IMPACT OF
EDUCATION FOR SUSTAINABILITY
AT A MONTESSORI
PRIMARY SCHOOL:
FROM SILOS TO SYSTEMS THINKING

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This thesis is presented for the degree of Doctor of Education
of
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DECLARATION

I declare that this thesis is my own account of my research and contains, as its main content, work which has not previously been submitted for a degree at any tertiary education institution.

Elaine Lewis

Date
ABSTRACT

This research investigated Education for Sustainability (EfS) at an independent Montessori primary school, located in the Perth metropolitan area of Western Australia. A longitudinal case study involving analysis of data from a twenty year period was conducted to determine the effectiveness of EfS. Historical information about EfS at the school from 1990 to 2005 was examined, with the main focus of the study being on the impact of the Australian Sustainable Schools Initiative (AuSSI) between 2005 and 2009. AuSSI promotes a whole school, whole systems thinking approach to EfS.

Three school-based issues in EfS were studied. Firstly, the research aimed to determine what elements of EfS were in operation in the school prior to involvement in AuSSI. Secondly, student outcomes including engagement with whole systems thinking, attitudes and values, knowledge and understandings, and skills and behaviours related to EfS, were investigated during the first five years of participation in AuSSI. Thirdly, teacher perceptions of the EfS program, including engagement with whole systems thinking, were examined during this same time period.

A case study approach was employed to enable in-depth investigation of EfS in the life of the school prior to, during and post implementation of AuSSI. This approach facilitated revelation of participants' lived experiences, their perceptions and understandings of EfS, as well as detailed information about student outcomes in EfS. Case study methodology was also compatible with the culture and processes of the participating school and provided an opportunity for utilising a whole systems thinking approach. Data was gathered from a range of sources, through surveys, interviews, observation and document analysis over a five year period. The total participants included eleven teachers and seventy five students.

The research identified particular antecedents of EfS in the Montessori Method of education that existed in the school prior to AuSSI, including the whole child approach, together with the Montessori learning environment, curriculum and values. Following participation in AuSSI, student attitudes and values, knowledge and understandings, and skills and behaviours related to EfS were enhanced for all year levels. However, after three years when specific EfS actions and projects ceased, student EfS outcomes were
limited. Furthermore, students’ thinking and behaviour indicated a ‘silo’, rather than whole systems thinking approach to EfS. Teachers perceived the EfS program as highly effective in the initial three years after joining AuSSI. Key elements that enhanced EfS included EfS staff champions who had access to EfS networks, leadership support, and active school community involvement in all EfS processes. However, after three years of being an AuSSI school, the culmination of reduced leadership support for EfS, lack of staff training, vague designation of staff with EfS responsibilities and inadequate community involvement, resulted in cessation of the EfS program. Teacher perceptions on whole systems thinking revealed alignment between Montessori philosophy, EfS and whole system thinking was more in theory than in practice.

Through an in-depth longitudinal case study of a school this research highlighted the importance of whole school EfS professional learning, embedding EfS and whole systems thinking across the curriculum at all year levels, whole school support, and the usefulness of a sustainability continuum that recognizes the complex, dynamic interplay of issues involved in a school’s EfS journey. It is strongly recommended improvements to pre-service teacher education in EfS are implemented, and a review of the AuSSI toolkit is conducted to refine EfS evaluation processes and to target the specific EfS needs of teachers at different stages of schooling, as well as to enhance understanding and implementation of the whole systems thinking approach. Finally, EfS professional learning for all school staff in all schools is warranted to enhance depth of EfS engagement.
I wish to dedicate this thesis to my mother, Nell Johansen … for living her life with deep caring, creativity and sensitivity, while seeking wisdom, understanding, knowledge and excellence; and to my aunt, Tan, for sharing the wonders and joys of gardening with me.

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PUBLICATIONS

Aspects of this thesis have been previously published or presented as follows:

Papers


**Conference Posters**


**Conference Presentations**


**Website Conference Presentations**


CHAPTER 1
INTRODUCTION

Since the 1960s there has been growing international recognition of the importance of Education for Sustainability (EfS). Environmental degradation and social justice concerns have been at the core of international publications, events and policy statements about the need for EfS (UNESCO, 1976, 2005b). Authors have increasingly reported on the impact of human behaviour on the environment and the need for public education (Carson, 1962; Diamond, 2005; Flannery, 2005, 2010; Lemonick, 2009; Oreskes & Conway, 2010). EfS now seeks to reorient people so that they can address environmental and social issues positively, so they have the attitudes and values, knowledge and understandings, skills and behaviours that are life enhancing in the present and for future generations (ARIES, 2009a; DEWHA, 2009e; M. Littledyke, Taylor, & Eames, 2009; Tilbury & Cooke, 2005a).

A dominant focus for EfS in Australia has been the school education sector (Tilbury, Coleman, & Garlick, 2005). The commencement of the Australian Sustainable Schools Initiative (AuSSI) in 2003, with its whole school and systems thinking approaches, dramatically increased this focus (DET, 2005b; Tilbury et al., 2005). Pilot AuSSI programs started in New South Wales and Victoria. The other Australian States and Territories joined the Initiative in 2004, with the Western Australian Sustainable Schools Initiative (AuSSI-WA) pilot starting in 2005 (DET, 2005b). A small independent Montessori primary school, located in the metropolitan area of Perth, Western Australia, was one of the schools that participated in the AuSSI-WA pilot.

The currency of EfS in Australia in 2011 is highlighted by ‘Sustainability’ being one of three cross curriculum priorities of the new Australian Curriculum (ACARA, 2011c). This priority recognizes that “Sustainability addresses the ongoing capacity of Earth to maintain all life” (ACARA, 2011c, p. 1). Organising ideas for the Sustainability priority focus on knowledge (systems) and action (world views and futures) (ACARA, 2011c). Clearly, EfS is recognized to be a critical component of school education in Australia.
1.1 Context of the Study

This study focused on EfS at an independent Western Australian Montessori school (Kindergarten to Year 7) before and after the introduction of AuSSI-WA in 2005. It investigated the approach to EfS adopted by the school over a twenty year period, from its inception in 1990 up to 2009 - whether EfS was taught at all, whether school management and lessons reflected isolated, unrelated EfS contexts (silos) or embraced a holistic, systems thinking approach (systems). Thus the words - silos and systems - in the title of this thesis.

A comprehensive literature review was undertaken to determine overarching issues related to EfS and the Montessori approach to education. The review of literature on the Montessori approach found numerous authors suggested a philosophical and practical congruence existed between the Montessori curriculum and EfS (Gausman, 2001a, 2001b; J. K. Miller, 1974; Sillick, 1987). However, there appeared to be a lack of research evidence related to this congruence, as well as a need for more and better research on outcomes arising from it and the impact of an EfS program (Henderson & Tilbury, 2004; Schonleber, 2006; Tilbury et al., 2005). Overall, a thorough examination of the literature revealed there was minimal research evidence on the nature of the overlap between the Montessori approach and EfS. Furthermore, while documented whole school approaches to sustainability were starting to emerge, they were still rare (Henderson & Tilbury, 2004; Tilbury et al., 2005). Available studies tended to be short term investigations and longitudinal research was scarce (Gralton, Sinclair, & Purnell, 2004; Hargreaves & Fink, 2003). Finally, no comprehensive research on the impact of the Sustainable Schools Initiative in Western Australia has been reported (Flinders, 2006) and this is still the case in 2011.

1.2 Purpose of the Study

The purpose of this study was to examine the impact of EfS at a Montessori K-7 school, with particular focus on student outcomes and teacher perceptions after joining AuSSI-WA (2005). The antecedents of EfS in the Montessori approach to education were investigated. The elements of EfS in operation in the school prior to participation in AuSSI-WA were examined, together with those in operation after five years following the school’s involvement in AuSSI-WA, 2005-2009. Student outcomes and teacher perceptions arising from the EfS program since participation in AuSSI-WA were investigated, with particular reference to a whole school approach and systems thinking.
Influences impacting on AuSSI-WA at the school are briefly outlined in the following section to provide an overview and framework for the study. These influences emerged from the Literature Review and are examined in depth in the next chapter.

1.2.1 Influences Impacting on AuSSI-WA

EfS research and reports, literature on the Montessori approach to education, and school-specific information were explored to provide understandings about influences impacting on participation in AuSSI-WA at the study school. Three groups of influences were investigated: EfS research themes; curriculum; and school setting. These were examined in relation to pre- and post-AuSSI-WA contexts.

EfS research themes arose as the first group of influences that appeared to impact on AuSSI-WA. Emerging from the growing body of research on EfS, eight themes relevant to the current study were identified: importance of whole school approaches; student voice; sense of place; leadership model; learning model; whole systems thinking; behaviour change; and alignment with state, national and international objectives. Curriculum was the second group of influences impacting on EfS at the study school. The Australian curriculum, Western Australian curriculum, and Montessori philosophy and curriculum converge to influence AuSSI-WA outcomes. School setting was the third group of influences explored in relation to impact on AuSSI-WA at the school. School setting relates to the unique features of the school itself and includes: school priorities and approach; community education; student voice; researcher position; sense of place; and professional learning.

1.2.2 EfS Pre 2005

Stakeholder understandings about EfS research themes, curriculum issues and school setting were examined in relation to EfS developments at the school prior to participation in AuSSI-WA. Antecedents of EfS at the school, student outcomes and teacher perceptions about EfS were investigated, utilising a range of evidence relevant to the period 1990-2004.

1.2.3 EfS and AuSSI-WA Post 2005

The vision of AuSSI was for all Australian schools and their communities to become sustainable (DEWHA, 2009b). AuSSI-WA formed part of AuSSI, so had broad aims consistent with the national initiative. AuSSI-WA provided a framework to support
Western Australian schools in the development of a whole school approach to EfS (DET, 2011). This thesis investigated the impact of the AuSSI-WA at an independent K-7 Montessori school. Issues related to EfS research themes, curriculum and school setting were explored. Student, teacher and school outcomes were investigated, as outlined in the following research questions.

1.3 Research Questions

Given the specific purposes of this study, the particular research questions were:

1a) What are the antecedents of EfS in the Montessori approach to education?

b) What elements of EfS were in operation in the school immediately prior to involvement in the Western Australian Sustainable Schools Initiative?

2) What are the outcomes, in terms of student attitudes and values, knowledge and understandings, and skills and behaviours related to EfS, after engagement with whole systems thinking and five years of involvement in the Western Australian Sustainable Schools Initiative?

3) What are the outcomes, in terms of teacher perceptions of the EfS program, after engagement with whole systems thinking and five years of involvement in the Western Australian Sustainable Schools Initiative?

Through addressing these research questions it was possible to determine the impact of AuSSI-WA in relation to EfS at a K-7 Montessori school.

1.4 Significance of the Study

It is anticipated that this study will contribute to theoretical and applied knowledge in the field of EfS. From a theoretical perspective, the significance of the study has two components. Firstly, there is a need for research on the Montessori approach to EfS. As will be outlined in the Literature Review, Montessori philosophy appears to embed certain principles into the curriculum which are similar to those espoused in EfS, as well as promoting in-depth integration of these principles into classroom programs (J. K. Miller, 1974; Montessori, 1973; Sillick, 1987). However, there has been little research on the compatibility between the Montessori philosophy, values and structures and the EfS program. The present study investigated these theoretical issues at a Montessori school in Western Australia.
Whole systems thinking is the other component of theoretical significance in the study. Whole systems thinking is a framework for seeing the big picture, for establishing interrelationships and understanding phenomena as an integrated whole (Capra, 1996; Clayton, Clayton, & Radcliffe, 1996; Sterling, 2003b; Tilbury et al., 2005). Systems thinking may be contrasted with fragmentary thinking, which is viewing phenomena in their separate parts (silos) and focusing only on narrow specializations. In an EfS context systems thinking means emphasizing relationships, relationships between natural and human systems and at different system levels (Lang, 2007; R. Littledyke & McCrea, 2009; Sterling, 2003b). However, there is a paucity of research on whole systems thinking as the theoretical approach underpinning EfS programs. The current research examined this theoretical issue in the school setting.

The anticipated applied knowledge resulting from the research involved three components. The first related to outcomes achieved by the introduction of AuSSI-WA in 2005 (DET, 2005a). Anecdotal evidence suggested the AuSSI-WA achieved positive outcomes in the twelve elements it identified as being important for sustainability in schools, such as, the adoption of a whole school approach and the development of school-based sustainability policies (Flinders, 2006; Henderson & Tilbury, 2004; Tilbury et al., 2005). However, no research was located that indicated whether AuSSI-WA was achieving its aims. Although there has been steady growth in EfS programs in Australian schools since 1985, particularly in the field of environmental education (EE) (Henderson & Tilbury, 2004), a recent review of studies in this field concluded that improved research evidence was required to determine outcomes of these programs and whether sustained behavioural change occurred (Gralton et al., 2004; Henderson & Tilbury, 2004).

From the applied perspective, the second component of significance for the study involved whole systems thinking. Although AuSSI has been built upon an understanding of system thinking to ensure change is sustainable, no research has been located on the outcomes of EfS programs that explicitly employ whole systems thinking. Systems approaches and systemic thinking is advocated in the Australian education context (Neill, 2008; Tilbury et al., 2005), however the application and impact of such approaches remains to be documented.

The third component of significance to the study, from the applied perspective, involved development of frameworks to understand and evaluate overarching issues and key aspects influencing the impact of AuSSI-WA on a school. The research sought to
discover and investigate issues impacting on AuSSI-WA and EfS to enhance understanding through the use of innovative frameworks and evaluation tools.

In conclusion, the present study addresses particular components of EfS that warrant further investigation, thereby contributing to theoretical and applied knowledge in this field. These components include the examination of congruence between Montessori philosophy and EfS, research to determine the practical outcomes for students and teacher perceptions after involvement in AuSSI-WA, as well as an investigation into the application of whole systems thinking in a primary school setting. Findings from this research will contribute new knowledge in the field of EfS, in particular evidence regarding the effectiveness of AuSSI-WA. Findings will also contribute new knowledge related to Montessori schools, as well as to other school settings that have adopted a child-centred approach. Finally, this research will provide Australian data on the outcomes of EfS programs and whether sustained behavioural change occurred.

1.5 Definition of Terms

Key terms mentioned in this chapter are defined below. The definition of other terms used in the thesis can be found in the Glossary.

**Australian Sustainable Schools Initiative (AuSSI)** - encourages schools to take a whole-system and whole-school approach to sustainability. AuSSI is a partnership of the Australian Government, States and Territories that seeks to support schools and their communities to become sustainable. It involves participants in a whole-school context, to explore through real-life learning experiences, improvements in a school’s management of resources and facilities, such as energy, waste, water and biodiversity. In addition, it addresses the associated social and financial issues (DEWHA, 2009b).

**Australian Sustainable Schools Initiative-Western Australia (AuSSI-WA)** - is part of the national Australian Sustainable Schools Initiative. It provides a framework that supports schools in Western Australia in the development of a whole-school approach to EfS (DET, 2010a).

**Education for Sustainability (EfS)** - refers to the co-ordinated management of interrelated systems - environmental, economic and socio-cultural systems - in the context of intergenerational equity (ARIES, 2009a; DEWHA, 2009e; Jacobs, 1999; Lemonick, 2009; Tilbury & Cooke, 2005a; UNESCO, 2005b). Co-ordinated management involves equipping everyone with the knowledge, skills and
understandings necessary to make decisions based on a consideration of the environmental, economic and social implications, from a whole systems thinking perspective (ARIES, 2009a; DEWHA, 2009e; Sterling, 2003b; Tilbury & Cooke, 2005a).

**Sustainability** - involves living within our environmental limits, achieving social justice and fostering economic and social progress for all peoples on Earth, both in present and future generations (DEH, 2006c; Newman, 2005a; Tilbury et al., 2005; Tilbury & Cooke, 2005b).

**Whole systems thinking** - refers to a framework for seeing the whole picture, for establishing interrelationships and understanding phenomena as an integrated whole (Capra, 1996; Clayton et al., 1996; Sterling, 2003a, 2003b). Systems thinking, or systemic thinking, emphasises an holistic approach and involves a critical understanding of how complex systems work, by focusing on the ‘whole’ rather than ‘parts’ (silos), and on ‘processes’ rather than ‘things’ (Tilbury et al., 2005, p. 90).

### 1.6 Overview of the Thesis

This thesis is presented in seven chapters. The introductory chapter outlines EfS and Montessori influences relevant to this study, and identifies the three research questions investigated. The focus of this research is on the impact of the EfS program at the case study school, with particular reference to AuSSI-WA and whole systems thinking.

The second chapter presents a review of the literature related to this research. There are four broad sections to the literature review: first, literature on EfS; second, literature examining the Montessori context; third, literature on leadership, particularly within the context of educational change; and finally, synthesis of this literature, drawing out influences upon AuSSI-WA, development of the conceptual framework and identification of overarching issues in EfS in relation to the present study.

Chapter three describes the methodology and indicates why the research approach was chosen. The theoretical perspective and researcher position are outlined. The method and research design employed to address the research questions are presented. The target population is described. Instruments employed in the study are elucidated, including questionnaires, observations and document searches. The chapter concludes with an audit trail, description of data analysis and study limitations.
The fourth chapter presents the results from the collected data and is divided into three main sections. The first section is the analysis of the pre AuSSI-WA (1990-2004) data. The school context for that period, along with the findings of the former teachers’ survey and former students’ survey are outlined. The second section considers data obtained from the post AuSSI-WA (2005-2009) period. This section was informed by teacher and student surveys, student observations and document searches. The final section of the chapter presents a summary of the main findings.

The fifth chapter discusses and reflects on the results of the research in the context of the literature. Each of the three research questions are considered in turn, with reflections on the conceptual framework concluding the chapter. Throughout the discussion the findings of the current research are compared with findings of related studies.

The sixth chapter draws on the findings of the current study to examine professional and conceptual implications of this research. Some aspects discussed include organisational change, school administration, curriculum and the conceptual framework. The chapter concludes with four key recommendations which aim to enhance the effectiveness of AuSSI-WA. These recommendations are drawn from the experiences of study participants so emerged directly from the research evidence.

The concluding chapter reviews the objectives, results and implications of the research. Limitations of the study are outlined, followed by final reflections.
CHAPTER 2
REVIEW OF LITERATURE

This chapter provides a detailed review of literature critical to the present research in order to establish the theoretical and research framework for the study at an independent Western Australian Montessori school (K-Year 7). Theory guiding this research relates to both practice and context. To address practice, understandings about Education for Sustainability (EfS) and whole school approaches to EfS were examined. The Australian Sustainable Schools Initiative in Western Australia (AuSSI-WA) is placed within national and international EfS contexts. To address context, the Montessori approach to education and leadership literature were studied. Evidence for the congruence of the Montessori approach with EfS is reviewed and leadership from the perspective of the impact and effectiveness of new initiatives in schools, with particular reference to EfS initiatives, is examined. Throughout this review weaknesses and gaps in the literature are identified, thereby providing a justification and conceptual framework for the current study.

2.1 Education for Sustainability

This section provides: a definition and historical context for EfS; examines attitudes and values, knowledge and understandings, and skills and behaviours for EfS; and reviews the literature on the whole systems thinking approach.

2.1.1 Defining EfS

Definitions

The literature abounds with different definitions of sustainability, with related terms such as ‘sustainable development’, used interchangeably (Holmgren, 2006; Pepper, 2007; Tilbury, 1995; Tilbury et al., 2005). The definition of ‘sustainability’ adopted in this thesis relates to the co-ordinated management of interrelated systems - environmental, economic and socio-cultural systems, in the context of intergenerational equity (Babiuk & Falkenberg, 2010; DEWHA, 2009e; Jacobs, 1999; Lemonick, 2009; Tilbury & Cooke, 2005a; UNESCO, 2005b). This conception of sustainability was adopted (section 1.5) because it is underpinned the Australian Sustainable Schools Initiative (AuSSI) philosophy and aligns with current thinking in the literature.
In Australia sustainability education has sometimes been referred to as Environmental Education (EE) in the context of education in, about and for the environment (J. Evans & Boyden, 1970; Fien & Gough, 1996; Linke, 1980; Tilbury, 1995) (Table 2.1). In brief, in refers to experience in the environment, about refers to knowledge of the environment and for involves the motivation to act and actions for the environment (Lucas, 1979; Tilbury et al., 2005). However, some authors argue that there are important differences between EE and EfS (Fien & Tilbury, 2002; Pepper, 2007). EE was considered to be more focused on the environment and nature study, while EfS addressed economic and social issues as well as environmental concerns and explicitly adopted a whole systems thinking approach (Tilbury & Cooke, 2005a). Furthermore, some authors maintain that not all EE is EfS because some EE is deficient in achieving changed behaviour (J. M. Davis & Ferreira, 2009; Fien, 2001; Heck, 2003). Given this debate, instead of focussing on differences between EE and EfS, the author agrees with Tilbury et al. (2005) and maintains that EE has evolved into EfS. As shown in Table 2.1, the evolution of EE to EfS may be simplistically presented as: about the environment in the 1970s, in the environment in the 1980s, for in the 1990s, and sustainability in the 2000s (Tilbury et al., 2005).

The 1992 Earth Summit (UNCED, 1992) heralded a shift from EE to EfS in Australia (Heck, 2003), with a focus on the for approach (Fien, 2001). In practice, during the 1990s, little effective progress was achieved in terms of outcomes despite the for the environment focus (Heck, 2003). However, in the 2000s the emphasis on EfS involved clarification of understandings related to for the environment, by promoting “critical reflection ... lifestyle changes that are more compatible with sustainability ... [and which] build capacity for active participation” (Tilbury, Coleman, & Garlick, 2005, p. 17). Education for the environment was considered to empower people, provide learners with skills to take positive action so that current and future generations could have a critical understanding of the complex systems involved: environmental, economic and socio-political systems (Tilbury, Coleman et al., 2005). Indeed, the most recent National Action Plan for EfS in Australia recognised the need for people and organisations to have the knowledge, skills, values and motivation to respond appropriately to the complex sustainability issues they encountered (DEWHA, 2009e).
<table>
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<th>Conception</th>
<th>Years and Major Focus</th>
<th>Representative Researchers/Theorists</th>
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<td>EE/Outdoor Education</td>
<td>1970s - about the environment</td>
<td><em>Education and the environmental crisis</em> (J. Evans &amp; Boyden, 1970); <em>Indoor or outdoor environmental education?</em> (Howie, 1974); <em>Environment and environmental education</em> (Lucas, 1979).</td>
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<td>EE/Outdoor Education</td>
<td>1980s - in the environment</td>
<td><em>Education for the Australian environment</em> (Fien, 1988); <em>Principles and practices of outdoor/environmental education</em> (Ford, 1981); <em>Environmental education in Australia</em> (Linke, 1980); <em>Redefining outdoor education and Outdoor leadership around the world</em> (Priest, 1986, 1988).</td>
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<td>EE/Outdoor Education</td>
<td>1990s - for the environment</td>
<td><em>An evaluation of two environmental education programs</em> (Dorricot, 1999); <em>Environmental education</em> (Fien &amp; Gough, 1996); <em>What works in environmental education</em> (Glover &amp; Deckert, 1998); <em>Learning about the environment</em> (Melamed, 1994); <em>Impact of a week-long experiential education program</em> (Mittelstaedt, Sanker, &amp; VanderVeer, 1999); <em>Is outdoor education environmental education?</em> (Parkin, 1998); <em>Environmental values education</em> (Scott &amp; Oulton, 1998); <em>Environmental education for sustainability</em> (Tilbury, 1995).</td>
</tr>
<tr>
<td>Efs</td>
<td>2000s – active engagement for, values education, whole systems approach</td>
<td><em>Collapse: How societies choose to fail or survive</em> (Diamond, 2005); <em>Education for sustainability</em> (Fien, 2001); <em>The global challenge of sustainability</em> (Fien &amp; Tilbury, 2002); <em>The green city</em> (Low, Gleeson, Green, &amp; Radovic, 2005); <em>Sustainability in the wild west</em> (Newman, 2005b); <em>Whole systems thinking as a basis for paradigm change in education</em> (Sterling, 2003b); <em>A national review of environmental education</em> (Tilbury et al., 2005); <em>A national review of environmental education and its contribution to sustainability in Australia</em> (Tilbury &amp; Cooke, 2005a); <em>Local sustainability at school</em> (Wooltorton, 2004); <em>Living sustainably: The Australian government’s national action plan for Efs</em> (DEWHA, 2009e).</td>
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Seven principles of EfS were outlined: transformation and change, education for all and life long learning, systems thinking, envisioning a better future, critical thinking and reflection, participation and partnerships for change (DEWHA, 2009e, p. 9). The Action Plan recognised that EfS had changed from the EE focus of the 1970s “on
awareness of natural ecosystems and their degradation to [author emphasis] equipping all people with the knowledge, skills and understandings necessary to make decisions based upon a consideration of their full environmental, social and economic implications” (DEWHA, 2009e, p. 3). Clearly, as shown in Table 2.1, understandings about EfS in Australia at the national level have evolved significantly over the last forty years.

Definitional issues will be raised again in the following sections of this literature review when they are found to impact on conceptions of EfS. All the foregoing developments in understandings about sustainability and sustainability education were fundamental to the creation of the Australian Sustainable Schools Initiative (AuSSI) in the early 2000s. Consequently AuSSI aimed to encourage schools to take a whole-system, whole-school approach to sustainability (DEWHA, 2008). A more detailed discussion of AuSSI will be presented in the section on whole school approaches, but first a brief overview of the historical context of EfS.

