacher interview).

4.4.9 Summary of participatory aspects fostered by the project

The participatory aspect of this project was strongly supported by both the management policies of the school and the principles of the EnviroSchools Programme (through their adoption of a 'whole school' approach). The *School Charter* embraces both participatory practice and environmental sustainability (EfS), meaning this project was an ideal 'fit'. As a result there was a great deal of support for the project from the school community (staff and parents), for example, the Lead EE teacher said, "All staff are excited about it. ... They know it's been a big part of our school as a project and they are right behind it" (Teacher interview). The inclusivity extended by the project has also ensured the project has embraced people widely. This has clearly translated to the students as willingness by staff to engage in different projects and encourage student input. According to the Lead EE teacher, projects in the school with a strong participatory focus are always over-subscribed. However, although this project was made possible by these background systems and philosophies, it was still an ambitious undertaking that owes much to the enthusiasm and commitment of the lead EE teacher. In her words:

Leading it has been incredibly time consuming, ... it has been really good, but it has taken a lot of time out of my life. ... especially the last two years. But I see it as a contribution, not only to the kids but to the environment. ... [It is] the most worthwhile teaching process that I have ever gone through" (Teacher interview).

This highlights the importance of role models and the commitment and passion that is required by adults involved in projects such as this.

The exemplars of participatory aspects fostered by the project, which were distilled from the data, all contributed to student learning. Giving students the opportunity to show their capability as decision-makers and drivers of the eco-classroom project gave them a confidence boost and the motivation to achieve in a way that greatly impressed all the other research participants. An important part of this was the honour they felt bestowed through their selection to be part of the EcoBWP, and the well-chosen people from the community that worked with them. For example the architect's manner and attitude with the

students was pivotal in their experiences and learning. The Lead EE teacher also credited the learning approach from the Enviroschools Programme as a major contributor to the success of student learning in the project, citing the Action Learning Cycle, coupled with 'thinking skills'. It is important to note that when the focus groups were held (November 2008) the architect was the key professional from the community who was engaging with students on a reasonably regular basis. The project manager had only just been appointed and had not begun working with students.

An important idea emerging from the data is that genuine participation increased engagement with the project and was therefore integral to the learning outcomes. Dependent on this was adults' belief in students' capability and their commitment to 'listening' to students. With this in place different ways of learning opened up. For example, students acknowledged and preferred the learning style in the eco-classroom project compared to more traditional classes. They appreciated the fun, hands-on aspects of the project, which was something the Lead EE teacher felt to be a major contributor to the success of the project. They also engaged politically with the environmental sustainability focus of the project – hosting 'Green Lunches' to which politicians were invited, and being involved with organising promotion and fundraising for the project. They were advocates for a sustainable future when other schools visited.

In conclusion, students were unanimous that the student-led aspect of the project was 'the best' with one student simply explaining, "Kid-driven means there are kids in it actually, but it's also run by kids, so if it wasn't kid-driven we wouldn't be here" (Focus group 1)!

4.5 Community connections fostered by the project

The inclusive participatory management of the eco-classroom project and its authentic context meant there was considerable community interaction. This led to a number of important learning outcomes as expressed in the following exemplars of community connections that emerged from the data.

4.5.1 Reciprocal gains between students and adults

The project required a high number of volunteer hours but the data collected clearly indicated that everyone involved felt the gains outweighed the costs. For example, the project manager said, “I have gained an insight into the value of [environmentally] sustainable education and working with young people ...” (Project manager interview), while the BoT member proposed, “It’s highly innovative ... it not just the kids, it’s all of us [that] are learning” (BoT interview). These stories give evidence of the reciprocity of gains due to the project. The Enviroschools Facilitator said that working with other participants in the project had been collegial and fun, while students acknowledged, “...all those people who’ve helped us a lot with their passion for the environment” (Focus group 1).

The interaction with the community also helped emphasise the authenticity of the project as the Lead EE teacher explained:

These people that we work with are really important. It’s not a school topic. ... There are people ... that study this ... coming in to talk to us, so it’s giving meaning and reinforcing value [to students] that this is actually a real project (Teacher interview).

Clearly the project contributed positively to the wider community. For example, the Enviroschools Facilitator spoke about the involvement of local council and other government agencies in the project and saw it as providing a focus that has been effective in bringing communities together, building partnerships and giving something to celebrate. Similarly, the project manager highlighted the effect of the students’ enthusiasm on the wider community, saying:

And the students have a really good effect on others due to their passion for their project. I think this has influenced a lot the members of the community that they meet with because it is something quite different. I think it opens other people’s eyes ... and maybe it opens people’s minds to the possibility that there is a different way of doing things (Project manager interview).

The last sentence of this quote is indication of a potential ‘ripple effect’ from the students intimately involved in the project, out to a wider catchment of people, who are learning something about sustainability issues and may therefore

think and act differently in the future.

Parents also gave generously with time and skills to the project but it was potentially the architect who were most financially compromised by his input. He balanced the different aspects of his input in the following way:

I absolutely love it. ... I come back from the classroom and think this is the best thing I do. ... The enthusiasm and liveliness of the kids is just wonderful. ... The disadvantages from our point of view is that it is not an economic proposition ... more than half of the time we are putting into the project is volunteer. ... We are doing it because ... educating people ... and the green environment is really important to us. ... And we have all gained a lot on a personal level. And I think that other clients can see what we are doing, or when we are pitching for projects that have an environmental emphasis, then I think that this is actually admired by the people we are pitching to. ...I would like to think our clients were aware of that when they selected us (Architect interview).

Picking up on this quote the BoT member highlighted how reciprocity was a currency that was helping to complete the project within budget:

In all specifications of anybody that has been engaged or involved [in the eco-classroom project], it says it's a participatory process, its driven by the kids. And that says to anybody who comes in, that's been a primary driver. The architect and the project manager and it will be for the builders - building specifications will say to the builder and the builder will have to [consult with the students]. We will be saying we don't want to pay for that either. This is part.... you get something out of this. It's like the architect, he loves this so he's doing a lot of things in his own time. Because actually he is learning how to create design and architecture for kids and for other than adults, and he is also learning how to interface himself, working with kids (BoT member interview).

In turn the students felt their involvement in the project had reciprocal benefits (also see the influence on the design of conventional classrooms in Section 4.2.2). For example a student said, "It's like influenced the school and the people skills have gone up" (Focus group 2).

4.5.2 Experiencing outside expertise and engagement with community processes

The involvement of community members with expertise in a whole range of areas including architecture, sustainable environmental practices, fund-raising and even marketing (e.g. designing a promotional brochure – see Fig. 3.14, p. 96) exposed students to a very different and adult-based world



Figure 4.18: Hands-on skills gained students' full attention, like brickmaking (Sept 2009).



Figure 4.19: Students being interviewed for a national news presentation (Sept 2009).

of jobs and skills to what they would normally encounter during their school days. Keeping this contact relevant, highly practical and fun-focused ensured continued interest and therefore learning. According to the EnviroSchools Facilitator, an important aspect of this was keeping it local and this relevance ensured students felt connected and 'at home'. For example:

... with the timber there were people who had never smelt the timber. Those ... more hands-on sensory types of things that they got the opportunity to have. The mud brick making was just fantastic. Everybody loved that. I think the thing about the mud bricks ... because it is relevant to this school (right down to collecting different samples from around the school environment ...), and it's hands-on and it's fun and it's using their environment. So it is so really relevant that they hook into it (EnviroSchools Facilitator interview).

Students in the focus groups were unanimous that the clay brick making experiment had been great fun. I was present for a later brick-making workshop and observed (11 September 2009) that students had a wonderful time as well as participating fully in skills acquisition (see Figure 4.18). Also linking into the 'fun' aspect of the project in terms of the community, students in focus group 2 unanimously enjoyed the publicity part of the project, with someone saying, "We got to be on TV one time and so it was pretty cool ...", and another added, "And we also sort of became famous because we were in like newspapers and stuff and we were like on radio and TV" (see Figure 4.19).

In addition students also encountered the frustrations of engaging in an adult world (see also Section 4.2.1 - Authentic context). The principal expressed it as the importance of, "...developing an understanding of how adults work" (Principal interview). An example of this was the sting of hypocrisy students felt due to a politician passing them over at the 'Green Lunch' they hosted, in favour of visiting an energy-hungry technology suite at another school (see Section 4.4.7). One student said disgustedly, "we invited him and then he heard about the computer thing and so he thought he'd go to that..." (Focus group 1), while another retorted, "In a class with lots of digital stuff, there is actually pollution and there's actually little poisonous toxins in the air" (Focus group 1).

Speaking at Board of Trustee and Parent Teacher meetings, as well as going through decision-making processes with adult groups such as this, made students much more aware of the way institutions such as their school runs. The BoT member was particularly impressed by how students conducted themselves in this arena, saying:

...their inspiration and their absolute commitment and belief in

the project has then translated across into the Board of Trustees and the adults, and the adults have seen this and said, well how can we encourage this, rather than saying this is a risky project, this is going to cost more... (BoT interview)

4.5.3 Long-term nature of project widened the sphere of involvement

The eco-classroom project was a long-term project (first beginning in term 4, 2005), and this necessitated 'passing-on' the project to successive groups of students. The principal highlighted the potential problem this created, saying, "I think it's been a challenge ... the bringing of that continuity. ... because every year you lose 100 students – that's 100 of your seniors who have perhaps worked on it for a couple of years, and they leave the school" (Principal interview). However, far from being a disadvantage, the way it was managed greatly widened the sphere of involvement of the project from what would otherwise have engaged relatively few. According to students during their speeches at the opening of the eco-classroom (Observation, 11 December 2009), approximately 170 students directly worked on the project during the four plus years up to the opening. Many others were involved in a lesser way through the strong school connections between different EfS projects.

The Lead EE teacher explained (personal communication, 12 May 2008) that groups of up to 35 students doing an elective on the eco-classroom ensured diversity of input and ideas, wide ownership and democracy with an ever-changing group of students working on the project. However, it was realised early on that between electives, the project stalled. In addition, the project had to keep backtracking while the teacher brought a new class up to speed. The solution devised was formation of a 'working party' group, chosen as 12 of the most motivated and enthusiastic environmental education students from year five and six (i.e. nine to eleven years), chosen from the electives or other school EfS initiatives (e.g. gully restoration, Enviro-council). This group met outside classroom time to provide continuity and forward progression for the project. They also acted as ambassadors and inducted new students into the project. Every year half the members of this group would move on from the school. New recruits, who were brought up to speed by activities that promoted learning for both groups, would replace them.

An important tool for managing the long-term nature of the project and the regular turnover of students was reflection. Activities based on RAS Alert (reticular activating system) developed thinking skills and were therefore invaluable for deepening meaning at the start of a new phase of the project (e.g. a new elective) or for inducting new members of the working party. Frangenheim

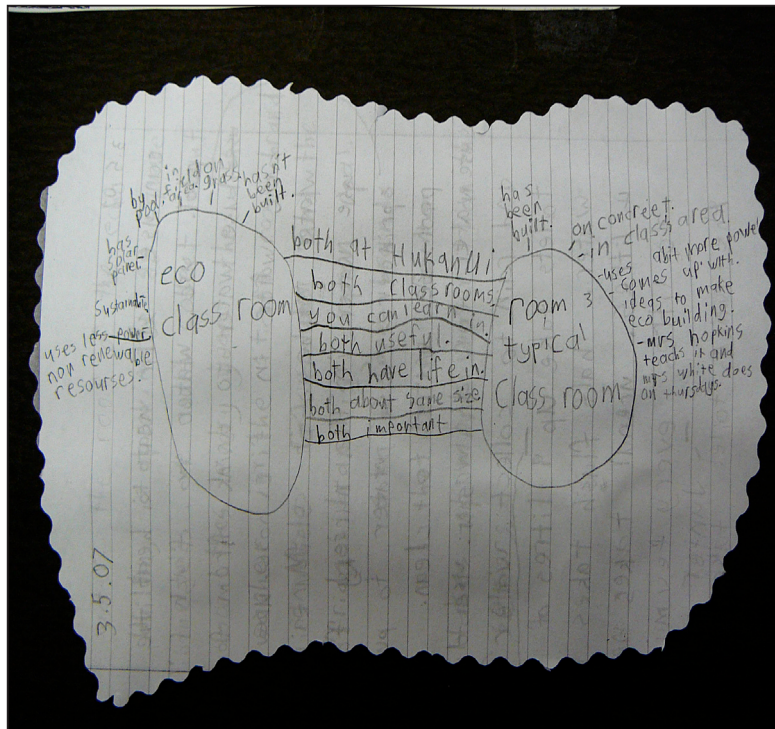


Figure 4.20: Example of a 'double bubble' thinking skills activity for comparison (TVD 2007).

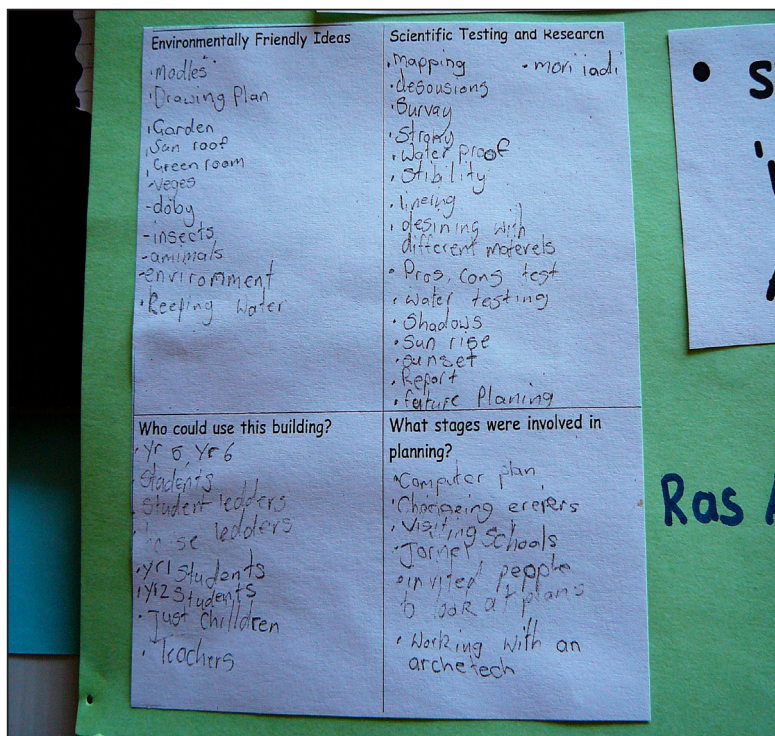


Figure 4.21: Example of RAS Alert activity for recalling and deepening knowledge (TVD 2007).

(2009), an Australian educational consultant and author, describes a RAS Alert as a safety mechanism in our brain that helps us survive by filtering out other events in a stressful situation, so we can concentrate on the emergency at hand. Used in the classroom, he believes it is useful as a 'warm-up' to focus the mind on the topic under discussion. According to the Lead EE teacher (personal communication, 12 May 2008 and Teacher interview), activities such as the 'double bubble', 'noisy round robin' and 'tournament prioritiser' enabled students at different levels of understanding to participate equally but at different levels (see Figures 3.6, p. 92; 4.20 and 4.21). The more experienced students searched out deeper understanding while the newer members gained a base understanding of the project. The Lead EE teacher explained, "We have to be quite creative about how we share information from year to year and thinking skills have done that for me" (Teacher interview). She elaborated as follows:

...they [existing working party members] were the mentors, they were the knowledge basket. These new people knew a little bit about it, but they didn't know enough to carry on, so they would have targeted questions that they would have to think about while the students were presenting. For instance 'what is the evidence of student planning?', which is one of the key ones. Or 'what decisions did the students make during this process?' or 'what environmentally friendly features can you note that the students have said they want this eco classroom to have?' (Teacher interview).

The Enviroschools facilitator explained how this enriched the learning process:

...all new kids have been brought up to speed right at the beginning. So part of the process is that the older kids feed into that pool of knowledge, basically giving the history and the journey to the new kids, so very quickly the new kids become familiar with the whole story. So they always start from where the idea started from and work through and I think that's a really, really important part of each of the phases we have seen. ... That pool of knowledge which is being passed on and shared and then added to, and passed on and shared... (Enviroschools facilitator interview).

Students seemed clearly aware of their role in this regard and generally coped well with the need to 'back-pedal', although one voiced mild frustration because she wanted to hasten closing the knowledge gap, as she described:

At the start of the elective, because we knew more than everyone else and we had to do this time line thing and we couldn't help the people to make decisions in it. And I got really annoyed because I wanted to help them (Focus group 2).



Figure 4.22: Mosaic plaque has been made with the eco-classroom's new name (Dec 2009).

Reflection was also used to ensure democracy of student input in the project by reflecting back on what previous groups had done or wanted included in the design (see Section 4.4.6).

Working with the long-term nature of the process also led to synergies, for example where siblings from a family became involved in the project and reinforced each other's environmental sustainability understanding and advocacy within a household. One student said:

... well my family quite has changed. Like my brother he was in this project before me and I didn't really understand what he went on about when he came home but now that I'm in the project too I realise all these things that he's talking about so with me and my brother it's making our family better (Focus group 1).

The architect felt this way of managing the project in such a positive process-focused way had rich connections to traditional ways of learning. He pointed out the similarities between this method and the traditional concept of apprenticeships or passing on information within families or tribes, saying, "If you think of communities and societies in the past, those kids would have been learning on the job. Building their *whares* (traditional *Maori* house), *tepee* ... So I think that every time a building goes into a school ... the kids should be part of that process" (Architect interview). Furthermore, he went on to link the long-term aspect of the project to the historical necessity of long-term community commitment, and the essentiality of the teacher in co-ordination:

I think it's been cunning, it's been really, really well done... In the old days when you build a cathedral over 100 years in the 13th century ... it's a community exercise and you are passing on that knowledge and enthusiasm as a main drive from one generation to the next. In some ways that is what they are doing here. ... I think that side of it is really interesting and to keep that enthusiasm ... and that vision going is obviously a testament to their teacher. If she wasn't there then you would lose the continuity which is really important (Architect interview).

Connected to this is the way of regarding the project as on-going, both for monitoring and further projects that will engage students and the community. As the teacher described, "the children always thought of it as a living monitoring place that they can learn from continually ... and other schools and the community can use" (Teacher interview). Students have named the eco-classroom 'The Living Room' (see Figure 4.22) and as a student explained, "... we're hoping to monitor the weather and how we can live sustainably" (Focus group 1). The architect also likened this continuity of purpose to a church, cathedral or *whare*, as a place of meaning and dynamism.

The long-term nature of the project enabled more involvement across the school community, e.g. students, teachers and parents. The Lead EE teacher explained how important it was to move slowly and ensure good communication with this immediate community:

... we did it in steps ... over two years we informed our local community and we sought out experts in our local community and then with our Green Lunch we took it to the wider community. ... I think that our process made the local community feel empowered and it has also brought on board ... people who want to help, people that see 'oh I can see this is something I can get my teeth in, this is my passion as well' ... It was purposely sought just to do it in stages like that ... [To avoid] people out there knowing things before our community had an opportunity to know things, and that included our local *iwi* group as well (Teacher interview).

Other teaching staff at the school were kept informed through notices and newsletters that the students helped to produce (see Figure 1.4, p. 24). This involvement contributed to ensuring their support, which fed back into student involvement in the project, as the following example illustrates:

Last year a couple of the year 3 and 4 students in a different study had to design a club, and they were not part of my teaching at all ... They decided to make a club that would support the eco-classroom. So I thought that this is really getting out there to other people. Not just the teachers, but the actual students (Teacher interview).

The eco-classroom project was publicised nationally through television and radio but it was the personal interaction between students and the community the school sits within that many believed to be its real success. For example:

... one of the main focuses of the project is a participatory approach, so they are bringing in experts from the community as well as people from their own Board of Trustees and other teachers, volunteers, parents and people like myself. So I think that whole bringing in and working together is spreading the awareness in the wider community (Project manager interview).

4.5.4 Awareness and valuing of students' involvement

Data from all adult participants indicated their peers, families, school and wider communities held the students' involvement in the project in high esteem. For example:

The fact they have support from their families, even if its down to the fact that they are bringing their children along when they come to the presentation nights..., sitting there and watching

their children presenting. There are those sort of things which I think are really good. ... [Also] to know that they are part of a bigger thing, that this idea is valued by people wider than outside our school. Other people are thinking that this is important (Principal interview).