Historical Context
From the perspective of historical context, sustainable behaviours have been practiced by many cultures for thousands of years but it was not until the 1960s that developed countries started to articulate interest in the concept (Department of the Environment and Heritage, 2006). Three books in the public arena are given credit for sparking current interest in the subject: Silent spring by Rachel Carson (1962), The population bomb by Paul Ehrlich (1971) and The limits to growth by the Club of Rome (Meadows & the Club of Rome, 1972). Carson’s (1962) book raised worldwide awareness of environmental problems and consequent danger to humans resulting from the indiscriminate use of pesticides, while the publications by Ehrlich (1971) and the Club of Rome (Meadows & the Club of Rome, 1972) drew attention to population growth and related global development issues. International forums were subsequently held to debate the need for a new approach to development and sustainability. Various international documents and commitments advocated educational reform to reflect a sustainability agenda, which had a direct impact on EE and EfS.

There has been rapid change in the last fifty years in EE and EfS, with current concerns about climate change continuing to emphasise the need for education and behaviour change (CCWA, 2009; Flannery, 2005; UNFCCC, 2009a). Our era in human history is unique because human survival is under threat due to global conditions (Babiuk &
Global concerns about sustainability have resulted in international commitments, with EfS being acknowledged as vital at all levels - global, national, state and local (UN, 2005; UNFCCC, 2009a). All these levels will be examined later in this chapter, in the section on whole school approaches to EfS. The following sections aim to clarify the components of EfS to set the scene for the present research. As outlined in the 2009 National Action Plan for EfS, attitudes and values, knowledge and understandings, and skills and behaviours are important components for living sustainably (DEWHA, 2009e). These three components of EfS will be examined separately as the aspects explored in the research question on student outcomes (RQ.2). These components are then linked together again in a review of whole systems thinking, which relates to research questions 2 and 3.

2.1.2 Attitudes and Values in EfS

Attitudes and values are integral to effective EfS, since having favourable attitudes and values towards living sustainably are fundamental for behaviour change to occur. Attitudes will be examined first, followed by values, although there is considerable overlap between understandings related to attitudes and values. An examination of the literature on attitudes and values is important for the present study because an aspect of the second research question specifically focuses on outcomes of the EfS program with reference to possible changes in student attitudes and values.

Attitudes

Attitudes cannot be directly observed, rather they are inferred from behaviour and derived from self-reports (Bell, Greene, Fisher, & Baum, 2005, p. 26). Attitudes refer to opinions, thoughts or feelings, about someone or something; it is an internal mental state that lasts for a least a short time and involves some level of assessment, favourable or unfavourable (Bell et al., 2005; Cooper & Stone, 2000; Eagly & Chaiken, 1993;
Hogg & Terry, 2000; Trafimow, 2000). In the present case the focus is on attitudes toward the environment and sustainability. As EfS is a more recent concept than EE there has been considerably more research conducted on environmental attitudes than attitudes toward sustainability.

Environmental attitudes

Environmental attitudes have been a very widely studied construct in the study of human interaction with the natural environment (Ewert & Galloway, 2004). Research on environmental attitudes has focused on a range of variables. Key variables include age, gender, residence, income, ethnic and cultural background, political ideology, childhood experiences, and social context (Teisl & O’Brien, 2003). Various studies have shown younger adult respondents, positive early childhood experiences outdoors, higher levels of income and education, living in urbanised areas and more liberal political ideologies appear to be related to favourable attitudes toward the natural environment (Place & Ewert, 2001; Teisl & O’Brien, 2003). Gender differences have also been found. For instance, Mohai (1992) reported women were more concerned about environmental issues but were less environmentally active than men.

This leads to one of the more challenging problems associated with environmental attitude research, namely, the relationship between environmental attitude and actual behaviour. Findings reveal less consistency between particular environmental concerns and actual behaviour (Ewert & Galloway, 2004; Olli, Grendstad, & Wollebaek, 2001). It appears that the link between specific variables and actual behaviours is multidimensional and considerably more complex (Ewert & Galloway, 2004). This research, however, was predominantly conducted in the adult domain, which consequently identifies a gap in the literature. There is a dearth of research evidence on the environmental attitudes of primary school students. This situation has arisen because there are few tools are available to measure young students’ attitudes and behaviours toward the environment (Ballantyne, Packer, & Everett, 2005; Manoli, Johnson, & Dunlap, 2005; L. M. Musser & Diamond, 1999; Vorkinn, 2001).

One tool recently developed to measure environmental learning by primary school aged children was documented by Ballantyne, Packer, and Everett (2005). This research involved 134 students, aged six to eleven years, attending programs at an Environmental Education Centre in Queensland, Australia. The resulting tool, the Environmental Learning Outcomes Survey, included observations of student engagement and an interview schedule that measured knowledge, attitudes and behavioural intentions.
This instrument enables researchers to measure student learning and investigate the impact of environmental EFS programs. It was utilized in the current study to determine environmental attitudes of young students, so provides new evidence in an area that is not well researched.

**Attitudes toward sustainability**

Attitudes toward sustainability have not been widely documented because the field is relatively new. No studies of primary school students’ attitudes towards sustainability were located. This gap in the literature highlights a key contribution the present research offers to the field. Other researchers, such as Salter (2009), are conducting research that is also expected to provide attitudinal evidence from primary aged children.

Some studies of adults’ attitudes towards sustainability were available for examination. This research mainly focused on particular aspects of sustainability, such as attitudes toward fisheries, waste, transport or energy, rather than investigating sustainability from a broad perspective (Bergquist & Zwick, 1995; Odom, Roedl, & Blevis, 2008; Ruff & Olson, 2007) (Appendix 5). These studies provided evidence of a gap between attitude and behaviour. Research that investigated broad attitudes toward sustainability obtained similar findings. For instance, Franz (1998) conducted a study to identify attitudes toward sustainability held by a group of Brisbane architects and designers. Overall, it was found that “practitioners do not appreciate the complexity and multidimensional nature of sustainability and its associated issues” (Franz, 1998, p. 1). Furthermore, despite espoused commitment to the notion of sustainability by the respondents, “very little ‘sustainable practice’ is conducted at home or in relation to design practice” (Franz, 1998, p. 1). A recent study of Murdoch University students’ attitudes reported a very high positive attitude towards sustainability, yet more than a third of the students did not consider sustainability relevant to their field of study (Malet, 2009, p. 19). Nevertheless, the students saw sustainability “as important in their lives” and did “not want to leave it to experts” (Malet, 2009, p. 19). These findings were important to the present study because they highlighted the complexity of attitudes towards sustainability and the gap between stated attitude and actual behaviour.

The disconnection between attitude and behaviour is an instance of what is known as ‘cognitive dissonance’. The phenomenon of ‘cognitive dissonance’ was described by Festinger as “the existence of non fitting relations amongst cognitions” (Festinger, 1957, p. 3). Furthermore, is was considered a “motivating factor in its own right”
(Festinger, 1957, p. 3). Thus Festinger (1957, p. 3) argued cognitive dissonance “can be seen as an antecedent condition which leads to activity oriented toward dissonance reduction just as hunger leads to activity oriented towards hunger reduction”. This work was developed by Aronson. Cognitive dissonance was viewed as a natural process that is a biological survival tool; as a means to deal with conflicting beliefs and justification for actions (Aronson, 2008; Aronson, Wilson, & Akert, 1997; Travis & Aronson, 2007). Aronson argued inconsistencies between beliefs, attitudes and behaviours should be accepted and examined so that people can learn from such situations (Aronson, 2008; Travis & Aronson, 2007). Numerous examples of cognitive dissonance were found in research about attitudes toward sustainability (Baudains, 2003; Kagawa, 2007; Malet, 2009) (Appendix 5). The literature presents considerable evidence of cognitive dissonance in adults in this field, but little evidence of possible cognitive dissonance in children. The present research will address this gap by contributing new findings on this issue.

Having briefly examined ‘attitudes’ in the context of EfS, the next sub-section explores ‘values’ and the way in which these are relevant to EfS. More specifically, the literature review sought to determine possible gaps that could be addressed by the current study.

Values

Although there is considerable overlap between attitudes and values, values are usually thought of as a broader construct than attitudes (Bell et al., 2005). Furthermore, it is argued that “specific attitudes develop within a normative or value-based context” (Bell et al., 2005, p. 26). A multinational study reported survey data examining the relationship between environmental values and attitudes, obtained from a sample of 2160 college students in fourteen countries (Schultz & Zelezny, 1999). Overall, the research findings supported the value-basis theory of environmental attitudes (Schultz & Zelezny, 1999).

Defining values, like defining attitudes and EfS itself, provides the opportunity for considerable debate. However, for present purposes the following definition was adopted. Values are "... the principles and fundamental convictions which act as general guides to behaviour, the standards by which particular actions are judged as good or desirable" (Halstead, Taylor, & Taylor, 2000). This approach to values is in accordance with the position taken in the national framework of Values for Australian Schooling (Australian Government Department of Education Science and Training, 2005). This document resulted in considerable dialogue across Australian school
communities about values. Values education is increasingly viewed in Australia, and internationally, as the core business of schools (Lovat, 2005; Lovat & Toomey, 2007) and is an integral part of EfS.

Recent developments in values education research suggest important changes are occurring in this field (Hill, 2008; Lovat & Toomey, 2007; Noble, 2009; Shaw, 2007). For instance, Australian research involving six case studies examined the symbiotic relationship between values education and quality teaching, a relationship known as the 'double helix effect' (Lovat & Toomey, 2007). The cases showed that values education can make a very important contribution to fostering strong positive relationships, positive dispositions to learning, producing a calm teaching and learning environment and providing emotional and spiritual space. The research also identified ways that values education nurtured in students the various dimensions of quality teaching: intellectual depth, communicative competence, capacity for reflection, self-management and self-knowledge. This relationship between values education and quality teaching highlights that good practice values education is congruent with quality teaching practice (Lovat et al., 2007), and this is argued to be critical for effective EfS (Noble, 2009). Other research has specifically targeted this link between values education, quality teaching and EfS, such as the Values Education Good Practice Schools (VEGPS) Project (Curriculum Corporation, 2006a; Sparvell, 2008).

The Values Education Good Practice Schools (VEGPS) Project was part of the Australian Government's values education program (Curriculum Corporation, 2006b; DEEWR, 2008). It aimed to devise successful ways of implementing the National Framework for Values Education in Australian Schools and conduct research to identify, substantiate and describe good practices in values education (Curriculum Corporation, 2006b). The VEGPS Project (Stages 1 and 2) contributed new understandings in this field, with a program designed to foster and support improved values education practice in Australian schools (Curriculum Corporation, 2006b; Sparvell, 2007). One innovative VEGPS project (Stage 2) in which values were regarded as central to EfS, involved a tri-state school cluster (Sparvell, 2007, 2008). The specific question overarching the schools involved in this tri-state VEGPS cluster was: How can we pursue an explicit values education agenda with an environmental education for sustainability perspective? Overall, this VEGPS project found conducting environmental education projects, with an EfS perspective was an effective, meaningful approach to the teaching of values. The projects provided students with opportunities to
explicitly engage with values in real life environmental contexts and actively participate in tasks that made the values being presented both physical and understandable, rather than vague abstract concepts. What could have been stand-alone EE projects in each of the schools, were transformed into "significant, deep and sustainable learning" journeys by re-framing staff and student thinking with a strong, explicit, values education foundation (Sparvell, 2007, p. 30). This VEGPS project also illustrated the importance of developing a ‘sense of place’ in EfS and values education.

_Sustainability values and ‘sense of place’_
Researchers argue that attachment to place, having a ‘sense of place’, is vital in EfS as it facilitates the development of strong close relationships with the local environment, which in turn increases connectivity to the natural world (R. Evans, Koul, & Rennie, 2007; Miles, 2008a; R. B. Stevenson, 2011; Tooth & Renshaw, 2009). Indeed, Gruenewald (2006, p. 4) claimed “to know anything about the world is to know its places”. Researchers investigating ‘place’ concluded that people needed opportunities for meaningful interactions with nature (Bonnett, 2002; Donaldson, 2009a, 2009b; Louv, 2005; Miles, 2008a; Neill, 2008). One reason provided for focusing on ‘place’ in EfS was to make learning more meaningful to all stakeholders.

A review of literature on values in EfS and the importance of ‘sense of place’ in EfS revealed considerable overlap. “Relationships with and in place are central to the issue of sustainability” (Everett, Noone, Brooks, & Littledyke, 2009, p. 183). VEGPS projects - stage 1 (Netherwood, Buchanan, Stocker, & Palmer, 2006) and stage 2 (Sparvell, 2008) provided evidence that supported engagement with EfS in local, meaningful contexts are empowering for all stakeholders. Other authors (Cameron, 2008; Demetriou & Wilson, 2010; Everett et al., 2009; Holdsworth & August, 2005; Neill, 2008) supported these findings and reinforced the benefits from encouraging student voice on issues of local concern. This evidence is relevant to the present study in terms of the degree of alignment, understanding and application of ‘sense of place’ findings in the case study school.

_Sustainability values and environmental values_
There are many formulations of the essential components of 'sustainability values' and 'environmental values' (Appendix 5). In the Millennium Declaration, for example, the United Nations identified six fundamental global values for sustainability in the twenty-first century (Leiserowitz, Kates, & Parris, 2004; UNGA, 2000). These include freedom, equality, solidarity, tolerance, respect for nature and shared responsibility
These sustainability values are broadly based and not narrowly focused on the environment only. Likewise, understandings about the essential components of 'environmental values' vary, such as, living harmoniously within ecological systems, developing a caring, responsible attitude toward nature, and promoting a sense of continuity and community with other people and all living things (Gralton et al., 2004; Martin, 2007; Smyth, 1996). Given this broad definitional landscape, the present study adopts the values outlined in the Western Australian curriculum document (Curriculum Council, 1998) because this provides the educational context underpinning the case study school EfS program and there is considerable overlap between all these different formulations.

The Curriculum Framework (Curriculum Council, 1998) for Western Australian schools explicitly outlines values to be addressed. Five ‘Core Shared Values’ are identified: a pursuit of knowledge and a commitment to the achievement of potential; self acceptance and respect of self; respect and concern for others and their rights; social and civic responsibility; and finally, environmental responsibility. These values readily align with the principles of EfS and overlap with other formulations of values, like those in the Millennium Declaration (Appendix 5). Furthermore, these understandings about values underpin the work promoted by AuSSI-WA (DET, 2011) and are relevant to the research context of the present study.

In summary, a review of the literature on attitudes and values, as they relate to EfS/EE, has shown that attitudes and values are a vital component of effective EfS. However, having attitudes and values that are favourable to living sustainably does not necessarily lead to behavioural change. The present study therefore investigates possible changes in student attitudes and values as an outcome of the EfS program and AuSSI-WA membership at the case study school. In so doing the current research contributes to a dearth of research evidence in this field, specifically focusing on pre-primary and primary aged children. Given the importance of attitudes and values in EfS, relevant knowledge and understandings are also part of the values-knowledge-skills requirements for empowering EfS. Literature on knowledge and understandings in EfS is reviewed in the following section.

2.1.3 Knowledge and Understandings

Environmental knowledge has long been recognized as an important component of EE (Lucas, 1979). The knowledge component of EfS is also essential for achievement of
desired outcomes. Knowledge and understandings about environmental, economic and socio-cultural systems are vital for effective EfS (Baudains, 2003; Birdsall, 2010; Lucas, 1979; Sterling, 2003b). Environmental knowledge will be discussed first, followed by a review of knowledge relevant to the economic and socio-cultural systems, as these are essential aspects of the broader EfS perspective (Sterling, 2003a, 2003b).

Knowledge about the environmental system provides understandings about how natural systems work, informs understanding of the impact of human activities upon them and develops environmental investigation and thinking skills, along with the opportunity for enhanced scientific literacy. Participation in environmental activities was expected to increase knowledge and influence attitudes, and these developments were “assumed to generate new activities, directed towards related goals, or more effective versions of the original actions” (Lucas, 1979, p. 74) (Figure 2.1).

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**Figure 2.1 Cyclic model of environmental education (Lucas, 1979, p. 74)**

However, numerous authors have argued that this model of environmental education is too simplistic and does not reflect the complexity of decision making (Baudains, 2003; Birdsall, 2010; Heimlich & Ardoin, 2008; Kollmuss & Agyeman, 2002). Baudains (2003, p. 23), for instance, argued that Lucas’ (1979) conception lacked reference to “metacognition, reflection and orchestration …[it] does not provide a space for learners to combine the three aspects of their learning, reflect on them objectively and subjectively, and form new directions to continue their own environmental education”.

The theory of learning that focuses on these characteristics is ‘self-regulation of learning’ (SRL) (Pressley, 1995; Zimmerman, 1990). A principal theorist in SRL linked motivation, behaviour and metacognition, recognizing the key role metacognition played with regards to knowledge and the other aspects (Radloff, 1997). Understandings from the cyclic model of EE and SRL were brought together in a new model presented by Baudains (2003, p. 26) (Figure 2.2). This model informs some current research and teaching in EE and EfS (Ampt, 2007; C M Baudains, 2006b,
Studies have shown that a lack of knowledge can be a barrier to behaviour change for sustainability. For instance, Schultz (2002, p. 78) reported “The results from a variety of studies suggest that knowledge about recycling is a strong correlate of recycling behaviour”. This researcher added however, “This conclusion is qualified by the concept that knowledge does not provide a motive for behaviour … beliefs provide a motive for behaviour” (Schultz, 2002, pp. 78-79). This qualification reinforces the understandings about attitudes and values discussed previously, and how they may be related to knowledge, motivation and metacognition in EfS.

In addition to the environmental system, knowledge and understandings about economic and socio-cultural systems are important in EfS, together with knowledge and understandings related to interactions and interdependence between all these systems. As Sterling (2003b, p. 39) argued, systems thinking recognised valid knowledge and meaningful understandings come from building up a complete picture of a phenomenon, and in terms of sustainability it implied the “wellbeing of the whole system”. Furthermore, the same author maintained:
In the imposition of managerial and economic values on education ... we are educated by and large to compete and consume rather than to care and conserve ... we have lost our sense of authentic education, of caring, of community, of engagement, of real purpose (Sterling, 2003a, p. 2).

Other authors have similarly pointed to the vital role the whole systems thinking approach has in EfS (DEWHA, 2009e; Henderson & Tilbury, 2004; E. Lewis & Baudains, 2007b; Smith, 2006; Tilbury et al., 2005; Tilbury & Cooke, 2005a; Verweij & Thompson, 2006). For example, Tilbury et al. (2005, p. 15) argue that whole systems thinking “enhances the links between environment and lifestyle issues eg. consumption and the system that those actions are based on”. Clearly, students need to engage with knowledge and understandings about the economic and socio-cultural systems, as well as the environmental system.

The types of knowledge needed to participate effectively in EfS are therefore wide ranging and not confined to any particular discipline (Appendix 5). Some of the key understandings that need to be developed and areas of knowledge which are important include ecology (nature of ecosystems and interdependence within the biosphere), biology (health and distribution of living species) and economics (rate and character of economic development) (Woods et al., 1999) (Appendix 5 for elaboration). Knowledge about democracy and participatory governance, equity and social justice, beliefs, cultures across our planet, international peace and security, are other aspects of the economic and socio-cultural systems that need to be included in EfS programs (UNGA, 2000). More recently, Birdsall (2010), outlined four dimensions of knowledge (nature; social, political and economic structures; how to effect change; direction of change) that were considered important for leading to direct and indirect action. It is argued that a wide range of knowledge is needed for effective participation in EfS.

In summary, a review of the literature on knowledge and understandings has shown these aspects are vital for effective EfS. However, it is essential that this knowledge is understood in the context of whole systems thinking. The present study therefore investigates possible changes in student and teacher knowledge and understandings in relation to whole systems thinking, as an outcome of the EfS program and AuSSI-WA membership at the case study school. In addition, it examines evidence for metacognition in EfS as proposed by Baudains (2003). The current research therefore contributes to limited research evidence in this field, specifically focusing on the pre-primary and primary school context. Given the importance of knowledge and
understandings in EfS, student engagement with these aspects is only part of what is necessary for effective EfS. Skills and behaviours form the third important component of the values-knowledge-skills triangle for empowering EfS. Literature on skills and behaviours in EfS is reviewed in the following section.

2.1.5 Whole Systems Thinking

Whole systems thinking brings together the foregoing discussions about sustainability, EfS, values education, knowledge and understandings, skills and behaviours. Admittedly, the relationship between EfS and values, for instance, is a sphere of investigation in its own right. Many authors have reported on the various aspects of this relationship (Baudains, 2003; Baudains & Styles, 2006; Mira, Deus, Rodriguez, & Martinez, 2003; Smith, 2006; Smyth, 1996). Similarly, studies of the relationship between knowledge and skills and EfS have been undertaken (Baudains, 2003; Delgado, Cerone, & Tilbury, 2007; Wortman, Cooke, Hebert, & Tilbury, 2006). However, this thesis will consider such relationships from a 'whole systems thinking' approach, in line with recent developments in education research (Neill, 2008; Sterling, 2003b; Tilbury et al., 2005).

Since 1995 ‘whole systems thinking’ has received increasing attention in literature, although it was first encountered in 1930s (Capra, 1996; Flood, 1999, 2000; Korten, 1995). Whole systems thinking is a framework for seeing the whole picture, for putting things into a context to establish interrelationships and understand phenomena as an integrated whole (Babiuk & Falkenberg, 2010; Capra, 1996; Clayton et al., 1996; P. M. Senge, 2006; Sterling, 2003a, 2003b; Tilbury et al., 2005). Systems thinking may be contrasted with fragmentary thinking, which is viewing phenomena in their separate parts and focusing only on narrow specialisations. It has been argued however, that compartmentalisation still has a place, a “circumscribed usefulness”, and that we “must come to learn how to think paradoxically”, to think of the parts and the whole, to integrate the parts into the whole (Peck, 1995, pp. 367 & 169). So whole systems thinking in an EfS context means emphasizing relationships, relationships between the whole system, and at different system levels, with the various parts - environment, economics, government, health, values, and so on. The importance of whole systems thinking has also been described in terms of humanity’s need to move towards an “Age of Integration” where the whole and the parts work hand in hand (Peck, 1995, p. 369).
Systemic thinking is a new way of perceiving our world. Sterling (2003b) maintained that education is shaped by predominant values and beliefs in the wider society and typically embodies fragments of understandings. Furthermore, Sterling (2003b) found little evidence of change arising from EfS except at a micro-scale. He argued that for many years educators and policy makers have taken a “fragmentary approach to knowledge – reflecting the roots of modern Western thinking in 300-plus years of an essentially reductionist and linear outlook which is deeply embedded in our culture” (Sterling, 2004, p. 81). To address this situation educators need to work for change in the dominant education paradigm, with an emphasis on the whole, that is, embrace an approach that is “holistic, organismic and ecological” (Sterling, 2003b, p. 52). More broadly, Sterling (2003b, p. 117) stated all people needed to be involved in a “fundamental change in the way [they] value, think and act”. This way of perceiving involves:

“... a set of principles, tools and techniques that is helping to lead to more genuine solutions for sustainability – solutions that address core problems and lead to sustained change. Essentially, systemic approaches help us shift our focus and attention from ‘things’ to processes, from static states to dynamics and from ‘parts’ to ‘wholes’” (Sterling, 2004, p. 81).

This approach requires people to examine the interrelationships between processes, between disciplines and between systems.

Other recent publications in EfS have recognized the importance of systems thinking (Babiuk & Falkenberg, 2010; Bronfenbrenner, 2005; Grace, 2006; Jones, Selby, & Sterling, 2010; Lang, 2007; R. Littledyke & McCrea, 2009). For instance, the ‘bioecological systems’ model, an adaptation of Bronfenbrenner’s (2005) ecological systems theory, has been applied in an Early Childhood EfS setting, diagrammatically represented by a series of concentric circles with the child at the centre (R. Littledyke & McCrea, 2009) (Figure 2.3). This diagram shows how broader EfS issues can impact on a child’s health. Lang (2007) reflected upon the interrelationships between natural and human systems utilising a ‘nested systems’ approach (Figure 2.4). These developments indicate a growing awareness of the vital contribution systems thinking is making to EfS.

In 2009 the Australian Government’s National Action Plan for Education for Sustainability, entitled Living Sustainably, was released (DEWHA, 2009e). This Plan outlined seven principles of EfS: systems thinking; transformation and change;
education for all and lifelong learning; envisioning a better future; critical thinking and reflection; participation; and partnerships for change. Systems thinking aimed “to equip people to understand connections between environmental, economic, social and political systems” (DEWHA, 2009e, p. 9). A recent publication by Littledyke, Taylor and Eames (2009) provides numerous examples of how systems thinking could be applied in the classroom. For instance, Littledyke and Taylor (2009), in a primary science teaching context, outline approaches to enhance student understanding that all living things are interlinked and humans are part of this interlinked system.

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Figure 2.3 EfS adaptation of bioecological systems model
(R. Littledyke & McCrea, 2009, p. 42)

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Figure 2.4 Nested systems model (Lang, 2007, p. 5)
In the Australian school context, however, teachers appear to experience difficulty in thinking and teaching from a whole systems perspective. In 2005, Tilbury and Cooke reported EE was “still occurring predominantly in the Key Learning Areas (KLAs) of Science and Studies of Society and Environment” (Tilbury & Cooke, 2005a, p. 57). In-depth engagement with EfS across all learning areas was not found. These authors recommended further development of systemic thinking and whole school approaches to EfS, as well as the provision of professional learning support for teachers to facilitate the embedding of EfS in all curriculum areas (Tilbury & Cooke, 2005a).