Results from all participants suggests a cycle of achievement, recognition and pride. The project manager spoke for the students in saying, “I think that’s a pretty amazing thing to think ‘wow we did that’. We raised all that money to build our own classroom and all these people are supporting us and think it is important” (Project manager interview). Students agreed, for example one said, “Because we’ll be helping the school. Instead of doing our work, we’ll be doing work for the school” (Focus group 2). Valuing students’ involvement in the project and their resultant learning was also evident through the way they were consulted over the design of the traditional classrooms at the school (see Sections 4.2.2 and 4.7.4).

A further way that students received recognition for their learning and achievements was via requests from other schools to visit, and this is ongoing (see Section 4.4.7). Not only were the visits tangible affirmation that the project is interesting and successful to outsiders, it also gave an opportunity for students to talk about and show what they had done, therefore deepening their knowledge and understanding:

... I can’t tell you how many schools we have had visiting - teachers or educators or whatever from other schools coming in. ... All sorts of countries have come through and it’s quite neat. They [students] host those visitors and they take them around and they are seeing that there are other people around the world that are doing or valuing this sort of thing too (Principal interview).

In return the school wants to support the students:

I am always challenged by their passion and that challenges me in turn to support them and make sure this thing works and that it does stay real and that our enviro teacher and the other parents that are really getting in behind it on the different groups are able to see a result (Principal interview).

4.5.5 Appreciation for skills of others.

The authentic and relevant context of the project and the consequent involvement of many people from the school and wider community provided an ideal opportunity for students to gain knowledge of different roles of people. The Lead EE teacher felt this included insight into the work of different professionals that have spent time with the students on the project and an

appreciation both for their skills and the time they have given to the project. She explained as follows:

I think they incredibly value what those community people are offering, whoever they may be. I think they really start to respect ... the time they are giving as well. ... I think it goes back to that building of relationships time and time again. Adults seeing kids as equals - it all goes back into those sort of circles. But I think the kids expect ... to be able to speak to them like you and I. They don't expect to be thought of as any less, which is really good (Teacher interview).

This appreciation was borne out by the students, who understood that members of the community who gave input into the eco-classroom project shared a common interest with the students in environmental sustainability, which is not necessarily felt by others, for example, "Most architects don't put environmental features on things, they just do it ordinary" (Focus group 1).

Students were especially appreciative of their teacher, e.g. "...with her helping us we've grown from when we started. We've become more confident" (Focus group 1). They were also very aware of the input of the architect, expressing they couldn't do the project without him, as one said, "...he's very important to us" (Focus group 1), another added, "He's donating quite a lot of his time" (Focus group 1), and a third noted "He knows about designing things. It would've taken us a lot longer to come up with the plans" (Focus group 1). A fourth stated, "[His] knowledge saves time and we might have sport on, so we don't really have time" (Focus group 1). The architect believed students had valued his input, saying, "...them seeing the value of a professional. I think that ability to talk with a professional, get good advice, and that discussion again. I think they have appreciated that" (Architect interview).

4.5.6 Summary of community connections fostered by the project.

These results reflect the 'active' relationship between participatory practice and community engagement.

The involvement of community led to multiple reciprocal gains. Students gained an appreciation and understanding of professional roles as well as management processes within the school and wider environment. From this they learnt skills (e.g. designing, building, research and decision-making) through a combination of hard work and fun. In the process they took some knocks, but made many more gains, as they negotiated their way through an adult world, always guided by their teacher and other very empathetic members of the community (e.g. architect, project manager, clay brick maker,

Enviroschools Facilitator, marketer, sustainable product manufacturers) who brought particular knowledge and specialist skills to the project. This 'local' focus fitted very well with the environmental sustainability aspect of the project (e.g. making bricks from local clay) and added to the relevance of the project.

Students developed an appreciation for the skills and time given by their teacher and community members involved in the project and benefited from the strong relationship-building that the project management encouraged. They also became aware that what they were involved in was something special and different – even unique. There was clear appreciation from students that both their school and the community members they worked with were not necessarily the norm in terms of belief in sustainable principles. Students' pride and confidence was boosted by the knowledge that their input was valued (by the school, families and the wider community) and the resulting feedback loop drew more students in. It also widened the circle of influence in the community and drew visitors to the school, which students learnt from (talking, guiding etc.). This further increased their skills and environmental advocacy.

The way student crossover within the project was managed to ensure continuity over the four plus years project has enabled deeper learning and an ever-increasing number of students to be involved. For example, the impact of the project was strengthened within families when siblings were involved at different times. The use of thinking skills like RAS Alert activities to recall and review past events, as well as ensuring student ideas from successive years remained included, has built a strong connection to the project and honoured principles of genuine participation. Students have felt respected and that their role was valuable. This was particularly the case for the students invited to join the Eco-Building Working Party. The working party was an effective bridging tool and the students were an important knowledge basket for others. Their learning gains from the project were lauded by all research participants. However the project clearly appeared to have touched many other students' lives, although this research did not collect data directly from any of these students.

The handing-on of skills and knowledge in this long-term project was likened to the building of cathedrals in the past where knowledge and skills were handed down with a strong family and community focus. The subsequent use and evolution of these grand buildings was also very dynamic and community driven. This analogy works well with the eco-classroom, now named 'The Living Room', since it is intended to use it like a laboratory with

ongoing monitoring of weather and performance of sustainable materials. It will also embrace community use.

The gains from the project for community members were many, which was important in order to offset the obvious time versus remuneration deficits of the project for professionals. Many experts donated large amounts of time and resources, and did so for a combination of altruistic and advertising reasons. In addition, all community members interviewed emphasised how much they had enjoyed being involved, and how impressed they were by the students' abilities within the project. The relationship-strengthening between students and the community was stressed. The following quote captures the opinion of the community members who were involved:

Great benefits to the students and everyone involved in the end. It's satisfying to be involved in a design process and a project that has that level [of participation]. Because the opportunities that come from that participat[ory aspect] and everyone contributing are really great, and much greater than if there were one or two people involved in that project. More input and different ideas and different levels of understanding ... The time really, it's just a time thing, and me being an engineer, time is quite critical. Always, well most projects, and this one has been most different. I have really enjoyed it (Project manager interview).

4.6 Knowledge and skills-based learning by students due to the project

The focus in this emerging theme is the design knowledge and skills students have developed as a result of their involvement in the project, which was identified through the original matrix for planning the data collection in this research project.

4.6.1 Development of a design dialogue

All research participant groups spoke about the clearly developed dialogue and discussion between students and design professionals, which happened both in the classroom and in the architect's office. This shaped the building design though student ideas (creative thinking and research) followed by a tempering process to reach a final design that complied with building codes & council regulations, MoE requirements and the project budget (achieved through fundraising). The architect explained it as follows:

...the work they have done has been the creative side of things. They have been able to say 'here's our ideas' ... [so] they are providing us with raw material. ... It really has been a process of recommendations. So we actually ... [do] a preliminary design. We take that back to the students, the way you would with any client and ... [equally] the client (or students in this case) would say 'here are some things that you haven't addressed or here are some things you have done and we can't see why and can you address these and explain why?' And then we've gone back and revised the design (Architect interview).

This process added to the authentic context, for example the principal explained:

They've learnt that there are a lot of aspects to the design process and a lot of consultation has to happen. ...for the children ... they quite like their here and now and get things done. So that's been quite something for them to grasp. They truly understand that ... it is a job in the real world and it has a lot of requirements on it (Principal interview).

In the focus groups, students explained how the process started with their ideas and developed into constructed elements of the eco-classroom, as one said, "There's this water thing...that was actually a student idea, a waterfall coming off the building, but instead now we have this thing going off the gutter" (Focus group 2). Students felt they were able to communicate their ideas and these would be listened to (see Figure 4.11, p. 152). For example, one said, "We had a lot to do with the design ... like we made all the suggestions but he [architect] actually put it all into the design" (Focus group 1), and another

said, “[The architect] visits with a plan and shows us and if we want to make any changes he goes back and he makes a new model or plan” (Focus group 1). Parents too were aware of the design dialogue their children engaged in. For example someone listed “... develop concept, speak with architect, new concept developed ...’ (Parent questionnaire survey).

The long-term nature has meant that students have had different design experiences and therefore learning within the project, indicating the importance of the collective learning in this project. The Lead EE teacher explained:

They [early students] got an idea how to create designs, perspectives, ... they were at the start of the briefing process with the architect. They got a really thorough understanding of that side and as we progressed through, other students who visited the architect’s office got a slightly different aspect of it (Teacher interview).

4.6.2 Understanding complexities of architecture and buildings

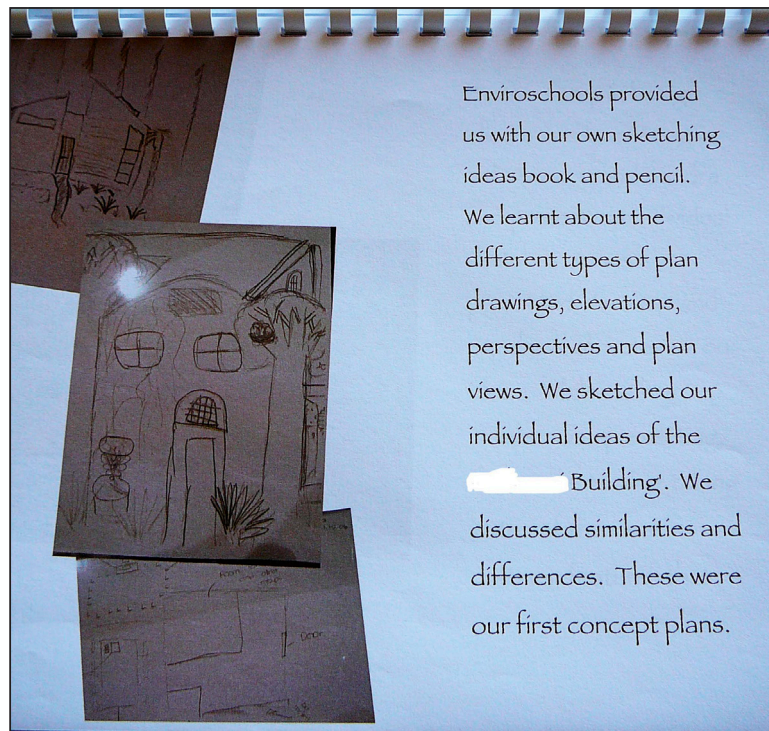
All research data groups made reference to students’ developing knowledge about architectural design and buildings, including an awareness of its complexities. For example, the architect pointed out the fundamental considerations of building design that students have had to grapple with in the project:

...the environment and sun, wind and material and accommodation and shelter and light. ... all those sorts of things they realise are part of the multifaceted nature of architecture and building and habitation, and you can see that happening. Obviously they have a lot of discussion and they do a lot of work on those things and they begin to realise the [physical] implications of the decisions they make or things they are thinking about. So that’s a really good investigative process I think. That’s what design is about, [and] ... the aesthetic side ... (Architect interview).

Another aspect of understanding the complexity of building was the authenticity of the project having to meet building standards and local council regulations. For example:

... actually having to go through that filtering process and ... developing process from a concept and revising a concept to then making it ... a bit more real in terms of codes ... I think being involved in that process has really made things real for them... (Architect interview).

The BoT member agreed, stating, “I think their involvement with key skill sets



like architecture and design has been really important ... about how human beings interface to the natural environment and the built environment ...“ (BoT member interview). As an example of students’ increased knowledge due to the project, a parent wrote, “Issues involved in building principles learnt through eco-classroom ...” (Parent questionnaire survey). Students themselves acknowledged the complexities; as one commented, “...it takes a lot of time” (Focus group 2), while another said, “...well I thought classrooms are classrooms, you can’t really do them eco-friendlier than that” (Focus group 1).

4.6.3 Drawing and spatial understanding

The development of skills in drawing and spatial awareness (see Figures 4.23 and 4.24) were a tangible result of the project and the different student groups have had plenty of opportunities over the years of the project to develop this in different ways, although as already stated (see Section 4.6.1 – Design dialogue), different student groups had different experiences of learning, depending on their stage of involvement. The architect felt students had developed an understanding of concepts of space compared with the norm at primary school:

I think they have got a very strong spatial awareness. I think one thing that is really underplayed in schools is graphical understanding and knowledge and I think having them draw things, which are real inside their heads is really important (Architect interview).

This is corroborated by student activities such as using their bodies to mark out the building footprint (see Fig 4.3, p. 128) as an exercise in spatial understanding. They also undertook a process of understanding and negotiation about potential loss of space on their school field due to the building of the eco-classroom, and how to minimise this (see Figure 3.3, p. 92).

The architect valued the drawing skills developed by students during the project, saying:

Seeing them building up knowledge about drawing and enjoying drawing and knowing it has a purpose; and understanding drawing by copying things and using drawing to understand things is really, really good. I think that it is one branch of the design process that is a really important thing ... (Architect interview).

The BoT member agreed although, coming from an engineering background, he emphasised science skills connected with materiality, saying, “Design goes through a number of professions whether it be engineering or architecture ... e.g. drawing skills, specification skills ... engineering skills and science ... it is all about properties, insulation ...” (BoT member interview). Parents also

made mention of development of skills in model-making and spatial shapes (Parent questionnaire surveys).

4.6.4 Principles and skills of environmental architecture

All research participants felt students had developed a thorough grounding of knowledge and experience in environmental architecture, which the architect expressed as, "... what I see as the value of this project. So with any [building] project in the future the environmental aspect will be fundamental to them" (Architect interview). The project manager described students' knowledge and skills acquisition as follows:

... designing for the lowest impact on the environment. I think that's one thing that they have learnt. That whole ecological footprint - why do we design a classroom that is eco? Then ... design aspects ... like orientation of the building ... they have a good grasp on that. ... And material choices, what's the value using an eco material, ... is it local? ... I believe that they have looked at trying to design a low energy building, trying to use natural light and natural ventilation and things like a fireplace rather than electricity for heating. Also I know that they have looked at the inside/outside environment; they have more of a holistic approach to not just designing a building but designing a living space that people want to move through. That includes their landscaping, they've got edible gardens, they want to have chooks and reuse resources like collecting rainwater for drinking and watering the gardens (Project manager interview).

As a major and tangible part of the project this clearly had everyone's attention and enthusiasm. This included parents who all either completely (6/10) or partly (4/10) agreed that their child's knowledge of sustainability issues had increased as a result of their involvement in the project (Parent questionnaire surveys). They listed their children's experiences for example as: "using clay for bricks", "... choice of products which affect the environment e.g. water tanks, solar panels", "Double glazing ... environmental footprint", "Positioning for maximum sun, heat, light" (Parent questionnaire surveys). This is corroborated by comments from students, including: "It's a building that's environmentally friendly and it's got a smaller carbon footprint than any other building" (Focus group 1), "I learnt lots of skills from this like evaluating and like green star ratings and stuff, but it also has ... made an effect on home, like switching off heaters" (Focus group 1), "We're also using some grey water" (Focus group 2), and "... it's going to be able to heat the pool with the solar panels" (Focus group 2). Students conducted experiments in building structures (see Figure 3.5, p. 92), insulation (see Figure 3.13, p. 96) and heating (see Figure 4.2, p. 128) to help their decision-making.



Figure 4.25: Student investigations into waste management for the project (TVD 2007).

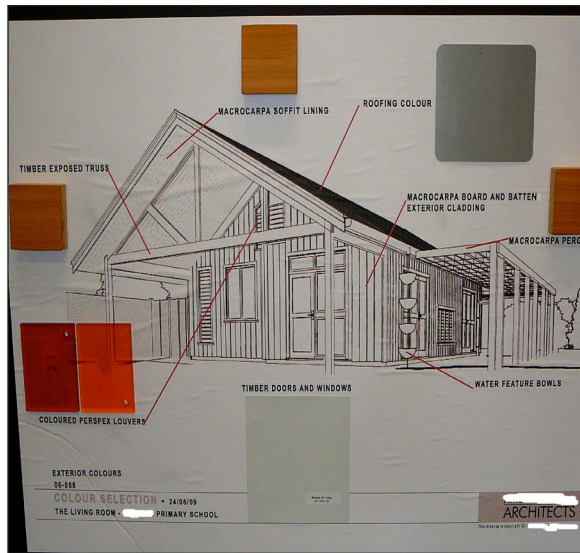


Figure 4.26: Architect's drawing of the eco-classroom external features (2009).

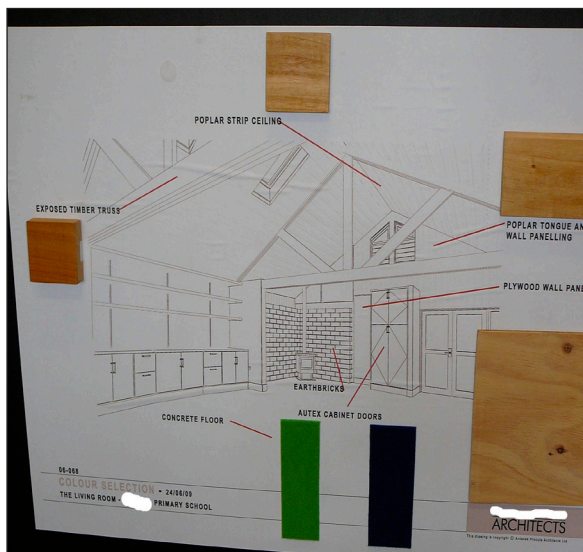


Figure 4.27: Architect's drawing of the eco-classroom internal features (2009).

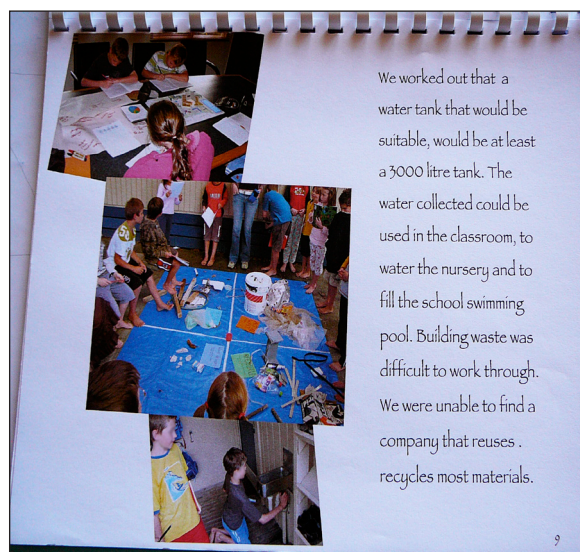


Figure 4.28: Student's carried out an activity on minimising construction waste (TVD 2007).

Sustainability principles were also well understood by students, as one said:

Sustainability is like using sustainable resources that won't run out, like the sun ... we can use it for solar heating and stuff. And like water's another sustainable resource that we can use to help ourselves survive. And like oil and stuff, it's gonna run out so it's not a sustainable resource (Focus group 1).

During the focus groups, students talked confidently about material choices, with comments such as: "[Before the project] I didn't know about all these resources that you can use... like different woods that don't rot, without chemical treatment and insulation and stuff" (Focus group 1), and "...we researched ...about solar panels and water tanks and we found some quite good ones that we'd like to use in the eco-classroom" (Focus group 1). According to the teacher:

... they had to work through the process of which one [product] would best suit our project. Also ... their choices when services haven't been available, like waste management... When the children thought someone would do the right thing, but they found there wasn't... They haven't compromised sustainability in any way though. ... but they can make choices within sustainability like the timber they have chosen (Teacher interview).

The comment about finding a lack of expected services is illustrated by Figure 4.25, from the teacher's visual diaries. As a result of student research *Cupressus macrocarpa* was chosen for framing (see Figure 4.26) because it does not require chemical treatment, and a pellet fire was determined to be more efficient than a heat pump for inside, especially when backed by a heat-storing clay brick wall (see Figure 4.27).

In addition, the project enabled very thorough coverage of sustainable principles, as applied to the building industry. For example, during the preparation of tender documents for construction, the project manager said "... so one thing we are working on at the moment is ... how the children can be involved in the monitoring process [to do with] minimising waste to landfill from the site (Project manager interview) (see Figure 4.28).

As also mentioned in Section 4.5.3 (Long-term nature), far from being regarded as a project that will end once constructed, students have designed the eco-classroom to be dynamic. As a result, different insulation materials were chosen (wine bottles and pumice as well as traditional polystyrene) to be laid under different parts of the concrete floor (dark coloured for heat-absorbency and partly recycled), with viewing windows and measuring



Figure 4.29: Student motto for the project is a word play from a television advertisement (Dec 2009).

equipment to enable comparison (see Figures 1.2 and 1.3, p. 24).

Students also had some awareness of the trade-off between sustainability and economics, as one said, “It’s an enviro-building and it’ll save money over time, because it may cost double the amount of a normal classroom but over time it will be saving us more money” (Focus group 1). However, the BoT member felt this still had a way to go:

Yes there is a broader understanding there. I think the kids have changed ... [but] I don’t think it’s finished. I think that the learning so far has been towards environmental sustainability and not towards the judgement of economic and social sustainability. ... From my pragmatic engineering sense ... we are going to face those tradeoffs because ... we don’t have the funds that the building is going to cost (BoT member interview).

4.6.5 Transference of creative skills to other areas

Several research participants mentioned the potential transference of creative or design skills to other areas of learning. For example, the principal said, “they ... have had to test different things and they might not have worked. ... That in itself is enough without even thinking about the transference of those skills to other things” (Principal interview) (e.g. see Figures 3.13, p.96 and 4.2, p.128). When asked whether he thought there was any value in primary school students learning about design, the BoT member said, “I think design is part of thinking skills ... Creative thinking and thinking differently, innovative thinking ...” (BoT member interview). The architect agreed, saying, “Yes I think it’s brilliant ...” and when asked if he felt they might look differently at things in the future he said: “The way they *will* look at things. There is no might about it I think” (Architect interview). This indicates a belief in a connection between following a design process and development of thinking skills.

Specific questions about design thinking (e.g. visually, spatially, functionally, aesthetically or structurally) were not asked during the focus groups (since it was not thought students would understand these concepts), but students did give some evidence of creative transference, for example, proposing candlelit dinners as a power-saving device and incorporating humour into development of a motto to market the eco-classroom project. This is ‘Green is Good’, from the recent Mitre 10 advertisements saying ‘Big is Good’ (see Figure 4.29).

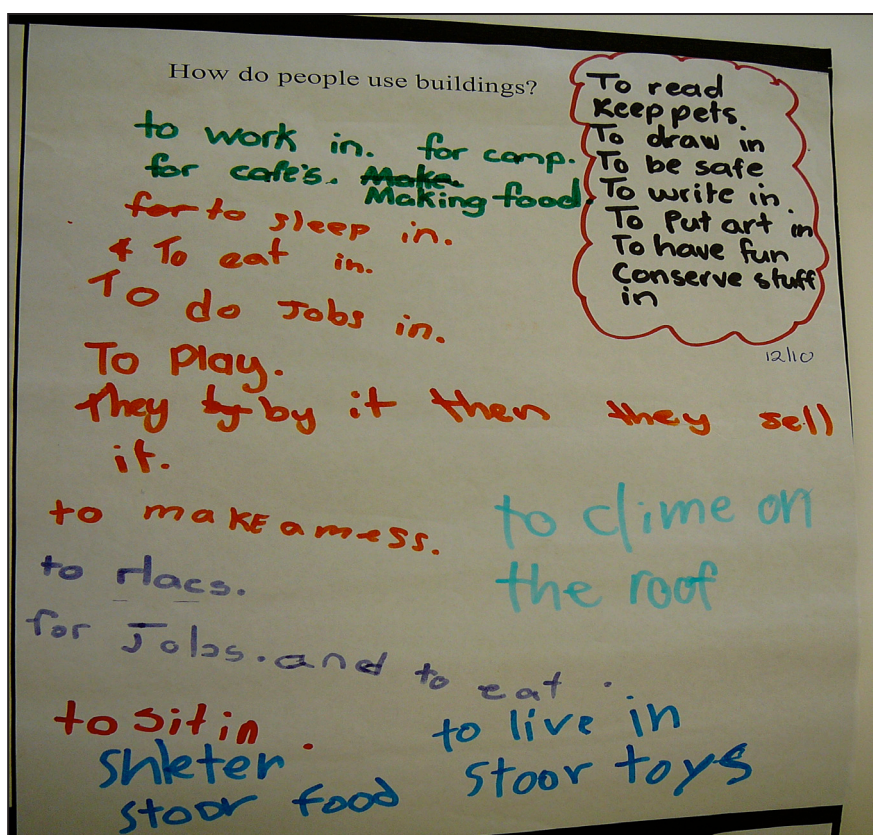


Figure 4.30: Students explored possible building use (TVD 2005).

4.6.6 Summary of knowledge and skills-based learning by students due to the project

Students developed a wide range of knowledge and skills relevant to architecture and sustainable building design. The exact nature of these depended on the stage of the project when individual students were involved, which highlights the importance of collective learning in this project. A clearly established dialogue existed between students and design professionals, facilitated by the Lead EE teacher, with students providing creative ideas and doing research, and the architect's team taking these ideas and generating concepts, models and detail drawings. These were always fed-back to students for review and returned to the architects for change. As part of this process students visited the architectural offices to see how the work was done. Student drawings were also used as part of the process and students conducted practical experiments to help with spatial awareness, building structures and application of sustainable principles. Later in the process, with the project manager, students investigated environmentally sustainable material options, e.g. timbers, insulation materials.

Students also gained an understanding about buildings and human habitation and applied fundamental considerations of building design to the eco-classroom project, such as light, orientation, wind, aesthetics. The complexity of human shelter and the process towards it was understood (see Figures 3.1, p. 92 and 4.30). There was acknowledgement of the great potential for the creative and other skills developed by students in this project to be transferred to other areas and learning endeavours in a positive way.

Perhaps most significantly mentioned by research participants was the increase in environmentally sustainable knowledge and skills, particularly to do with environmental architecture. This knowledge basket included depth, breadth and time, with the eco-classroom intended to continue to be a learning resource that welcomes the whole community.

4.7 Attitude and value-based learning by students due to the project

As distinct from gains in knowledge and skills, the feelings people develop have important influences on learning through the shaping of attitudes and values (affective or emotional learning). Being an EfS-based project, the intention to influence attitudes and values in the eco-classroom project was an important rationale because of the acknowledged link with behaviour changes towards the environment. The following exemplars of this emerging theme from the data focus on affective changes due to the design and environmental sustainability aspects of the eco-classroom project, coupled with the community connections fostered. It should be noted that six out of ten parents surveyed (Parent questionnaire surveys) believed their children's attitudes to have changed as a result of their involvement in the eco-classroom project (the other three either partly agreed, were unsure or disagreed because they already believed their child to have strong sustainability attitudes).

4.7.1 Design perseverance and awareness

A number of participants highlighted the willingness of students to take on responsibility, understand decision-making implications and show perseverance during the design process. For example, one parent commended students on their, "Perseverance and commitment – this has been a long term project without any tangible building yet but the children remain committed and enthusiastic" (Parent questionnaire survey). The architect felt that students began to develop an awareness and empathy of the design process they were going through, for example, "... they begin to realise the implications of the decisions they make or things they are thinking about" (Architect interview). The project manager agreed, and the Enviroschools facilitator emphasised the important role of the working party in this regard, saying:

...once that student working party was set up and they started to understand, and that they held that role of responsibility for nurturing that vision and carrying it through for the rest of the school, then yes they recognised it was part of something quite special (Enviroschools facilitator).

The principal was especially impressed at the determination of the students, saying, "... they are really good because they don't get disheartened" (Principal interview). In addition, he felt in awe of the confidence they had developed and the way they conducted themselves:

The confidence that they have got to have an idea, to try it, to think around things if things haven't worked, to believe it, to sell it to other people, to get them on board, to develop perseverance

to carry it through, past a few knocks, to keep coming back and retesting - that's incredible (Principal interview).

In the focus groups students provided evidence of design perseverance, for example: "You've got to find out information before ..." (Focus group 2), "I had to call up all these places and I kept being transferred. I felt annoyed because it took longer than I expected" (Focus group 2), and, "We're also making all the choices and ... making decisions" (Focus group 1).

4.7.2 Part of a design decision-making team

There is no doubt that all participants believed the students were an active and integral part of the design team, although the most important people to feel this were the students themselves. During the focus groups there were a number of comments made that show how integral they felt to the design process. For example someone said, "Before they make the final decision, they check with us so I think that's really good" (Focus group 1), while another said, "We make everything happen apart from like the building, but we will contribute to that" (Focus group 1).

Parents were enthusiastic about their children's role, for example a parent highlighted, "Sharing of ideas ... to be in a group where there is so much creativity" (Parent questionnaire survey). Design professionals believed the participatory team approach with the students was authentic, for example the project manager said, "... the architect's ... talked them through the design decision-making process" (Project manager interview). School staff agreed, with the Lead EE teacher expressing how confident students felt in expressing their feelings when giving feedback, for example:

They were critical of the plans when they came out. They weren't just willing to accept things if they weren't on there. They wanted to know why and see if the reasoning was acceptable or not. There was always student representation at any design meetings (Teacher interview).

The authenticity of the students' involvement in the design process was dependent on the professionals involved and the facilitation by the Lead EE teacher and others (e.g. EnviroSchools Facilitator). Support from the principal was important too. Trust was an essential part of this, which the Lead EE teacher described as, "they have to have faith in the people working with them ... [the architect and project manager] made sure [they] understood the plans, they explained things to them ... [so they] really felt involved (Teacher interview).



Figure 4.31: Cultural meaning-making - kapa haka group at the opening ceremony. (Dec. 2009).



Figure 4.32: Students representing past, present & future cut the flax ribbon (Dec. 2009)



Figure 4.33: Students from the current EcoBWP bury a time capsule at opening (Dec. 2009).

4.7.3 On-going connection with place and building

This project was clearly about connections between people as a collaborative process and between people and places as a space and meaning-making process (see Figure 4.31). The architect strongly believed in this connection and its maintenance, saying:

Because they have finished at the school they shouldn't be out of the project to my mind. They should actually carry on because they had an emotional tie, and buildings and creating things are an emotional issue. People have put a lot into it. I think it would be really important and neat for those kids to actually have an ongoing relationship (Architect interview).

This connects well to an earlier comment by the architect (Section 4.5.3 – Long-term nature) about the historical embeddedness of communities in their significant buildings.

Comments from the students indicated that they have put a lot of themselves into the project and feel great pride and ownership in it, especially due to it being 'a New Zealand first'. The principal felt strongly that the school community should continue to include past students, especially ones involved in a project such as this, saying:

Last year ... some of them were ones that had been with us for quite a while and we presented them with special medals ... the ones that graduated from school. We will definitely invite them back as part of the process. Some of them have brothers and sisters here anyway so it's a family thing. So we will definitely make it a must ... [that] they can continue to participate. It's just a given really. ... we try to develop that in the school when we can have role models come back and be involved in some way (Principal interview).

Associated with this is the greater care and respect the project manager believed students are likely to accord the building due to their involvement in it, and its better fit to their needs:

...if they have had some ownership they are more likely to look after it and enjoy it and use it. And if they are involved with the design process as well, it's going to be something that they want rather than something that you might want or adults might want (Project manager interview).

At the end of 2009, phase one of the eco-classroom opened and the celebration included all students, staff and community members connected with the project, a ribbon-cutting by students representing the past, present and future of the project (see Figure 4.32), and the burying of a time capsule by present students (see Figure 4.33).

4.7.4 Potential influence on future environmental decisions and career choice

Although it is impossible to say with any certainty what effect the project may have on students' future environmental decisions or behaviour, it is important to discuss what emerged from the data in this regard, because of the EfS mandate of changing environmental behaviour in people through learning transformations.

Adult participants unanimously agreed the democratic, authentic and long-term nature of the project was a significant contributor to any potential future influences of the project on students' lives. For example, the architect said:

...the intensity of their involvement in a real project of this nature is that ... whatever they end up doing in their adult life, they have a really good foundation of environmental architecture. That's been very important to me and ... I see as the value of this project (Architect interview).

The Enviroschools facilitator felt that it gave students a future advantage to have this knowledge, attitude and way of thinking, saying:

Kids need to be thinking outside the square now because there are going to be lots of issues about managing resources & lifestyles and just being able to eat and live healthily. I think the kids that are having these opportunities to develop that sort of thing at school, they'll have a head start on kids that don't (Enviroschools facilitator).

The BoT member described it as, "... an absolute experience that they will remember for the rest of their lives" (BoT member interview).

All students in the focus groups believed that it had already changed their lives, for example, someone said, "I've learnt to be more confident and how I use ... power and how I look after the environment ..." (Focus group 1), while another added, "It has made a really big difference in my life. Nowadays ... I say 'mum can we get more energy efficient lightbulbs?'" (Focus group 2). Two students felt environmental education was essential compared to other school-based learning. For example one said: "We don't die if we can't read or write ... but global warming? (Focus group 2).

Other adult participants felt that it gave students valuable insight into a possible career path, for example the lead EE teacher stated:

I think any opportunity we can offer them at school that gives them (a) a life-long learning opportunity and (b) ... an interest in an area ... they might go into as a career at a later stage, is



Figure 4.34: Everyone associated with the project was invited to the opening (Dec. 2009).

surely why we are teaching (Teacher interview).

A parent agreed, saying, "...I think this may lead to interest in design or architecture in the future" (Parent questionnaire survey). The project manager concurred, saying, "there will definitely be a few little [future] architects in the room, or engineers" (Project manager interview). Statements from students such as, "I've become all architecty" and, "I became inspired by that" (Focus group 2) give an indication the project connected with them emotionally. In Focus group 2, there was enthusiastic agreement from all six participants about how their new knowledge about environmental architecture from this project was able to influence the construction of the traditional classrooms recently built at the school (see Section 4.2.2 and 4.5.4). This endorsement reinforced to students the ongoing usefulness and valuing by others of their learning in this project.

In the focus groups, students expressed interest in taking their knowledge, experience and confidence as environmental sustainability advocates on to their next schools. For example, in both groups there was discussion that the local intermediate, where many students will move to, is not very environmentally focused. The majority of the students felt they would want to be involved in EfS projects at their next school, for example, "Wherever I go [to intermediate] I hope that if they don't already have ... any plans for the environment, I'd like to step up and give them an extra hand ..." (Focus group 1). Some students however were concerned that it couldn't match their current experience, as one said, "If there was one just started I'd ... definitely join but ... whatever it is, it's probably not going to be as good as the eco-building" (Focus group 1). The following student's concern seemed typical of the group, "We've got so many teachers who are so passionate [about the environment], but I think a lot of other places the teachers are thinking our kids are more grown up now so they're not willing to do it..." (Focus group 1). This signals their uncertainty about the future compared to their empowerment in their current school.

4.7.5 Summary of attitude and value-based learning by students due to the project

Students developed a strong ethic of perseverance during the design process for the eco-classroom and became aware of the consequences and implications of their decision-making. They felt a strong part of the design decision-making process due to efforts by adults they worked with to ensure they fully understood and were involved. Students therefore had faith and trust in these people which enabled them to feel confident enough to relax and contribute fully and freely. As a result the on-going connection they feel to the building is likely to be strong (see Figure 4.34) and their on-going use and care



Figure 4.35: Inside the eco-classroom on opening day, with adult stakeholders (Dec. 2009).

of the building should be positive. Their ongoing connection and involvement in The Living Room is fully supported by the school community and there are indications that other stakeholders from the community will also remain connected (see Figure 4.35).

The attitudes and values that the project has shaped in students are a pivotal part of the rationale for both the project itself and this research. It is clear from the data that the project has touched the lives of the students profoundly and the experience will not be forgotten. There is good indication that this may influence later career choices and is likely to influence future environmental decision-making. For example, there was indication that they wanted to take their eco-classroom experiences onto their next school. However more research is needed to verify this, by collecting data some years on.

4.8 Summary of findings

Initial development of a matrix (see Section 3.5) comprising key aspects of this research project has meant a consistent layered approach to data analysis has been applied throughout. Combining this with a mixed method of data gathering that focused on participants' experiences of the eco-classroom project via a strong emphasis of narrative inquiry and, in keeping with this project, a democratic approach by including students and adult stakeholders in the data set, has enabled a rich array of data to be coded and analysed. This has resulted in a number of strong emerging themes about student learning and other outcomes due to the eco-classroom project. These relate closely to the key aspects of the project, as identified in the original matrix, but are more synthesised and integrated through the analysis process.

Each emerging theme is supported by a number of exemplars that highlight the diversity of learning as a result of the project. There is also an interconnectedness running through the different exemplars, supported by, but not constrained by, the grouping of the emerging themes into 'passive' (setting the scene), 'active' (defining the learning and relationships) and 'applied' (integration as outcomes) aspects of the eco-classroom project. In fact, based on the data presented here there is fluidity between all these aspects of the project, rather than a hierarchy. While recognising these connections as being a hallmark of the integrated or embedded nature of learning and experiences in the eco-classroom project, it is most convenient to summarise the key findings from this chapter under each emerging theme, while pointing to other connections.

4.8.1 Aspects attributed to the nature of the project (passive)

The flexible and multi-disciplinary nature of EfS coupled with its embeddedness in the philosophy (e.g. via the *School Charter*) of the study school set the early context for the eco-classroom project as being inclusive of people and learning potential. Having the support of school management, especially the principal, was critical to the success of the project because it made it self-sustaining in terms of future environmental decisions at the school and the subsequent reinforcement of learning for students, through school staff 'walking the talk'. To this was added the power of authenticity – a 'real life' EfS project that focused on action-taking and engaged students in the design and build of a structure built to commercial regulatory codes. Adult research participants unanimously agreed it was good for students to experience the more onerous aspects of the project, however adults, especially the architect,

bore the brunt of decision-making that was sometimes difficult, such as feeling they were dashing students' ideas. The architect also felt this, and the issue of time, had compromised the final design in terms of capturing more overtly, the 'look' of being designed by children.

4.8.2 Aspects brought by students to the project (passive)

The holistic involvement of students in the eco-classroom project brought a unique freshness and functionality to the design process and the resulting structure as well as the benefit of their differing experience and perspectives. This conflicted slightly with the architect's view (in the section above) that children's design aesthetics had been compromised by the necessary 'tempering' process to get regulatory approval to build. From a research perspective it was also acknowledged that the students participating in the focus groups were selected as being students who were perhaps more environmentally empathetic than other students at the school.

4.8.3 Participatory aspects fostered by the project (active)

As with the focus on EfS principles at the study school, principles and practice of participation were embraced by the principal and school management, also through the School Charter. This was a good match with the Enviroschools Programme (through the adoption of a 'whole school' approach) that the school had joined, which was the impetus for the eco-classroom project. The Lead EE teacher also felt well supported by the learning approach of the Enviroschools Programme, especially the Action Learning Cycle and tools for developing thinking skills (e.g. RAS Alert activities). However, even with the considerable support and resources of the school management and the Enviroschools Programme it was unanimously acknowledged that staff with passion, commitment, knowledge and skills were needed within the school to act as role models and facilitators in a project like this, especially given its long-term nature. This was extended also to the critical selection of the right type (i.e. personalities and values) of professionals to match with a project of this nature.

There was no question from all participants about the students' capability to contribute fully to the project. From this position of feeling there was adult belief in their ability and a commitment to listen, students' learning flourished through full engagement in what they felt to be 'their project'. A focus on fun that was linked to learning engaged students fully, especially in the hands-on aspects of the project. Ownership led to empowerment, demonstrated, for

example, as development of skills of advocacy in environmental sustainability by students. Students were clear that the participatory or democratic aspect of the project was 'the best' and in turn it led them to develop cross-disciplinary 'life skills' such as teamwork, public speaking and leadership roles.

4.8.4 Community connections fostered by the project (active)

The strong community aspect of the eco-classroom project contributed significantly to its authenticity and relevance to students through connecting students meaningfully to their wider community and its many processes, occupations and perspectives; while determinedly staying 'local'. This fitted well with the environmental sustainability focus of the project (i.e. staying local to reduce impact on the environment) and the positive feedback students received from acknowledgement and support of the community, endorsed their behaviour. In return all community members interviewed indicated that gains from the project were reciprocal, i.e. not just about student learning.

Of significance in this emerging theme is the way the project was managed long-term; a situation necessitated by the learning imperative of the project and the commitment to a democratic process involving students. Because of this there was a focus on process and the long time frame and subsequent turnover of students was regarded as an opportunity (rather than an obstacle) for both deeper learning as well as widening the sphere of involvement in the project, as existing students inducted new students into the project. One community member likened this to the way massive building projects within communities were effected historically, and drew similarities between 'The Living Room', as the eco-classroom has been named, and the ongoing significance and dynamism of such structures e.g. town halls and cathedrals. The long-term nature of the project also made it more meaningful, especially when it made connections across families, giving greater traction to sustainability understanding and advocacy.

4.8.5 Knowledge and skills-based learning by students due to the project (applied)

Students worked on the project through a series of 'electives' they could choose, with continuity provided by the Eco-building Working Party (EcoBWP) who met at lunchtimes and were very actively involved in decision-making, taking on leadership roles, preparing and giving presentations, and conducting research outside of the electives.