Furthermore, the evidence provided previously on the importance of developing place-based EfS programs may be linked with the whole systems thinking approach. The ‘sense of place’ studies documented previously found increased awareness and understanding of local environment, along with engagement in and for the environment, which contributed to enhanced caring for and ‘attachment to place’. Results indicated participants explored the factors and systems impacting upon the local environment. For instance:

... education that is grounded in places encourages students to look critically at their places, both natural and constructed, and consider the interconnections that occur within and through these places. Further, allowing students to investigate the influence of social, political and economic decisions on natural places incorporates the socially critical and political action goals of environmental education (Miles, 2008a, p. 1).

Other authors have similarly indicated links between a ‘sense of place’ and whole systems thinking, although not necessarily in explicit ‘whole systems’ terminology. The relative importance of sociocultural and ecological factors in attachment to place have been investigated (Beckley, 2003) and findings showing ‘sense of place’ increased environmentally responsible behaviour reported (Vaske & Kobrin, 2001). However, few studies have explicitly used ‘whole systems’ terminology, within the context of a whole school approach to sustainability (E. Lewis & Baudains, 2007a; Neill, 2008). These studies identified numerous challenges in achieving a systemic approach in the school context, such as ongoing professional learning for school staff and parents.

In summary, the position adopted in this thesis is that whole system thinking provides an improved way of understanding and managing complex situations, particularly as they relate to sustainability. Furthermore, this approach readily incorporates the multifaceted evidence about attitudes and values, knowledge and understandings, and
skills and behaviours necessary for effective EfS. In addition, whole systems thinking was considered to be relevant to the present study because it was one of the understandings that informed EfS in the whole school context under investigation (E. Lewis & Baudains, 2007a). This study will therefore contribute evidence about the application of whole systems thinking in a primary school, evidence that is currently lacking.

2.1.4 Skills and Behaviours

Skills and behaviours make manifest the attitudes and values, knowledge and understandings discussed previously. One of the most fundamental features of effective EE/EfS is that it leads to behaviours which result in improved environmental outcomes, not simply reflection upon values or the accumulation of inert knowledge (Henderson & Tilbury, 2004; Hungerford & Volk, 1990; Sia, Hungerford, & Tomera, 1985). Understandings about the skills required to achieve this reflect recognition that these skills need to range from practical environmental action skills, such as skills to develop strategies for on-site, hands-on action, to critical thinking skills and skills developed in a wide range of learning areas, including the interpretation of data and expressive language skills. Various authors have identified key skills important for EE/EfS (Hungerford & Volk, 1990; McKenzie-Mohr, 2000; Sia et al., 1985).

Eight variables related to the development and demonstration of environmentally responsible behavior have been identified (Sia et al., 1985). These variables included level of environmental sensitivity, perceived knowledge of environmental action strategies, perceived skill in using environmental action strategies, psychological sex role classification, individual locus of control, group locus of control, attitude toward pollution and belief in technology (Sia et al., 1985). The authors found three major behaviour predictors - perceived skill in and knowledge of environmental action strategies, and environmental sensitivity - needed to be addressed in curriculum development and instructional practice (Sia et al., 1985). However, Hungerford and Volk (1990) acknowledged that increased knowledge alone did not result in changed human behavior. As already outlined (Henderson & Tilbury, 2004), effective EfS was seen to result from a complex mix of factors.

Other researchers maintained that a hierarchical-approach involving four levels of activities, was important for skill development (Howe & Disinger, 1988). These levels included: ecological knowledge (to support sound decision-making); conceptual
awareness (of how behaviours influence the relationship between the quality of life and of the environment); issue investigation and evaluation (of alternative solutions for remediating the issues); and environmental action skills (to resolve environmentally-related issues). Research evidence indicated that behaviour change did not usually occur if learners were only exposed to ecological knowledge and conceptual awareness; rather they needed to engage at all four levels (Howe & Disinger, 1988). These authors also reported that programs that included experiences with issue analysis, issue investigation, and working on real environmental problems were more successful than those that did not include these experiences. Furthermore, programs that included an emphasis on environmental knowledge and problems over several months to several years were found to be more successful than brief activities. Howe and Disinger (1988) therefore recommended that school staff and other program developers should consider including such experiences in their programs if they were to be effective.

Another educational approach documented by Howe and Disinger (1988) was called Conservation for Children. It was a six-year program that was designed to increase conservation awareness, understanding of basic scientific environmental and conservation concepts, and conservation action. The program provided a conservation emphasis across the curriculum, with various basic skill activities in language, mathematics and social studies, and science with conservation concepts and action. Research data indicated that most students who used the program materials on a regular basis learnt over eighty percent of the concepts and implemented conservation practices at home (Howe & Disinger, 1988). Furthermore, evidence has been reported that engaging in conservation behaviours contributes to improved academic outcomes (Donaldson, 2009b).

Seven skills found to be important for effective EE have been identified (Woods et al., 1999) (list in Appendix 5). For example, skill number five stated “Communicate information and points of view effectively” (Woods et al., 1999, p. 5). This is a language learning area skill. All the skills identified illustrate interrelationships between school curriculum learning areas and skill development for EfS. The first skill referred to the science and technology learning areas, the sixth to the health curriculum, while skills two and three involved critical thinking. Other researchers have investigated skills for effective EE/EfS too. For instance, critical thinking skills and social skills (CES, 1993; Henderson & Tilbury, 2004), physical skills and observation skills (Tilbury et al., 2005), have been identified as important (see Appendix 5 for
elaboration). Clearly, skill development for EfS is closely related to desired outcomes in the existing Western Australian school curriculum. However, curriculum focus on applying the skills, that is ‘action’ in the environment, in schools across Australia was only found in a small number of cases (Tilbury et al., 2005). The present research will determine the extent to which ‘action’ occurred in the case study school before and after joining AuSSI-WA.

Another approach to behaviour change investigated facilitators and barriers to change (McKenzie-Mohr, 2000; McKenzie-Mohr & Smith, 1999). For instance, a facilitator for litter reduction involved providing a refund for empty bottles, and this was found to be far more effective than fines to punish people for littering (McKenzie-Mohr & Smith, 1999, p. 111). Alternatively, initiatives that ignored barriers were considered “a recipe for failure” (McKenzie-Mohr & Smith, 1999, p. 119). For example, office paper recycling was found to dramatically increase by the provision of a recycling container for fine paper (McKenzie-Mohr & Smith, 1999, p. 120). Thus, an understanding of the facilitators and barriers in different situations can impact on behavioural change outcomes.

It has been claimed that education programs facilitating broad based skill development are vital for effective EfS (Tilbury et al., 2005). A planned approach to a skills-based curricula is therefore recommended (IIEP, 2006), followed by research to determine evidence for behavioural change and action (Appendix 5). Examples of overseas research documenting successful EfS projects, reflecting changed behaviour, have been located (Blair, 2008; McDuff, Margulies, Graden, & Monroe, 2006) (Appendix 5). The Blair (2008) paper also provided evidence of limited success at one site due to a poor communication campaign and limited support and resources, including retaliation from some stakeholders. This finding reflects the complexity of EfS in action.

Research evidence in the Australian context also indicates variable outcomes in EfS endeavours. The early childhood Sustainable Planet Project focused on water conservation and found “children were able to critically analyse their own and others’ behaviours”, resulting in enhanced waterwise behaviours (J. Davis & Elliott, 2003a, p. 15). Similarly, a report on the Waste Wise Schools Program reported changed behaviour. The Waste Wise Schools program operated in over 900 schools in Victoria and a study conducted by Armstrong, Sharpley and Malcolm (2004) investigated two active schools. Evidence was obtained showing the Program changed the thinking and
behaviour of many families at these schools, and suggested the children were having an intergenerational influence, acting as catalysts impacting on their parents’ waste wise behaviours.

In contrast to the aforementioned ‘successful’ projects, Thomas’ (2005, p. 108) review of the Australian context in relation to theory and practice in EE, identified “a rhetoric-reality gap, between the intended objectives of education for the environment curricula and its actual teaching”. This author concluded teachers’ facilitation skills, knowledge and experience were very important for the effective implementation of education for the environment programs. However, research on the vital need for mainstreaming sustainability into preservice teacher education highlighted a significant weakness in teacher education training across Australian (Ferreira, Ryan, Davis, Cavanagh, & Thomas, 2009). Another recent study reported key differences in AuSSI schools in terms of capacity building processes for embedding significant cultural change that promoted sustainability (J. M. Davis & Ferreira, 2009). These authors proposed a continuum from a ‘product approach’ in which EfS programs were developed by external experts, to a ‘webbed network approach’ where all participants were experts learning together (J. M. Davis & Ferreira, 2009). This research clearly recognized variable outcomes for EfS endeavours.

In brief, research findings about skill development and behavioural change suggested narrowly focusing on specific environmental skills was not sufficient to achieve positive EfS outcomes. Skills involved in contributing to successful EfS outcomes include developing student skills across all curriculum learning areas (Tilbury & Cooke, 2005b) and teacher skills, which included using a broad range of teaching and learning strategies and values education (Ferreira et al., 2009; Thomas, 2005). The present study therefore investigated aspects of curriculum integration and teacher perceptions about EfS that related to skill development and behavioural change. This will contribute to the evidence on whether Australian schools are actually applying EfS skills or still focusing more on the about and in the environment aspects (Tilbury et al., 2005). In other words, was the case study school making the connections between values, knowledge and behaviour; was it operating from a silo or systems thinking perspective. The following section develops this idea and explains the whole systems thinking approach to EfS.
2.2 Whole School Approaches to Sustainability

Given global concerns about sustainability and resultant international commitments, EfS is acknowledged to be vital at all levels - global, national, state and local (UN, 2005; UNFCCC, 2009a). This section examines whole school approaches to EfS within the international, Australian and Western Australian scenes so that the AuSSI-WA approach can be understood in the context of these broader influences.

2.2.1 International Perspectives

Since the 1960s many international publications, events and policy statements have contributed to the development of understandings about EfS. Key developments are summarised in Table 2.2. Further details are presented in Figure 2.5 and Appendix 5.

As an outcome of these international developments school programs reflecting the sustainability agenda began to emerge. Such programs occurred in, for example, Europe, the United Kingdom, the United States of America (USA) and Australia. The Environment and School Initiatives, ensi, (1986) promoted international research and innovation on EE, active approaches to education, and sustainable development in schools and their communities. Over twenty nations world-wide have been involved in the ensi process since 1986. These nations include for instance: Australia, Canada, Denmark, France Germany, Hungary, Mexico, New Zealand, Spain and the USA. Learnscapes is an example of an ensi program (LPD, 2009). It aims to link the built and social environments to become a learning environment.
**Table 2.2**

International Contributions to the Development of EIS Understandings

<table>
<thead>
<tr>
<th>Year</th>
<th>International Development or Policy Statement</th>
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<tbody>
<tr>
<td>1962</td>
<td>Publication of <em>Silent spring</em> (Carson, 1962)</td>
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<tr>
<td>1971</td>
<td>Publication of <em>The population bomb</em> by (Ehrlich, 1971)</td>
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<tr>
<td>1976</td>
<td>The <em>International workshop on environmental education</em> held in Belgrade resulted in the ‘Belgrade Charter - A global framework for environmental education’ (UNESCO, 1976); UN Habitat conference on Human Settlements (IISH, 1976)</td>
</tr>
<tr>
<td>1977</td>
<td>First <em>Intergovernmental conference on environmental education</em> held in Tblisi (UNESCO-UNEP, 1978)</td>
</tr>
<tr>
<td>1988</td>
<td><em>International congress to determine an international strategy for action in the field of environmental education and training for the 1990s, held in Moscow</em> (UNESCO, 1988)</td>
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<tr>
<td>1990</td>
<td><em>Learning through Landscapes</em> school program commenced (LtL, 2009).</td>
</tr>
<tr>
<td>1996</td>
<td>China’s <em>Green School Projects</em> started (CEEC, 2009).</td>
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<tr>
<td>2001</td>
<td><em>Education for sustainable development</em> (UNESCO, 2005a)</td>
</tr>
<tr>
<td>2002</td>
<td>World Summit on Sustainable Development, Johannesburg (UN, 2002)</td>
</tr>
<tr>
<td>2005</td>
<td><em>UN Millennium Development Goals</em> which identified eight goals to achieve by 2015 (UN, 2005).</td>
</tr>
<tr>
<td>2006</td>
<td>UNESCO model of sustainability that integrated four systems: natural, social/cultural, economic and political systems. See Figure 2.5.</td>
</tr>
<tr>
<td>2007</td>
<td><em>An overview of the Kyoto Protocol</em> (DCC, 2007)</td>
</tr>
<tr>
<td>2008</td>
<td><em>Fighting climate change</em> (UNDP, 2008)</td>
</tr>
<tr>
<td>2009</td>
<td><em>United Nations conference on climate change, Copenhagen</em> (UNFCCC, 2009b)</td>
</tr>
</tbody>
</table>
Although Learnscapes originated in New South Wales and grew from related developments in the UK, it now operates as part of ensi (Henderson & Tilbury, 2004). One of ensi’s more recent programs is Quality criteria for ESD schools. This program aims to deepen understandings of the conceptualisation of education for sustainable development (ESD) and use quality criteria for school self-evaluation (ENSI, 2006).

Other school EfS programs that commenced in the early 1990s include Eco-schools, which started in European schools, and the UK’s Learning through Landscapes (LtL). LtL sought to use school grounds creatively to “Deliver the curriculum in a stimulating and meaningful way ... [and] ... Provide a range of formal and informal opportunities for physical activity, improving health, well-being and motivation to learn” (LtL, 2009). LtL is now known as Sustainable School Grounds (ARIES, 2009b). Canada’s Evergreen program similarly aimed to transform barren school grounds into healthy, natural, safe, creative spaces (Evergreen, 2009). Other school sustainability programs include China’s Green School Project (CEEC, 2009), Sweden’s Green School Award program (Nyander, 2009) and New Zealand’s Enviroschools program (Enviroschools, 2009). Research evidence has suggested that schools involved in such programs are “more likely to demonstrate environmental leadership and models of good practice than non-participating schools” (Henderson & Tilbury, 2004, p. 40). In conclusion, the 1990s saw the growth of many whole school sustainability programs across the world.
The rapid expansion of the whole school approach to EfS appears to be a successful development (Henderson & Tilbury, 2004; Parker & Wade, 2008). However, there is some evidence that this progress is being challenged. For instance, the ESD policy in the Scottish formal school system was reviewed by McNaughton (2007) and evidence presented documenting a lack of implementation of ESD. The period of review covered fifteen years, 1993 to 2007. The paper adopted the metaphor of the *Sleeping Beauty* to tell the story of ESD in Scotland: the story’s “*three main phases of emergence, obscurity and re-emergence*” was reported (McNaughton, 2007, p. 1). This long term study revealed that progress is not as positive as it may appear in short term studies. Indeed, other researchers (Gralton et al., 2004; Hargreaves & Fink, 2003) indicated the need for more longitudinal research to be conducted so that a more accurate understanding of EfS outcomes could be determined. Thus the longitudinal approach in the present study was conducted.

In summary, international forums about sustainability issues contributed to a focus on the importance of EfS and whole school approaches to EfS. Such approaches developed across continents and evolved to be more holistic and inclusive. These understandings influenced what happened at national levels too. This national perspective will be examined next, with particular reference to developments in Australia.

### 2.2.2 National Perspective

Since the 1970s numerous events and policy statements have contributed to the development of understandings about EfS in Australia. This is characterized by a growing awareness of the need to look beyond concern for the environment within the context of economic progress, to actively working towards a sustainable way of life within a systems thinking perspective. This awareness is reflected in the gradual evolution of EE understandings (*about, in* and *for* the environment) to EfS, involving a more holistic approach. By 2008 Australian students were to be “active and informed citizens” that “*work for the common good, in particular sustaining and improving natural and social environments*” (MCEETYA, 2008). The emphasis was on being active, on doing, on working; not just ‘desk’ learning about the environment. Key developments over the last forty years are summarised in Table 2.3, with further details presented in Figure 2.6 and Appendix 6.
Table 2.3
National Contributions to the Development of EfS Understandings

<table>
<thead>
<tr>
<th>Year</th>
<th>National Development or Policy Statement</th>
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<tbody>
<tr>
<td>2000</td>
<td><em>Environmental education for a sustainable future: National action plan</em> (Environment Australia, 2000); National Environmental Education Council (NEEC) formed.</td>
</tr>
<tr>
<td>2001</td>
<td>National Environmental Education Network (NEEN) on trial Sustainable Schools Initiative (DEWHA, 2009c).</td>
</tr>
<tr>
<td>2005</td>
<td><em>Educating for a sustainable future: A national environmental education statement for Australian schools</em> (DEH, 2005a); Sustainable Schools Initiative trial, WA &amp; SA (DEH, 2006b; DEWHA, 2009d); <em>A National Review of Environmental Education and its Contribution to Sustainability in Australia</em> (Tilbury et al., 2005); National model for environmental education (DEH, 2005b) See Figure 2.6.</td>
</tr>
<tr>
<td>2006</td>
<td><em>Caring for our future</em> (DEH, 2006a).</td>
</tr>
<tr>
<td>2008</td>
<td><em>Melbourne Declaration on Educational Goals for Young Australians</em> (MCEETYA, 2008).</td>
</tr>
<tr>
<td>2010</td>
<td><em>Sustainability Curriculum Framework</em> (DEWHA, 2010).</td>
</tr>
</tbody>
</table>

Analysis of the conceptualization and contextualization of EfS research during the 1990s in Australia revealed certain areas of this field received considerable attention while others were neglected (R. B. Stevenson & Evans, 2011). For example, during this period critical analysis dominated EE research, followed by a focus on the environmental/sustainability curriculum, while some areas received little or no attention, such as, sense of place, informal and non-formal education, pre-service teacher education, special needs education, and vocational and technical education (R. B. Stevenson, 2011; R. B. Stevenson & Evans, 2011). This means that EfS research demonstrated particular strengths, yet simultaneously allowed gaps to develop.
The 1990s also saw the growth of many whole school sustainability programs across the world, a trend also developing in Australia. A particularly important event occurred in 2001 when the National Environmental Education Network (NEEN) met to discuss a trial Sustainable Schools Initiative (SSI) in Australia (DEWHA, 2009c). SSI trials were initially conducted in New South Wales & Victoria in 2002 and then in South Australia and Western Australia in 2005 (DEH, 2006b; DEWHA, 2009d). SSI became a national program for schools known as the Australian Sustainable Schools Initiative (AuSSI).

The vision of AuSSI is for all Australian schools and their communities to be sustainable. To facilitate this, nine goals were identified by AuSSI (DEWHA, 2009b). These goals have been presented in Table 2.4, with the elements of sustainability as topic identifiers. In addition, AuSSI established seven guiding principles (DEWHA, 2009b). Table 2.5 presents these principles, again with the elements of sustainability as topic identifiers. Such statements provided clearer direction for EfS in Australia. Furthermore, evidence was reported indicating successful outcomes following participation in the Initiative.

These included, for example, the opportunity to achieve curriculum requirements in the key learning areas and reduced consumption of resources and improved management of the school grounds and facilities (DEWHA, 2009a).
Table 2.4
AuSSI goals (DEWHA, 2009b)

<table>
<thead>
<tr>
<th>Element</th>
<th>AuSSI Goal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision and values</td>
<td>Schools and communities developing values that support a sustainability ethos.</td>
</tr>
<tr>
<td>Governance</td>
<td>Schools and school authorities implementing governance practices that support effective environmental education for sustainability.</td>
</tr>
<tr>
<td>EfS activity</td>
<td>Schools using natural resources, including energy, water, waste and biodiversity in more sustainable ways.</td>
</tr>
<tr>
<td>Teaching and learning</td>
<td>Learning and teaching for sustainability as an integral component of school curricula.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Schools actively engaged in a continuous cycle of planning, implementing and reviewing their approach to sustainability as part of their everyday operations.</td>
</tr>
<tr>
<td>Reporting</td>
<td>Schools and school authorities reporting on changes towards sustainability.</td>
</tr>
<tr>
<td>Student voice</td>
<td>Young people sharing ownership of sustainability initiatives and decision making.</td>
</tr>
<tr>
<td>Partnerships</td>
<td>Schools working towards sustainability in partnership with their local communities.</td>
</tr>
<tr>
<td>Recognition</td>
<td>Individuals supported to make effective sustainability decisions and choices.</td>
</tr>
</tbody>
</table>

Table 2.5
AuSSI principles (DEWHA, 2009b)

<table>
<thead>
<tr>
<th>Element</th>
<th>Principle</th>
</tr>
</thead>
<tbody>
<tr>
<td>Governance Policy</td>
<td>Encourages the involvement of the whole school.</td>
</tr>
<tr>
<td>Vision and values</td>
<td>Seeks to develop relationships with other areas that impact on the organisation and management of a school.</td>
</tr>
<tr>
<td>EfS activity &amp; curriculum integration</td>
<td>Seeks to develop a school culture committed to the principles of sustainable development.</td>
</tr>
<tr>
<td>Professional learning</td>
<td>Seeks to go beyond awareness raising to action learning and integration with school curricula.</td>
</tr>
<tr>
<td>School &amp; community networks</td>
<td>Is founded on a sound basis of theory and practice in schools and school systems, quality teaching and learning, environmental education for sustainability.</td>
</tr>
<tr>
<td>Evaluation</td>
<td>Encourages the involvement of a school’s local community and encourages a shift in the broader community towards more sustainable practices and processes.</td>
</tr>
<tr>
<td></td>
<td>Encourages schools to achieve measurable social, environmental, educational and financial outcomes.</td>
</tr>
</tbody>
</table>

Despite some findings that indicated successful outcomes arising from initial participation in AuSSI, maintaining the sustainability momentum appeared to sometimes be the greater challenge. Some schools found long term commitment to EfS
much harder (Pepper, 2007). Seven critical success factors for whole school sustainability programs have been identified:

… alignment with national government priorities; access to expertise in EE and/or EfS during program; significant and continuous funding; alignment with EfS approaches; investment in professional development of program team as well as school partners; creating links with EE initiatives already in operation; establishment of multi-stakeholder partnerships (Henderson & Tilbury, 2004, p. 6).

Clearly, joining AuSSI is only a first easy step in the sustainability journey; sustaining the journey is the real challenge. This highlights the need for longitudinal research in this area.

Another issue impacting on effective EfS relates to early childhood education. AuSSI focuses on school education and the early childhood sector appears to be neglected (J. Davis, 2009; Tilbury et al., 2005). However it has been recognised that change towards sustainability needs to occur in the early childhood education sector too (Tilbury et al., 2005). Some small-scale EfS initiatives in Australian early childhood centres have been reported but they are ad hoc, lack cohesion and linkage with AuSSI, and there is a dearth of research to show they contribute to EfS learning goals (Tilbury et al., 2005, p. 43). Currently these centres are a hub for young children’s health and welfare services, but they could be for sustainability issues too (Tilbury et al., 2005, p. 45). However important developments in this field are occurring. For instance, a recent report outlines the introduction of an eastern states early childhood EfS program, Climbing the Little Green Steps, to WA, along with links to AuSSI-WA (Pearson, 2010). Also, the present research investigates EfS outcomes in the 3-6 years age group. It seems therefore that EfS in the early childhood education sector has great potential for deep engagement with EfS.

The most recent National Action Plan for EfS in Australia, released in 2009, recognised the need for “individuals and organisations [to] have the knowledge, skills, values, capacity and motivation to respond to the complex sustainability issues they encounter” (DEWHA, 2009e, p. 8). Seven principles of EfS were outlined: transformation and change, education for all and life long learning, systems thinking, envisioning a better future, critical thinking and reflection, participation and partnerships for change (DEWHA, 2009e, p. 9). Clearly, understandings about EfS at the national level have evolved dramatically since the 1970s (Table 2.1). Despite these developments, ongoing
tensions in EfS remain, such as the place of environmental education in Australia’s new formal school curriculum (Gough, 2011). National understandings about EfS are important because of their impact on EfS at the state level. This has a subsequent impact on what happens at individual schools, including the case study school. The following section examines EfS at the state level.