As part of the learning students conducted experiments to test ideas and developed a dialogue with design professionals regarding a design process

towards design and construction of 'The Living Room'; aptly named because it is intended to be used as an ongoing EfS laboratory and to host community groups. A key aspect of the learning in the project was principles and practices of sustainable architecture. Students experience and learning in the project was intended to be as holistic as possible, with specific content being dependent on the stage of the project a student was involved with. This focuses importance on the collective learning within the project, as well as learning of individuals. Every effort was made throughout to honour the democratic aspect of the project, with students involved in all decision-making processes and a system of reflection used to continually 'fold-in' previous students ideas and work. This helped maintain integrity through the nearly four and a half years process of the project. The architect and project manager worked closely with the students, advising and consulting as decisions and changes were made. Students were encouraged to be part of the artistic and creative aspects of the project and they learnt some representational skills, although the architect did the final drawings. Students were also actively involved in research and specification of materials, waste minimisation on the building site and aspects of construction such as making mud bricks, pre-wiring, filling gabion baskets and laying insulation.

4.8.6 Attitude and values-based learning by students due to the project (applied)

The on-going commitment by adults involved with the eco-classroom project to maintain democracy, instilled trust and confidence in students and led to empowerment, which is likely to increase for them the meaningfulness and custodianship of 'The Living Room'. This was clearly in evidence at the opening, to which all past students and involved parties were invited. In addition, the evidence to students that their work was making an environmentally sustainable difference in other areas of school management (e.g. design of other classrooms) helped endorse their sustainable learning and hopefully perpetuate behaviour changes towards the environment.

There was also some evidence of future influence on career decisions (e.g. architecture or engineering) and interest was shown towards future projects in other schools. Clearly the project has been influential in students' lives and although the future is unknown, it would seem likely that their experience with the eco-classroom project will impact on future environmental decision-making, which was the purpose of the project.

The final chapter of this thesis discusses these findings with respect to the literature review and research question, and draws conclusions and implications for future consideration.

5 Discussion and Conclusions

5.1 Introduction

This thesis has been based on an analysis of outcomes from the eco-classroom project, with the following research question:

In the eco-classroom project what are the student learning and other outcomes of an education for sustainability co-design and co-building process within a school?

As described in Chapter 3, analysis of student learning was conducted under the three components – cognitive, psychomotor and affective domains. Additionally, learning and other outcomes were considered within the four key aspects of the project – the issue of education for sustainability, the method of participatory practice, the process of design, and the development of community partnerships.

There were some further sub-questions, of particular interest to the Enviroschools Foundation, which were introduced in Section 1.3. These will also be addressed through the course of this chapter.

The connection between findings from this research (Chapter 4), and the literature review (Chapter 2) is discussed in light of the main research question. In doing this I follow the layout of the previous chapter summary, although as indicated there, the project had a high degree of connectivity between areas; a fluidity that was initially encouraged by the setting up of a data gathering matrix for this research. Therefore the choice of particular emerging themes as a place to situate different information should be regarded as inclusive, not exclusive, to which attention is drawn throughout this chapter.

5.2 Aspects attributed to the nature of the project (passive)

The ‘real-life’ nature of the eco-classroom project incorporated an actual design and build project, for construction to regulatory standards. It was therefore authentic in terms of student learning about the process of ‘green’ or low impact (i.e. environmentally sensitive) building design and construction. In my research the authentic aspect of the project was the most frequently mentioned aspect by all research participants, with findings indicating that it exposed students to a wealth of experiences and learning that were in turn made meaningful by the authenticity of the project. Because of this students felt they had made a very significant contribution both to the school and environmental sustainability. Alongside the participatory aspect (see Section 5.4) it was a fundamental connection linking my results, in terms of student

learning.

Within significant life experience (SLE) research, Chawla and Cushing (2007) emphasise the importance of 'real' projects with political aspects (such as working within a regulatory building framework would require). This also sits well with Jensen & Schnack's (1997) proposal of action competence, the development of which requires environmental education (EE) projects that have an action-taking focus, alongside knowledge, commitment and vision. This equates to a project 'for' the environment, which can be interpreted as a 'real-life' example that engages people in the affective domain (i.e. attitudes and values). Fien and Greenall Gough (1996) suggest that an action-oriented teaching and learning approach implies an attitude and values change, which is viewed as having greater potential of leading to learning transformations. As a result this is more likely to lead to permanent behaviour changes with regard to the environment. Reiterating this in relation to the contemporary shift from EE to education for sustainability (EfS), Mogensen and Schnack (2010) emphasise that viewing EfS with an action competence lens shifts focus from isolated facts and skills to dealing holistically with real situations that embrace collective learning both within students and the school. This takes EfS learning into a far more empowering realm (Laessoe, 2010) than the traditional science or transmissive approach, as criticised by Tilbury (1995), while avoiding the moralistic stance alluded to by Littledyke (2004). My findings indicated that the eco-classroom project, through the embedding of EfS and participation within the *School Charter* ([School name], 2009), and its strong association with the EnviroSchools Programme (Mardon et al., 2005), and therefore practice of a 'whole school' approach (see Section 5.4), exemplified Mogensen and Schnack's (2010) collective learning, especially due to strong support by an empathetic school management. An example is the way the content of student learning varied depending on the stage of the project they were involved with. As a result students gained value from their individual learning as well as benefiting from the collective learning that accrued over time and led ultimately to the design and construction of the eco-classroom.

Findings identified that the principal was very committed to the eco-classroom project, and practiced a devolved management system that empowered teachers to pursue interest areas such as particular EfS projects. This is significant because, as Woollorton (2004) pointed out, principals wield considerable power and influence in schools. Therefore without their support, a project the scale of the eco-classroom could not happen. In New Zealand schools the Board of Trustees is equally important and a significant aspect for this project was therefore the fact that EfS was fully supported by the spectrum of school management.

The authentic aspect of the eco-classroom project was accompanied by a genuine follow-through of sustainable principles to other aspects of the school, in a way that endorsed the learning in this project. This was also linked to the embeddedness of EfS principles in the school management, via the *Charter*. The principal was committed to ‘walking the talk’, which he demonstrated when he consulted with students over the building of a traditional classroom at the school. This sent a clear message to students that their knowledge and capabilities were acknowledged and valued, which connects strongly to the participatory aspects of the project. In contrast, in his manual on youth participation, Driskell (2002) highlighted that a key barrier to participation is adults not believing in children’s capability, something echoed by Iltus and Hart (1995) with particular reference to co-design projects. Findings from the eco-classroom project indicate that an important manifestation of adults believing in students’ abilities was adults being prepared to listen; something the principal said more than once during his interview. Freeman et al. (1999) pointed out that true listening to children in a way that leads to their empowerment through ownership in a co-design situation, is something design practitioners often don’t understand. This can be contrasted with my findings regarding the relationship between the design professionals and students in the eco-classroom project, as discussed in Section 5.4.

Early on in the current environmental movement (post 1960s), global documents such as the *Belgrade Charter* (UNESCO-UNEP, 1975) and *Agenda 21* (UNESCO, 1992) established not only the essentiality of environmental education, but also its multidisciplinary nature. Findings clearly indicated the authentic nature of the project afforded many and rich opportunities for students to benefit in this way (e.g. integrating maths, science, art and reading). In terms of the national *Curriculum* (Ministry of Education, 2007), the findings from the eco-classroom project provide evidence that action-taking EfS projects can integrate learning from other disciplines, including areas such as reading and writing that are currently receiving special attention by the government. This is in agreement with both Law (2004) and Chapman and Eames (2007),

One of the sub-questions in my research asked: “How important was cross-disciplinary learning in the project?” and, as noted in Section 5.2, both the authentic and participatory aspects of the eco-classroom project led to the development of cross-disciplinary ‘life skills’ in students. Particularly strongly mentioned by all research participants were communication and public speaking skills, but teamwork, interviewing, research and leadership were also highlighted. Sorrell and Sorrell (2005), who have set up multiple co-design projects at schools in the United Kingdom, agree, and my experience of seeing members of the Eco Building Working Party (EcoBWP) make presentations

and guide visitors, is that they are extremely confident and articulate for their age. The architect and Lead EE teacher were especially impressed by the way two of the EcoBWP astutely managed the interview process for the project manager. These findings further confirm both the multidisciplinary and cross-disciplinary learning potential of EfS projects.

Within the authenticity of the eco-classroom project it was felt, especially by parents and school-based adult research participants, to be invaluable for students to experience the labyrinth of adult processes, such as the tempering process to get building consent and Ministry of Education (MoE) approval. However the contradiction to this was the lament by the architect that the final 'look' of the building did not overtly reflect the creative quirkiness of 'child-design'. This indicates interest within the design fraternity to experiment and enable un-tempered creativity to shine through in the finished building, while parents and educationalists felt the important learning was students experiencing an adult tempering process, which tended to stifle creativity. This resonates with issues raised by Catling (2003) about whether we actually encourage children's original ideas or an interpretation of our own (i.e. adults), which relates strongly to participatory aspects of this project. It is suggested this complex area could be worthy of future investigation in the area of co-design projects.

The process-focused, rather than outcome-driven, management of the eco-classroom project was a product of the learning and participatory agenda within the 'real life' nature of the project and was, findings indicated, a great strength. Such a focus is widely supported by authors in my literature review (e.g. Driskell, 2002; Francis & Lorenzo, 2006; Hart, 1997), and is also recommended within an action competence approach (e.g. Breiting et al., 2005; Jensen & Schnack, 1997; Mogensen & Schnack, 2010). The success of this process-focus in the eco-classroom project, e.g. shown by the effective handing-on of knowledge between student groups, in terms of learning, can be positively contrasted with the clear importance on 'outcome' within the Building Schools for the Future (BSF) programme in the United Kingdom (e.g. den Besten et al., 2008; Wheeler, 2009a). In this regard, Wheeler (2009b) was calling for a different kind of process with students in the BSF co-design examples, which needed to be deeper and more profound in terms of EfS engagement. I recommend that an action competence approach, such as has been indicated by the management and learning in the eco-classroom project, could help to address these issues, and therefore suggest this should be considered for any BSF replacement programme. However, this would require a shift from being outcome-driven to being process-focused.

As previously mentioned, the action competence approach is a good match with the eco-classroom project in a number of ways that are linked both to the authenticity of the project and the EfS embeddedness within this project and the research school. For example, the quality criteria, based on an action competence approach, that have been developed into the guidelines of Breiting et al. (2005) are a close match with aspects of importance that this research has identified about learning in the eco-classroom project. For example, their focus on identifying participation, school management, community connections and EfS teaching and learning, which are critical components of an action competence approach. Other interpretations of criteria for action competence. Breiting et al. (2005) also explain that their quality criteria and accompanying indicators and guidelines are a response to an increased requirement to measure and evaluate EfS programmes (Mogensen & Schnack, 2010). However, they also represent a useful tool that other schools wanting to undertake similar projects to the eco-classroom, could customise.

In conclusion students gained authentic learning in the project from the 'real life' or actual nature of the project, coupled with the conformity to a regulatory framework, which resulted in a 'permitted' building. This gave a breadth of learning experiences and made them more meaningful, i.e. it took learning into the affective domain. This was then reinforced by the embedded nature of EfS in the school, via the *School Charter*, which endorsed and deepened affective learning. Feeding into this, the importance of the support of the principal and school management (including the BoT) was identified. As a consequence the school was keen to 'walk the talk' – giving students opportunities for EfS projects and learning and then backing them up, both directly (e.g. through asking their advice) and indirectly (e.g. through other projects going on in the school). This affirmed students' belief in their learning and the value of the project within the school and community. Students therefore believed they had made a significant contribution and felt valued. It is accepted that this is more likely to lead to changes in attitudes and values, and possibly therefore, a permanent change in behaviour towards the environment. As supported by the literature and endorsed by findings from the eco-classroom project, this is indicated by an action competence approach to EfS, which also has established links to significant life experience research.

My findings for the eco-classroom project point strongly towards the criticality of truly listening to students, and focusing on process, rather than outcome, which is again supported by my literature review. The multi-disciplinary nature of EfS projects is confirmed by my findings, and an important outcome is the development in students of cross-disciplinary experiences and skills uniquely gained due to this co-design project. The collective, as well as

individual nature of learning in the eco-classroom project is highlighted, which also links to an action competence approach.

5.3 Aspects brought by students to the project (passive)

In agreement with the literature (e.g. Iltus & Hart, 1995; Sorrell & Sorrell, 2005; Sutton & Kemp, 2006), findings indicated the students' input brought a different aesthetic and functionality perspective to the design arena, e.g. their use of colour and light (see Figures 4.8 and 4.9, p. 142). Acknowledging that they have different needs to adults (Francis & Lorenzo, 2002) and perceive and use spaces differently (Thomson & Philo, 2004), led to design ideas such as low windows for views and ventilation when sitting on the floor (see Figure 4.7, p. 142), which is likely to result in a more usable design for them.

While children's freedom from an adult awareness of rules and problems makes them natural designers (Koralek & Mitchell, 2005), and the project architect commented that students' ideas and different perspectives enriched the design process, my findings agreed with the literature (e.g. Chiles, 2005; Francis & Lorenzo, 2002) that children need adult assistance and expertise, for example, to turn ideas into working drawings.

The slight contradiction in this project between adults simultaneously wanting children to 'step up' into an adult world, while still expressing themselves as children through the building design, adds an interesting tension that is possibly inherent in co-design projects with children. However, being mindful of this may lead to better resolution in a later project. And while the shape of 'The Living Room' is disappointingly (to the architect) rectilinear, there is plenty of evidence of the student's ideas both inside and outside its walls.

In conclusion students were encouraged to bring their unique design needs, ideas and perspectives to the process and the resulting building reflects this, even if budget and other constraints resulted in a more traditional overall shape to the eco-classroom.

5.4 Participatory aspects fostered by the project (active)

Participatory practice aligns itself closely to the post-modern view of childhood, which regards children as capable (Clark & Moss, 2005) and full of potential (C. Edwards et al., 1993) that can be realised through co-construction with adult role models (Jordan, 2004). The importance of adult role models was originally suggested through the socio-constructivist pedagogical work of

Vygotsky (1978), as a way of scaffolding learning in a social and egalitarian context.

One of my research sub-questions was “How important were role models in the project?” While this project certainly endorsed the essentiality of role models, my findings about the eco-classroom project emphasise the importance in co-design projects of adult role models having not only technical skills, but also the attitude and disposition to gain the trust and respect of students. For example, seeing them as equals. This was particularly the case with the teaching and facilitation of the project by the Lead EE teacher and the specialist design assistance by the architect, and later the project manager. Linking this to educational practice, teachers taking the role of ‘facilitators’ is advocated by ‘emergent curriculum’ learning (Durno, 2009), which the Lead EE teacher has practiced in the eco-classroom project.

Role models are also embraced as essential within SLE research (e.g. Chawla & Cushing, 2007), childhood nature advocacy (2002), children’s participatory writing (e.g. Driskell, 2002; Hart, 1997) and within co-design projects (e.g. Newman & Thomas, 2008; Parnell et al., 2008; Webb, 2009). As well, the importance in EfS of social context (e.g. via role models) in building understanding to a higher level of engagement and political advocacy that is transformative, is linked through the concept of *Bildung* to action competence and the pedagogy of critical theory (Mogensen & Schnack, 2010). Findings in the eco-classroom project echoed this criticality of adult role-models for the following reasons: scaffolding student learning, managing and facilitating the physical process of the project with continuity and an understanding of adult processes (linking to the authentic nature of the project), and providing specialist skills and knowledge (e.g. architectural).

Some of the role models involved in the project received little mention by students during the focus groups. It is important to signal possible reasons for this. Firstly while it was acknowledged by other adult participants that the input of the project manager was significant in the eco-classroom project, the timing of data collection meant most students had not met this person when the focus groups were conducted. Another role model figure of significance in the project was the EnviroSchools Facilitator. It is suggested that the relative lack of mention by the students of this contributor is a positive reflection on the way the project was run, rather than being an oversight. The role of EnviroSchools Facilitators is to assist schools in running their own EfS projects – they are invaluable in the background rather than intending to dominate, which is supported both by my observations and the findings of this research. The principal, despite his significance, also received scant mention by students.

Other role models and practitioners from the wider community (e.g. mud brick craftspeople) were clearly influential in the eco-classroom project. An observation I made during the student focus groups was the immediacy of what students were telling me. For example the 'Green Lunch' they had just hosted was frequently mentioned. If they had not seen important role models for several weeks, it is understandable they weren't mentioned with the frequency of their teacher and major mentor.

Driskell's (2002) ideal of 'shared decision-making' is the mantra of the Enviroschools Programme; as well the programme subscribes to a 'whole school approach' of holistic participation, as described by Eames and Wilson-Hill (2010b), Shallcross and Robinson (2008), and Tilbury and Wortman (2006). Of great importance to the success of the eco-classroom project was the embeddedness of a philosophy of participatory democracy in the school, led by the principal and endorsed through the *School Charter* ([School name], 2009). A synergy therefore clearly exists between the embedded participatory philosophies of the Enviroschools Programme, that values and encourages projects like this, and the school. This is evidenced by the well-established nature of the Enviroschools Programme within the school and the Enviroschools awards the school has received, all of which stood behind the achievement of the eco-classroom project.

The Lead EE teacher lauded the Action Learning Cycle (Mardon et al., 2005) from the Enviroschools Programme (see Figure 1.1, p. 20) for encouraging learning approaches that concentrated on development of 'thinking skills' like RAS Alert activities (J. Edwards, 2007), which led to deeper and more varied learning. The Action Learning Cycle is framed by a whole school approach of democratic EfS, and loops back to the 'whole school vision map' (see Figure 4.1, p. 126) that was the seed of the eco-classroom project. In totality this describes a process of democratic action-taking in EfS, which links to the authentic nature of the eco-classroom project (Section 5.2) and suggests an action competence approach; by engaging with a vision, showing commitment, having ownership, sharing and reflecting (Jensen & Schnack, 1997). In addition, these authors emphasise democratic participation is an imperative of an action competence approach.

Reflective processes are embedded both within an action competence approach (Jensen & Schnack, 1997) and a whole school approach (Eames & Wilson-Hill, 2010b). These were strongly in evidence in the eco-classroom project, where they were used in multiple layers. For example, the Lead EE teacher extended the participatory process through a time dimension by using reflection to ensure that previous year groups' work was carried forward by

new groups, and not forgotten. She also used reflection as part of the learning process in the passing-on of knowledge within the project from one group of students to another. At a further level, it is used by school management in annually reassessing aspects of the *School Charter*. This is important in whole school approaches due to the philosophy of shared reflection (Eames & Wilson-Hill, 2010b) and as part of a *Bildung* approach of placing equal importance on the management of schools and the learning of students (Mogensen & Schnack, 2010), which is reflected in the quality criteria of Breiting et al. (2005).

Student engagement in the eco-classroom project was found to be high due to the greater autonomy and variety of learning students experienced. The control given to students and the subsequent responsibility expected in the eco-classroom project was a challenge they met admirably. This supports the call made by researchers (e.g. Barratt & Barratt Hacking, 2007; Roe, 2007) to give students more democratic opportunities to be involved in landscape or environmental projects that link to curriculum learning at school. As a result of the inclusive and democratic running of the project students were not only given ownership in the eco-classroom project by adults as per the participatory tenets espoused by Driskell (2002), Hart (1997) and the EnviroSchools programme (Mardon et al., 2005), but also developed their own project ownership as a result. The latter is exemplified by an action competence approach (Jensen & Schnack, 1997), which promotes empowerment through the emancipatory learning processes used.

A further participatory aspect of the project was that, by necessity, the brunt of design decision-making in the eco-classroom project fell to the architect, who sometimes felt he was dashing the students' ideas and creativity, in order to ensure professional indemnity. As previously mentioned (Section 5.2), he therefore felt the building was 'adult-looking' rather than 'child-inspired'. However, students did not regard this negatively (or in fact at all) and it is suggested that if co-design projects like this became more common, these issues may be able to be better managed. According to the Lead EE teacher, there was clear understanding by students of the limits of their participation, something Hill (2006) established, from children, as being important. In this regard both Francis and Lorenzo (2002) and Iltus and Hart (1995) point out the importance of not assuming children can manage the complexity of design alone. Relating to this, Mannion (2007) calls for a partnership in participation that acknowledges both children's and adults' strengths, to enable focus on the important aspects of space and place. My findings showed that the eco-classroom project did exhibit partnership participation. For example, in the way students were actively involved or kept informed in all decision-making, even extending back to previous students' ideas, although not to the extent of

expecting students to decide on things they clearly could not, such as budget-setting or requirements for building consent. With very few documented co-design projects that actually include a built structure, the findings from this research and the experience being built up by design professionals through involvement in such projects, will be invaluable.

Findings from the eco-classroom project acknowledge the importance to students of 'having fun', and the Lead EE teacher and the Enviroschools Facilitator (who both worked closely with students in the eco-classroom project) were particularly aware of the essentiality of this for heightening the learning potential and maintaining student interest in the project. The Enviroschools Programme highlights the importance of fun to learning (e.g. Mardon et al., 2005, p. 39). In addition, findings indicate it was a key experience for adults in the project, especially due to the commitment of time required. The Lead EE teacher emphasised that fun needed to go alongside learning, not instead of. In SLE research, fun elements are recommended for helping develop pro-environmental behaviour (e.g. Chawla & Cushing, 2007) and Kranzl-Nagal and Zartler (2010) identified the essentiality of fun in their research into European school-based EfS projects. Breiting et al. (2005) hint at it by advocating a process of engagement that students will enjoy, in their quality criteria guidelines. In the eco-classroom project, having fun was a powerful 'hook' into learning, as evidenced by comments (and photos) from students and adults.

The combination of engagement, ownership and fun led to increased learning in the project, and the resulting commitment and responsibility empowered students to become strong advocates for the eco-classroom project. In SLE research, Chawla and Cushing (2007) emphasise the necessity of political engagement of students in EfS projects, which is in keeping with 'real life' projects and consequent development of a feeling of making a meaningful contribution. Connected with this is feeling 'valued', which is discussed further in Section 5.7. In the eco-classroom project, advocacy was evidenced by the following: students guiding visitors around school EfS projects (including the eco-classroom), appearing on TV and radio (which students also rated as fun), wanting to start new projects at other schools, trying to change environmental behaviour within their families; and engaging with the 'politics' of environmental issues such as recognising hypocrisy, conducting trade-off negotiations over a tree, finding out waste services were inadequate, and working towards obtaining building permits from local government. An action competence approach invites engagement with these processes as evidence of authenticity, for example, Mogensen & Schnack (2010) talk about students, "transform[ing] themselves into critical, democratic and political human

beings” (p. 10), and Laessoe (2010) recommends projects that cause students to work with “... dilemmas, dissensus and deliberative communication” (p. 54).

In conclusion, the importance of role models to scaffold learning, such as by providing facilitation and specialist knowledge and skills, is emphasised unanimously in socio-constructivist pedagogy, SLE research, an action competence EfS approach, children and nature advocacy, participatory research and co-design literature. In the eco-classroom project this was also found to be the case, alongside a clear indication of the importance of having particular skills, interest and attitudes for working with children. For example, the Lead EE teacher skillfully managed the facilitation of the process, while the architect and project manager artfully guided students through a design process, always treating them as equals (e.g. as clients) and showing respect and belief in their capabilities, which was reciprocated by students.

The Enviroschools Programme, with its embrace of the participatory concept of ‘shared decision-making’ and a ‘whole school’ approach to EfS, coupled with the embeddedness of participatory processes within the study school, meant there was a solid precedent of democratic processes, which the eco-classroom project could fully capitalise on. Within this the Action Learning Cycle espoused by the Enviroschools Programme, coupled with use of thinking skills, was an effective and flexible tool used by the Lead EE teacher for lesson planning and learning within the project, which supported the participatory process being applied. The reflective processes embedded within this were used at multiple levels to achieve different things inclusively across the school, for example student learning, management of the project and general school management and planning. This is in line with an action competence approach, which recognises the importance of the management of schools to EfS learning and whose tenets include: engaging with vision, showing commitment, sharing and reflecting.

The participatory nature of the project increased student engagement, ownership, advocacy and empowerment, which are all indicated as important in the literature on SLE, action competence and participation. Through being given greater control and more variety of learning methods and materials students were engaged and challenged, especially due to the authentic nature of the project and the input of community members. Feeling valued led to them ‘stepping up’ to meet the responsibilities they were given and their ownership, and therefore commitment to the project, led to development of advocacy for their project, and environmental sustainability in general. This increased learning cyclically and led, as indicated by an action competence approach, to them grappling with a number of difficult issues. This was effected in a

partnership of participation with adult role models, which acknowledged that both parties had strengths and limitations.

In the eco-classroom project having fun through the process was a key factor in students' continued interest and commitment. While the importance of fun is indicated in SLE research and other school-based EfS projects, as well as being implicated in action competence, my research findings suggest that having fun can also be transformative.

5.5 Community connections fostered by the project (active)

From its inception the eco-classroom project sought to engage with community in a myriad of ways and on a variety of levels, from visiting the Sustainable Backyard for ideas and a cathedral for a sense of place, to fundraising and inviting eco-product retailers in to speak, and going out to practitioner's offices such as architecture and advertising. The initial idea for the eco-classroom was to create a space not only for EfS learning but also, more expansively and inclusively, for school groups and community use. The way the community input was managed in the project can be described as 'measured'. It was felt important to involve and inform them, but initially to keep the focus internal to the school. By working quietly and methodically in this way the project brought people on board slowly and the project didn't lose sight of its original intention, which was student-driven learning in EfS.

An interesting finding in this section was the reciprocity of gains between the school and the community due to the eco-classroom project, particularly so as it is one of my research sub-questions, as follows: "What outcomes were there for adult participants as a result of the project?" For adults more closely associated with the project, among my research participants several mentioned that the experience had been personally rewarding; citing experience, collegiality, learning, and awe at what the students achieved and how they managed the process. Regarding the wider community the project manager suggested that the students' enthusiasm and knowledge drew attention to the project in a way that might cause community members they met with to think and act differently. This refers to a potential transformative effect, which connects to the Board of Trustees (BoT) member referring to the eco-classroom project as a 'heart subject' – something that touches people and encourages their 'buy-in'. This can be linked to Sipos et al. (2008) renaming projects 'for' the environment as 'heart' or 'enablement' projects, in their model for transformative sustainability learning. Using children to 'tug at the heart strings' of adults has long been employed successfully by advertisers. In this

case, however, it was the students' earnest belief and impressive knowledge in what they were doing that generated the 'pull'.

As previously mentioned, of all community members involved in the project it was probably the architect who invested the most time, much of it unpaid. Other co-design projects I found in the literature all had in common the fact they were driven by passionate and socially minded people (e.g. Blundell Jones, 2005; Hubner, 2005; Sancar, 2006; Sorrell & Sorrell, 2005). Passions they had included teaching architecture to children, social justice and community building, and environmental sustainability. This was also the case with the architect for the eco-classroom project who was driven by aspirations of environmental sustainability in architecture and building (i.e. low impact design), as well as enjoying a teaching role with children. He cited the gains for him in the project as professional, as well as personal, in that being involved in the eco-classroom project may lead to future business. This could be either co-designing with children or getting further environmental architecture projects through being known as the architect on this project. The BoT member was sure that these gains were significant and would help offset the 'time costs'. Parnell et al. (2008) suggested that the specialisation of architects and other professionals involved in the BSF programme would both improve the management of future projects and help these people gain further contracts in this area.

The eco-classroom project also had a positive effect on the community in general by drawing people in with a subject both informative and meaningful. Eames & Wilson-Hill (2010b) highlight the importance of people in a whole school approach and my findings give ample evidence of the inclusivity of people in this project – both from within the school as well as the wider community. People were keen to be involved and donate time and materials. This helped to galvanise a community, especially with associated publicity around the students' activities and its fame as 'a New Zealand first'. A ripple effect was created, reaching out to more and more people and the school managed this very well with the production of a regular, informative newsletter to update other members of the school and families, and by welcoming the many visiting schools and others that wanted to see for themselves. The positive reciprocal effect within communities through involvement in projects like this is mentioned by Sutton and Kemp (2006) and singled out for important inclusion by Breiting et al. (2005) in their quality criteria guidelines for education for sustainable development (ESD) projects.

Another research sub-question was "How important was community input in the project?" Findings clearly showed the essentiality to student

learning of the community connections the project made. This was evidenced, for example, by development of: knowledge and skills through working with professionals and craftspeople, an understanding of processes and professions within the community, and personal skills from interfacing with people outside the school environment (e.g. self-confidence). Agreeing with this, Woollorton (2004) emphasised the increased transformative EfS learning gains in a school under study due to strong interaction with members from the community. Due to the embeddedness of participation in the school and the project, students expected to be treated as equals, meaning they were in a strong position to appreciate what the community could offer their learning, via the project. In turn, the democracy evident throughout the project made this a self-fulfilling prophesy - being treated as equals within the school and community set up a cycle of achievement, recognition and pride that led to a deepening of knowledge and learning. This was also linked to the advocacy roles students took on, e.g. showing visitors around the school because they were proud of their involvement and what had been achieved (see Section 5.4).

As an authentic project with an action-taking EfS focus the eco-classroom project was locally grounded, which made the experience more meaningful or relevant to students. This extended to sourcing materials locally, such as the clay for the bricks, which matched the sustainability focus of the project. A number of researchers emphasise the importance of students tackling 'local projects' for the environment that they can relate to (e.g. Chawla & Cushing, 2007), and which link strongly with the local community (e.g. Barratt & Barratt Hacking, 2007; Mogensen & Schnack, 2010). As evidenced by their confident articulation in social and formal situations with adults, students in the eco-classroom project obviously felt 'at home' due to the local flavour. This clearly increased their feeling of being in control.

Finally, a significant aspect of this emerging theme was the exemplar of the 'long-term nature of the project', which was also a sub-question of this study, as follows: "What effect did the long-term nature of the project have on participants' experience and learning?" In the eco-classroom project, in contrast to the BSF programme as described by den Besten et al. (2008) where student changeover was seen as a negative aspect of projects, the fact that the eco-classroom project spanned several years and students groups was seen as a positive challenge rather than a negative problem. According to Laessoe (2010) and Mogensen and Schnack (2010), this fits well with the concept of 'ecological modernisation', which is the dominant Northern European EfS discourse, and sees environmental issues as opportunities to learn from rather than problems to dwell on. By instigating a 'working party' system (Eco-Building Working Party), project momentum was ensured with these students acting as a 'bridge'

between elective classes, and a consistent and more experienced presence through the whole process. A system of 'peer education' (Kranzl-Nagl & Zartler, 2010) was used with the working party members inducting new students to the project, both within electives and due to half the working party being replaced annually as they moved onto Intermediate School. In agreement with Shiers (2010), this system of empowering young people to help each other, greatly increased the number of people whose lives and learning it reached. In the eco-classroom project the student community involved in the project grew, commensurate with their learning. By using thinking skills such as RAS Alert activities (Frangenheim, 2009), e.g. 'double bubble' and 'noisy round robin', new members were inducted into the eco-classroom project process, while the knowledge of existing members was deepened. The architect related this method of working to that practiced in earlier centuries when mammoth structures took a long time to build and knowledge had to be passed down through generations. He also likened the passing of knowledge and skills to traditional apprenticeships, which Hart (2008) claimed as an early example of participation, pointing out it is a method still practiced in non-Western cultures, where participation of children in adult tasks is a necessity, rather than a right. The situation described by Shier (2010) is similarly a traditional model, but more empowering because it requires children to step up as the 'teachers'. In the eco-classroom project, this worked very successfully, as a process that was under skilled supervision and facilitation by the Lead EE teacher, since it is important to recognise the potential for power disparities between children as well.

Because the project ran for over four years, this sometimes led to more than one child in a family being part of the eco-classroom project. The potential result of this, as evidenced by one student in the focus groups, was reinforced learning and influence on environmentally sustainable behaviour within a family. Cengiz Bektas, in his interview with Sancar (2006) recommends patience when working democratically with children on sustainability projects, saying "They should question on their own and decide on their own" (p. 216). The eco-classroom project was a study in patience due to the focus being on student democracy and learning. Blundell-Jones (2005) explained that the winning architectural entry for a sustainable school in Germany was one that showed the design as a continuous process including the user (students and staff), while in the built structure, involvement of the students was on-going. Similarly, the eco-classroom has been appropriately named 'The Living Room' and it is intended to be an ongoing laboratory for sustainability and monitoring.

In conclusion, the eco-classroom project had very strong engagement with people within and without the school. Inside the school this occurred

via the whole school approach and vision map as well as production of a regular newsletter and website update for students, staff and families about the project. Outside the school specialist skills were enlisted (e.g. architect, brick maker, project manager) as well as students making visits to places of relevance, bringing in outside speakers, hosting other schools' visits and reaching out to the general public as part of fundraising. Moving slowly with community involvement was the key to preventing this aspect of the project from becoming overwhelming for the students and Lead EE teacher, or the project losing sight of being about student learning. In addition, the building was always intended to be encompassing in its use and to continue to evolve and act as a monitoring laboratory – a place of dynamism and inclusivity.

There was an important reciprocity of gains evident in my findings between students and other stakeholders in the project. This was particularly important to help offset the costs of donated time borne by the architect and project manager, although as per the literature on co-design projects, the eco-classroom architect was clearly driven by more esoteric agendas such as a strong passion about environmental sustainability that he wanted to share with children.

The eco-classroom project was locally based which ensured its relevance to students, something emphasised in SLE and action competence literature. This led to students feeling more comfortable and relaxed. Students also showed great appreciation for the skills of others, and the time they gave; and in turn clearly felt appreciated due to the way adults in the project treated them. This, linking to advocacy, increased their pride, motivation and learning. Findings showed the essentiality of community input to the breadth and depth of learning in the project and agreed with a suggestion from the literature that community involvement contributes to transformative EfS learning.

The eco-classroom project cleverly managed the long-term (four years plus) nature of the project by seeing it as a positive opportunity to both deepen existing student knowledge and induct new students into learning in the project, via a changeover and peer education process for students. The project architect likened this to traditional building methods within families or communities where knowledge and skills were passed on through generations. He also compared it to an 'apprenticeship' of learning, in this case where students mentored each other. Thinking skills such as RAS Alert activities were used by the Lead EE teacher and it was her excellent management of this process, as well as her facilitation (see Section 5.4), that has clearly been a considerable factor in the success of the eco-classroom project. The long-term nature of the project coupled with the student changeover has been shown to

extend the influence of the project within families, where more than one child from a family has been involved.

5.6 Knowledge and skills-based learning by students due to the project (applied)

It was widely acknowledged that a clearly defined design dialogue was developed between students and design professionals, which links back to the authenticity of the project and the democratic processes. Alongside this, design professionals felt students developed understanding of the complexities of design such as place and space. It was highlighted that student groups had different experiences and therefore learning, depending on the stage of the project (see Section 5.2). Drawing skills were developed in some student groups and were seen as a valid learning experience by adult research participants. Anning and Hill (1998, as cited in Chiles, 2005, p. 109) caution that lack of encouragement of such skills can have a negative impact on students' perception of design while Iltus and Hart (1995) recommend drawing and model making as powerful tools in the participation of children in the design of their environments. Drawing is a representation of a person's spatial awareness and it is clear from the literature (e.g. Thomson & Philo, 2004) that children view and use spaces uniquely, and this is often in strong tension with adults (e.g. Jones, 2000; Matthews et al., 2000). This makes a strong case for involving students in design and paying attention to the way they represent things. In the eco-classroom design project it was also suggested that this links back to thinking skills in looking at things more laterally or creatively.

All research participants in the eco-classroom project were unanimous that students had developed an excellent understanding of sustainable principles as they relate to buildings and also the wider landscape, in the manner of the holistic view of New Zealand schools that Mardon (2007) mentions. In developing this students conducted activities and research and made informed decisions about a great variety of sustainable aspects, all embedded into the national *Curriculum* (Ministry of Education, 2007). This was largely due to the skills, dedication and facilitation of the Lead EE teacher, supported by the principal and school management as well as the sound foundations and guidance from the Enviroschools Programme. As already highlighted in Section 5.2, one of the sub-questions in this study asked: "How important was cross-disciplinary learning in the project?" The knowledge and skills part of the project produced strong evidence of the cross-disciplinary potential of action-taking EfS projects, with students making and testing mud bricks, investigating and laying insulation, conducting surveys and putting together power point presentations. This gives validity to making EfS and

architectural education compulsory at primary school, as EfS is in Australia (Fien, 2004) and architectural education is in Finland (Meskanen, 2008).

In conclusion, individual student learning varied depending on the stage of the project, and was consistent in being cross-disciplinary, design focused and curriculum-integrated; to the credit of adult role models in the project. The awareness students developed of the design process, space and place, adult regulatory processes, drawing and a cornucopia of knowledge and skills of environmentally sustainable processes, especially to do with buildings, positioned them well for learning transformations that could connect with environmental behaviour.

5.7 Attitudes and values-based learning by students due to the project (applied)

This emerging theme is literally at the 'heart' of the project because these are the feelings developed by students as a result of the eco-classroom project. A change in attitude and values towards the environment, leading to permanent behaviour changes is the ultimate aim of the project, and the Enviroschools Programme in general (Mardon et al., 2005).

All adult participant groups were impressed by students' awareness of design issues and perseverance through what was, in the lifetime of these students, a very long process. This links back to ownership, which, as previously discussed, is connected to participation and community (school and wider) through the control and belief in themselves that students have been given (e.g. from school management with the consultation over building the traditional classroom), and the input of time and expertise from community members. Students clearly placed great trust in the project manager and architect, and most importantly their teacher, who in turn was well supported by the principal, school management and school colleagues. Important also to the students' strong perseverance in the project was that they were enjoying themselves and having fun (also see Section 5.4). During the focus groups they highlighted how they enjoyed the privilege of being able to miss classes to work on the project, becoming 'famous' through television and radio interviews (and getting to meet politicians), and generally having a great time during hands-on events such as the brick-making.

Students felt part of a design decision-making team through the participatory and community aspects of the eco-classroom project. As a consequence of the belief in themselves and subsequent ownership that their involvement in the project gave to students, they developed an ongoing connection of place and space with 'The Living Room'. The project architect again likened this to the on-going and changing relationship traditionally forged between communities and the significant buildings they created, emphasising the collaborative aspect of the project for building people connections and the embedding of meaning that this created within a community. The project manager of the eco-classroom project and Iltus and Hart (1995) both point out that this is likely to lead to greater care of the building by these students and the community. The essence of building relationships between people and buildings in a democratic project with children is illustrated by the following quote from Kemal Ozcul's acceptance speech (Hubner, 2005), which was a hypothetical letter written by the architect, embracing his co-design vision, to accompany his winning entry for a school design for an impoverished Turkish

community in Germany:

We had achieved 450 square metres of construction and felt we were real builders, grown-up carpenters, which certainly was not true, but we felt it. We had helped, we had identified ourselves with the building, and we took a pride in it. The rest of the construction was completed by trained craftsmen quickly enough ... (p. 162).

The final exemplar in this emerging theme was the potential influence on future environmental decisions and career choice. Although direct data could not be collected from current students about whether the project actually influenced their career decisions, findings gave evidence that some of the students may pursue an architectural or engineering career. However, ten years old is very early for career decisions. Regarding the influence of the project on environmental behaviour all participants in the focus groups agreed, when asked, that it had changed their lives. In addition, this is also indicated by the strong development of advocacy they demonstrated (see Section 5.4). It is also suggested by students' uncertainty about future EfS project experiences, because they felt so comfortable and contributory in the eco-classroom project they could not imagine another EfS project being as enjoyable or significant in their lives. This points to learning transformations, as defined by Sipos et al. (2008).

In conclusion, knowing that their ideas and research helped generate the design and drive the process made students feel listened to, valued and important, which increased their engagement and ownership. As a result students made learning transformations, which may influence future career decisions. The connection students have made with 'The Living Room' is well expressed by the following quote from Hubner (2005, as cited in Burke, 2007, p. 369), "Buildings remember the story of their making. The traces of the various hearts and hands are preserved in a subtle way, and are also intelligible to third parties."