2.2.3 State Perspective

Since the 1970s many international, national and state policy statements, events and publications have contributed to the development of EfS in WA (Table 2.6). The following key developments will be highlighted. First, the state government’s 2003 *Hope for the Future* initiative, a state sustainability strategy (Government of WA, 2003) (Appendix 5). Next, the state’s *Environmental Education Strategy and Action Plan* was released in 2004 (DE, 2004). In 2005 the AuSSI-WA Pilot program commenced. Twenty state and independent Western Australian schools participated in the Pilot. Despite the recent nature of the Initiative in WA, it is important to acknowledge that EE/EfS was taught at schools prior to AuSSI-WA but it was recognised that EE usually lacked an overarching, coordinated, whole-school framework (C M Baudains, 2006a; EEAC, 2005; Tilbury & Cooke, 2005a). By 2008 AuSSI-WA conceptualised sustainability in terms of social, economic and environmental systems, viewed from a holistic, integrated perspective, relevant across the curriculum (DET, 2008c).
### Table 2.6

**Contributions to and developments in EfS in Western Australia**

(adapted from Baudains, 2006a)

<table>
<thead>
<tr>
<th>Year</th>
<th>International</th>
<th>National</th>
<th>Western Australia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1977 *</td>
<td></td>
<td></td>
<td>First <em>Intergovernmental conference on environmental education</em> held in Tblisi (UNESCO-UNEP, 1978)</td>
</tr>
<tr>
<td>1988 *</td>
<td></td>
<td>*</td>
<td><em>International congress to determine an international strategy for action in the field of environmental education and training for the 1990s</em>, held in Moscow (UNESCO, 1988)</td>
</tr>
<tr>
<td>1992 *</td>
<td></td>
<td>*</td>
<td><em>Agenda 21</em> developed at the United Nations Conference on Environment and Development, Rio De Janeiro (UNSD, 1992)</td>
</tr>
<tr>
<td>1997 *</td>
<td></td>
<td>*</td>
<td><em>Agenda 21</em> endorsed by the Australian Government (DEWHA, 2009f)</td>
</tr>
<tr>
<td>1999 *</td>
<td></td>
<td>*</td>
<td><em>National strategy for ecologically sustainable development</em> (Commonwealth of Australia, 1992)</td>
</tr>
<tr>
<td>2000 *</td>
<td></td>
<td></td>
<td>Environmental Education Workshop (DEP, 1997)</td>
</tr>
<tr>
<td>2001 *</td>
<td></td>
<td></td>
<td><em>Today shapes tomorrow: Environmental education for a sustainable future – A discussion paper</em> (DEWHA, 1999).</td>
</tr>
<tr>
<td>2002 *</td>
<td></td>
<td></td>
<td><em>National goals for schooling in the twenty-first century</em> (MCEETYA, 1999a)</td>
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<tr>
<td>2004 *</td>
<td></td>
<td></td>
<td>National Environmental Education Council (NEEC) formed.</td>
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<tr>
<td>2005 *</td>
<td></td>
<td></td>
<td><em>Education for sustainable development</em> (UNESCO, 2005a)</td>
</tr>
<tr>
<td>2006 *</td>
<td></td>
<td>*</td>
<td>World Summit on Sustainable Development, Johannesburg (UN, 2002).</td>
</tr>
<tr>
<td>2007 *</td>
<td></td>
<td>*</td>
<td><em>Learning for sustainability: NSW environmental education plan 2002-2005</em> (Government of NSW, 2002)</td>
</tr>
<tr>
<td>2008 *</td>
<td></td>
<td>*</td>
<td>Sustainable Schools Initiative trial, NSW &amp; Victoria ((DEH, 2006b; DEWHA, 2009d)</td>
</tr>
<tr>
<td>2009 *</td>
<td></td>
<td>*</td>
<td><em>Hope for the future: The Western Australian state sustainability strategy</em> (Government of WA, 2003). See figure in Appendix 5.</td>
</tr>
<tr>
<td>2010 *</td>
<td></td>
<td>*</td>
<td>Environmental education strategy and action plan (DE, 2004).</td>
</tr>
<tr>
<td>Year</td>
<td>International</td>
<td>National</td>
<td>Western Australia</td>
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<td>2009</td>
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<td>2011</td>
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</table>
AuSSI-WA forms part of AuSSI, so has broad aims that are consistent with the national initiative. AuSSI-WA provides a framework that supports schools in the development of a whole-school approach to EfS. Furthermore, it encourages the “use of sustainability as a key context for teaching and learning as part of a whole-school approach; ‘embedding sustainability within the culture of the school community’ is the overarching goal of this initiative” (AuSSI-WA, 2009a). Schools involved in the initiative are supported by a toolkit, with framework and planning processes that enhance successful practice by developing a streamlined, coordinated approach. Figures 2.7 and 2.8, and Table 2.7, illustrate some of the tools promoted by AuSSI-WA (DET, 2010a). As part of the process in developing a local Sustainability Action Plan, school communities are encouraged to reflect on their values as they create a shared vision for a sustainable future.

This focus on values is compatible and aligned with the WA Curriculum Framework’s (Curriculum Council, 1998) set of ‘Core Shared Values’. In brief, AuSSI-WA supports:

‘Real-life’, meaningful learning tasks for students and teachers; opportunities to save school communities money through effective resource management; access to a range of resources and an expanding support network; promotion of schools’ EfS activities; curriculum development - teaching, learning and reporting, with explicit links to learning areas and core shared values within the WA Curriculum Framework; building community partnerships; active, global citizenship - a chance to empower, and feel empowered, within your local community – taking action for a cleaner, inclusive, bio-diverse world; professional learning and networking opportunities (DET, 2011, p. 1).

Clearly, EfS in the AuSSI-WA context embraces an active, holistic whole school approach that is aligned with national and international objectives for EfS. The present study investigated one of the AuSSI-WA pilot schools to determine the impact of AuSSI-WA at the local school level. This is a unique contribution to the field because no other research has been located on the impact of AuSSI-WA, although another doctoral study on this topic has commenced (Salter, 2009; Salter, Venville, & Longnecker, 2011). Since the current study was conducted in a Montessori school it is important to understand this educational context.
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Figure 2.7 AuSSI-WA Ecological Footprint

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Figure 2.8 AuSSI-WA Social Handprint
Table 2.7
AuSSI-WA Key Elements Rubric

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2.3 Montessori Educational Context

This third section of the literature review examines the Montessori educational approach. There are five sub-sections: a summary of the history and philosophy of the approach; values; curriculum; evidence for the alignment of this approach with EfS; and finally a review of research conducted in Montessori contexts.

2.3.1 Brief History and Philosophy

Maria Montessori was an Italian doctor who strove to improve the quality of children's education at the turn of last century (Kramer, 1976; Montessori, 1967). She undertook a scientific approach to observations of children's development and developed an educational philosophy of teaching and learning, termed the "Montessori Method" (IMI, 2009; Montessori, 1964, 1965). The Montessori Method embraces the whole child, the physical, social, emotional, intellectual and spiritual development of each unique child (Erskine, 1998; Montessori, 1988). It also recognises that young children have “absorbent minds” and that their “sensitive periods” for different aspects of learning need to be responded to by providing an appropriately ordered, stimulating “prepared learning environment” (Homfray & Child, 1999, p. 32; P. P. Lillard, 1996, p. 26; Montessori, 1964, 1988). Montessori staff are trained to observe each child's "sensitive periods", which refers to the times when the child has the greatest capacity for particular types of learning, such as learning to read (Gettman, 1987; P. P. Lillard, 1996, p. 25; Montessori, 1966, p. 37). This observational information is then used by teaching staff to "follow the child" and develop individual programs for each child (Loeffler, 2001, p. 23). All these different components of the Montessori approach to education will be compared to EfS to identify areas of alignment (see section 2.3.4).

2.3.2 Values

Values education is another important component of the Montessori approach. Four key values in Maria Montessori's philosophy and method of education may be identified: love of learning, facilitating initiative, development of respect and living peacefully (Kramer, 1976; Montessori, 1965, 1966; O'Donnell, 1996; Orem, 1971; Orem & Foster, 1978). All these values will be related to values education in EfS.

The first value mentioned involves fostering a love of learning. The Montessori Method (Montessori, 1964; Orem, 1974) provides a prepared learning environment, which nurtures the growth of this value in children. Promoting this value also involves
providing freedom for children to grow and learn, with opportunities to follow their interests and passions. An instance of this value being promoted, prior to AuSSI-WA, was reported in a paper in which Montessori students followed their interests, resulting in the installation of a solar power system at the case study school (ASTA, 2005a).

Another Montessori value relates to facilitating student initiative, which means promoting independent work habits, persistence in completing tasks, creative self-expression, encouraging self-motivation, concentration, orderliness and co-ordination (Montessori, 1966). The aforementioned solar power project also illustrates student initiative with a positive outcome for EfS.

The third value focuses on helping each child to develop respect: self-respect, respect for others, and respect for their environment (Gausman, 2001a; Montessori, 1967). A recent report on values education at the Montessori school provided numerous examples of children being engaged in projects on environmental sustainability (Sparvell, 2008). These projects ranged from developing a community permaculture garden to conducting research into the nesting requirements of local freshwater turtles. This work reflected ‘respect for the environment’ in action.

Finally, Maria Montessori was passionate about the value of ‘peace’; with ‘peace’ being viewed as the ‘work of education’ (Montessori, 1992). Consequently the Montessori curriculum included peace studies which fostered the value of peaceful cooperation between people. The curriculum utilized the idea of a ‘peace flower’. The Montessori peace flower has four petals: self-awareness, community awareness, cultural awareness and environmental awareness (Gausman, 2001a). In this context, environmental awareness was closely related to peace studies, particularly as it linked human responsibility for ecological imbalances in the world and the consequences of these imbalances for social justice between different peoples (Gausman, 2001a).

In brief, therefore, Montessori educational values appear to support inquiry, the development of initiative and respect, and a focus on peace. These values are embedded in the Montessori curriculum and can be seen to align with the EfS values discussed in section two of this chapter.

2.3.3 Curriculum

An understanding of the Montessori curriculum provides insight into links with EfS. The Montessori curriculum is based on understandings about ‘Cosmic Education’
(Duffy & Duffy, 2002; Hayes, 2005; Montessori, 1948). Cosmic Education ties in and relates all elements of the curriculum to each other, so that each subject is not taught in isolation (RHMS, 2009). The overall framework for the Montessori primary school curriculum is the five “great lessons”:

In essence, the Five Great Lessons encompass the history of the earth’s past as we know it, and encapsulates the whole of the Montessori curriculum: science, history, grammar, mathematics, human psychology, behaviours, questions of life here and on other planets (Gausman, 2001b, p. 2).

Cosmic Education therefore includes subjects such as history, geography, science, mathematics, English, art and craft, music and physical education.

In the Montessori context EfS is an important part of Cosmic Education. A key link between the cosmic curriculum and EfS is the Montessori notion of ‘supernatura’. Through their activities, humans have transformed their world into one that is now beyond nature’s contriving; it is a world created by the work of human beings, a world of ‘supernatura’ (Montessori, 1992). “‘Supernatura’ was the suggestion that we humans can no longer survive on our own – that we are interdependent” (Gausman, 2001a, p. 21). Understanding this interdependence between people, and between people and our planet, is fundamental to the sustainability of humanity and to life on Earth (Montessori, 1992). Although Maria Montessori did not refer to ‘supernatura’ in terms of EfS, close links between her concept and EfS may be ascertained from Montessori studies of biology, ecology and culture.

Maria Montessori stated that up to the age of twelve years, “… nature ought to constitute the child’s primary interest” (Montessori, 1973, p. 96). She had an abiding love of nature (D. Kahn & Ewert-Krocker, 2000). Gardening and outside excursions were considered an important part of the Montessori child’s experience of nature. Through the cultivation of living things and experiences in the natural environment children were imbued with a feeling for nature (Montessori, 1964, pp. 35 & 159). Furthermore, Montessori maintained that “All is strictly interrelated on this planet” (Montessori, 1973, p. 40). Thus biology and ecology were an important part of the Cosmic Curriculum. Montessori students study ecosystems, biomes, individual species and species interactions, biodiversity, and so on. The ultimate goal of Montessori biology:

… is an ecological view of life and a feeling of responsibility for [the] environment. The child will see that each individual life on earth is seemingly
selfish (fighting for its own survival) but in reality each serves the good of the whole. Montessori calls this the Cosmic Plan (J. K. Miller, 1974, p. 60).

The Montessori view of ecology, of the interdependence between humans, between all living things, and of the importance of environmental values for the future of our planet is explained as follows:

Ecology looks at the interaction of living things and the way we live. We use biology in an ecological framework – without ecology there is no link between living and non-living forms. Without an understanding of ecology there is no meaning to cosmic education ... We must create concerns for what we are doing and how we are doing it – creating value systems where children must live with them to absorb them ... While humankind is on a major collision course with the environment we don’t have much time (Sillick, 1987, p. 18).

Thus, from a Montessori standpoint an understanding of ecology develops concern for what humans are doing to our planet and creates a value system where children absorb a caring commitment for the environment. This position aligns closely with some of the EfS understandings outlined in section 2.2.

Using the above perspectives it is arguable that the ‘Cosmic Education’ curriculum could sit comfortably within an EfS framework. It seems that ‘Cosmic Education’ could provide a solid foundation for EfS understandings relating to the interdependence of all living and non-living things, as well as the development of environmental values. Furthermore, from a triple bottom line view of sustainability (outlined in section one), the Montessori curriculum predominantly focuses on the social and environmental aspects of sustainability. The development of personal qualities, as well as emphasis on ecological and peace studies, reflects this focus. Nevertheless, the economic aspect of sustainability is addressed in history studies of the ‘common needs of man’ (Gausman, 2001c; Hayes, 2005). So from a curriculum point of view there appears considerable congruency between Montessori and EfS.

2.3.4 Alignment of Montessori and EfS

The Montessori approach to education (Gausman, 2001a; Montessori, 1964; Sillick, 1987) appears to align with the basic precepts of EfS in four ways. First, a fundamental point of congruence relates to the Montessori focus on the whole child. The Montessori approach requires teaching staff to focus on the needs of the whole child, with the students' social, emotional, physical and academic needs being addressed in an integrated manner (Homfray & Child, 1999, p. 7; P. P. Lillard, 1996, p. 8; Montessori,
1964, 1988; MTA, 2002). This fundamental, holistic perspective is congruent with a whole systems thinking approach, in contrast to a narrow academic emphasis in the education of the child.

A second point of congruence relates to students taking responsibility for their own learning and actions. Montessori students work within the context of a child centred, prepared learning environment (P. P. Lillard, 1996; Montessori, 1964, 1966; MSWA, 2002; Wentworth, 1999). They work independently, at their own pace, make choices about their learning program/s, are encouraged to utilise critical thinking tools and guided in the evaluation of their own work (E. Lewis, 2004; Montessori, 1966; Pears, 1996a, 1996b, 1999). Students are also encouraged to be aware of and use strategies which support their own learning styles (P. P. Lillard, 1996, p.70; Montessori, 1964, p. 95). Thus, according to Montessori philosophy, children in this environment become progressively more independent, responsible for their own learning and contributors to humanity (P. P. Lillard, 1996; Montessori, 1988). This contribution to humanity and action for future generations, is also a characteristic goal of EfS programs (Tilbury et al., 2005).

Another aspect of the Montessori approach that appears congruent with EfS relates to the ‘Cosmic Education’ curriculum. This curriculum focuses on some of the values, knowledge and skills outlined in the documentation of the Western Australian Curriculum Framework learning areas of Science and Society and Environment, as well as the Values statement (Curriculum Council, 1998). Cosmic Education encourages children’s respect and care for the environment through hands-on engagement with the main disciplines of learning related to the natural world (living and non-living), such as biology, chemistry and geology. The Montessori curriculum also aims to develop children’s values for peace and the future of humanity (Montessori, 1966, 1992).

The final aspect of the Montessori approach that appears congruent with EfS relates to the development of self awareness, ultimately leading to awareness of the needs of the wider world. Maria Montessori (1966, p. x) valued “the contribution the child can give humanity”. Montessori recognised that to do this, children must first be assisted to discover themselves. This was seen as important because humankind had done many amazing things, such as, travelled to the moon and divided the atom, but Montessori considered that unless a person discovered his or her ‘self’, that person would be very dangerous – to self and the world (Montessori, 1966). From this perspective the Montessori philosophy and values may be seen to be an integral part of EfS. Indeed,
Montessori stated that “We serve the future by protecting the present” (Montessori, 1988, p. 177). Thus, it may be argued that the Montessori approach to education aims to address not only the essentials for the education of the child but also the wellbeing of the wider world – socially and environmentally.

It can be argued, however, that gaps in the alignment between Montessori and EfS may be present in some educational contexts. Four gaps or weaknesses have been identified; these relate to curriculum, staff workload, philosophical emphasis and governance. First, the pressure on Montessori schools to fulfil state or national educational requirements as well as the Montessori curriculum presents a challenge (Schonleber, 2006). This pressure has also been reported as “negatively impacting on the implementation of the Montessori curriculum” (E. Lewis, 2004, p. 8). This situation could result in reduced lesson time spent outdoors, engaging with the natural environment. Next, some Montessori teachers have expressed concern about heavy workload pressures and are reluctant to take on more responsibilities (E. Lewis, 2004, p. 2, 30 & 166). This situation could impact on teacher’s willingness to engage in lessons that involve working for the environment, consequently focusing more on a classroom approach to learning about the environment.

A third issue impacting on the alignment of Montessori and EfS, relates to the philosophical debate about the Montessori curriculum in terms of the weighting given to strict adherence to the Montessori Method, as against a Montessori approach or ‘response’ within the modern educational context. Some authors argue for a more flexible response to the Montessori curriculum, with increased inclusion of new understandings and development in education (A. Alegria, The June Shelton School and Evaluation Centre, personal communication, February 3, 2000; Cossentino, 2005; Erskine, 1998).

Finally, some Montessori schools need to develop the governance, administrative and management structures that facilitate whole school approaches to educational issues (E. Lewis, 2004; Schonleber, 2006). A whole school approach with strong supportive leadership has been shown to be vital for ongoing positive outcomes in EfS but this does not appear to be always present (Pepper, 2007). In conclusion, while a positive alignment between Montessori and EfS can be identified, numerous gaps and concerns have been discussed. These gaps may impact on the effectiveness of the implementation and sustainability of EfS within a Montessori context.
2.3.5 Research

There is a paucity of research on EfS in a Montessori setting. Three major areas of current research focus within the Montessori educational approach can be identified as: first, studies investigating what constitutes authentic Montessori (Boehnlein, 1980; Cossentino, 2005; Dobozy, 1999, 2004; Erskine, 1998); second, the efficacy of the Montessori approach in relation to ‘best practice’ (Elkind, 2003; A. S. Lillard, 2005); and finally, research into learning outcomes for Montessori students. Numerous studies have found educational benefits for children attending Montessori schools (Chattin-McNichols, 2001, November; Rodriguez, Irby, Brown, Lara-Alecio, & Galloway, 2003; Schonleber, 2006, p. 80). Other research in this area focused on investigations related to the curriculum and outcomes for children at educational risk (Pickering, 1998; Pickering & Alegria, 1999).

No documented research on EfS in a Montessori setting has been located, although many features of EfS appear aligned with Montessori philosophy and curriculum. Nevertheless, numerous Montessori schools have been reported as being schools committed to EfS (AuSSI-WA, 2009c; Beinat, 2009; DesignShare, 2009). The present study therefore appears to provide initial, original, current research evidence on EfS within a Montessori setting.

2.3.6 Summary

This section of the literature review examined the Montessori educational approach to provide an understanding of the school context of the research. It briefly addressed the history and philosophy of the approach, values and curriculum content. Evidence for the alignment of the Montessori approach with EfS was mixed. Identified weaknesses drawn from an analysis of the Montessori literature that may impact of EfS in these schools related to curriculum, staff workload, philosophical emphasis and governance. These weaknesses, together with an absence of any documented research found specifically on EfS in Montessori contexts, clearly indicate the need for the present research.

2.4 Leadership in EfS

Leadership is a critical notion for the success of EfS initiatives. This final section of the literature review reflects on the impact of leadership on EfS. There are three sub-
sections: a summary of different perspectives on leadership; leadership in the context of educational change; and thirdly, evidence for the sustainability or otherwise of change initiatives.

2.4.1 Different Perspectives on Leadership

To understand the complexities of leadership in EfS it is necessary to understand some of the broad issues and concepts in the literature on leadership. Different definitions of leadership and theories of leadership abound, and these definitions and theories have changed over time. For instance, in the 1980s and 1990s leadership research and discussions in the literature has focused on leadership as a position in the hierarchy, a top-down approach (P. Senge et al., 2007, pp. 8-15; Yukl, 1989), while in the current decade it has been viewed more in terms of facilitating commitment and learning capability at all levels in an organisation (P. Senge et al., 2007, pp. 12-15; Taylor, 2008b). Other ways of looking at leadership are in terms of ‘influence’ and ‘skill’.

“Leadership is a process of influencing the activities of members of an organisational group in its efforts towards goal setting and goal achievement” (Stogdill, 1950, p. 3). Leadership can also be “defined by skill sets, not job title, and offers specific strategies to enhance advanced practice ... leadership skills” (Byram, 2000, p. 1). However, current theories of leadership focus on the capacity for change (Bennett, 2008; Fullan, 2001, 2007; P. Senge et al., 2007; Taylor, 2008b) and values (Day, Harris, Hadfield, Tolley, & Beresford, 2000; Hill, 2008), rather than position in a bureaucracy. This focus on capacity for change and values is an approach to leadership that is particularly relevant and critical for change in EfS.

Another approach suggests that the nature of leadership in EfS needs to take different forms during the different phases of a project (Taylor, 2008a, 2008b). At the start of the project, the initiation phase, leadership is characterized as ‘focused’, in that the leadership process is dominated by individuals and is often initiated by project champions. During the endorsement phase the project is endorsed by the organisation’s formal leaders, and this form of leadership is called ‘instrumental’ leadership. However, while the project is being implemented, ‘distributed’ leadership is optimal, as leadership is group-based with multidisciplinary teams involving numerous leaders in collaborative activities. Thus it is argued that leaders need to be dynamic and able to change over the life of a project.
An analysis of the literature on leaders and leadership in EfS resulted in the identification of four broad types of leaders: dynamic leaders, passive leaders, champions and leadership communities. Each of these types was informed by a different conception of leadership and appears to have varying outcomes for EfS. ‘Dynamic leaders’ are people at the highest levels in an organization’s hierarchy; they include senior administrators, school principals and senior school staff who actively support EfS initiatives (B. Adams & Bailey, 1989; Benham, 1996; Blewitt, 2005; Clugston & Calder, 1999). An example of a dynamic leader is demonstrated in a study conducted at another AuSSI-WA independent school. This principal’s vision and enthusiasm was clearly demonstrated by her comments:

“I’m in the position to try and influence things [by introducing initiatives such as] fair trade coffee [in the staff room], reduce the amount of [plastic] wrap that’s used to wrap up dishes, ... Encouraging walk to school with the community. And institutionally talking about how often you should be using your heating and air conditioning. It sounds a bit dictatorial, but there are whole-school things that you can actually do, like the whole-school recycling” (Salter et al., 2011).

Interestingly, teachers at this school who were interviewed “acknowledged that leadership of their principal was integral to the school’s sustainability focus, and that losing her could be a threat to the process” (Salter et al., 2011, p. 155). Thus dynamic leadership may display both strengths and weaknesses.

Another strength of the ‘dynamic’ leadership style involves the principal or other senior staff member’s support for teacher champions. As one author stated, “When principals promote the self-efficacy of teachers, they are promoting product champions” (B. Adams & Bailey, 1989, p. 45). This means when principals corroborate the work of teachers in the school environment, they are supporting champions in the teachers’ fields of interest, be it in EfS or any other learning area. Such leaders also fit into Taylor’s (2008a) category of ‘instrumental’ leadership.

‘Passive leaders’ hinder the potential success of EfS through behaviours that range from unintentional discouragement to deliberate termination of EfS initiatives. These leaders do not display ‘instrumental’ leadership. For example, a passive leader for EfS, identified as Gordon, is described in Pepper’s (2007) study. Gordon is a principal at a Western Australian secondary school:
Gordon displays little emotional involvement and indicates early that while he is new to the school he is on the promotional path and is not staying long. While he acknowledges the passion and enthusiasm for education for sustainability among some staff he does not suggest any sharing of these sentiments” (Pepper, 2007, p. 131).

Clearly Gordon takes little active interest in EfS initiatives at his school so limits EfS initiatives.

‘Champions’ in the current context are individuals at middle and lower levels of an organization’s hierarchy; they work hard to actively support EfS. These leaders may be identified with Taylor’s (2008a) ‘focussed’ leadership. Champions will be discussed in more detail in the next section.

‘Leadership communities’ bring together dynamic leaders, champions and other members of a community to work together cooperatively (Mawson, 2008b; Price, 2010; P. Senge et al., 2007; Taylor, 2008a, 2008b). In Taylor’s (2008a) terms, this represents ‘distributed’ leadership. This approach aligns with another author’s perspective on leadership:

... the capacity of a human community to shape its future, and specifically to sustain the significant processes of change required to do so... [Leadership grows] from the capacity to hold creative tension, the energy generated when people articulate a vision and tell the truth (to the best of their ability) about current reality (P. Senge et al., 2007, p. 16).

So, a school having a leadership community could have numerous ‘leaders’ at different levels in the hierarchy who play critical roles in generating and sustaining this creative tension. In the context of these understandings the present research will contribute insights into the impact of leadership type on the implementation of EfS initiatives, in particular, on AuSSI-WA as an educational change initiative.

2.4.2 Educational Change

The notion of change is central to EfS. Many people find change difficult. Change has been viewed as a “double-edged sword ... on the one hand, fear, anxiety, loss, danger, panic; on the other, exhilaration, risk-taking, excitement, improvements” (Fullan, 2001, p. 1). Clearly change arouses numerous emotions. Fullan (2001, p. 1) argues “when emotions intensify, leadership is key”. The quality and effectiveness of the leadership can facilitate or inhibit the change outcomes (Bascia & Hargreaves, 2000; Hargreaves,
Clearly such outcomes will impact on the success or otherwise of EfS initiatives.