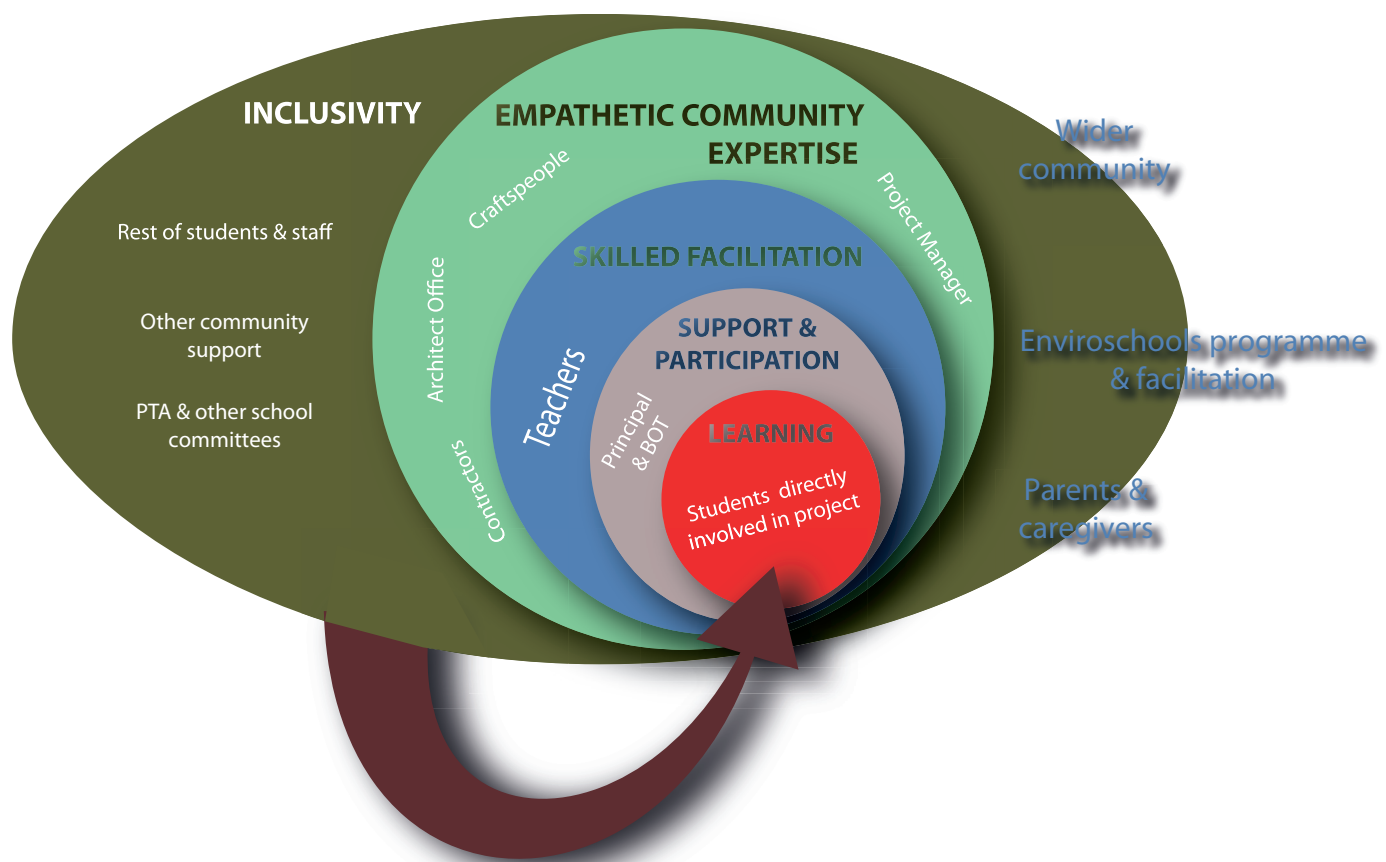


Figure 5.1: The ecology of learning evident in the eco-classroom project.

5.8 Conclusions

The eco-classroom project has emerged from this research as being process-driven and learning focused; carried out within an environment of authenticity, relevance and democracy. It was the confluence of a particular and deliberate set of circumstances that contributed significantly to its successes in terms of student learning and other outcomes, due to participation in a school-based co-design and co-build project.

The following findings have emerged from this research as representing significant aspects of the eco-classroom project, supported by results from my literature review.

1. An ecology of learning evolved (see Figure 5.1) through the way the project was deliberately developed. This can be explained as follows:

- Keeping student learning at its heart was a key aspect that ensured this, the *raison d'être* of the project, was never overshadowed or lost sight of. Within this core are all the students who directly contributed to the project via their learning and experiences.
- Supporting this was the embeddedness of both EfS principles and democratic practices in the fabric of the school, coupled with direct encouragement from school management such as the principal and BoT. In a fertile environment of support like this, ideas and projects flourish.
- The next layer was the skilled facilitation and dedication of the Lead EE teacher, someone who drove and oversaw the eco-classroom project with passion, and clear trust and respect from students.
- The extensive expertise of different community members was yet another layer, most prominently filled by the architect office and later the project manager, but also including the significant input of craftspeople such as mud-brick makers, graphic designers (for the advertising brochure), plus construction contractors - all of whom worked within the process-focused environment of learning and democracy that was established.
- A further layer was made up by the rest of the school (students and staff), PTA and other school committees, plus community members who donated services and materials. Particularly within the school community these people supported and celebrated the progress of the eco-classroom and helped with fundraising and organisation, or separate projects that contributed.
- The wider group of parents and caregivers, not actively involved, plus the wider community formed another layer, not actively involved but supportive, or tolerant, none-the-less.

- Last, but certainly not least, the Enviroschools Programme, and Facilitator, including the National office and Director provided significant support, advice and resources for this project, while always letting the school maintain ownership, as per the philosophy of the programme to enable rather than direct projects in schools.
2. **Learning methods used were diverse but complementary.** Through the Enviroschools Programme the project utilised the democratic principles of a 'whole school' approach to EfS and the Action Learning Cycle. These combined with a 'thinking skills' teaching focus to provide the Lead EE teacher with flexible tools and methods for guiding students through a learning process that culminated in a built structure with meaning and on-going relevance to students and the whole community. Throughout the long-term process, an ever-growing number of students have developed knowledge and skills in environmentally sustainable architecture and low impact design, as well as cross-disciplinary 'life skills' such as teamwork, leadership and communication. It was acknowledged that the project nurtured both individual and collective learning.
 3. **Learning transformations occurred.** EfS projects 'for' the environment have been identified as being the most likely to lead to learning transformations, although this is not guaranteed. In the eco-classroom project the following combination led to students being committed and feeling empowered. As a result my findings show evidence that student learning in the eco-classroom was transformative.
 - Keeping the project authentic and relevant.
 - Treating students as equals (especially by the design professionals they interacted with and supported by the school philosophy).
 - Believing in their capability and valuing their input.
 - Encouraging them to take ownership and responsibility.
 - Supporting them by ensuring resources were available (including the right people to work with them).
 - Focusing on fun within learning.
 - Working slowly so that no one was left behind and students helped each other.
 4. **An action competence approach was demonstrated.** The way the eco-classroom project was run can be strongly linked to the action competence approach, developed in Scandinavia. Action competence is characterised by the key EfS aspects of knowledge, commitment, vision and action-taking, all of which were demonstrated in the eco-classroom project. This is evidenced through the following:
 - An action-taking focus.
 - The 'real' or authentic nature of the project.

- Valuing of collective learning within individual students and groups - extending out to embrace the whole school community.
- The importance of support from school management.
- Continual and wide use of reflection, integrated with a genuine democratic process involving students.
- Focus and valuing of community involvement
- Acknowledgement of the essentiality of role models.

5. Other important features of the eco-classroom project that emerged from my research were:

- Evidence of development in students of clear knowledge and some skills of sustainable design principles and practice.
- Development in students of a meaningful relationship with a place and space.
- Evidence of changed environmental attitudes and values, for example seen through the advocacy roles students developed.
- The importance of skilled facilitation of the process, supported by adult role models with skills and personalities to gain the trust and respect of students.
- The positive way the long-term nature of the project was managed led to a widening circle of students whose lives and learning were touched, as well as endorsing learning within families. The utilisation of peer education increased empowerment and deepened learning.
- The strong evidence of cross-disciplinary learning (e.g. public speaking) alongside the seamless integration of traditional subject learning into the project in an applied way (e.g. maths and science).
- The confidence engendered in students through democratic processes leading to ownership and empowerment.
- The reciprocal benefits to both students and adult participants.
- The process-focus of the project meant that student learning took precedence over outside or wider agendas that could have lost the essence of the project, especially once community involvement and publicity became a potentially consuming entity.

Finally, while the eco-classroom is only one small project, it had the power to positively impact on the lives and learning of many children over four and a half years through its design and build, and, it is predicted, many more in future years, with the dynamism inherent in a school community and embedded into 'The Living Room'. This research into learning and other outcomes in the eco-classroom project therefore contributes valuably to the literature, which has few examples of similar projects, and even less detail. It has established the integral nature of both the authenticity of the project, which

gave breadth and meaning to learning, and the follow-through of sustainable principles within the school, which endorsed and deepened learning. This had strong traction in the affective domain and links with community partnerships and the imperative of a participatory process that has been demonstrated by this research.

Managing children's learning through authentic projects and democratic processes has huge potential to lead to learning transformations as well as integrate curriculum content and encourage cross-disciplinary life skills. Adding to this, it could easily be said that children's learning about low impact design is critical for the future state of the environment due to the knowledge and attitudes they will take into the future, coupled with the importance of buildings and their surroundings for human shelter and comfort. However, in considering the project and the learning that occurred, an aspect that distinguishes the success of this project was the focus on collective learning as well as individual. This permeated and gave power to the project, leading ultimately to a constructed building called 'The Living Room' that has meaning within its community. This building and sharing of learning has connections to traditional ways of working, where generations (e.g. within families and between siblings) and communities were more reliant on each other. This essence is reflected in the architect's words:

... what this is about isn't the project in itself so much. It's actually about what's happening to those students. ... you are ... building something into them and not the building itself, which has got a future ... a very important future" (Architect interview).

The learning that has been 'built' comprises knowledge and skills, coupled with attitudes and values about environmental sustainability and the value of collaboration and communities.

5.9 Implications

The eco-classroom project is somewhat unique within the literature I have canvassed in foregrounding student learning in a school-based co-design project, and likewise this research in presenting that in detail. It is hoped the project encourages further projects and this research, the same. One area of significance would be a follow-on study of development of perspectives and environmental behaviour of the children at varying times beyond their involvement in the eco-classroom project. I believe such a study is being currently undertaken (C. Eames, personal communication, 7 May 2010). It would also be valuable to collate any other examples of co-design projects within New Zealand, and even some internationally, to compare the processes.

Although this research was based on only one project, I felt it would be useful to develop my findings from this research into some fundamental tenets that may help to characterise school-based EfS co-design projects. These are presented below. While it is noted that they are general, rather than specific to design projects, this reflects the consistency of principles applying to any action-taking EfS projects. Within this I hope this research encourages further school-based co-design projects because of the rich potential they have to truly influence the built environment of the future and the need to go beyond learning basic design principles and tools of the architects' trade to engaging students in a fun way with real projects that will equip them with knowledge, skills and attitudes and values to respond to the certainty yet uncertainty of future sustainability issues.

- Action-taking projects 'for' the environment that are authentic (i.e. 'real life' and meeting an established need for the school or wider community) and concentrated on individual and collective learning.
- Community focused and locally based (i.e. relevant).
- Democratically mandated (i.e. participatory).
- Politically engaging (to understand and challenge regulatory systems and develop skills of advocacy).
- Process-focused rather than outcome-driven.
- Involving the right role models (e.g. design professionals) and facilitators – professionals that can relate to young people and well-trained and knowledgeable facilitators to guide the process and act as a go-between.
- Supported by the school community – especially the principal and the culture of the school.
- Engendering empowerment through ownership – through the democratic processes and the resulting learning.
- Incorporating fun that is linked to learning.

As a final note, these points are strongly correlated with the set of quality criteria developed by SEED (School Development through Environmental Education) as representing an ESD philosophy that exhibits an action competence approach (Breiting et al., 2005).

5.10 Limitations

As previously discussed, there is a limitation to extrapolation of these findings, due to the students who made up my research participants being hand-selected, for their interest and motivation in previous EfS initiatives at the school, to be part of the Eco-Building Working Party (who made up my focus groups). As a result they do not necessarily represent the majority of students in the school. Coupled with this, the decile rating of the school (10) reflects a high socio-economic catchment of families, which could point to students being generally more conscious of environmental issues due to greater encouragement and resources at home. This is possibly also indicated by evidence that the school focus on environmental sustainability is a popular consideration for parents and caregivers when choosing this school for their children.

Finally, from a timing perspective for data gathering, in retrospect it would have been better to have conducted the student focus groups and parent/caregiver questionnaires later, i.e. at the same time as the adult stakeholder interviews. This would have given a closer correlation between the data collected. For example, it would have been ideal to wait until students had had an opportunity to work with the project manager. However, the school was more tied up with the project by then and it might have been difficult to organise this as well as the interviews. Also the time chosen for the focus groups was ideal in other ways. For example students in the working party were equally experienced and knowledgeable about the project due to having spent a year together on it. At the beginning of the year this is not the case because new members have joined (e.g. in March when the adult stakeholder interviews were held).

APPENDIX A Research information given to parents/ caregivers for student focus groups

5th November 2008

Dear parent/caregiver

I am writing to ask your permission to include your child in a research study being conducted in their school. This study involves Investigating children's learning experiences as a result of their participation in the eco-building design project in their school grounds, which is part of my research thesis for a Masters in Education at Waikato University. The Enviroschools Foundation has provided a partial research grant in support of this project; the research is in all other regards independent. The research will focus on the effects of the following on student learning:

- experiences of a shared or participatory approach,
- learning about education for sustainability,
- engagement in a design process,
- development of community partnerships,
- within the context of the eco-building project.

My hope is that findings from the project can help to inform future education for sustainability projects at the school and at other New Zealand schools. The school Principal has granted me permission to conduct the research in the school and I would like to involve your child in a focus group interview to be held at the school, as well as asking you to complete the enclosed short survey. This can be returned, via your child, to school in the enclosed envelope within two weeks. This will provide valuable data on your perceptions of the eco-building project in terms of your child's learning.

I plan to hold the focus group, to which your child will be invited to participate in, during term 4, at a time that minimises disruption to classroom learning and your child's daily routine at school. It is expected that it will take up to 40 minutes and will provide me with invaluable data to analyse regarding the effects of the eco-building project on student learning. There will be other students at the focus group, plus an independent children's advocate – as required by the school. I will be asking questions that the students can answer verbally. The focus group will be audio taped and the dialogue transcribed (typed out word-for-word) afterwards. As part of my data collection I may also like to look at some of your child's school work to do with the eco-building project. With your permission, and that of your child, I may copy certain parts of these documents to enable analysis at a later date. Finally, I may also like

to take photographs that could include your child, engaged in some aspect of the eco-building project. I therefore seek your permission to use any photo showing your child in my report and any future publication or presentation of this project that I write or give. I would not identify the school or your child in any captions or text and would not take close-ups of your child's face. All data collected by myself during this research will be kept strictly confidential to me and my supervisor and stored securely. This potentially includes audio tapes, transcribed conversations, photographs and copied student work from your child and a completed anonymous survey from you.

Your child can decline to be involved in the research, and can withdraw from involvement in the research up until analysis has begun. Your child's work and ideas will remain anonymous in my research although a grateful acknowledgement will be made to the input of all anonymous participants in my research, in any publications. You can also decline your child's involvement and may withdraw your child at any stage up until data analysis has begun (one month after the data was collected. This would mean that all data (e.g. transcribed conversations from the focus groups, copied work, photos) collected from your child would be taken out of the study without question.

I would greatly appreciate your permission for your child to be involved with this research project, and your own input, as evidenced by the return of the attached survey. If you need any more details about the project please contact me on swake@unitec.ac.nz or the following phone numbers: work (09) 815 4321 X7804, mobile 021 172 3762.

In the event of any issues arising from the research also contact me. If I cannot clarify the issue please contact my supervisor, Dr Chris Eames at the University of Waikato (email: c.eames@waikato.ac.nz tel: 07 838 4357).

If you give consent for your child, and your child wishes, to be involved, please sign the attached consent form and ask your child to return it to the school office for me in the second envelope provided. I would appreciate this consent being returned to school as soon as possible. Please retain this letter for your information.

Sincerely

Sue Wake

APPENDIX B Research consent form given to parents/ caregivers for student focus groups

I have read the attached letter of information. I understand that:

1. My child's participation in the project is voluntary.
2. I have the right to withdraw my child at anytime and my child has the right to withdraw at any time, up until one month following data collection.
3. Data may be collected from my child in the ways specified in the accompanying letter. This data will be kept confidential & secure.
4. Data obtained from my child during the research project may be used in the writing of reports or published papers and making presentations about the project. It may also be used by the EnviroSchools Foundation in a format that makes it accessible to other schools. This data will be reported without use of my child's name.

I give my consent to the following (tick boxes which apply):

☐ My child can be involved in a shared focus group with other students.

☐ Copies of my child's work can be collected for analysis. Examples from their work may be included in reporting but they will be used anonymously.

☐ Photos of my child, without their name, may be used in reports, publications or presentations authored by the researcher named below.

I can direct any questions to the researcher, Sue Wake, at swake@unitec.ac.nz or via phone: (09) 815 4321 X7804

For any unresolved issues I can contact the research supervisor, Dr Chris Eames at the University of Waikato tel: 07 838 4357.

I give consent for my child to be involved in the project under the conditions set out above.

Name: _____

Signed: _____

Date: _____

Please return this form to the school office in the envelope provided, by WEDNESDAY 12TH NOVEMBER 2008 if you give your consent.

APPENDIX C Structure for student focus groups

My name is Sue Wake and I'm doing a study into your learning as a result of the eco-building project. This is part of my school work.

We have the lunchtime to talk about the project and I'll use some starter questions to get you going and then mostly listen while you talk.

Because I'm recording this it's important that we talk one at a time. When I ask a question, any of you can answer it, or add to something someone else says. I really want to hear everyone so I may go round the group asking everyone in turn what they think. You can say what you want – I'm not going to tell anyone who said what.

Question Matrix

Types of student learning Parts to research investigation	Things that you know	Things that you can do	Things that you feel
Sustainability	1. Can you tell me what this project is about? 2. What is an eco-building? 3. Did you know about eco-buildings before you got involved in this project? How did you know? 4. Why is the school getting one? 5. What does the word 'sustainability' mean to you? 6. Did you know about sustainability before you started this project? How?	7. What things have you done in this project? 8. Are any of these things that you hadn't done before at school? What was new?	9. How important do you think this project is – to the school, to the environment? 10. Has this project changed your attitudes about caring for the environment? (do you see things differently now – and act on it? 11. After your experiences with this project would you like to do another sustainability project in your next school?

Types of student learning Parts to research investigation	Things that you know	Things that you can do	Things that you feel
Participation	<p>12. Why did you get involved in this project?</p> <p>13. Has working on this project been different to what you have done in class? How?</p> <p>14. Have all the students that wanted to be involved in project got involved?</p> <p>15. Do you think those who are not involved know what you are doing?</p>	<p>16. How did you get involved in this project?</p> <p>17. What have you done?</p> <p>18. Have you worked with others? Was that good?</p>	<p>19. Have you enjoyed being involved in this project? Why/why not?</p> <p>20. What bits did you particularly like?</p> <p>21. Were there any bits that didn't make you feel good or you didn't like?</p> <p>22. How could these be made better or done differently? (e.g. more participative)</p>
Design process	<p>23. What do you think you have learnt about the process of designing buildings and landscapes?</p>	<p>24. What things have you learnt how to do in designing this building?</p>	<p>25. How has this made you feel about designing buildings or other things?</p>
Community partnerships	<p>26. Who have you worked with from outside the school on this project?</p> <p>What do those people do?</p>	<p>27. What have these people helped you to do?</p> <p>28. Are these things important to do? Why?</p>	<p>29. Have you enjoyed working with those people? Why/why not?</p> <p>30. Are they important in the project?</p> <p>31. Could you have done it without them?</p>

APPENDIX D Structure for adult stakeholder interview questions – community members group

There are 4 themes to this research and under each theme I am interested in student learning in terms of cognitive (knowledge), psychomotor (skills) and emotive/affective (attitudes and values).

1. General

- What student groups from the school have you been involved with, and over what time period?
- How did you become involved with this school initially?

2. Sustainability

- In your experience have the students you have been involved with increased their knowledge of sustainability issues as a result of the eco-building project at the school? Examples? Have you noticed this spreading to the wider school community? Examples?
- Have they acquired new sustainability skills (e.g. composting, revegetation, recycling, using sustainable materials, teamwork, communication) as a result of the project? If so are these widely practiced throughout the school that you know of? If so do you think this is a direct result of the eco-building project or other influences?
- Among the students you have been involved with have you noticed their attitudes and values towards the environment/sustainability changing as a result of the eco-building project?
- Give any examples of changed student attitudes towards the environment (both students more and less involved)? What about your attitudes (towards sustainability/education) – have they changed as a result of involvement in this project?

3. Participation

- The way the eco-building project has been run is described by the students as 'kid-led or kid-run'. Would you agree that it has been? If so, do you think the 'kid-led' (participatory) aspect of this project has been important for student learning? If you agree, what examples have you observed to support this?
- Are there examples you can think of where students you have been involved with have developed knowledge, skills, or attitudes and values that you would uniquely attribute to the 'kid-led' aspect of this project?
- In your experience do the students seem to 'have fun' being part of this project? How important do you think this is and why? How much do you think the 'kid-led' aspect of the project contributed to this? Examples?