The change process may be conceptualised as involving three phases: initiation, implementation and institutionalisation (Huberman & Miles, 1984). Initiation is the process leading up to the decision to adopt a particular change, while implementation consists of putting the reform into practice and institutionalisation involves embedding the change into the routines of the institution. This last phase appears to receive the least attention (Fullan, 2007), which impacts on the sustainability of the initiative (Hargreaves, 2006). However, careful planning related to all three phases is vital for ongoing achievement in EfS.

An important component of the initiation phase relates to the ‘initiator’ of the change. Change may be initiated through government initiative (international, national, state, local), by school leaders (principal, deputy) or champions (other people in the school community - staff members, students, parents). Champions have historically played an important role in facilitating school environmental education and EfS initiatives (B. Adams & Bailey, 1989; Benham, 1996; Blewitt, 2005; C. J. Lewis, 1986; E. Lewis, Baudains, & Mansfield, 2009b; Pepper, 2007). Indeed champions are considered to play a crucial role as change agents, in making links between an organisation’s purpose, environmental performance and social responsibility (Hayles & Holdsworth, 2006; Schaefer, 2004; Schaefer, Coulson, Green, New, & Skea, 2003; Walley & Taylor, 2005). This has been frequently reported in the EfS literature. The research by Peters and Waterman (1982) highlighted the importance of building champions. They reported, “All the activity and apparent confusion we were observing revolves around fired-up champions and making sure that the potential innovator, or champion, comes forward, grow and flourishes” (Peters & Waterman, 1982, p. 202). Education research by Lewis (1986, p. 1) referred to champions as “prime movers” and argued that schools cannot be successful without them.

The personal characteristics of champions are key predictors of project outcomes (Hemingway, 2005; Howell & Sheab, 2003). For example, champions who displayed an internal locus of control, a wide breadth of interest and viewed initiatives as opportunities (not threats) were found to display behaviours that positively predicted project performance over one year (Howell & Sheab, 2003, p. 1). Another study reported success in the strategic use of champions “who displayed understanding, sympathy and previous experience in attempting to integrate concepts of sustainability
into their curriculum” (Hayles & Holdsworth, 2006, p. 3). These academic champions were recognised to play a very important part in initiating and sustaining change, so were specifically employed to work on the curriculum renewal project as a component of their duties (Hayles & Holdsworth, 2006, p. 5).

Champions have been found to adopt a range of strategies to promote their work (Walley & Stubbs, 1999, 2000). Some of the strategies employed by environmental champions to promote their agenda include networking, maintaining a sense of audience when interacting with others and interpreting other agendas (such as improved use of technology) as environmental gains to build feelings that progress is achievable (Walley & Stubbs, 1999). Research has also found a “tension between formal and informal dimensions of environmental champion systems and roles” (Walley & Stubbs, 2000, p. 1). Champions may play a formal, administratively recognised role within an organisation, and also offer “inspiration to would-be environmental change agents working within organisations where there is no organisation-wide commitment to environmental change” (Walley & Stubbs, 2000, p. 1). Clearly champions can play an effective role in facilitating change; however difficulties sometimes arise in the ongoing role of an organisation’s leader in sustaining the champion who is enabling the educational change (Pepper, 2007).

The effectiveness of champions can be diminished if they feel unsupported and overwhelmed with the enormity of their role or when they leave the organisation. For example, a secondary teacher, Finn, introduced many environmental initiatives at his school over a five year period but concluded:

While this was a huge success for the school there was little acknowledgement for the staff involved. I felt burnt out, even though I was thrilled for the program’s success ... I took long service leave ... when I wanted to return ... [the principal] suggested I look for a position in another school ... but I was even more disappointed as the strong and thriving program I left, crumbled ...
When I asked the principal ‘Why’ ... she replied, ‘Everybody knows about the environment. There is no need for it now’ (Pepper, 2007, p. 92).

This lack of support by the school principal (a passive leader in terms of EfS) resulted in the termination of the program. Finn’s environmental initiatives were therefore not sustainable on personal or school administrative levels.

Other authors also investigated challenges faced by champions (Schaefer, 2004; P. Senge et al., 2007; Whitehouse & Evans, 2010). For instance, a study conducted in four
state primary schools in regional Queensland found leading environmental educators did not want to be identified as ‘greenies’ due to the socially negative connotations of this term (Whitehouse & Evans, 2010). Another documented challenge involves the ongoing demand for fostering clarity and credibility of associated values and aims, while persisting with a sustainability program - ‘walking the talk’ - long term (P. Senge et al., 2007, p. 200). Allocating time and budgetary support for champions who are changing jobs, to teach replacement staff, and for the assessment of outcomes over time, are vital for sustaining change (P. Senge et al., 2007, pp. 174 & 289). Evidence suggests that if such allocations are not made initiatives may die (P. Senge et al., 2007, p. 174). In brief, it appears that the different initiators of change - leaders and champions - are important to the sustainability of educational change initiatives.

2.4.3 Sustaining Educational Change

The success of EfS in schools is partly dependent on the capacity for sustaining educational change. Sustained change is difficult to achieve. Many change initiatives fail and there is considerable evidence of this failure to sustain significant change despite substantial resources being committed to the change effort (P. Senge et al., 2007). Various authors have studied change specifically in the educational context and similarly reported varied outcomes, with some initiatives being effective and sustained and others failing. Hargreaves and Fink (2003, p. 693) conducted research in this field and concluded “Educational change is rarely easy to make, always hard to justify and almost impossible to sustain”. Research illustrating some of the challenges to the change process will be discussed first.

Initiatives to enhance student achievement are one field of educational reform that re-appears in different forms over the years. For example, Shulman (2004, p. 137) explored the “apparent failure of Project Headstart” in the context of “those teachers or schools that consistently produced high achievement in their pupils from those that consistently failed to do so”. This author identified five possible impediments when attempting to implement policy based solutions to problems of teaching and learning: inconsistencies among mandates; limits on resources, time or energy; limits of teacher expertise; limitations of working conditions; and the self-defeating mandate (Shulman, 2004, p. 141). Shulman (2004, p. 160) concluded “the teacher must remain the key ... literature on effective schools is meaningless, debates over educational policy are moot, if the primary agents of instruction are incapable of performing their functions well”.

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One of the components of enabling teachers to perform their functions well relates to how leadership is conceptualised, at both head office and school levels. Two competing leadership models are identified (Shulman, 2004, p. 314). First, powerful and charismatic administrators and school leaders who create a climate of shared expectations and a collective commitment. Second, a model in which teachers exercise substantial leadership, with management decentralised.

Another demon of current reform movements in education is ‘time’, as Shulman (2004, p. 330) states “Time tyrannizes teaching”. Time: time on task; time to cover the expanding amount of material; time for deeper, more collaborative, more critical learning; time for students to interact with teachers, who are themselves always learning. How these time issues are addressed, depending in part on the leadership model in operation, will contribute to the success or otherwise of the reform being implemented. These important issues identified by Shulman (2004) impact on the outcomes, the sustainability of educational change initiative.

Other researchers have similarly investigated the effectiveness of educational change initiatives. Pepper (2007) reported on research that captured leaders’ understandings of EfS, and how it was implemented across the curriculum in Western Australian government secondary schools. Four key concepts were identified as essential for embedding EfS into these schools: understanding sustainability; imagining the future; building relationships; and taking action (Pepper, 2007, p. 163). Furthermore, Pepper (2007, p. 164) found “Leadership does not seem evident consistently across the settings of my study”. Many EfS initiatives were adopted in an ad hoc manner and were thus “doomed to collapse without being normalised into the school culture” (Pepper, 2007, p. 166). This author concluded:

Sustaining initiatives does not occur as a consequence of the actions of charismatic or passionate individuals as typified in transformational leadership. Instead collaborations within and among committed teams as practised in the distributed leaderships and sustainable leadership models face greater likelihood of success (Pepper, 2007, p. 166).

Clearly, there is a close relationship between sustaining an educational initiative and the leadership model adopted.

Examples of successful educational change can be found in the literature (Babiuk & Falkenberg, 2010; Bennett, 2008; Fullan, 2005; Hargreaves & Shirley, 2009; Lang, 2007; E. Lewis & Baudains, 2007a; Potter, 2007; P. Senge et al., 2007). A recent case
study of a K-7 Queensland school reported success in implementing a whole school approach to sustainability – greening the school grounds, resource management, governance, partnerships, curriculum development and so on (Potter, 2007). This study is particularly interesting because it appears to be an instance of a successful ‘leadership community’ in operation. Another example of success in implementing educational change was research conducted by Bennett (2008), involving ten school districts in Canada, Europe and Australia. This work intersected a number of areas, including systemic educational change and teacher education. Bennett (2008) argued that sustained change required every aspect – from curriculum, instruction and assessment, to school partnerships, involving all stakeholders and principals attending teacher professional learning sessions - to be built into the system for effective, sustained, systemic educational change. Senge (2006) similarly recognised links between sustaining change and systems thinking. This author argued that a new type of systems thinking management practitioner was necessary for long term embedded change to occur. However, much of the research into educational change is short term, and some ‘successes’ may not reflect continuing and deep improvement.

Numerous sources abound with examples of successful AuSSI/EfS programs (Armstrong et al., 2004; AuSSI-WA, 2009b; DEWHA, 2009g; MacLeod, Carnes, & Parsons, 2008; Potter, 2007), but are the programs being maintained? Thus, longitudinal research of change experiences, in a variety of settings, is recommended (Gralton et al., 2004; Hargreaves & Fink, 2003). AuSSI, as a recent change initiative, therefore needs to be studied in the broader context of educational change initiatives, from a longitudinal perspective, with the view to contributing evidence as to whether the Initiative is being sustained.

In brief, the literature reported the impact of leadership on EfS to be critical; critical for the success and sustainability of EfS initiatives. Different perspectives on leadership in the context of educational change were examined and evidence for the sustainability or otherwise of change initiatives was examined. There appeared to be a close relationship between sustaining an educational initiative and the leadership model adopted. The case study school in the present research experienced three changes in school leadership after joining AuSSI-WA (2005-2009) so the findings will provide evidence on the impact of these changes on EfS. Finally, leadership issues, together with other key aspects impacting on EfS, are highlighted in the following conceptual framework for the study.
2.5 Influences Impacting on AuSSI-WA

Three groups of influences impacting on AuSSI-WA emerged from the literature review. These influences were also relevant in the Montessori school context. The three groups of influences were: EfS research themes; curriculum; and school setting. These influences, and the relationships between them, are presented in Figure 2.9. They are discussed below in relation to pre and post AuSSI-WA. This discussion also synthesises disparate influences in the literature to enhance understandings and reveal interconnections.

Figure 2.9 Influences impacting on AuSSI-WA at the Montessori school
2.5.1 EfS Research Themes

The first group of influences identified as impacting on EfS in a school related to stakeholder awareness of research themes in this field. Emerging from the growing body of research on EfS, eight themes relevant to the current study may be identified: whole school approaches; student voice; sense of place; leadership model; learning model; whole systems thinking; behaviour change; and alignment with state, national and international objectives (Figure 2.10).

Figure 2.10  EfS research themes influencing the study

Whole School Approach
Whole school approaches to EfS have been found to be vital for the success of EfS programs in national and international settings (Henderson & Tilbury, 2004). Such an approach was therefore considered to be an important issue for the present study.

Leadership Model
The leadership model employed by a school influences EfS outcomes (P. Senge et al., 2007; Shulman, 2004). The model in operation is particularly vital during a period of educational change. Since AuSSI-WA was an intervention that involved educational change, the success of AuSSI-WA may be understood to be partly dependent on the capacity for sustaining this educational change (Hunting & Tilbury, 2006). Many change initiatives fail and one of the issues impacting on the success or failure of an
The initiative is the leadership model adopted (P. Senge et al., 2007). The leadership model has been found to be critical for the success and sustainability of EfS initiatives (Pepper, 2007). The case study school experienced two leadership changes before the AuSSI intervention (1990-2005) and three leadership changes after joining AuSSI-WA (2005-2009). The research provided evidence on the impact of these changes on EfS at the school.

**Learning Model**

Theory informing the learning model adopted in the present study included Lucas’ (1979) knowledge-attitudes-actions model (Figure 2.1) and Baudains’ (2003) model of self-regulated learning and environmental education (Figure 2.2). These models are elaborated in the following chapters (2.1.3 and 3.3). It is argued that to be effective, AuSSI-WA needs to go beyond the dissemination of knowledge, engagement in the environment and development of attitudes for the environment, to include participants’ metacognition involving reflection upon the EfS experience - planning, monitoring and evaluation.

**Student Voice**

Student voice refers to the degree to which students are able to participate in school decision making (Mitra, 2004). A whole school approach recognises that students are one of the key stakeholders and provides a major role for them to contribute to actions for sustainability (DET, 2010a).

**Sense of Place**

Researchers maintain attachment to place, having a ‘sense of place’, is vital in EfS because it facilitates the development of strong close relationships within the local environment (R. Evans et al., 2007; Miles, 2008a; Tooth & Renshaw, 2009). This attachment results in active enhanced care for the environment. The current study provides evidence about EfS projects that are set in the local area.

**Behaviour Change**

The major purpose of EfS is to achieve behaviour change that supports sustainable lifestyles. However the majority of studies are short term investigations and there is a need for more and better research on long term outcomes arising from EfS programs (Henderson & Tilbury, 2004; Tilbury et al., 2005). The present study contributes evidence relating to school, student and teachers outcomes from a longitudinal perspective.
The foregoing research themes have been shown to be relevant to a school’s EfS program. The second group of influences identified as impacting on EfS in the research school related to curriculum. Curriculum influences are outlined in the next section.

2.5.2 Curriculum

The current State curriculum, the new Australian curriculum, Montessori philosophy and curriculum come together in the present study as influences upon EfS outcomes. These curriculum influences are discussed below (Figure 2.11).

Curriculum Framework

Although an independent school in Western Australia, the case study school was required to comply with the State Curriculum Framework (Curriculum Council, 1998). The degree to which this requirement was considered to contribute additional work pressure on teachers, who were already implementing the Montessori curriculum, was considered in the present study.

Montessori Philosophy

Montessori education philosophy recognises interdependence between people, and between people and the environment, and this interdependence is considered fundamental to the sustainability of humanity and to life on Earth (Montessori, 1992). This philosophy appears congruent with understandings in EfS. The present research examined aspects of the degree of congruence.

Montessori Curriculum

The Montessori curriculum integrates personal development, social growth and the interdependence of all living things. It emphasises caring values as well as the importance of children developing a close relationship with and understanding of the natural world. The ecology curriculum particularly emphasises the need for children to be ‘outside’, learning in the garden and during experiences in Nature (Montessori, 1964, 1966).

Australian Curriculum

The new Australian Curriculum recognizes the critical role it plays in educating current and future young Australians for the 21st century (ACARA, 2011b). ‘Sustainability’ has been identified as one of the three overarching priorities in this new curriculum (ACARA, 2011c). This curriculum may influence education at the Montessori school in the future but did not impact on the school during the data collection phase because new curriculum documents were not available at that time. Nevertheless, aspects of research
evidence informing this curriculum development was available to the school during the data collection phase (DEH, 2005a; Henderson & Tilbury, 2004).

These four curriculum influences impacted upon the school’s EfS program. The third group of influences impacting on EfS in the Montessori school related to the unique features of the school itself. School setting influences are outlined in the following section.

2.5.3 School Setting

Six influences are identified as important for EfS in the school setting. These are discussed in the following section and include: school priorities and approach; community education; student voice; researcher position; sense of place; and professional learning (Figure 2.12).

School Priorities and Approach

Schools identify their priorities and approach according to the needs of the students and the community within which they are located. These priorities and approaches include for example, form of governance, leadership styles, academic focus and school values. They may be espoused priorities and/or enacted priorities, and these may change over time. Academic focus may influence the adoption of a silo or systems thinking approach in EfS. School values towards EfS at the Montessori school appeared to be
influenced by Montessori philosophy and stakeholder commitment to a sustainable vision.

Figure 2.12 School setting influences in the study

Professional Learning
Staff engagement in EfS professional learning (PL) is vital for successful EfS outcomes (Henderson & Tilbury, 2004; Hunting & Tilbury, 2006). At different times during the study, staff engaged in whole staff, small group, individual and no EfS learning experiences. The research will examine the impact of varying levels of staff participation in EfS PL. Furthermore, staff at the school expressed different educational priorities and interests as to be expected, with a few staff members choosing to engage in considerable EfS PL as they were the EfS champions. The present longitudinal study documents the impact of EfS PL on the EfS program at the school.

Community Education
Along with students and staff, the other major stakeholder group in a school is the school community. This group includes parents, guardians, care givers, volunteers and other interested wider community members. An effective whole school approach requires the inclusion of this group in EfS education so that vision and actions are aligned throughout the whole school (DEWHA, 2009e; Tilbury & Cooke, 2005a).
Researcher Position

As a teacher at the school from 1999 to 2007, the study enabled the researcher to extend personal knowledge and understandings about EfS and AuSSI-WA. In addition, personal aims were to contribute to visioning, governance, policy, curriculum development and EfS activity within a whole school, whole systems thinking context, as well as enhance personal practice. After 2007 until the end of the study, the researcher visited the school as required by the data collection schedule. Researcher position is elaborated further in the Methodology chapter (3.2 and 3.4).

Other Influences

Student voice and sense of place, discussed previously in the section on research evidence, are also relevant to the school setting. The emphasis a school places on these issues impacts on the effectiveness of its EfS program (DET, 2010a; Miles, 2008a). All the foregoing influences were identified as potentially impacting upon EfS outcomes at the school, in both pre- and post-AuSSI-WA contexts.

The foregoing discussion of influences upon AuSSI-WA needs to be complemented by an understanding of key aspects in EfS. Key aspects in EfS interact and overlap with some of these influences. Such interconnections will be examined in the next section, informing the development of the conceptual framework for the study as well as elucidating the dynamic interrelated nature of key aspects and overarching issues in EfS.

2.6 Conceptual Framework

The conceptual framework for this research provides a context within which the complexity of EfS programs in schools can be investigated. The framework has been developed from an analysis of the foregoing literature and draws together key aspects (DET, 2008a; Henderson & Tilbury, 2004). Figure 2.13 identifies ten key aspects: vision, governance, professional learning, EfS activity, teaching and learning, curriculum, student voice, school networks, community networks, and acknowledgement. The framework suggests that these aspects are on a continuum, and schools may be located anywhere along this continuum at any particular time in terms of their approach to EfS (J. M. Davis & Ferreira, 2009; Thomas, 2005; Tilbury et al., 2005). They may be at the most sustainable end of the continuum, meaning they are actively engaged in EfS from an ongoing, whole school, whole systems thinking perspective, or they may be nearer the least sustainable end of the continuum, engaging
in a more silo, isolationist, ad hoc, product-based approach to EfS. Another way of conceiving the continuum is viewing most sustainable schools as consistently demonstrating sustainability as a way of ‘being’, while least sustainable schools display a more ‘tick the box’ approach to sustainability. The framework proposes the various aspects not only impact on EfS outcomes but also interact with each other. These understandings are elaborated in the following sections.

Conceptual Framework

Figure 2.13 Conceptual framework: Aspects impacting on EfS in schools

2.6.1 Vision

The aspect of ‘Vision’ relates to school community understandings about the meaning of the word ‘sustainability’ (section 2.1), what ‘whole school approaches’ entails (2.2), and the particular beliefs and values held by the school (2.3). This clarification of its role in a sustainable future is vital for a whole school approach to be effective (Henderson & Tilbury, 2004; Tilbury et al., 2005). These understandings may come together and be formally represented in the form of the school’s ‘model of sustainability’. The model adopted by the case study school is shown in Appendix 6.

2.6.2 Governance

In the conceptual framework, ‘Governance’ refers to school decisions that define expectations, grant power, and verify performance in terms of the adoption of sustainability as an important context for learning. It involves the form and processes of
leadership employed by a school (section 2.4 in the Literature Review), including support for EfS, to enable positive outcomes for sustainability (Fien, 2001; Tilbury et al., 2005). Thus ‘Governance’ that promotes EfS requires informed understandings about ‘sustainability’ (2.1) and ‘whole school approaches’ (2.2). Documentary evidence reflecting aspects of governance that relates to EfS may be found, for example, in school policies and strategic plans. Such evidence relevant to the case study school can also be viewed in Appendix 6. Finally, verifying EfS performance is a critical component of reporting on the effectiveness of the whole school approach. This reporting needs to address all key aspects in EfS (Figure 2.13).

2.6.3 Professional Learning

The Western Australian College of Teaching recognizes that professional learning needs to be ongoing. The College states “As professionals, teachers need to update their skills and knowledge continuously, not only in response to a changing world, but in response to new research and emerging knowledge about teaching and learning” (WACOT, 2010, p. 1). Furthermore, the College identified fifteen different categories of professional learning, including continued development of skills, the acquisition of knowledge, and the commitment to continue to engage with research into teaching and learning (WACOT, 2010). However, it is not only educational staff that need to participate in professional learning; the whole school community needs to engage with ongoing learning experience that enhance understandings about sustainability, such as parent education sessions and community forums (Ferreira et al., 2009; Henderson & Tilbury, 2004; Tilbury et al., 2005). Thus, from a most sustainable school perspective, it is recognized that all stakeholders need to be engaged in EfS learning on an ongoing basis and that this learning results in integrated action learning strategies that reflect the local context; while from a least sustainable position the school may address EfS professional learning needs on an ad hoc, interest-only basis. Professional learning is not so much about ‘attending’ a learning experience, as taking meaningful ‘action’ as a consequence of the learning experience. It is evident then, that informed understandings about ‘sustainability’ (2.1) and ‘whole school approaches’ (2.2) are fundamental to effective professional learning.
2.6.4 EfS Activity

The aspect of ‘EfS Activity’ refers to the degree of integration, breadth and depth of the school’s approach to teaching and learning for sustainability, including whether engagement in EfS reflects behaviour change. Schools may conduct EfS lessons but these may not result in behaviour change towards sustainable living patterns. Most sustainable schools demonstrate behaviour change, attachment to place and the whole school community being knowing experts (section 2.1 in the Literature Review), while least sustainable schools conduct EfS lessons in an ad hoc, silo, product-based manner (J. M. Davis & Ferreira, 2009; Miles, 2008a; Tilbury et al., 2005). The product-based approach involves a knowing expert providing information for the unknowing teacher (J. M. Davis & Ferreira, 2009). Embedded in the notion of most sustainable teaching and learning for sustainability, is the strategic collection of information that enables meaningful reporting not only of student learning outcomes, but also whole school sustainability objectives.

2.6.5 Teaching and Learning

Teaching and learning refers to the pedagogy adopted by the school in relation to the development of collaborative teamwork and critical thinking skills for EfS. A most sustainable school recognizes these attributes are fundamental to behaviour change and an action approach to EfS (Tilbury et al., 2005). Again, this requires a whole school conception of sustainability and a whole school approach (21. and 2.2). Schools at the least sustainable end of the continuum, by way of contrast, tend to teach EfS in a silo, ad hoc manner. Finally, reporting on student outcomes is an essential part of ‘teaching and learning’ because evaluation of changes in attitudes and values, knowledge and understandings, and skills and behaviour is fundamental to an effective EfS program.

2.6.6 Curriculum

Curriculum, in schools at the most sustainable end of the continuum, explores attitudes and values, knowledge and understandings, skills and behaviours in relation to EfS, in an integrated, comprehensive manner across all year levels. Schools at the least sustainable end of the continuum conduct EfS lessons on an ad hoc, product-based basis. Obviously, to move towards the more sustainable end of the continuum a school needs to develop a deep understanding of sustainability and enact a whole school
approach (DEWHA, 2010; Ferreira et al., 2009; Henderson & Tilbury, 2004; M. Littledyke et al., 2009; Tilbury et al., 2005).

2.6.7 Student Voice
Most sustainable schools involve students in key decisions related to sustainability, while least sustainable schools adopt token student involvement. Schools at the most sustainable end of the curriculum recognize the importance of student participation in decision-making (DET, 2008a; Mitra, 2004) and provide opportunities for critical reflection on EfS outcomes (Henderson & Tilbury, 2004; Miles, 2008b).

2.6.8 School Networks
Developing networks with other local schools to work on EfS projects, share resources, engage in professional learning, is typical of most sustainable schools. Schools at the less sustainable end of the continuum may undertake local EfS projects on their own, reflecting an isolationist approach. As before, to shift such a school towards the most sustainable end of the continuum, it would need to embrace a whole school approach to EfS, with deep engagement in EfS understandings. Deep engagement requires that most of the school staff involved are competent in EfS practice (J. M. Davis & Ferreira, 2009; Ferreira et al., 2009; Henderson & Tilbury, 2004).

2.6.9 Community Networks
In most sustainable schools the whole school community – students, parents/care givers and staff – work with wider community networks, forming partnerships that cooperate in EfS projects (J. M. Davis & Ferreira, 2009; Henderson & Tilbury, 2004; Tilbury et al., 2005). In contrast, schools at the least sustainable end of the continuum may inform the community about EfS endeavours at the school, but not actively seek to develop wider community partnerships.

2.6.10 Acknowledgement
Acknowledgement, for most sustainable schools, typically involves recognition by the wider community of their whole school systems thinking approach to EfS which includes taking action on local sustainability issues (Armstrong et al., 2004; DET, 2010a; Henderson & Tilbury, 2004; Miles, 2008b). Alternatively, EfS
acknowledgement in least sustainable schools is focused on internal, school-based recognition of individuals.

2.6.11 Interactions and Complexities

Although the foregoing ten aspects are listed separately, each impacts upon each other. See Figure 2.14 showing the dynamic, interrelated nature of the key aspects. For example, in a less sustainable school, the school’s sustainability vision could be imposed top-down. This approach may limit student voice and the development of community networks. Alternatively, in a more sustainable school the principal would actively engage all stakeholders, with consequent supportive impacts on whole school professional learning, teaching and learning, and curriculum development. To illustrate again, a teacher in a less sustainable school may not be interested in sustainability and chose not to attend EfS professional learning, so when it comes to EfS activity for that teacher it may be product–based. Here there is an interaction between professional learning and EfS activity in terms of student learning outcomes and teacher perceptions.

![Figure 2.14 Dynamic interrelated nature of key aspects in EfS](image)

The situation becomes more complex when the investigation of EfS outcomes takes place over a long period of time (Hargreaves, 2006; McNaughton, 2007), as in the
The framework accommodates the longitudinal nature of the study by suggesting that the processes of moving towards/away from ‘being’ sustainable is indeed an ongoing one. The mobile nature of engaging with EfS allows for local, national and international changes. For instance, school leadership changes may impact on school EfS priorities, moving it towards most sustainable status; alternatively, increasing local drought conditions may influence school kitchen garden developments, changing how the school community addresses health and wellbeing issues.

Further illustration of the complexity of the EfS field is revealed by reflecting on the literature from a different perspective. The conceptual framework for the present study was developed from the ‘practice’ understandings in the literature and influences emerging from current research. However, when the literature is viewed from the ‘context’ perspective particular overarching issues emerge. These overarching issues emerged from the various influences identified as impacting of AuSSI-WA, as well as EfS more broadly. In relation to the present study, five overarching issues arose from the literature review: EfS understandings, whole systems thinking, whole school approach, educational philosophy and leadership. These overarching issues are discussed in the following section and shown in Figure 2.15.

![Figure 2.15 Dynamic interrelated nature of key aspects and overarching issues in EfS](image-url)
The first overarching issue that arose from the literature related to evolving understandings of EfS over the last forty years. Consideration of where the case study primary school was located in terms of its EfS understandings was required to appreciate the context in which it operated. Did earlier conceptions of EE or current understandings of EfS dominate? Who was involved at the school – an individual, a small group or was there whole school engagement with sustainability? The second overarching issue concerned the implementation of whole systems thinking. Research on this issue was found to be warranted, so evidence will be sought from the case study school to determine whether the EfS program operated from a silo or systems perspective, and whether this changed over time. Next, many international, national and state policy statements, events and publications were shown to have contributed to the development of EfS in WA. The emergence of whole school approaches to EfS internationally was found to be an overarching issue as it influenced EfS conceptions in AuSSI-WA, which in turn had ramifications at the local school level. A fourth overarching issue related to the degree of congruence between the Montessori educational approach and EfS. Evidence for such alignment was mixed, with numerous gaps identified. Finally, leadership issues were reviewed and found to impact on EfS outcomes.

The foregoing overarching issues interrelate and overlap with the ten key aspects in the conceptual framework. This situation may be simplified by diagrammatic representation. Figure 2.15 shows, for instance, that whole systems thinking can impact on all ten aspects. Whole systems thinking is aligned with the whole school community being involved in the development of the school values related to sustainability (vision), with sustainability being embedded in the school’s strategic and operational plans (governance), with targeted whole staff professional development experiences in EfS (professional learning), and so on. Alternatively, leadership clearly impacts on whether students are meaningfully involved in decision making (student voice), whether the school forms partnerships within the wider community (community networks), and whether the school is recognized for its progress towards ‘being’ sustainable (acknowledgement).

In brief, the conceptual framework for this study has been generated from current research in the field of EfS. The framework suggests a way of conceiving a whole school community in terms of its approach to EfS. The framework outlines key aspects only and is not designed to provide a complete set of aspects, or the issues and
interconnections between these aspects. It provides an approach that facilitates reflection on aspects and overarching issues emerging from qualitative data related to student outcomes in EfS and teacher perceptions of EfS.

2.7 Summary of Literature Review

This chapter addressed theory guiding ‘practice’ through a critical examination of understandings about EfS and whole school approaches to EfS. Theory guiding ‘context’ involved examining literature on the Montessori approach to education and leadership. From this review key aspects and overarching issues emerged, resulting in the development of the conceptual framework for the current research. This framework recognises that schools are on an EfS continuum, spread between least and most sustainable positions, and movement along this continuum may shift in either direction depending on the interaction of key aspects and overarching issues at any point in time.

Despite many worthwhile whole school sustainability initiatives being reported as ‘successful’ in the literature, there was some evidence of significant set-backs experienced in EfS outcomes. Furthermore, numerous projects that have been documented as operating successfully only covered a comparatively short period. It appeared there was a close relationship between the success of an educational initiative, the leadership model adopted and the length of the research period. These findings linked directly to weaknesses and gaps identified in research evidence and consequently informed the resultant research questions investigated in the present study.

In the next chapter the methodological framework of the research is described. The case study approach is justified, along with the research design and methods used to address the research questions.
This study was conducted in a small independent Montessori school (K-Year 7) in the Perth metropolitan area of Western Australia. A longitudinal case study approach was adopted to examine historical information on Education for Sustainability (EfS) since the opening of the school in 1990, with the main focus of the study being the impact of AuSSI-WA in the school during 2005-2009. To undertake this study Human Research Ethics Committee approval was obtained (Approval Number 2006/289). This chapter presents the theoretical perspective, researcher position, method and research design employed to address the research questions, data analysis and study limitations.

3.1 Theoretical Perspective

There are a number of paradigms or ways of looking at the world, which include postpositive, constructivist, transformative and pragmatic (Mertens, 2010). These different general theoretical perspectives impact on the research methodology chosen by the educational researcher (Caelli, Ray, & Mill, 2003; Mertens, 2010; Schram, 2003). The theoretical perspective adopted in the current study was constructivist. This paradigm recognises multiple socially constructed realities and an interactive link between the researcher and participants (Garrick, 1999; Mertens, 2010). Further, the perspective is characteristically phenomenological, hermeneutic and qualitative (Cohen, Manion, & Morrison, 2007; Mertens, 2010). Phenomenology allows exploration of the ways humans make sense of their experiences (Denzin & Lincoln, 2000; Garrick, 1999; Neville, 2008; Patton, 2002; Schwandt, 2000). In using this approach the researcher analysed different aspects of phenomena experienced by participants. In essence, the constructivist perspective involved the interpretation of the ‘lived experience’ (Erikson, 1986; Garrick, 1999; Mertens, 2010). The researcher position is elaborated in the following section.

3.2 Researcher Position

As a teacher at the school from 1999 to 2007, this study enabled the researcher to extend personal knowledge and understandings about EfS and AuSSI-WA. Personal aims were to contribute to visioning, governance, policy, curriculum development and
EfS activity within a whole school, whole systems thinking context, as well as enhance personal practice. After 2007 until the end of the study, the researcher visited the school as required by the data collection schedule.

The underlying reason behind the study being conducted was the researcher’s commitment to ‘justice’ – working towards a fair and sustainable world for present and future generations. This position is eloquently represented in the UNESCO vision for a sustainable world (UNESCO, 2006a, 2006b) (Figure 2.1 and Appendix 5, 2.2.1). In brief, the researcher wanted to contribute to an EfS agenda to make a difference to the lives of current and future learners so they could be part of a just world.

The explicit purpose behind the study was to determine the long term impact of a sustainability program at a school. To do this a constructivist theoretical perspective was adopted as it aligned with researcher and school understandings about the learning process. This perspective recognized that learners generated knowledge and meaning from an interaction between their experiences and their ideas (Mertens, 2010; Patton, 2002). Utilising this perspective the researcher analysed different aspects of the ‘lived experience’ (Erikson, 1986; Garrick, 1999; Mertens, 2010) of students and staff in relation to the EfS program and reported the findings. Case study research was employed to ascertain the participants’ views.

3.3 Case Study Research

Within the constructivist paradigm, case study methodology is highly appropriate to obtain knowledge about participants’ experiences (Mertens, 2010). Case studies are often used in qualitative research and have been employed in the fields of EfS, EE and educational leadership (Conle, 2003; Pepper, 2007; Wildy, 2004).

A case study is an empirical enquiry that "investigates a contemporary phenomenon within its real-life context" (Yin, 1994, p. 13). Further, the case is a "specific, complex, functioning thing", an "integrated" system (Stake, 1995, p. 2). It is also a “bounded” system, in other words a unit with set limits (Merriam, 1998, p. 27). Thus in the current research the bounded system is the school. Guidelines on designing a case study, collecting data and analysing case study evidence are presented by various authors (Merriam, 1998; Patton, 2002; Yin, 1994). Case study data may be collected from a wide range of sources and can be both qualitative and quantitative (Merriam, 1998;
Sources of evidence used in the present study included surveys, observation and document analysis.

Case study research at the participating school was chosen for a number of different reasons. First, it was selected because it appeared compatible with the culture, values and administrative procedures of the school. More broadly, case study research can be justified from a range of perspectives. It is efficient, in that general conclusions may be able to be derived from a limited number of cases (Cherry, 1999; Punch, 1998). Case study is empirical and field orientated, in that it seeks to understand the case holistically and in depth, in its natural setting with all its inherent complexity (Punch, 1998; Stake, 1995). Next, it emphasises analysis and interpretation (Stake, 1995). Case study research can provide a ‘landmark’ case with specific conclusions that are important and interesting in their own right (Cherry, 1999; Punch, 1998). Further, it can be used to generate change, by showcasing an idea or strategy (Cherry, 1999). Another advantage of case study research is that it provides an opportunity for wholism, so that a phenomenon can be examined from different aspects as well as being seen in the context of its total environment (Punch, 1998; Stake, 1995). This aligns with the whole systems thinking approach investigated in the study (Sterling, 2003b). In addition, case studies provide the opportunity to collect rich and powerful data with high face validity (Patton, 2002). Finally, the outcome of a case study provides a template against which others can reflect on their own experiences relating to that phenomenon (Cherry, 1999).

However, there are some limitations to case study research. This form of research is limited by subjectivity, high cost in time and money, and that it may be seen to produce purely 'local' knowledge, from which it is difficult to derive general conclusions (Stake, 1995). In addition, case studies may lack statistical validity and test-retest reliability (Cherry, 1999). Despite this, 'petite' generalisations, that is, those arising from a single case in a particular situation, do occur (Stake, 1995). Such generalisations, combined with the use of triangulation (section 3.3.1), increase the validity of the study (Stake, 1995).

In summary, case study research was the method chosen for this study because it could reveal participants' lived experiences, their perceptions and understandings, as well as detailed information about student outcomes in EfS. In the context of the school under investigation, case study research provided exploratory and explanatory opportunities which were not as accessible using other methods (Punch, 1998). The predominantly
qualitative methods that were employed sought not only to describe the various characteristics of EfS being studied but also to explore the meaning of these. This triangulation of methods therefore allowed not only breadth of research to accurately describe the school but also depth of data to accurately explain why and what was happening. This method may also facilitate change in the school and in the broader context, by producing a template for examining EfS in any primary school. Issues relating to the reliability and validity of this research method are reviewed in the following section. The design of the research is then outlined.

3.3.1 Reliability and Validity

Information was collected from a number of sources, settings, time frames, research methods, instruments and theorist perspectives to increase the validity and reliability of the research. Triangulation (Creswell & Plano Clark, 2007; Mertens, 2010; Patton, 1990, 2002; Webb, 2000) involved the use of a variety of:

- Sources - Teachers, students, parents, colleagues, documents.
- Settings - Professional learning sessions, questionnaires, individual interviews, classroom and outside observations, staff meetings.
- Time frames - Longitudinal study, providing historical information since the opening of the school in 1990, with the main focus of the research on the impact of AuSSI-WA, 2005-2009.
- Research methods - Qualitative (case study) and quantitative.
- Instruments - Questionnaires, observation and document searches.
- Theorist perspectives – EfS theorists (C. M. Baudains, 2006; Sterling, 2003b; Tilbury et al., 2005).

Adoption of this wide range of information sources, settings, time frames, methods, instruments and perspectives enhanced rigor and enabled more thoughtful, meaningful conclusions to be drawn.

Reliability was enhanced by employing various techniques. Along with triangulation, these included the use of outlining theoretical and contextual information, as well as conducting the audit trail of how data were collected and decisions reached. Construct validity was increased by using multiple sources of evidence, establishing a chain of evidence and providing key participants with the opportunity to review preliminary data.
analysis. Internal validity was enhanced in the present study by applying a range of strategies. These involved the use of triangulation, conducting member checks, doing long term observations, involving the participants in all phases of the research, and finally, the researcher's field notes and reflective journal to clarify ideas and biases. External validity was increased in the research process by describing the typicality of the program so that others could compare this with their own context, and by involving students across pre-primary and primary year levels to maximize the diversity of the phenomenon being studied.

In brief, triangulation of various data sources, settings, time frames, methods, instruments and perspectives employed is a robust approach to enhance the trustworthiness of qualitative research (Creswell & Plano Clark, 2007). Data was collected from surveys, observation and document searches and these were analysed to obtain different perspectives on the same issues. Although many strategies were used to enhance reliability and validity of the present research, some limitations may be identified. These are discussed at the end of the chapter.

### 3.4 Research Design

Influences impacting on AuSSI-WA were presented in Figure 2.9 and the specific research questions documented in the Introduction (section 1.3). In broad terms this thesis proposed that by empowering school staff and students in learning and decision-making through participation in AuSSI-WA, improved outcomes for EfS would result. Theory informing this learning and decision-making was Lucas’ (1979) knowledge-attitudes-actions model (Figure 2.1) and Baudains’ (2003) model of self-regulated learning and EE (Figure 2.2). It is argued that to be effective AuSSI-WA needs to go beyond the dissemination of knowledge, engagement in the environment and development of attitudes for the environment, to include participants’ metacognition involving reflection upon the EfS experience - planning, monitoring and evaluation. In terms of the conceptual framework (Figure 2.13), the researcher expected that involvement in AuSSI-WA would ‘change’ EfS at the school, shifting it more towards the more sustainable end of the continuum. The AuSSI-WA toolkit (planning, monitoring and evaluation tools) was expected to facilitate metacognition and support this shift. These understandings and the research questions are related to one another and explained through the simplified model presented in Figure 3.1. The elements
referred to in this figure were introduced in the Literature Review (Figure 2.6) and are the twelve AuSSI-WA elements in Figure 3.2 (DET, 2008a).

![Diagram](image)

**Figure 3.1 Research scenario showing relationships between the case study context and EfS outcomes.**

The left hand side of Figure 3.1 represents the school context prior to 2005, before involvement in AuSSI-WA. The right hand side of the figure presents outcomes from the AuSSI-WA initiative during the period 2005-2009. It was hypothesized that participation in the AuSSI-WA would support improved EfS outcomes for the school, staff and students. The research therefore investigated different aspects of EfS phenomena experienced by participants and analysed their ‘lived experience’ (Erikson, 1986; Garrick, 1999; Mertens, 2010).

To determine EfS outcomes after the commencement of AuSSI-WA, whole classes of students and individual teachers from the school were surveyed, observed and interviewed to ascertain attitudes, knowledge and behaviours in relation to EfS. The research predominantly employed a qualitative approach to gather information in order to address the research questions. The approach was phenomenological (Neville, 2008), in that it set out to determine what happened before and after the school became
involved in the AuSSI-WA, what students and teachers thought about EfS and how the EfS program influenced them.

AuSSI-WA developed a self-assessment tool to enable schools to determine their level of achievement in EfS (DET, 2010a). Twelve elements were identified by this tool: values, governance, policy, review of EfS activity, professional learning, teaching and learning, curriculum integration, reporting on learning outcomes, student voice, networks and partnerships, and lastly, recognition of successful action. The overall relationship between these elements and the data collection methods employed in the research is illustrated in Figure 3.2. All three data collection methods - questionnaires, observations and document searches – were used to ascertain evidence of EfS activity in the school. Survey and observational data provided evidence for the elements of teaching and learning, student voice and engagement, curriculum integration and reporting outcomes. Document search evidence provided information to determine outcomes in the remaining elements.

![Figure 3.2](image)

**Figure 3.2 Design framework showing the relationship between data collection methods and 12 elements of EfS at the school.**

The influences on AuSSI-WA identified in the previous chapter (section 2.5), together with the conceptual framework (section 2.6) provided grounding for the research questions and subsequent investigations on the impact of AuSSI-WA on EfS at the school. This research scenario is summarised below.
Pre AuSSI-WA

Stakeholder understandings about EfS research themes, curriculum issues and school setting influenced EfS developments at the school prior to participation in AuSSI-WA (Figure 2.9). Antecedents of EfS at the school, student outcomes and teacher perceptions about EfS were investigated through surveys and data searches. Indeed, pre 2005 EfS initiatives at the school contributed to its selection as one of the AuSSI-WA pilot schools in 2005.

Post AuSSI-WA

The vision of AuSSI was for all Australian schools and their communities to become sustainable (DEWHA, 2009b). AuSSI-WA formed part of AuSSI, so had broad aims consistent with the national initiative. AuSSI-WA provided a framework to support Western Australian schools in the development of a whole school approach to EfS (DET, 2010a). This thesis investigated the impact of AuSSI-WA at the Montessori school, with student, teacher and school outcomes investigated, as follows.

Post AuSSI-WA School

Elements of EfS (Table 2.7) in operation at the school after joining AuSSI-WA in 2005 were examined through surveys, observation and document searches during the following five years, 2005-2009. Engagement with the whole systems thinking approach was also investigated.

Post AuSSI-WA Students

Student attitudes and values, knowledge and understandings, and skills and behaviours have been identified as important components of living sustainably (DEWHA, 2009e). These components were examined separately (section 2.1) as they related to the research questions on student outcomes after joining AuSSI-WA.

Post AuSSI-WA Staff

Teacher perceptions of EfS have been recognised as important to the success of EfS programs (Potter, 2007; Tilbury et al., 2005). The present study brought together all the influences on AuSSI-WA identified in Figure 2.9 as potentially impacting upon these perceptions.

3.4.1 Participants

The target population of the research was the entire school population, as well as samples of former teachers and Year 7 graduates from the school. In 2007, at the
commencement of the first survey, the total school population included six classroom teachers, five teacher assistants, four part-time specialist teachers, school principal, together with 150 students in six classes. Sixty-six students were in the Children’s Houses, forty-four in junior primary classes and forty in senior primary. Numbers changed in the following year as shown in Table 3.1. As participation in the research was voluntary, the actual participants were limited to the staff and students who returned signed ‘agreement to participate’ forms. For the purposes of the study the participant population included:

- Eight classroom teachers agreed to participate in the research; two from the Children's Houses (3-6 year olds), two junior primary (6-9 year olds) and two from senior primary classes (9-12 year olds). Two replacement teachers joined the school after the first year of the two-year survey period when two teachers left the school. These new teachers agreed to be involved in the research.

- Sixty five students provided permission to participate in the study; consisting of twenty two students aged 3-6 years, twenty three students aged 6-9 years and twenty students aged 9-12 years. Fifty four students participated in both years, with the total respondent numbers changing in the second year due to students being promoted to higher classes and some leaving or starting school. Eighteen ‘new’ students provided permission to participate in the study in the second year.

- Long term former teachers at the school were invited to participate in the research. Three former teachers who taught at the school for at least five years agreed to provide background information about the school’s pre-2005 approach to EfS.

- Former students of the school were invited to contribute to the study. Former students who graduated from Year 7 and attended the school for at least five years were approached. Ten agreed to provide background information about the EfS program prior to the school’s involvement in AuSSI-WA and after involvement if they were in attendance during that period.

The total school population and actual population that participated in the research is summarised in Table 3.1.

In summary, the total participant population over the five year data collection period included eleven teachers and seventy five students. Eight teachers employed at the
school between 2005-2009 participated in the study, along with three long term pre-2005 teachers. Sixty five students who attended the school during the research period participated, together with ten long term pre-2005 students.

Table 3.1

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<tr>
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<tr>
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<td>6</td>
<td>6</td>
</tr>
<tr>
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<td>0</td>
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<tr>
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<td>41</td>
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</tr>
<tr>
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<td>23</td>
</tr>
<tr>
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</tr>
<tr>
<td>Former Students</td>
<td>56</td>
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<td></td>
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</tbody>
</table>

Prior to commencement of the recruitment process for participants, written permission of principal and chairperson of the management board was obtained to allow the research to be conducted in the school. The school’s management board also reviewed the research proposal and granted approval for the study to proceed.

3.4.2 Recruitment Process

Recruitment process for participants varied according to the categories in Table 3.1. At the beginning of 2007 information letters were given to all potential participants at the school, including the principal, chairperson of the management board, the staff and parents or student care givers. Information letters (Appendix 1) inviting participation were mailed to parents and care givers of former students, or if these students were over eighteen years of age, mailed to them directly. All participants were reminded they could choose, without prejudice, to change their minds about participating and that all data gathered would remain anonymous.
All participants over the age of nine years and their parents or care givers provided written permission for participation in the study. This approval to participate was given in the context that there would be no exploration of issues that could be considered sensitive or intrusive. A total of fifty four students provided the required permission in 2007 but seven of these students left the school at the end of that year.

The foregoing recruitment process was repeated in 2008. The only change to the process was the addition of an incentive to participate, specifically, that returned forms would be automatically entered into a draw to win one of three movie vouchers (Appendix 1). An incentive was provided to encourage new students attending the school, as well as existing students who didn’t participate in 2007, to participate in the study. An additional eighteen students provided written permission to participate in the study in the 2008. No withdrawals of permission were received.

3.4.3 Data Collection

A range of data collection methods were employed in order to ascertain antecedents of EfS in the Montessori approach to education, along with the elements of EfS that were in operation in the school prior to AuSSI-WA; the outcomes, in terms of attitudes and values, knowledge and understandings, and skills and behaviours of students after five years involvement in AuSSI-WA, and; the perceptions of teachers. Methods of data collection for both students and teachers included questionnaire, observation and document search. The latter included student work samples, school policies, newsletters and meetings, such as teacher workshops. Table 3.2 summarises the timeline for data collection. Each method is outlined in more detail below.
Table 3.2
Timeline for Data Collection

<table>
<thead>
<tr>
<th>Data Sources</th>
<th>2007</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>Semester 2</td>
<td>Semester 1</td>
</tr>
<tr>
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<td></td>
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<tr>
<td>Student</td>
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<td></td>
<td></td>
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<tr>
<td>Participant</td>
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</tr>
<tr>
<td>Student</td>
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<tr>
<td>Doc. Search:</td>
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<tr>
<td>Informal</td>
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<tr>
<td>Official</td>
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<td></td>
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<tr>
<td>Visual</td>
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</table>

Questionnaires

Questionnaires are a valuable tool for exploratory research, to study the range and complexity of ideas, understandings and points of view employed by individuals and groups (Creswell & Plano Clark, 2007; Murphy, Dingwall, Greatbatch, Parker, & Watson, 2001a; Patton, 2002). Questionnaires range along a continuum from highly structured, with pre-specified research questions, to unstructured, with general guiding questions (Punch, 1998). Further, they range from simple descriptive surveys with data collected at one point in time, to longitudinal surveys, at which data are collected at different points over a period of time (Punch, 1998). The present study utilized questionnaires that were predominantly unstructured with open ended questions, in the context of a longitudinal study.

Teachers were approached to participate in a questionnaire to provide evidence of teacher perceptions about the EfS program (RQs 1a, 1b and 3). The teacher questionnaire (Appendix 2) was administered twice (2007/2008), a year apart (at different times depending on when the teachers started/finished at the school) to allow for comparison, in a pre-test/post-test context and the twelve questions took 20-30 minutes to complete. Teachers were given the opportunity to complete the questionnaire on their own or in an interview context, but they preferred the former situation. The
former teachers’ questionnaire was administered once, early in 2007, and the eleven questions took about 30 minutes to complete.

To provide evidence of student outcomes (RQ 1b and 2), four different questionnaires were designed to identify the knowledge, attitudes and behaviours of the various student groups in the target population. Students were invited to participate to determine outcomes of the EfS program, together with its links to AuSSI-WA. Content and method of delivery of the four student questionnaires varied according to ages of the children:

- Children’s House students (2007/2008) - short, orally administered, student drawing and teacher scribed; as this was the most appropriate way to collect data from young children (MacDonald, 2009).
- Junior primary students (2007/2008) – six questions, orally administered, and student written; as this was age-appropriate.
- Senior primary students (2007/2008) – ten questions, self administered, written.
- Former students – eleven questions (more detailed than senior primary survey), self administered, written.

See Appendix 2 for copies of these questionnaires. Student questionnaires were administered twice, a year apart, in a pre-test/post-test context (2007/2008). Students completed the questionnaires in 10-30 minutes at each sitting. The ‘drawing-telling’ method (Desjardins & Wakkary, 2011; MacDonald, 2009; Wright, 2007) for Children’s House students involved the researcher asking the children to draw and then explain what their drawing meant. Intact classes worked on the questionnaires as part of their normal class activity but only those questionnaires completed by students who had written approval to participate were included in the research data. Former students were only approached once, at the beginning of the data collection period, to determine their understandings about EfS while they were at the school. Their surveys were completed in 15-30 minutes. All surveys were short (10-30 minutes) to enable completion before student attention wavered.