- Do you think students are more likely to get involved in a project like this again if it is 'kid-led'?
- In your experience has the participatory nature of the project changed relationships between students and community members? Examples?
- Do you think the philosophy of the Enviroschools programme has been an impetus for participatory practice as applied to the eco-building project? Why/why not?

4. Design Process

- What do you think the students have learnt about design (knowledge and skills) as a result of this project? Examples? Have you seen any evidence of this knowledge/skills being passed on within the school or other environment?
- Do you think students have felt part of a design decision-making team working through a process of resolving a design? Examples?
- What is your experience of the capability of students in a co-designing situation?
- Do you think being part of this design process and gaining skills and knowledge has changed students' attitudes towards design? What about designing sustainably (eg importance of)?
- Do you value a knowledge of design and do you think it may benefit students in their futures?

5. Community partnerships

- Were you familiar with the Enviroschools programme and this school before you became involved in the eco-building project? If so, how? Has the school been easy to work with? Why/why not?
- Do you believe this project has been successful in developing and building community relationships? If so, list as many as you know.
- How important is it to have developed the partnership with the students you have - to the project, the students, the school and you? Examples?
- Do you think your involvement in the project has influenced/changed the attitudes and values of students you have been involved with? Examples?
- Has it influenced or changed your own attitudes and values about children and working with them? Examples?

APPENDIX E Question survey for Parents/caregivers of the focus group students

Dear parent/caregiver

I would like to invite you to contribute to my study about children's learning experiences as a result of their participation in the eco-building design project in their school grounds. This is part of my research thesis for a Masters in Education at Waikato University.

My aim in sending out this survey is to get as full a picture as possible of the understanding of different people involved with the school, such as you, about the eco-building project and what your child has learnt from their involvement in it.

I expect that this questionnaire will take approximately 20 minutes to complete. If you're happy to participate, return of your completed questionnaire to the school in the enclosed envelope will be taken as consent to use the information you provide. Your responses will be treated confidentially and your data will be stored securely and reported anonymously.

Data collected from you may be used in writing my Masters thesis, other publications, or in presentations, including for the University of Waikato and Enviroschools.

If you have any questions regarding this study, please contact me at swake@unitec.ac.nz or by the following phone numbers: work (09) 815 4321 X7804, mobile 021 172 3762. For any unresolved issues, please contact my supervisor Dr Chris Eames at the University of Waikato, Ph (07) 838 4357.

Thank you very much for your contribution to this important research. I appreciate your time and thought and your valued input will help inform future Education for Sustainability projects in this and other schools.

Yours sincerely,

Sue Wake

Please return this questionnaire in the envelope provided to the school by Monday 24th November 2008. If you are agreeable to my contacting you to clarify anything about your survey response, please provide a first name and contact phone number here.

SURVEY FOR PARENTS/CAREGIVERS OF CHILDREN
PARTICIPATING IN THE SCHOOL'S ECO-BUILDING PROJECT

Please answer the following questions to the best of your knowledge.

1. My child seemed to understand what the eco-building project was about. (Please circle one)

Completely agree	Partly agree	Unsure	Disagree
1	2	3	4

2. My child enjoyed being involved in the eco-building project. (Please circle one)

Completely agree	Partly agree	Unsure	Disagree
1	2	3	4

3. My child liked telling me about what they were doing in the eco-building project at school. (Please circle one)

Completely agree	Partly agree	Unsure	Disagree
1	2	3	4

4. My child's knowledge of sustainability issues has increased as a result of involvement in the eco-building project. (Please circle one)

Completely agree	Partly agree	Unsure	Disagree
1	2	3	4

4(a) If you agreed with the statement in Q4, please list any examples of their increase in knowledge of sustainability issues that you can think of.

--

5. My child's knowledge of the process of designing spaces (e.g. buildings and their surroundings) has increased as a result of involvement in the eco-building project. (Please circle one)

Completely agree	Partly agree	Unsure	Disagree
1	2	3	4

5(a) If you agreed with the statement in Q5, please list any examples of their increase in knowledge of designing spaces, you can think of.

6. My child has developed new skills as a result of their involvement in the eco-building project. (Please circle one).

Completely agree	Partly agree	Unsure	Disagree
1	2	3	4

6(a) If you agreed with the statement in Q6, please list any examples of this that you can think of. These could be physical skills (e.g. making, building or conducting surveys or experiments) or mental skills (e.g. to do with communicating design ideas, or to do with sharing decision-making with fellow students, school staff or members of the community such as architects).

7. My child's values and attitudes regarding environmental sustainability have changed as a result of involvement in the eco-building project. (Please circle one)

Completely agree	Partly agree	Unsure	Disagree
1	2	3	4

7(a) If you agreed with the statement in Q7, please list examples of ways your child has displayed any change in attitudes and values about environmental sustainability through practices outside school, such as at your home (e.g. choices about products to purchase, conservation of energy and other resources, reduction of waste, recycling, growing vegetables and fruit, taking part in native planting days)

8. Please list any other experiences or skills gained by your child as a result of involvement in the eco-building project.

9. I have a clear understanding of what the eco-building project is about. (Please circle one)

Completely agree	Partly agree	Unsure	Disagree
1	2	3	4

10. I have gained this understanding through: (Please circle any that apply)

My child telling me about it	School newsletters	Attending school events
1	2	3

Other means (please specify)

APPENDIX F Example of analysis process showing logging of comments under emerging themes

Sustainability

theme	Student learning	Type	Evidenced by				
			Students	Parents	Design prof	School prof	Others
	1. Environmental sustainability provides a core area children can learn from & the project gives this a real life context, both of which are embedded teaching principles in the school	K/S	10x	6x	Arch Proj. Man	Teacher principal	BoT
	2. knowledge, awareness & experience of sustainable principles & materials – how they are used, making choices (research & experimentation) & learning skills through hands-on experience	K/S (A&V)	15x	11x incl 6/10 com & 4/10 partly agree sus know inc; 8/10 com ag sus skills inc	Arch Proj. Man	Teacher principal	BoT EnFac
	3. transferable skills eg co-operation, teamwork, persistence, problem-solving real issues, confidence at public speaking, self-belief, leadership. (moves to partic 7)	K/S/ A&V	1x but needs to be added to no.15 from design				
	4. Changes in attitudes and values towards sustainability – that may be passed on	A&V	24x incl 8/12 would like to do another sus project in their next school	13x incl 6/10 com & 2/10 partly ag A&V changed	Arch Proj. Man	Teacher principal	BoT

Numbers of parents & students refers to numbers of comments, not necessarily numbers of participants.

APPENDIX G Example of analysis process showing logging of comments under emerging themes (Table A), followed by their subsequent synthesis in Table B

Table A Design Process

			Evidenced by				
	Student learning	Type	Students	Parents	Design prof.	School prof.	Others
A	1. Understanding of the complex nature of arch & building through an investigative process of engagement & discussion.	K	6x stud	par	Arch p.man	Teach prin	EF BoT
C	2. Appreciating the implications of their decisions. Showing perseverance– looking for alternatives. Move to sus 3?	K/V&A	4x stud	par	Arch P.man	prin	
A	3. Developing their own sense of aesthetics & functionality that is different to adults.	S	2x stud		Arch p.man		BoT
A	4. Bringing different experiences & perspectives to the project.	K	2x stud		Arch P.man		EF
A	5. Capability – eg interest, enthusiasm, engagement (in the adult world of design) (move to partic 10)	V&A	2x stud	par	Arch P.man	Teach prin	EF
A	6. Development of a dialogue with professionals AWARENESS COMING FRM REAL PROJECT & HIGHLY PARTICIPATIVE NATURE OF THE PROJECT (move to commun 2)	K/S	5x stud	3x par	Arch P.man	Teach prin	EF
A	7. Felt part of a design decision-making team resolving a design e.g. creativity,	V&A	4x stud	3x par	Arch P.man	Teach prin	BoT
A	8. Building skills in drawing & spatial understanding	S	stud	2 x par	Arch		EF BoT
C	9. Developed an on-going emotional relationship with a place & building	V&A	stud		Arch	prin	
B	10. Development of a solid foundation of knowledge & experience of enviro arch that they will take into their future lives	K/S/V&A	4x stud	par	Arch p.man	teach prin	BoT
B	11. Skills of environmental architecture	S/V&A	8 x stud	7x par	P.man Arch	prin	BoT
B	12. Because of the unique nature of the project being spread over a number of years (move to commun 1)	K/S	stud		P.man arch	teach	EF
B	13. joins with 10 Has provided these students with an advantage in terms of dealing with environ issues in life	K/V&A	2x stud				EF
A	14. The potential transference of these thinking skills to other areas.	K/S	2x stud			prin	BoT
C	15. Skills in leadership and public speaking (media, peers, professionals) (move to partic 6)	S/V&A	6x stud	4x par			
C	16. Appreciation for the specialist skills of others e.g. architects (move to commun 5)	V&A	4x stud				

Numbers indicated next to students and parents represent numbers of specific comments made that agree with this point, not necessarily numbers of students or parents who agreed with this point.

Table B Summary of learning emerging from data analysis of the 'Design Process' section of the project

Learning theme	Evidenced by	Main Learning type	Supported by data from participant grps:				
			Ch.	Par.	DP	SP	O
Design aspects children brought to the project and/or were heightened through their involvement.	*Perseverance, confidence & consequence awareness.	K, S, A&V	+	+	++	+	+
	*Unique sense of aesthetics & functionality.	K	+		++		+
	Different experiences & perspectives.	K	+		++		+
	*Capability.	A&V	+	+	++	++	+
Design knowledge, Skills, attitudes & values developed.	*Felt part of a design decision-making team.	A&V	+	+	++	++	+
	*Awareness coming from real project.	K, S	+	+	++	++	++
	*Understanding of the complexities of architecture & building.	K	++	+	++	++	++
	Skills in drawing & spatial understanding.	S	+	+	+		++
	*Skills of environmental architecture.	S, A&V	++	++	++	++	++
Future-focused or transferable learning.	On-going connection with place & building.	A&V	+		+	+	
	*Foundation in environmental architecture that could influence future decisions.	K, S, A&V	++	+	++	++	++
	Potential transference to other areas.	K, S	+			+	+
	Leadership & public speaking skills.	S	++	+	++	++	++
	Appreciation for specialist skills e.g. architecture.	K, A&V	+		+	++	++

Key: K = knowledge; S = skills; A&V = attitudes and values

Ch. = children (focus groups); Par. = parents (questionnaires); DP = design professionals (interviews); SP = school professionals interviews); O = others (interviews)

+ analysed data contains text from at least one participant relating to this point.

++ comments from at least half the student (12 participants) or parent (11 participants); or both members in the three adult stakeholder groups.

* points particularly pertaining to sustainable architectural practice that will be discussed below.

References

- [School name]. (2009). *Charter 2009-2011*. Hamilton: New Zealand.
- Aitken, S. C. (2001). *Geographies of young people: The morally contested spaces of identity*. London: Routledge.
- Anonymous. (2010). About the office of the Children's Commissioner. Retrieved from http://www.occ.org.nz/aboutus/about_the_office_of_the_childrens_commissioner 2 Jan 2010.
- Barratt Hacking, E., Barratt, R., & Scott, W. (2007). Engaging children: Research issues around participation and environmental learning. *Environmental Education Research*, 13(4), 529-544. doi:10.1080/13504620701600271
- Barratt Hacking, E., Barratt, R., Scott, W., Talbot, W., Nicholls, D., & Davies, K. (2006). Education for sustainability: Schools and their communities. In J. C.-K. Lee & M. Williams (Eds.), *Environmental and geographical education for sustainability: Cultural contexts* (pp. 123-137). New York: Nova Science Publishers.
- Barratt, R., & Barratt Hacking, E. (2007). A clash of worlds: Children talking about their community experience in relation to the school curriculum. In A. Reid, B. B. Jensen, J. Nikel, & V. Simovska (Eds.), *Participation and learning: perspectives on education and the environment, health and sustainability* (pp. 285-298). Dordrecht: Springer.
- Berglund, U., & Nordin, K. (2007). Using GIS to make young people's voices heard in urban planning. *Built Environment*, 33(4), 469-481.
- Biddulph, P. (2004). *Stocktake report of New Zealand action plan for human rights - Children's rights component*. Dunedin: Children's Issues Centre, University of Otago. Retrieved from <http://www.hrc.co.nz/index.php?p=23950> 20 February 2008.
- Blair, A. (2004). PM speech on climate change 14th Sept 2004. Retrieved from <http://www.number10.gov.uk/Page6333> 7 Jan 2010.
- Blakely, S. K. (1994). Parents' conception of social dangers to children in the urban environment. *Children's Environments* 11(1), 20-35. Retrieved from <http://www.colorado.edu/journals/cye/>
- Blanchet-Cohen, N. (2008). Taking a stance: Child agency across the dimensions of early adolescents' environmental involvement. *Environmental Education Research*, 14(3), 257-272.
- Blundell Jones, P. (2005). Ozcul postscript: The Gelsenkirchen school as built. In P. Blundell Jones, D. Petrescu, & J. Till (Eds.), *Architecture and Participation* (pp. 173-180). London: Spon Press.
- Bolstad, R. (2003). Environmental education: Roots in the past, visions of the future, opportunities in the present. *Set*, 3, 10-14.
- Bolstad, R., Cowie, B., & Eames, C. (2004). *Environment education in New Zealand schools: Research into current practice and future possibilities. Vol 1: Summary of research findings*. Wellington: Ministry of Education.

- Breiting, S., Mayer, M., & Mogensen, F. (2005). *Quality criteria for ESD-schools: Guidelines to enhance the quality of education for sustainable development*. Retrieved from http://seed.schule.at/uploads/QC_eng_2web.pdf 21 March 2010.
- Bronfenbrenner, U. (1979). *The ecology of human development*. Cambridge, MA.: Harvard University Press.
- Bryman, A. (2004). *Social Research Methods* (2nd ed.). Oxford: Oxford University Press.
- Burke, C. (2007). The view of the child: Releasing “visual voices” in the design of learning environments. *Discourse: studies in the cultural politics of education*, 28(3), 359-372. doi:10.1080/01596300701458947
- Carlsson, M., & Sanders, D. (2008). School councils as a arena for pupils’ participation in collaborative environmental education projects. In A. Reid, B. B. Jensen, J. Nikel, & V. Simovska (Eds.), *Participation and learning: Perspectives on education and the environment, health and sustainability* (pp. 321-337). Dordrecht: Springer.
- Carson, R. (1963). *Silent spring*. London: Hamish Hamilton.
- Catling, S. (2003). Curriculum contested: Primary geography and social justice. *Geography*, 88(3), 164-210.
- Chapman, D., & Eames, C. (2007). Position paper: Backgrounding new guidelines for EE/EfS. Retrieved from http://www.nzaee.org.nz/efs_position_paper.htm 8 Feb 2010.
- Chawla, L. (1998). Significant life experiences revisited: A review of research on sources of environmental sensitivity. *Journal of Environmental Education*, 29(3), 11. Retrieved from <http://web.ebscohost.com>
- Chawla, L. (2002). Cities for human development. In L. Chawla (Ed.), *Growing up in an urbanising world* (pp. 15-34). London: UNESCO.
- Chawla, L. (2008). Participation and the ecology of environmental awareness and action. In A. Reid, B. B. Jensen, J. Nikel, & V. Simovska (Eds.), *Participation and learning: Perspectives on education and the environment, health and sustainability* (pp. 98-110). Dordrecht: Springer.
- Chawla, L., & Cushing, D. F. (2007). Education for strategic environmental behaviour. *Environmental Education Research*, 13(4), 437-452. doi:10.1080/13504620701581539
- Chiles, P. (2005). The classroom as an evolving landscape. In M. Dudek (Ed.), *Children’s Spaces* (pp. 101-113). Oxford: Elsevier.
- Clandinin, D. J. (Ed.). (2007). *Handbook of narrative inquiry: Mapping a methodology*. Thousand Oaks, CA: Sage.
- Clark, A., & Moss, P. (2005). *Spaces to play: More listening to young children using the Mosaic Approach*. London: National Children’s Bureau.
- Cohen, L., & Manion, L. (1994). *Research methods in education* (4th ed.). London & New York: Routledge.
- Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education* (6th ed.). London: Routledge.

- Curtis, P. (2010, 5 July). School building programme scrapped in latest round of cuts. *Guardian* Retrieved from <http://www.guardian.co.uk/education/2010/jul/05/school-building-programme-budget-cuts> 20 August 2010.
- Dahlberg, G., Moss, P., & Pence, A. (1999). *Beyond quality in early childhood education and care: Postmodern perspectives*. London: Falmer Press.
- de Bono, E. (2007). Parallel thinking - the six thinking hats. Retrieved from <http://www.edwarddebono.com/concept6.htm> 26 May 2010.
- den Besten, O., Horton, J., & Kraftl, P. (2008). Pupil involvement in school (re) design: Participation in policy and practice. *CoDesign*, 4(4), 197-210. doi:10.1080/15710880802524946
- Dept of Education Tasmania. (2007). Six thinking hats. Retrieved from <http://wwwfp.education.tas.gov.au/english/sixhats.htm> 15 Jan 2010.
- Driskell, D. (2002). *Creating better cities with children and youth: A manual for participation*. London: UNESCO.
- Durno, J. (2009). Inquiry learning at Weber school. Retrieved from <http://nzcurriculum.tki.org.nz/Curriculum-stories/School-stories/Weber-Inquiry> 15 Jan 2010.
- Dymont, J. E. (2004). "At that age, you just accept what you have... you never question things": A case study of student participation in school ground greening. *Children, Youth and Environments*, 14(1), 130-152. Retrieved from <http://www.colorado.edu/journals/cye>
- Dymont, J. E. (2008). Student participation in school ground greening initiatives in Canada: Reflections on research design decisions and key findings. In A. Reid, B. B. Jensen, J. Nikel, & V. Simovska (Eds.), *Participation and learning: Perspectives on education and the environment, health and sustainability* (pp. 241-255). Dordrecht: Springer.
- Eames, C., & Wilson-Hill, F. (2010a). *A framework for developing action competence in education for sustainability*. Paper presented at the NZAEE Biennial Conference: Taking the Next Steps. 20-22 January Hastings, New Zealand (notes supplied by authors).
- Eames, C., & Wilson-Hill, F. (2010b). *A framework for developing whole school approaches to education for sustainability*. Paper presented at the NZAEE Biennial Conference: Taking the Next Steps. 20-22 January, Hastings, New Zealand (notes supplied by authors).
- Edwards, C., Gandini, L., & Forman, G. E. (Eds.). (1993). *The hundred languages of children : The Reggio Emilia Approach to early childhood education* Norwood, NJ: Ablex Pub. Corp.
- Edwards, J. (2007). Teaching thinking skills. Retrieved from <http://onthinking.co.nz/?p=9> 15 Jan 2010.
- Environmental Defence Society. (2009). Resource Management Act for the community. Retrieved from <http://www.rmguide.org.nz/rma/introduction.cfm> 10 Feb 2010.
- Enviroschools Foundation. (2009). *Enviroschools kit*. Hamilton: Enviroschools Foundation.
- Enviroschools Foundation. (2010). About Enviroschools. Retrieved from <http://www.enviroschools.org.nz/about-enviroschools> 13 Feb 2010.