**Observation**

Observational research is central to the qualitative research tradition (Creswell & Plano Clark, 2007; Murphy, Dingwall, Greatbatch, Parker, & Watson, 2001b). Observational research techniques range from participant observation in which the researcher gathers data by participating in the daily life of the group being studied, to more structured contexts where the researcher uses pre-established observational categories (Murphy et
Observational research was chosen to be part of the present study for two main reasons. First, the Montessori method of education is based upon “observation of the child” (Montessori, 1964, p. 108) and observation was commonly employed at the school. Second, observation in the context of ‘observer as participant’, provided a relatively non-intrusive method (Murphy et al., 2001b) to obtain evidence on the impact of the EfS program. In addition to utilising participant observation, the current study employed an observational survey with predefined aspects for investigation. Observations contributed evidence to determine student outcomes and teacher perceptions (RQs 2 and 3).

**Participant Observation**

The researcher was a staff member at the case study school during the initial phase of research (2006-2007). This situation provided opportunity for participant observation of students in classrooms and the playground, and of teachers at meetings and professional learning workshops, as well as the whole school community at assemblies and concerts. The researcher’s ‘observe as participant’ status indicated that those being observed knew they were being observed and understood the researcher’s interest (Murphy et al., 2001b). Observations were documented immediately following the various events in field notes (Appendix 3).

**Observational Survey**

An observation survey, with pre-defined categories, was employed to record evidence of student outcomes in 2007 and 2008, in terms of attitudes, understandings and behaviours related to EfS (RQ 2). Observations were undertaken twice, a year apart in a pre-test/post-test context (2007/2008), in all classes during EfS lessons. Each class was observed for one hour, using the Australian “Environmental Learning Outcomes Survey - Student Observation Schedule” (Appendix 3). This schedule, designed and tested by Ballantyne, Packer and Everett (2005), identified eight categories for engagement in learning behaviours:

- Sharing learning with peers and experts;
- Making links and transferring ideas and skills;
- Initiating/showing responsibility for their own learning;
- Purposefully manipulating objects and ideas;
- Showing confidence in personal learning abilities;
• Actively involved in learning;
• Responding to new information or evidence; and
• Disengagement.

The researcher recorded frequency of engagement observed for these categories using four codes: rarely, sometimes, most of the time or all of the time (Ballantyne et al., 2005). Observational data were collected from consenting participants.

Immediately following class observations, students were individually interviewed using the Australian “Environmental Learning Outcomes Survey - Interview Schedule” (Ballantyne et al., 2005) to determine their knowledge, attitudes and behavioural intentions (Appendix 3). Students were asked:

• Knowledge questions: What are some of the things you learned about caring for the environment during your lesson? Where were you when you learned this? What was it that helped you learn? What were your feelings when you learned this?

• Attitude questions: Have you changed the way you feel about the environment as a result of your lesson? If so, how have you changed? Was there a particular part of the lesson that made you change how you feel? Where was it? What was it that made you change? What were your feelings?

• Behavioural intention questions: Do you think what you learned from your lesson will change what you do for the environment? If yes, what do you think you will do? Where were you when you learnt this? What was it that made you think about doing something for the environment? What were your feelings?

For each class observed, a random sample of three students who had permission to participate in the research, were individually interviewed using the “Environmental Learning Outcomes Survey - Interview Schedule”. A total of thirty six individual face-to-face interviews were conducted over the two year period, eighteen in each year, with three students from each of the six classes. Each interview was completed in 10-20 minutes.

In summary, unstructured and structured observational techniques were utilised to record evidence of the impact of the EfS program. Observations of students and staff (Children’s House, Junior and Senior Primary) participating in different EfS contexts were conducted and an analysis of outcomes and perceptions reported.
Document Search

Textual and documentary sources of data provide a valuable, though often neglected, avenue for evidence collection (Creswell & Plano Clark, 2007; Murphy et al., 2001a). Such sources include informal documents (e.g. letters), official documents (e.g. administrative records) and visual documents (e.g. advertisements) (Murphy et al., 2001a). In the present study the documentary sources examined were:

- Informal sources: student work samples, handouts from teacher workshops and school newsletters;
- Official records: public school documents including school handbooks, website and policy statements; and
- Visual sources: photographs, public CDs of special events and yearbooks.

Analysis of these documents was undertaken to provide evidence to contribute to all research questions.

Documentary evidence was considered important for the present research because it added a textual source of data in the longitudinal context. The surveys of former staff and students provided some historical evidence, while document analysis provided confirming/disconfirming evidence to the remembered EfS understandings of respondents. Further, recent policy statements and longitudinal information from school newsletters and the website provided evidence of developments in EfS. In the constructivist context of the present study, documents were treated as objective means for making inferences about recorded realities.

Informal Sources

Student work samples, handouts from teacher workshops and school newsletters were examined to provide evidence for all the research questions. Student work samples provided additional evidence on student outcomes (RQs 1b and 2). Work samples were in various formats, such as, scientific reports, powerpoint presentations, drawings and mind maps. The mind maps, for instance, illustrated participants’ understandings of the term ‘sustainability’, as well as their attitudes, values and knowledge related to different EfS projects such as the biological survey, turtle watch and water conservation (Appendices 7 and 8). Handouts from teacher workshops contributed evidence for teacher outcomes (RQ 3). Handouts outlined EfS topics addressed, content and dates of presentations (Appendix 9). School newsletters contributed evidence to all research questions (Appendix 10). Key understandings and representative quotes relating to the EfS program
were extracted from these sources and entered into a journal for later analysis. In brief, various informal sources contributed documentary evidence to the present study.

In addition to the normal program of staff professional development, learning workshops on EfS were conducted with the staff as part of the research. Four staff workshops were presented by the researcher, with each session lasting two and a half hours (Appendix 9). The topics of the four workshops were: The Elemental Drop (water conservation), Sustainable Schools (sustainable schools movement in state, national and international contexts), Our Story of Sustainability (EfS program at the case study school) and SOS: Science of Sustainability (water conservation). These sessions involved nearly all staff at the school in ten hours of EfS professional learning and provided evidence (field notes) relating to teacher perceptions about EfS (RQ 3).

Official Sources
Official public school records from 1990-2009 provided documentary evidence for all research questions. For example, the sustainability policy outlined the school’s approach to EfS and the Strategic Plan attempted to embed sustainability principles (Appendix 6). The school website and handbook also provided corroborative evidence that related to aspects of commitment to EfS.

Visual Sources
Visual texts, such as school photographs (from website and newsletters), public videos, CDs of school events and yearbooks, were examined to provide evidence for all research questions. For example, pre 2005 yearbooks and post 2005 photographs in school newsletters were examined to determine the presence of sustainability related themes (Appendix 11). Themes relating to the EfS program were extracted from these sources and entered into a researcher journal for later analysis. In summary, a wide range of documentary evidence - from informal sources, to public official records and visual texts - was examined to provide additional data to enhance the longitudinal focus of the research.

3.4.4 Audit Trail
An audit trail of data collection methods and sources employed in this research is presented in Table 3.3. This summary outlines the research evidence in terms of outcomes and changes that these methods and sources provided.
<table>
<thead>
<tr>
<th>Audit Trail</th>
<th>Type of Data</th>
<th>Date</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Former teachers (3).</td>
<td>Focused, open-ended researcher designed schedule.</td>
<td>Semester 1, 2007.</td>
<td>Antecedents, if any, of EfS at the school. Elements of EfS in operation at the school before AuSSI-WA.</td>
</tr>
<tr>
<td>2007/2008 students (65) including drawings (Pre primary students) and mind maps (Yr 1-7 students).</td>
<td>Focused, open-ended researcher designed schedule including student-drawn pictures and maps showing their conceptions of EfS.</td>
<td>Mid-Semester 1, 2007 &amp; 2008.</td>
<td>Student outcomes (attitudes, understandings, behaviours) and changes, if any, in number/detail of responses/detail of drawings/maps.</td>
</tr>
<tr>
<td>Former students (10).</td>
<td>Focused, open-ended researcher designed schedule.</td>
<td>Semester 1, 2007.</td>
<td>Antecedents, if any, of EfS at the school. Elements of EfS in operation at the school before AuSSI-WA.</td>
</tr>
</tbody>
</table>

2. Observations:
- Participant observation – teachers (8) and students (65) – in classrooms, playground, teacher meetings/PL, assemblies/concerts.
- Student observations – “Environmental Learning Outcomes Survey”.

Anecdotal feedback and field notes on school community member responses in a range of EfS program contexts. Semester 1, 2007 – end of Semester 1, 2008. Outcomes and changes, if any, to student responses to EfS in a range of EfS contexts; in perceptions of teachers to elements of EfS in operation; and in whole school community responses to EfS.

Field notes on student responses in a range of EfS program contexts in all 6 classes. 10 hours observation per year with a minimum of 1 hour/class. Each class observation schedule also included interviewing a randomly selected student from that class who had permission to participate. Second half of Semester 1 in 2007 & 2008. Outcomes (attitudes, understandings, behaviours) and changes, if any, to student responses to EfS in a range of EfS program contexts.
### Table 3.3 cont.

<table>
<thead>
<tr>
<th>Audit Trail</th>
<th>Type of Data</th>
<th>Date</th>
<th>Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual sources – public school photographs, videos, CDs and yearbooks.</td>
<td>Photographs, pictures and drawings (in newsletters, yearbooks, website, photo albums/collections, videos, CDs) and field notes.</td>
<td>Ongoing, Feb 2007 – Dec 2009.</td>
<td>Antecedents, if any, of EfS at the school. Elements of EfS in operation at the school before AuSSI-WA. Outcomes after 5 years of AuSSI-WA.</td>
</tr>
</tbody>
</table>

### 3.5 Data Analysis

Methods for analysis of qualitative data need to be systematic and transparent (Cohen et al., 2007; Punch, 1998). There were two main phases for data analysis in this study. Firstly, analysis of different sources of data as it was collected so that informed understandings could be made in relation to subsequent steps in the research. Secondly, a deeper more reflective analysis after all data was collected, with a view to determining possible overarching themes, as well as the extent to which the research questions were answered. All sources of data were analysed by discourse analysis (Arts & Buizer, 2009; Punch, 1998).

Discourse analysis is not a unified body of theory and practice (Arts & Buizer, 2009; Punch, 1998). Fundamentally it is “concerned with any part of human experience touched on or constituted by discourse” (Punch, 1998, p. 227). Further, it is social, there may be different discourses that conflict with one another and discourses may be viewed as being arranged in a hierarchy (Punch, 1998). Four types of discourse approaches were
identified by Arts and Buizer (2009): discourse as communication, as text, as frame, and as social practice. Discourse analysis may be viewed on a scale from ‘narrow’ – as speech and text, to ‘broad’ – as social practice (Arts & Buizer, 2009). The present study focuses on participants’ speech and text to obtain insights into EfS orientation. However, discourse as frame (shared frame of meaning) and social practice (power) are also considered. Discourse as social practice examines how power is structured in the school and whether it impacts on the effectiveness of AuSSI-WA. All discourse data, from speech to social practice, were analysed using specialized computer software, QSR NUD*IST, Non-numeric, Unstructured Data - Indexing Searching Theorising (QSR, 2007; Richards, 2005).

NUD*IST is a software program that allows qualitative data to be coded and organized. NUD*IST aims to conceptualise data and tease out relevant results and themes (Bazeley, 2007; QSR, 2007; Richards, 2005). Data from all research sources were coded and entered into the NUD*IST program. NUD*IST simplified the extraction of text, related to a particular issue or theme, from a cross section of all the data sources. Development of the coding system consisted of three main phases. First, free nodes were created to note issues as they arose. These initial free nodes included demographics, questionnaires, meetings, document search, observational, EfS program and other information categories. Second, existing and new nodes were sorted and connected into a branching system of tree nodes on important issues. These included, for example, antecedents, attitudes, values, understandings and behaviours. Finally, meta-nodes were created to reflect overarching themes that emerged from the data. As teacher and student questionnaire responses were analysed, for instance, patterns of association between codes became apparent. These took the form of facilitators and barriers to EfS, as well as key issues, such as leadership.

Data analysis focused on providing evidence for the three research questions. To provide evidence for sections (a) and (b) of the first research question, data from the questionnaires and document searches were analysed. The second and third research questions were addressed by an analysis of the data from questionnaires, observations and the various document sources. All sources of data were analysed by discourse analysis, utilising NUD*IST software. Data analysis also included semantic network analysis (Kleinnijenhuis, 2008; Krippendorff, 2004) of student mind maps and drawings. Further explanation of data analysis for the various methods of data collection is elaborated below.
3.5.1 Questionnaires

Data was analysed for patterns in the type of responses given by students and teachers. Each questionnaire was examined for statements made about EfS understandings, behaviours and activity types. Data from questionnaires was used to generate, identify and define categories. For instance, student reference to caring for nature and the environment, the biological survey, pit traps, animals, bird watching, gardening and planting trees were grouped together into a ‘biodiversity’ category. Whereas student comments about the solar power project, solar panels, the Sun Fair or saving electricity were grouped into the ‘energy’ category. Appendix 4 lists identifying aspects for all categories that emerged from student responses, whether these were in written or drawing form. Table 3.4 shows the final coding categories that emerged from responses for all questions related to EfS activities. Where student comments reflected more than one type of EfS activity, these were coded in other relevant categories. Using tables of these emergent categories, data was coded for each student and across all groups. Examples of coding of student responses can be seen in Appendix 4. Some of the emergent categories corresponded with action learning areas identified by AuSSI-WA (DET, 2010a), such as ‘waste’ and ‘water’.

Table 3.4
Final Coding Categories

<table>
<thead>
<tr>
<th>Year Group</th>
<th>Waste</th>
<th>Water</th>
<th>Biodiversity</th>
<th>Energy</th>
<th>Wellbeing</th>
<th>Cleaning</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children’s House</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Lower primary</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Upper Primary</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

An independent judge (Lombard, Snyder-Duch, & Bracken, 2002) assisted in the coding of surveys. The judge shared education expertise with the researcher, but came from an adult research focus rather than school context. Using the coding system designed by the researcher, the judge independently coded survey data and then met with the researcher to reach agreement. Employing the categories identified by the researcher, the independent judge read and coded 24% (31) of the completed questionnaires (129).
This overall percentage represented a minimum of 20% and a maximum of 33% of surveys in the various questionnaire groups coded by the independent judge (Appendix 4). For instance, 20% of the lower and upper primary questionnaires were coded by the independent judge, while 33% of the Children’s House and teacher questionnaires were coded. Additional Children’s House and teacher questionnaires were coded by the independent judge because these were perceived by the researcher to be the most difficult to code. For example, interpreting young children’s drawings required very specific coding identifiers.

There were several phases in the interjudge coding process. First, a representative sample of questionnaires was selected for the independent judge to code. For example, eight upper primary questionnaires were coded by the independent judge, four from 2007 and four from the 2008 questionnaires, with two Year 4 respondents, two Year 5s, one Year 6 and three Year 7s. Identical numbers of questionnaires in each sub-group were not provided for coding by the external judge because the questionnaires were selected on the basis of researcher-perceived ambiguity in the responses, together with a spread of year levels in each group. The researcher used the opportunity of working with the judge to present the more complex or ambiguous responses to an external authority so that uncertainties could be discussed and addressed.

The next phase of the interjudge coding process involved the researcher modelling coding decisions for at least two questionnaires in each group prior to the independent judge coding that sample of questionnaires. The judge then independently coded the questionnaires. This was followed by a close examination of the degree of coding agreement between the researcher and the judge. Overall, coding categories were very clear, with the final interjudge reliability across all questionnaires being 93%.

Coding disagreement predominantly arose for two reasons, coder context and knowledge about the characteristics of young children’s drawings. Coder context is illustrated by reference to a lower primary (Year 3) student mind map in which the following items were listed: “pit traps, water tanks, solar panels, garden – no chemicals” (S60, Appendix 4). The researcher coded these responses as: three items relating to ‘biodiversity’ (pit traps, garden – no chemicals), one for ‘water’ (water tanks) and one for ‘energy’ (solar panels); while the independent judge coded: two items for ‘biodiversity’ (pit traps, garden), one for ‘water’ (water tanks), one for ‘energy’ (solar panels) and one for ‘wellbeing’ (– no chemicals). As the judge’s research context was the Living Smart program (L. Sheehy & Dingle, 2004), which included a component
involving ‘wellbeing’ through awareness of toxic chemicals in the environment, the
student’s “– no chemicals” response was placed in the broader ‘wellbeing’ category. The researcher, however, placed this response in the ‘biodiversity’ category because it was written by the student with a direct link (a dash) to the garden, not to the central sustainability concept.

The second main reason for coder disagreement related to knowledge about typical features of young children’s drawings. For example, one Children’s House student (4 year old) drew a picture of a boy and four guitars, in response to the request to “draw a picture of you outside, doing something good for the environment” (S18, Appendix 4). The researcher coded this response as ‘other’, while the independent judge coded it in the ‘wellbeing’ (boy) and ‘other’ (guitars) categories. The judge viewed the drawing of the boy, with widely spread arms and legs as an expression of joyfulness, reflecting a sense of wellbeing. However, the researcher considered the drawing to simply reflect the typical representation of people at that stage of a young child’s drawing development. Although such coding disagreements arose, they were minimal (7%) in the overall coding context and didn’t substantially change the meaning of the data. Thus, it was considered that the interjudge disagreements were not cause for concern.

In summary, the questionnaire coding process was verified with final interjudge reliability of 93%. Differences occurred due to coder context and knowledge about the characteristics of young children’s drawings and were resolved after discussion. Reliability was broadly achieved, however, from triangulation of the wide range of data sources collected.

3.5.2 Observations and Document Analysis

Observational data from the “Environmental Learning Outcomes Survey” was coded using the categories identified by Ballantyne et al. (2005). Tables of the results were physically marked up, identifying themes. Transcripts from other data sources – participant observation field notes and documents – were coded using the same emergent coding process discussed previously. Transcripts were physically marked up, clarifying themes, similarities and differences in the patterns and structures of ideas. Data was coded and entered into the NUD*IST program and analysed for overarching themes in the evidence. Findings are reported in the following chapter.
3.6 Limitations of the Study

There are a number of limitations to this study: the Montessori context, sample size, research scope, and case study method. The Montessori school in which the study was conducted featured certain characteristics and values that may not necessarily be found in other educational contexts. Although the research examined the impact of the EfS program, findings related to the Montessori curriculum and prepared learning environment may not be generalisable to other contexts. Different Montessori schools and other independent and state schools may not have the same administrative, policy and procedural systems as the school investigated. The research does not, therefore, attempt to extrapolate from the Montessori school under consideration to other schools, although some parallels may be found. The Montessori emphasis on child-centred education, addressing the needs of the ‘whole child’ and recognition of the vital role of real life experiences in nature, have been adopted in many other school settings, so this research may inform EfS in such contexts.

Sample size was another limitation of this study. As the research involved a small school this meant a relatively small ‘teacher’ sample size. Consequently, the results may have limited generalisability beyond the target population studied, but again, the mainstreaming of key Montessori ideas extends applicability of the findings.

Scope of the present research is another methodological limitation to this study. For instance, it was beyond the bounds of this study to obtain comprehensive feedback from all stakeholders - parents and care givers at the school and community partners. However, some such evidence was obtained from observational and documentary sources. Other limitations related to the research techniques employed in this study are outlined in the next section.

Case study as a research method has some limitations. In broad terms these include reliance on subjective judgements, high risk of bias because evaluation of one's own efforts are involved, and the findings are generally applicable only to the setting where the research was undertaken (Cohen et al., 2007; Kemmis & McTaggart, 2000). However, these shortcomings can be minimised by the use of triangulation (Creswell & Plano Clark, 2007). This approach attempted to maximise both the internal validity of the process and generalisability. A range of other techniques were employed to minimise the shortcomings of the present research. These involved using cyclical processes which encouraged the researcher to continually test ideas in action, asking
colleagues for critical and supportive feedback, employing an audit trail and member checks, and lastly, working 'robustly' with an awareness of researcher subjectivity by employing reflective techniques and co-operative inquiry (Cherry, 1999; Creswell & Plano Clark, 2007; Webb, 2000).

Table 3.5 outlines the limitations of techniques used in this study, drawing on information presented by numerous authors on weaknesses of various types of evidence collection (Creswell & Plano Clark, 2007; Denzin & Lincoln, 2000; Merriam, 1998; Mertens, 2010; Yin, 1994). Nevertheless, as the research design utilised triangulation and other techniques to enhance reliability and validity, the effects of these limitations should be minimised.

**Table 3.5**

<table>
<thead>
<tr>
<th>Technique</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teacher Questionnaires</td>
<td>• Small sample size of teachers participating.</td>
</tr>
<tr>
<td></td>
<td>• Inaccuracies due to respondent recall and teachers knew the researcher.</td>
</tr>
<tr>
<td>Student Questionnaires</td>
<td>• Approximately forty-five percent (sixty five students) of the school student population participated.</td>
</tr>
<tr>
<td></td>
<td>• Approximately twenty percent (ten students) of the former school student population participated.</td>
</tr>
<tr>
<td></td>
<td>• Inaccuracies due to respondent recall and students knew the researcher.</td>
</tr>
<tr>
<td>Observations – staff and students</td>
<td>• Participants may behave differently because they were being observed.</td>
</tr>
<tr>
<td></td>
<td>• Bias arising from researcher being a staff member at the school in 2007, working with all classes for some EfS lessons.</td>
</tr>
<tr>
<td>Student Observation Interviews</td>
<td>• Response bias, such as interviewee telling interviewer what s/he thinks is expected.</td>
</tr>
<tr>
<td></td>
<td>• Inaccuracies because of interviewee recall.</td>
</tr>
<tr>
<td>Documents Search</td>
<td>• Subjectivity of writers in promoting the school.</td>
</tr>
</tbody>
</table>

Despite the foregoing limitations, this research provides new and original knowledge in areas of EfS that have been neglected, as outlined in the first chapter on the significance of the study. In addition, even though the specific contextual findings of the study may not necessarily be transferable to other settings, the processes employed and understandings developed may find wider applicability, especially in educational settings that share the same EfS emphasis as the case study school.
3.7 Summary

The overall purpose of this study was to determine the impact of AuSSI-WA. There was a recognized need for research evidence on the impact of AuSSI-WA, especially long term. The current chapter presented an overview of the theoretical perspective, researcher position, method and research design underpinning the research. Case study research was chosen because it appeared compatible with the culture and processes of the participating school. Further, case study research provided an opportunity for wholism and was therefore aligned with a whole systems thinking approach. In addition it provides a template against which other schools could reflect upon their own AuSSI-WA experiences.

The process of enlisting participants, collecting and analyzing data was described. The specific research techniques employed included questionnaire, observation and document search. Based on the literature review and the chosen methodology, the researcher had some expectations regarding the findings of the study. At the beginning of the research it was expected the impact of AuSSI-WA on the school would be ongoing progress on the Key Elements Rubric (DET, 2010a), along with overall success in student EfS learning outcomes and positive teacher perceptions regarding EfS. In conceptual framework terms, such an impact was expected to move the school from the least sustainable end of the continuum towards the most sustainable end. However, what actually ensued is reported in the next chapter where the data and data analysis is presented.
CHAPTER 4

RESULTS

The results of the analyses of data are presented in three main sections. The first section is the analysis of the pre AuSSI-WA (1990-2004) data. The school context for that period, along with the findings of the former teachers’ survey and former students’ survey are outlined to identify antecedents to EfS at the Montessori school prior to AuSSI-WA (RQ 1). The second section considers data obtained from the post AuSSI-WA (2005-2009) period (RQs 2 and 3). This section is divided into two parts: 2005-2007 and 2008-2009, with teachers’ and students’ surveys conducted in 2007 and re-administered in 2008. Copies of the surveys can be found in Appendix 2. Student observations were also undertaken in 2007 and again during the following year. Student results were presented according to three multi-age groupings: Children’s House (3-6 year olds), Lower Primary (6-9 year olds) and Upper Primary (9-12 year olds). Other sources of data, field notes and document searches were included in this section. A summary of the main findings concludes the chapter.

Findings were drawn from various sources – directly from teachers and students, and through observations and document searches. Teachers’ and students’ own words are quoted throughout to authenticate the results, and thereby minimise possible researcher subjectivity. As the study seeks to investigate and understand the processes involved in EfS at the school, the results are presented to accurately describe the perspective and context of the individuals involved. The findings will be discussed in Chapters 5 and 6.

4.1 Pre AuSSI-WA 1990-2004

The school opened in February 1990 with three teachers and twenty-three families. It was registered with the Western Australian Education Department as an independent Montessori school. By 2004, increasing enrolments at the school resulted in the number of children enrolled exceeding 150, from nearly 100 families. During this period the particular mix of multi-age classrooms varied, reflecting the ages of the student population. By the early 2000s there were two Children’s Houses (3-6 year olds), two Lower Primary classes (6-9 years olds) and two Upper Primary classes (9-12 year olds). The school followed the Montessori curriculum, an inter-disciplinary course that wove together the study of language, mathematics, science, geography, history, art and music.
across all ages. The Children’s House program also included Practical Life and Sensorial activities, and later a Perceptual Motor program. For education in the pre-primary and primary years, the school incorporated the Montessori curriculum with Western Australian state government *Curriculum Framework* (Curriculum Council, 1998) requirements. Furthermore, programs drew upon modern educational theories and equipment, along with traditional Montessori Method and materials, to enhance students’ educational experiences.