- Faber Taylor, A., & Kuo, F. E. (2006). Is contact with nature important for healthy child development? State of the evidence. In C. Spencer & M. Blades (Eds.), *Children and their environments: Learning, using and designing spaces* (pp. 124-140). Cambridge: Cambridge University Press.
- Fien, J. (2004). Education for sustainability. In R. Gilbert (Ed.), *Studying society and environment: A guide for teachers* (3rd ed., pp. 184-200). Southbank, Victoria: Thomson Social Science Press.
- Fien, J., & Greenall Gough, A. (1996). Environmental education. In R. Gilbert (Ed.), *Studying society and environment: A handbook for teachers* (pp. 200-216). Melbourne: Macmillan.
- Fosnot, C. T. (1996). Constructivism: A psychological theory of learning. In C. T. Fosnot (Ed.), *Constructivism: Theory, perspectives, and practice* (pp. 8-33). New York: Columbia University.
- Francis, M., & Lorenzo, R. (2002). Seven realms of children's participation. *Journal of Environmental Psychology*, 22, 157-169.
- Francis, M., & Lorenzo, R. (2006). Children and city design: Proactive process and the 'renewal' of childhood. In C. Spencer & M. Blades (Eds.), *Children and their environments* (pp. 217-237). Cambridge, MA: Cambridge University Press.
- Frangenheim, E. (2009). The RAS Alert and its role in the classroom. Retrieved from <http://www.rodineducation.com.au/downloads> 15 Jan 2010.
- Freeman, C., Henderson, P., & Kettle, J. (1999). *Planning with children for better communities: The challenge to professionals*. Bristol: Policy Press.
- Freeman, C., Nairn, K., & Sligo, J. (2003). 'Professionalising' participation: From rhetoric to practice. *Children's Geographies*, 1(1), 53-70.
- Freire, P. (1993). *Pedagogy of the oppressed* (Revised edition of 1970 ed.). New York: Continuum.
- Frost, R., & Holden, G. (2008). Student voice and future schools: Building partnerships for student participation. *Improving Schools*, 11(1), 83-95. doi:10.1177/1365480207086832
- Ghaziani, R. (2008). Children's voices: Raised issues for school design. *CoDesign*, 4(4), 225-236. doi:10.1080/15710880802536403
- Hallett, C., & Prout, A. (Eds.). (2003). *Hearing the voices of children: Social policy for a new century*. New York: Routledge.
- Hart, R. (1994). Fostering earth stewardship. *American Horticulturist*, (July), 5-6.
- Hart, R. (1997). *Children's participation: The theory and practice of involving young citizens in community development and environmental care*. London: Earthscan.
- Hart, R. (2008). Stepping back from 'The Ladder': Reflections on a model of participatory work with children. In A. Reid, B. B. Jensen, J. Nikel, & V. Simovska (Eds.), *Participation and learning: Perspectives on education and the environment, health and sustainability* (pp. 19-31). Dordrecht: Springer.

- Heerwagen, J. H., & Orians, G. H. (2002). The ecological world of children. In P. H. Kahn, Jr & S. R. Kellert (Eds.), *Children and nature: Psychological, sociocultural, and evolutionary investigations* (pp. 29-64). Cambridge, MA: The MIT Press.
- Heft, H., & Chawla, L. (2006). Children as agents in sustainable development: The ecology of competence. In C. Spencer & M. Blades (Eds.), *Children and their environments* (pp. 199-216). Cambridge, MA: Cambridge University Press.
- Henderson, K., & Tilbury, D. (2004). *Whole-School approaches to sustainability: An international review of whole-school sustainability programs*. Retrieved from http://www.aries.mq.edu.au/projects/whole_school/ 2 Jan 2010.
- Hill, M. (2006). Children's voices on ways of having a voice: Children's and young people's perspectives on methods used in research and consultation. *Childhood*, 13(1), 69-89. Retrieved from <http://chd.sagepub.com>
- Hodson, D., & Hodson, J. (1998). From constructivism to social constructivism: A Vygotskian perspective on teaching and learning science. *School Science Review*, 79(289), 33-41.
- Holloway, S., L., & Valentine, G. (2000). Children's geographies and the new social studies of childhood. In S. L. Holloway & G. Valentine (Eds.), *Children's geographies: Playing, living, learning* (pp. 272). London: Routledge.
- Horelli, L. (2006). A learning-based network approach to urban planning with young people. In C. Spencer & M. Blades (Eds.), *Children and their environments* (pp. 238-255). Cambridge, MA: Cambridge University Press.
- Hubner, P. (2005). Kemal Ozcul's acceptance speech. In P. Blundell Jones, D. Petrescu, & J. Till (Eds.), *Architecture & Participation* (pp. 161-171). London: Spon Press.
- Hungerford, H. R., & Volk, T. L. (1990). Changing learner behavior through environmental education. *Journal of Environmental Education*, 21(3), 8-21.
- Hwang, S. (2010). Teachers' environmental education as creating cracks and ruptures in school education: A narrative inquiry and an analysis of teacher rhetoric. *Environmental Education Research*, 15(6), 697-714. doi:10.1080/13504620903380771
- Iltus, S., & Hart, R. (1995). Participatory planning and design of recreational spaces with children. *Architecture and Behaviour*, 10(4), 361-370.
- IUCN. (2010). Caring for the earth. Retrieved from <http://www.ciesin.org/IC/iucn/CaringDS.html> 11 Feb 2010.
- Jans, M. (2004). Children as citizens: Towards a contemporary notion of child participation. *Childhood*, 11(1), 27-44. Retrieved from <http://chd.sagepub.com>
- Jensen, B. B., & Schnack, K. (1997). The action competence approach in environmental education. *Environmental Education Research*, 3(2), 163-179. doi:10.1080/1350462970030205

- Jones, O. (2000). Melting geography: Purity, disorder, childhood and space. In S. L. Holloway & G. Valentine (Eds.), *Children's geographies: Playing, living, learning* (pp. 29-47). London: Routledge.
- Jordan, B. (2004). Scaffolding learning and co-constructing understandings. In A. Anning, J. Cullen, & M. Fleer (Eds.), *Early childhood education: Society and culture* (pp. 31-42). London: Sage.
- Kahn, P. H., Jr. (2002). Children's affiliations with nature: Structure, development, and the problem of environmental generational amnesia. In P. H. Kahn, Jr & S. R. Kellert (Eds.), *Children and nature: Psychological, sociocultural, and evolutionary investigations* (pp. 93-116). Cambridge, MA: The MIT Press.
- Kahn, P. H., Jr. & Kellert, S. R. (Eds.). (2002). *Children and nature: Psychological, sociocultural, and evolutionary investigations*. Cambridge, MA: The MIT Press.
- Knowles-Janez, K. (2009). Asking practical ethical questions about youth participation. *Les Ateliers de L'Ethique*, 4(1), 97-104. Retrieved from <http://www.creum.umontreal.ca/spip.php?article1064>
- Kong, L. (2000). Nature's dangers, nature's pleasures: Urban children and the natural world. In S. L. Holloway & G. Valentine (Eds.), *Children's geographies: Playing, living, learning* (pp. 257-271). London: Routledge.
- Koralek, B., & Mitchell, M. (2005). The schools we'd like: Young people's participation in architecture. In M. Dudek (Ed.), *Children's Spaces* (pp. 114-153). Oxford: Elsevier.
- Kranzl-Nagl, R., & Zartler, U. (2010). Children's participation in school and community: European perspectives. In B. Percy-Smith & N. Thomas (Eds.), *A handbook of children and young people's participation* (pp. 164-173). Oxon, UK: Routledge.
- Kuo, F. E., & Faber Taylor, A. (2004). A potential natural treatment for Attention-Deficit/Hyperactivity Disorder: Evidence from a national study. *American Journal of Public Health*, 94(9), 1580-1586. Retrieved from <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1448497/> 20 Sept 2010.
- Laessoe, J. (2010). Education for sustainable development, participation and socio-cultural change. *Environmental Education Research*, 16(1), 39-57. doi:10.1080/13504620903504016
- Law, B. (2004). *Environmental education/education for sustainability*. Paper presented at the Asia Pacific Environmental Education Research Seminar. Retrieved from <http://www.eec.miyakyo-u.ac.jp/APEID2004/pdf/Barry.pdf> 3 July 2009.
- Lessard, M., & Torres, J. (2007). Children and design students as partners in community design: The Growing Up in Cities Projects in Montreal and Guadalajara. *Children, Youth and Environments*, 17(2), 527-540. Retrieved from <http://www.colorado.edu/journals/cye>
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic inquiry*. Newbury Park, CA: Sage.
- Littledyke, M. (2004). Primary children's views on science and environmental issues: Examples of environmental cognitive and moral development. *Environmental Education Research*, 10(2), 217-235. doi:10.1080/13504620242000198186

- Louv, R. (2005). *Last child in the woods: Saving our children from nature-deficit disorder*. Chapel Hill, North Carolina: Algonquin Books.
- Mannion, G. (2007). Going spatial, going relational: Why 'listening to children' and children's participation needs reframing. *Discourse: studies in the cultural politics of education*, 28(3), 405-420.
- Mardon, H. (2007). Schools in a carbon neutral world. In N. Harre & Q. D. Atkinson (Eds.), *Carbon neutral by 2020: How New Zealanders can tackle climate change* (pp. 28-38). Nelson: Craig Potton.
- Mardon, H., Price, K., & Dennis, J. (2005). *Enviroschools Handbook*. Hamilton: The Enviroschools Foundation.
- Mathar, R. (2006). Eco-schools and green schools. In J. C.-K. Lee & M. Williams (Eds.), *Environmental and geographical education for sustainability* (pp. 139-153). New York: Nova Science Publishers.
- Matthews, H., Limb, M., & Taylor, M. (2000). The 'street as thirdspace'. In S. L. Holloway & G. Valentine (Eds.), *Children's geographies: Playing, living, learning* (pp. 63-79). London: Routledge.
- Mayall, B. (2002). *Towards a sociology for childhood: Thinking from children's lives*. Buckingham & Philadelphia: Open University Press.
- McKendrick, J. H., Bradford, M. G., & Fielder, A. V. (2000). Time for a party! Making sense of the commercialisation of leisure space for children. In S. L. Holloway & G. Valentine (Eds.), *Children's geographies: Playing, living, learning* (pp. 100-116). London: Routledge.
- Mein Smith, P. (2005). *A concise history of New Zealand*. Melbourne: Cambridge University Press.
- Meskanen, P. (2008). Architecture education in Finland: A glimpse to the everyday in 2008. Retrieved from www.mo.org.tr/UIKDocs/SAFA_Meskanen.pdf 10 Dec 2009.
- Mezirow, J. (2000). *Learning as transformation : Critical perspectives on a theory in progress* (1st ed.). San Francisco: Jossey-Bass.
- Ministry for the Environment. (1998). Learning to care for our environment: Me ako ki te taiao. Retrieved from www.mfe.govt.nz/publications/.../environment-education-strategy-jun98.pdf 10 Feb 2010.
- Ministry for the Environment. (2010). Towards sustainability: Environment 2010 & the Green Package. Retrieved from <http://www.mfe.govt.nz/publications/ser/ser1997/html/chapter4.9.html> 10 Feb 2010.
- Ministry of Education. (1999). *Guidelines for environmental education in New Zealand*. Wellington: Learning Media.
- Ministry of Education. (2007). The New Zealand curriculum. Retrieved from <http://nzcurriculum.tki.org.nz/> 12 Aug 2008.
- Mogensen, F., & Schnack, K. (2010). The action competence approach and the 'new' discourses of education for sustainable development, competence and quality criteria. *Environmental Education Research*, 16(1), 59-74. doi:10.1080/13504620903504032
- Mooney, C. G. (2000). *Theories of childhood: An introduction to Dewey, Montessori, Erikson, Piaget & Vygotsky*. St Paul, MN: Redleaf Press.

- Moore, R. C., & Cooper-Marcus, C. (2008). Healthy planet, healthy children: Designing nature into the daily spaces of childhood. In S. R. Kellert, J. H. Heerwagen, & M. Mador (Eds.), *Biophilic design: The theory, design and practice of bringing buildings to life* (pp. 153-203). Hoboken, NJ: Wiley.
- Nabhan, G. P., & Trimble, S. (1994). *The geography of childhood: Why children need wild places*. Boston, MA: Beacon Press.
- Newman, M., & Thomas, P. (2008). Student participation in school design: One school's approach to student engagement in the BSF process. *CoDesign*, 4(4), 237-251. doi:10.1080/15710880802524938
- NZAAE Auckland Branch. (2009). The woe-ful demise of "clean, green NZ" Retrieved from http://www.citizen-click.co.nz/clean_green 11 Feb 2010.
- Obama, B. (2009). Inaugural Speech. Retrieved from http://www.whitehouse.gov/the_press_office/President_Barack_Obamas_Inaugural_Address 6 Jan 2010.
- Oliphant, F. (2002). Putting the environment into our schools. *New Zealand Environment*, (14), 10.
- Orr, D. W. (2002). Political economy and the ecology of childhood. In P. H. Kahn, Jr & S. R. Kellert (Eds.), *Children and nature: Psychological, sociocultural, and evolutionary investigations* (pp. 279-304). Cambridge, MA: The MIT Press.
- Parnell, R. (2004). Soundings for architecture: An educational workshop for adults and young people. *Children, Youth and Environments*, 14(2), 229-241. Retrieved from <http://www.colorado.edu/journals/cye>
- Parnell, R., Cave, V., & Torrington, J. (2008). School design: Opportunities through collaboration. *CoDesign*, 4(4), 211-224. doi:10.1080/15710880802524904
- Peterson, C., & McCabe, A. (1983). *Developmental psycholinguistics: Three ways of looking at a child's narrative*. New York: Plenum.
- Petrescu, D. (2005). Losing control, keeping desire. In P. Blundell Jones, D. Petrescu, & J. Till (Eds.), *Architecture and Participation* (pp. 43-63). London: Spon Press.
- Pinnegar, S., & Daynes, J. G. (2007). Locating narrative inquiry historically. In D. J. Clandinin (Ed.), *Handbook of narrative inquiry: Mapping a methodology* (pp. 3-34). Thousand Oaks, CA: Sage.
- Prout, A. (2003). Participation, policy and the changing conditions of childhood. In C. Hallett & A. Prout (Eds.), *Hearing the voices of children: Social policy for a new century* (pp. 11-25). New York: Routledge.
- Pyle, R. M. (2002). Eden in a vacant lot: Special places, species, and kids in the neighbourhood of life. In P. H. Kahn, Jr & S. R. Kellert (Eds.), *Children and nature: Psychological, sociocultural, and evolutionary investigations* (pp. 305-328). Cambridge, MA: The MIT Press.
- Raban, B., Nolan, A., Waniganayake, M., Ure, C., Brown, R., & Deans, J. (2007). *Building capacity: Strategic professional development for early childhood practitioners*. South Melbourne, Victoria: Thomson.

- Reid, A., Jensen, B. B., Nikel, J., & Simovska, V. (2008). Participation and learning: Developing perspectives on education and the environment, health and sustainability. In A. Reid, B. B. Jensen, J. Nikel, & V. Simovska (Eds.), *Participation and learning: Perspectives on education and the environment, health and sustainability* (pp. 1-18). Dordrecht: Springer.
- Reid, A., & Nikel, J. (2008). Differentiating and evaluating conceptions and examples of participation in environment-related learning. In A. Reid, B. B. Jensen, J. Nikel, & V. Simovska (Eds.), *Participation and learning: Perspectives on education and the environment, health and sustainability* (pp. 32-60). Dordrecht: Springer.
- Roe, M. (2007). Feeling 'secrecy': Children's views on involvement in landscape decisions. *Environmental Education Research*, 13(4), 467-485. doi:10.1080/13504620701581562
- Rogoff, B. (2003). *The cultural nature of human development*. Oxford and New York: Oxford University Press.
- Sancar, F. (2006). A conversation with Cengiz Bektas: Architect, engineer, author. *Children, Youth and Environments*, 16(2), 207-219. Retrieved from <http://www.colorado.edu/journals/cye>
- Sanoff, H. (2001). *A visioning process for designing responsive schools*. Retrieved from <http://www.eric.ed.gov/> 18 Sept 2010.
- Sener, T. (2006). The Children and Architecture Project in Turkey. *Children, Youth and Environments*, 16(2), 191-206. Retrieved from <http://www.colorado.edu/journals/cye>
- Shallcross, T., & Robinson, J. (2008). Sustainability education, whole school approaches, and communities of action. In A. Reid, B. B. Jensen, J. Nikel, & V. Simovska (Eds.), *Participation and learning: Perspectives on education and the environment, health and sustainability* (pp. 299-320). Dordrecht: Springer.
- Shier, H. (2001). Pathways to participation: Openings, opportunities and obligations. *Children & Society*, 15, 107-117.
- Shier, H. (2010). 'Pathways to participation' revisited: Learning from Nicaragua's child coffee workers. In B. Percy-Smith & N. Thomas (Eds.), *A handbook of children and young people's participation* (pp. 215-229). Oxon, UK: Routledge.
- Sipos, Y., Battisti, B., & Grimm, K. (2008). Achieving transformative sustainability learning: Engaging head, hands and heart. *International Journal of Sustainability in Higher Education*, 9(1), 68-86. doi:10.1108/14676370810842193
- Sorrell, J. (2008). *joinedupdesignforschools*. In G. Tipton (Ed.), *des/IRE: designing houses for contemporary Ireland* (pp. 161-165). Kinsale, Co. Cork: Gandon Editions/National Sculpture Factory.
- Sorrell, J., & Sorrell, F. (2005). *joinedupdesignforschools*. London: Merrell.
- Srinivas, H. (2010). UN Decade of Education for Sustainable Development. Retrieved from http://www.gdrc.org/sustdev/un-desd/intro_un-desd.html 27 Mar 2010.

- Sutton, S. E., & Kemp, S. P. (2006). Young people's participation in constructing a socially just public sphere. In C. Spencer & M. Blades (Eds.), *Children and their environments* (pp. 256-276). Cambridge, MA: Cambridge University Press.
- Tasca, E. P. (1999). Setting up a European Ombudsman for Children. Retrieved from <http://assembly.coe.int/Documents/WorkingDocs/doc99/edoc8552.htm> 13 Dec 2009.
- The Treaty of Waitangi Information Programme. (2006). *The story of the Treaty Part 1*. Wellington: State Services Commission.
- Thomson, J. L., & Philo, C. (2004). Playful spaces? A social geography of children's play in Livingston, Scotland. *Children's Geographies*, 2(1), 111-130.
- Tilbury, D. (1995). Environmental education for sustainability: Defining the new focus of environmental education in the 1990s. *Environmental Education Research*, 1(2), 195-211. doi:10.1080/1350462950010206
- Tilbury, D., & Wortman, D. (2006). 'Whole School' approaches to sustainability. In J. C.-K. Lee & M. Williams (Eds.), *Environmental and geographical education for sustainability* (pp. 95-107). New York: Nova Science Publishers.
- Tsai, M.-L. (2007). Understanding children's personal narratives. In D. J. Clandinin (Ed.), *Handbook of narrative inquiry: Mapping a methodology* (pp. 461-488). Thousand Oaks, CA: Sage.
- UNESCO. (1977). Tbilisi Declaration. Retrieved from www.cnr.uidaho.edu/css487/The_Tbilisi_Declaration.pdf 11 Jan 2010.
- UNESCO. (1992). Earth Summit: Agenda 21. Retrieved from http://www.un.org/esa/dsd/agenda21/res_agenda21_00.shtml 11 Jan 2010.
- UNESCO-UNEP. (1975). The Belgrade Charter: A framework for environmental education. Retrieved from unesdoc.unesco.org/images/0001/000177/017772eb.pdf 10 Feb 2010.
- UNHCHR. (1989). United Nations Convention on the Rights of the Child. Retrieved from <http://www2.ohchr.org/english/law/crc.htm> 2 Jan 2010.
- Vygotsky, L. S. (1978). *Mind in society*. Cambridge, MA: Harvard University.
- Wake, S. J. (2007). Children's gardens: Answering 'the call of the child'? *Built Environment*, 33(4), 441-453.
- Wake, S. J. (2008). 'In the best interests of the child': Juggling the geography of children's gardens (between adult agendas and children's needs). *Children's Geographies*, 6(4), 423-435.
- Waller, T. (2006). "Don't come too close to my octopus tree": Recording and evaluating young children's perspectives on outdoor learning. *Children, Youth and Environments*, 16(2), 75-104. Retrieved from <http://www.colorado.edu/journals/cye>
- WCED. (1987). Our common future, Chapter 2: Towards sustainable development (from A/42/427). Retrieved from <http://www.un-documents.net/ocf-02.htm> 2 Jan 2010.

- Webb, R. (2009). Does the DQI process work? *Architects' Journal*, 230(4), 22-31.
- Wheeler, A. (2009a). The ethical dilemma of lifestyle change: Designing for sustainable schools and sustainable citizenship. *Les Ateliers de L'Ethique*, 4(1), 140-155. Retrieved from <http://www.creum.umontreal.ca/spip.php?article1064>
- Wheeler, A. (2009b). *Theatre practices, performativity and young people's ethical architectures*. Paper presented at the Second Ethics & the Built Environment Conference. , University of Nottingham, 9-11 Sept. (paper supplied by author).
- Wilson, V. (2000). Can thinking skills be taught? A discussion paper. Retrieved from <http://www.ttrb.ac.uk/viewarticle2.aspx?contentId=13501> 15 Jan 2010.
- Wilson-Hill, F. (2003). *Children's participation in environmental education: An analysis of Enviroschools, a whole-school approach to environmental education* (Unpublished Masters) Griffith University, Queensland, Australia.
- Woolner, P., Hall, E., Wall, K., & Dennison, D. (2007). Getting together to improve the school environment: User consultation, participatory design and student voice. *Improving Schools*, 10(3), 233-248. doi:10.1177/1365480207077846
- Wooltorton, S. (2004). Local sustainability at school: A political reorientation. *Local Environment*, 9(6), 595-609.