4.1.1 Context 1990-2004 from Document Search

EfS was featured in the education program at the school during 1990-2004 (RQ 1). This was illustrated by a number of endeavours in operation during this period, as outlined in various public school documents. The strengths of these endeavours are discussed first, then limitations outlined.

The document search (Section 3.4.3) revealed a wide range of EfS-type endeavours in operation prior to 2005. These endeavours were typified by environmental projects and social commitments, as shown in the Timeline 1990-2004 (Figure 4.1). Environmental endeavours included water quality monitoring at the nearby lake, biodiversity studies like vegetable gardening, keeping animals and creating a frog pond. Social, community-based endeavours included camps, community-building activities, and artistic and creative presentations. A more holistic approach, however, was illustrated by the school’s solar power project as it brought together environmental, social and other understandings into a single project. The presence of these endeavours highlighted the strengths of EfS at the school during this period.

The solar power project was an excellent example of EfS in action during the pre-AuSSI period. The project was initiated in 2002 by a Year 4 student and facilitated by the school EfS champion (teacher). As the project developed momentum, other students joined the project team. They started thinking holistically; their aim was to install a solar power system at the school connected to the metropolitan electricity grid … an energysmart project that achieved environmental, social, economic and educational benefits as reported by ASTA (2005a). The children investigated and reported on various environmental, social, economic and educational aspects and indicated how these interrelated. This process involved seeing the big picture … establishing interrelationships and understanding phenomena as an integrated whole which is consistent with ‘whole systems thinking’, as discussed in Section 2.15.
By 2004 the whole school was engaged in the solar power project. School newsletter items summarised student involvement: Children’s House students cleaned second hand solar panels (donated by a local business); Lower Primary students created artistic promotional materials; and Upper Primary students made solar-powered models (car, fan and school), solar ovens, measured actual solar panel performance and assisted with the installation of the solar power system. This project illustrated numerous strengths in the school’s approach to EfS prior to 2005. Such strengths included strong student agency, whole system thinking, community partnerships and a whole school approach.

Other EfS-type projects referred to in various school documents also illustrated strengths in the school’s pre-2005 approach to EfS. Such projects included community tree planting, keeping animals (hens, birds, fish, amphibians and a lamb), the kitchen garden, frog pond development, community-building activities (like busy bees and playground construction), student concerts at retirement villages, as well as school camps and creative artistic performances with sustainability themes. Some of these projects will be reported in more detail later, in the findings of the former teachers’ and former students’ surveys. They will be presented as instances of environmental and social sustainability in action.

Document searches also examined the ‘School Handbook’ and school policies. The ‘School Handbook’ stated the ‘Cosmic Curriculum’ embedded freedom of choice and values of care and respect in the daily operation of the school. Similarly, school policies, such as the ‘Whole Child Policy’, emphasized a holistic approach to each child’s education, with all spheres of a child’s development - social, emotional, physical and intellectual - considered equally important. In brief, the document search findings revealed that the school engaged in a range of EfS-type projects and embraced some EfS values and philosophy before joining AuSSI-WA. Further, these projects displayed some of the strengths of the AuSSI approach and contributed to the selection of the school as one of the AuSSI-WA pilot schools in 2005.

Review of the school’s historical records also identified limitations in the pre-AuSSI approach to EfS. A significant limitation was the absence of any public documentation that stated the school’s vision and approach to EfS or mention of the word ‘sustainability’ in strategic planning documents. Furthermore, elements of EfS outlined by AuSSI-WA (DET, 2005c, 2009b) were not evident in any public school documents. What was evident through school yearbooks however, was a series of projects led by
and relying on EfS champions. No documents showing evaluation of such projects were found and projects such as water monitoring, vegetable gardening and hen-keeping were discontinued when champions left the school or were unavailable.

Other limitations associated with the pre-AuSSI period appeared to be lack of program co-ordination and understandings about EfS. The document search revealed an ad hoc, uncoordinated approach to EfS programming. Further, the pre-AuSSI approach seemed to be characterised by a focus on environmental education from the perspectives of being ‘in’ and ‘about’ the environment, without consistent inclusion of the crucial ‘for’ the environment. For example, lake investigations were presented as engaging science lessons about water quality and life in the lake but opportunities for students to participate in hands-on action to improve water quality were not reported. This situation, along with issues raised above, illustrates various limitations to the school’s approach to EfS during 1990-2004.

In summary, document search data showed that EfS was a part of the education program at the school in the pre AuSSI-WA context. These EfS-type projects displayed many strengths, but numerous limitations were also identified. The former teachers’ survey, reported in the next section, will build on these findings.

### 4.1.2 Former Teacher Survey

Three former teachers who worked at the school long term completed the survey (Appendix 2). Responses to various items in the former teachers’ survey are presented below and contribute evidence toward understanding the antecedents of EfS at the school prior to 2005 (RQ 1).

**Background Information**

Responses providing background information about former teachers were drawn from Questions 1 (*What years did you work at [school]?) and 2 (*What position did you hold during this period*). Three respondents completed the survey. They commenced at the school during the initial years of operation and stayed for over ten years. During this time the respondents were employed in different teaching roles. Analysis of the former teachers’ survey identified strengths and limitations in the school’s approach to EfS prior to 2005.
SWOT Analysis

A SWOT analysis is a strategic planning tool used to evaluate the Strengths, Weaknesses, Opportunities, and Threats (SWOT) involved in a particular endeavour. This tool was adopted in the present study because teachers were familiar with using it and had found it to be useful. Language of the SWOT analysis is consequently employed when reporting on participant responses and in no way implies any judgement.

Question 3 (Using a SWOT analysis chart, show your understanding of EfS at the school) elicited numerous strengths (Table 4.1). For instance, the local lake environment was highlighted as an educational asset for EfS, enabling macroinvertebrate studies. Other responses referred to camps, animals at school and community performances. These strengths were followed by respondents’ reflections on weaknesses of the school’s approach to EfS.

Four categories emerged from responses about weaknesses: external governmental constraints; internal governance concerns; parental issues; and staff sustainability. External government constraints were seen to be increasing, such as enhanced reporting requirements for the independent school sector. Internal governance concerns related to the operation of the school’s management board, including annual membership changes. Parental issues involved increased parental expectations and policy disagreements. The final category of weaknesses impacting on EfS related to staff workloads. Despite these weaknesses, respondents highlighted numerous opportunities provided by the school’s approach to EfS.

Opportunities for EfS were seen to be unlimited and many new initiatives were undertaken. Particular mention was made of camps where opportunities to develop increased connectivity with the natural environment were provided. These opportunities were then juxtaposed with respondents’ reflections on threats to EfS.

Two categories of threat emerged from participants’ responses: external and internal threats. External threats included challenges to the school’s financial viability and increased governmental reporting requirements. Other external threats included environmental and social issues. Internal threats related to staff wellbeing and managing challenging individuals at the school. In brief, numerous internal and external threats were reported to have impacted on respondents’ EfS work at the school.
The foregoing responses were then analysed according to the twelve key elements of the AuSSI-WA assessment, planning and evaluation tool, to determine the school’s EffS development from an AuSSI-WA perspective (DET, 2010a). The AuSSI-WA elements are: vision and values, school governance, school policy, EffS activity, professional learning, teaching and learning, curriculum integration, reporting, student voice and engagement, school networks, school community networks and partnerships, and recognition and promotion of successful action. Representative teacher quotes are presented in Table 4.1.

Table 4.1
Teachers’ SWOT Analysis of Understandings of EffS (1990-2004)

<table>
<thead>
<tr>
<th>SWOT</th>
<th>Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strengths</td>
<td><strong>Vision &amp; Values</strong>: “Life long education put into action – provide models to kids”; “‘Virtues’ helped”; “Freedom to grow”.</td>
</tr>
<tr>
<td></td>
<td><strong>EffS Activity</strong>: “Kids loved being by the lake”; “Animals at school”; “Camps”.</td>
</tr>
<tr>
<td></td>
<td><strong>Student voice</strong>: “Follow children’s interests”.</td>
</tr>
<tr>
<td></td>
<td><strong>Community networks</strong>: “Community rituals and performances”.</td>
</tr>
<tr>
<td>Weaknesses</td>
<td><strong>Governance</strong>: “Over time the interface with DET increased”; “[School board] mixed educational backgrounds and different educational understanding”; “Rules and systems in the community”.</td>
</tr>
<tr>
<td></td>
<td><strong>Teaching/learning</strong>: “Burn out”; “[Teachers’] personal sustainability”.</td>
</tr>
<tr>
<td></td>
<td><strong>Reporting</strong>: “Parent expectation for learning outcomes”.</td>
</tr>
<tr>
<td></td>
<td><strong>Community networks</strong>: “Hard edge cases”.</td>
</tr>
<tr>
<td>Opportunities</td>
<td><strong>Vision &amp; Values</strong>: “So many more things possible – yes to offers and see if they work”.</td>
</tr>
<tr>
<td></td>
<td><strong>EffS Activity</strong>: “Parents, teachers and children had connection with nature”; “[Community] celebrations”; “Early camps and the freedom not to be curtailed by the timetable”; “The ‘Council of all Beings’ was a very moving experience”.</td>
</tr>
<tr>
<td></td>
<td><strong>Community networks</strong>: “Committed community- worked hard”.</td>
</tr>
<tr>
<td>Threats</td>
<td><strong>Vision &amp; Values</strong>: “Environmental threat”; “Justice and peace”.</td>
</tr>
<tr>
<td></td>
<td><strong>Governance</strong>: “Grants and to sustain numbers and income”; “Parents contributing to the administration of the school...difficult debates”.</td>
</tr>
<tr>
<td></td>
<td><strong>Teaching/learning</strong>: “Burn-out. Where to ... off-load?”.</td>
</tr>
<tr>
<td></td>
<td><strong>Reporting</strong>: “Parent expectations ... unrealistic”.</td>
</tr>
<tr>
<td></td>
<td><strong>Community networks</strong>: “Wild cases”; “Parents want to be heard, want you to do what they say”; “Some [parents] were laissez-faire”; “Appropriate amount of parent input?”.</td>
</tr>
</tbody>
</table>
Teachers identified numerous strengths, weaknesses, opportunities and threats to EfS. Table 4.2 summarises the alignment of teacher responses with AuSSI-WA elements for assessment, planning and evaluation (DET, 2010a).

### Table 4.2

**Elements Identified in Teachers’ SWOT Analysis (1990-2004)**

<table>
<thead>
<tr>
<th>Elements</th>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision and values</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>School governance</td>
<td></td>
<td>*</td>
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<td>*</td>
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<tr>
<td>School policy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EfS Activity</td>
<td>*</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Professional learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching and learning:</td>
<td></td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Curriculum integration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reporting</td>
<td></td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Student voice</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School networks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community networks</td>
<td>*</td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Recognition of action</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Former teachers identified the school’s vision and values as manifesting strengths, opportunities and threats to EfS, while community networks was in terms of strengths, weaknesses and threats. EfS activity was discussed in relation to strengths and opportunities, while student voice as a strength only. School governance, teaching and learning, and reporting were mentioned in the context of weaknesses and threats. Issues relating to school policy, professional learning, curriculum integration, school networks and recognition of successful action were not raised by respondents.

Overall, responses to Question 3 addressed many issues that impacted on the school’s approach to EfS prior to 2005. Respondents elicited numerous strengths and opportunities, as well as weaknesses and threats. Another possible influence on EfS was the educational philosophy in operation at the school. The following section reports on respondents’ reflections on the Montessori educational context.

**Impact of the Montessori Philosophy**

Responses to Question 4 (*What do you think is the impact of the Montessori philosophy on EfS at the school?*) were mostly positive. Four key impacts of Montessori philosophy on EfS were identified (Table 4.3). Using respondent quotes to illustrate,
the four impacts were categorized in terms of eco-inter-relationships, the learning/classroom environment, values and community involvement.

Table 4.3

| Eco inter-relationships | “Veggie garden”; “Animals at school”; “Connection with nature”; “Science-by-the-lake”.
|-------------------------|----------------------------------------------------------------------------------
| Learning/classroom environment | “Guiding principle”; “The equipment being the focus is a narrow view of Montessori”; “Montessori is very passionate about the early years. This links to sustainability – playgroup and family – the importance of quality”; “Montessori can be too individualized and it can compartmentalize [student] lives ... so a balanced approach was adopted during the early years of the school’s operation ... not pure individualization, need community involvement”.
| Values | “Awareness of peace”; “Tolerance and compassion”; “Caring for Nature”; “Caring for self, others and the environment”; “Justice and peace”; “Participation in the MakePovertyHistory performance in Perth which involved staff, parents and students who were concerned about world poverty”.
| Community involvement | “Coming together of individuals and the community in sustainability - ceremonies, celebrations and rituals”; “Ceremony ... the spirit component of sustainability”.

Eco-inter-relationships recalled included, for example, the school vegetable garden and chooks. These eco-experiences were seen to enhance children’s connection with nature. A critical learning/classroom environment response explained the Montessori philosophy adopted in the school was viewed as:

“a frame, a hook, a strength-based model employed as a guiding principle ...[school] was not locked into fundamental Montessori; we were something new. Other Montessori schools tended to view the underlying philosophy as more important. We wanted to be smaller, be more powerful, have a greater influence”.

Respondents also indicated that although Montessori equipment - for language, mathematics, cultural, sensorial and practical life lessons - was used, Montessori values were paramount. Respondents indicated these values, including care for the environment and each other, were enacted by bringing the community together for various school projects, rituals and celebrations. The importance of early childhood in the Montessori approach to education was discussed by all respondents. However, responses on the impact of Montessori philosophy on EfS were not all positive. One
respondent commented that Montessori can be too focused on the individual, rather than on community wellbeing. It seemed therefore, although Montessori philosophy “was not the sole, driving force” in the school, it had an overall, direct, positive, enriching impact on EfS. It appeared to facilitate lived EfS experiences through the implementation of numerous education programs and community based activities.

**EfS Programs**

In responding to Question 5 (*Did any EfS programs operate at the school during this period?*) comments referred to environmental programs such as “animals at the school”, “veggie garden...and herb spiral”. Additionally, comments were made about “involvement in artistic, creative presentations” to enhance social and cultural sustainability. These presentations were developed by students and the school community over a school term and were perceived to have a “powerful impact”. Social sustainability was also enhanced through adoption of the Virtues Project (Popov, Popov, & Kavelin, 1995) which provided strategies supporting the practice of virtues, like honesty and caring, in everyday life.

Responses to Question 6 (*Describe, in as much detail as you can, one program in your class that is a good example of your approach to EfS*) were grouped by respondents into either environmental and/or social sustainability. When discussing environmental sustainability, one respondent stated:

> “Environmental sustainability involved kids and committees; but didn’t take the programs into concrete, practical action. We focused on the thinking and philosophy ...and the local environment. We did Science-by-the-lake, which involved macroinvertebrate studies; monitoring by the season and over years. They made their own nets; we didn’t need money”.

Plants were another important part of the environmental sustainability program:

> “One class activity I recall was based on a Steiner idea. We roped off some land, grew wheat, watched it grow, harvested it, winnowed it, seeds milled using a hand grinder, and then made bread. We also grew veggies. We planted natives too. All the planting on the outside fence and on the posts, from 1991 on, were natives planted by the school”.

Another respondent referred to programs involving animals:

> “... brought the chooks in. We had a lamb for a term. ... brought in rabbits and guinea pigs. The intended benefits of keeping the animals (especially with the chooks) were to provide a settling place for disturbed kids, as well as eggs for
the kitchen and compost for the garden. Keeping animals also involved the children in Practical Life activities, such as collecting eggs and cleaning”.

Camps were also seen as an integral part of the environmental sustainability program:

“The Nanga Bush camp, the whole camp was in the jarrah forest. The children did many different activities in the forest, for example, maths using a species map of Jarrah and Marri”.

Thus environmental sustainability at the school was implemented through programs associated with lake investigations, plant and animal experiences, as well as camps. Social sustainability was seen in programs that culminated in community concerts and rituals, like the annual Bibbulmun Track Vision Quest for Year 7 students. Such activities were viewed by respondents to be an important part of the education program.

Although respondents answered this question in terms of environmental or social sustainability, data was also considered from the perspective of AuSSI-WA programs, that is, waste, water … energy and so on. Table 4.4 summarises the data with regard to the AuSSI-WA format. EfS activities operating at the school during 1990-2004 were thereby identified in categories of waste, water, biodiversity and wellbeing.

### Table 4.4
Teacher Perspectives: EfS Programs (1990-2004)

<table>
<thead>
<tr>
<th>Waste</th>
<th>“Animals ... compost”.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>“Science-by-the-lake ... monitoring by the season and over year”s.</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“Macroinvertebrate studies”; “Nanga Bush camp ... Rottnest camp. Grew wheat... veggies... planted natives”; “Chooks ...a lamb ... rabbits and guinea pigs... turtle nests in the school yard”.</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>“Celebrations”; “MakePovertyHistory performance”; “[Concert] about sustainability ... the 'Epic Journey of the Blue People’. This blew people away”; “Virtues Project...which was very inclusive and open-ended”; “Bibbulmun Track Vision Quest has a sustainability focus for older kids”.</td>
</tr>
</tbody>
</table>

### Sustainability Model/Policy

Responses to Question 7 (Was there a sustainability model or policy operating at the school during this period?) confirmed that a sustainability model or policy did not exist prior to 2005. However, it was emphasized that sustainability was a topic of discussion amongst founding families.

“Although there was no policy at the beginning, we talked about sustainability before the school started. ...For example, we talked about making the school a solar school but we didn’t make any practical progress on it”.
Thus, even though a formal sustainability policy did not exist during the first fifteen years of the school’s operation, some community members were interested in sustainability. The next survey question investigated whether respondents’ understandings of sustainability changed over the years.

**Understandings of EfS**

Question 8 (What are your current understandings of EfS?) explored respondents’ present understandings of EfS. Understanding of sustainability involved: “Similar issues to those of the past, that is, sustainability of an independent school - economics; sustainability of ideas and philosophy; sustainability of environment - but based on notions of philosophy regarding energy, water, recycling, and so on, not reality; sustainability of community – a passion for community”.

This sentiment was reflected in other responses. All respondents referred to sustainability ideas and programs that were a part of their thinking from their earliest days at the school.

**Interests Neglected**

In Question 9 (Do you think the school’s approach to EfS, when you were there, ignored the interests of anyone?) were all “no”, but qualified by one respondent who added “jobs in un-environmental contexts” (Table 4.5).

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table 4.5</strong></td>
<td><strong>Teacher Perspectives: Interests Ignored by Approach to EfS (1990-2004)</strong></td>
</tr>
<tr>
<td><strong>No</strong></td>
<td><strong>Yes</strong></td>
</tr>
<tr>
<td><strong>Anyone:</strong></td>
<td>“Jobs in un-environmental contexts”.</td>
</tr>
<tr>
<td>No (x 3)</td>
<td></td>
</tr>
<tr>
<td><strong>Anything:</strong></td>
<td>“Not enough was done about waste”.</td>
</tr>
<tr>
<td>No (x 2)</td>
<td></td>
</tr>
</tbody>
</table>

One response to Question 10 (Do you think the school’s approach to EfS, when you were there, ignored the interests of anything?) focused on waste. Although this respondent commented “Not enough was done about waste”, achievements were outlined “we did recycle, for example, we used recycled rubbish for art and craft. We recognized that excess photocopy sheets was a bad model to students. ... in 1993, we installed ...a huge playground of recycled wood and tyres”. The school therefore
attempted to be waste-aware, years before the formal Waste Wise Schools (DEC, 2009) program operated.

**Final Comments**

Responses to Question 11 (*Is there anything else you would like to add regarding EfS at the school?*), included comments relating to social sustainability. Particular mention was made of the *Small Schools History Project* (2006-2009), sponsored by the Association for Independent Schools in Western Australia, which aimed to document the history of small independent schools in Western Australia. “*I support completing the timeline of the history of the school as it links with developments in sustainability at the school*”. The school’s project highlighted EfS achievements during 2005-2007.

Reference to a “community systems model” was promoted by one respondent as it was seen to enhance social sustainability – “the community is stronger when things are harder, as in the early days”. Suggestions were made about developing a sense of community through “Grandparents, friends and male days” as well as a “fathers’ group”. Further, “There were ideas we hadn’t taken up, initiatives ... that could still happen. The school could be a place where enough people got together to share the dream ... the ultimate empowerment”. It is clear from these comments that social sustainability was an important focus during the initial years of the school’s operation.

Themes emerging from responses to this question were considered as facilitators or barriers to EfS at the school. Only facilitators were mentioned; no barriers were identified by teachers (Table 4.6).

<table>
<thead>
<tr>
<th>Table 4.6</th>
</tr>
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</table>

**Teachers’ Final Comments: Facilitators to EfS (1990-2004)**

<table>
<thead>
<tr>
<th>Facilitators</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Committed cooperative community... worked hard and some put their own money up for the school”;</td>
</tr>
<tr>
<td>“Community rituals and performances”;</td>
</tr>
<tr>
<td>“Community systems model ... Extending the community as an extra income source ... conducting Yoga classes”</td>
</tr>
</tbody>
</table>

Overall, the former teachers’ survey provided invaluable data about EfS in the school from the teaching perspective. The next section reports on findings from the former students’ survey, which will contribute another layer of understanding to the foregoing results.
4.1.3 Former Students Survey

Ten former students who attended the school long term completed the survey (Appendix 2). Responses to items in the former students’ survey are presented below and contribute evidence toward understanding EfS at the school prior to 2005 (RQ 1).

Background Information

Responses providing background information about former students were drawn from Questions 1 (How old were you when you started at [name of the school]?), 2 (How old were you when you left?) and 3 (What are you doing now?). Eight of the ten former students commenced at the school in the Children’s House (3-6 years). The other two students started in Years 1 and 3. All respondents attended the school for at least five years and finished their primary schooling at the school in Year 7. Eight respondents were attending high school when they completed the survey; two were university students. There was a wide spread of year levels represented by high school respondents: two in Year 8; two in Year 9; three in Year 10; and one student in Year 12. The courses being undertaken by the two tertiary students were in Science and Humanities. Overall, these respondents were a diverse group, 13-22 years old.

Understandings of the Term ‘Sustainability’

Two categories emerged from former student responses to Question 4 (What are your current understandings of the term ‘sustainability’?): an environmental perspective, and a generally worded broad perspective. All high school respondents referred to particular components - energy, biodiversity, air quality, resource use and waste - indicative of an environmental perspective of sustainability. Energy responses included “It is a term associated with renewable energy, and it refers to making a building, town or society able to produce, using renewable resources, the amount of electricity ... it uses” (Year 10). A typical biodiversity response was:

“... the trip to Ningaloo Reef ... They investigate questions like ‘What is effecting the coral and the food chain’ – how one creature or plant is cancelled, then the others in the food chain impacted by this” (Year 9).

Air quality responses referred to “stopping greenhouse gases” (Year 9) and “protecting the ozone layer” (Year 8). Resource responses included, for instance, “Sustainable resources are ones that continue to be used without harm to the environment” (Year 12). A waste-awareness focus was highlighted in: “To re-use what you have and not waste it. To think about what you are doing and be grateful for what you have” (Year
8). This response, together with “Sustainability to me is where generations now attempt to preserve unique places, e.g. Ningaloo Reef, for future generations to come” (Year 10) clearly indicated values (“be grateful”) and futures thinking (“future generations”), within the context of environmental sustainability.

University student statements about ‘sustainability’ were worded generally and reflected a broader perspective. ‘Sustainability’ referred to “The ability to maintain something” and “Equilibrium – all things in stable equilibrium with each other”. Neither tertiary student elaborated on their responses. Survey participants were then asked to think back from their current position, to their understanding of the term ‘sustainability’ when they were attending primary school.

Primary School Understandings of the Term ‘Sustainability’
Responses to Question 5 (What do you think were your understandings of ‘sustainability’ when you were at primary school?) overwhelmingly indicated understanding was in terms of an environmental perspective. “I thought sustainability was just limited to sustainable energy sources” (Year 9) and “Being able to put solar panels on the school ... and also recycle, turn off lights when not in use, save water etc. i.e. environmental sustainability” (Year 10). One of the tertiary student respondents stated that her early understanding of sustainability was “Probably that if you abused a specific species they would all die and all the things that ate it etc”. However, two students reflected uncertainty about the meaning of the term; one stated she “didn’t understand it fully ... didn’t know there was so much more about sustainability” (Year 8) and the other said “not sure, I think I knew what it meant but didn’t think much to how this could be applied to everyday life” (Year 12). In summary, overall primary school understandings of sustainability were linked to specific lesson themes (silos), such as energy. Students were then invited to reflect on the impact of Montessori philosophy on their understandings about sustainability.

Impact of Montessori Philosophy
Four categories of response emerged from Question 6 (What do you think was the impact of the Montessori philosophy on sustainability at the school?): eco inter-relationships, learning/classroom environment, values and community involvement. The importance of understanding eco inter-relationships in the Montessori approach is illustrated by a Year 9 response: “Teaching me how to care for the environment – learning about the frogs at school and their place in the eco-system”. Another student commented on overlap between eco inter-relationships, learner choice and values in
Montessori philosophy (Year 12 quote below). Former students recognized their part in the healthy functioning of the whole system - ecological system and social system.

Learning/classroom organization comments focused on enjoyment of learning. Three students mentioned the importance of learning being ‘fun’. They said, for instance, “we learnt more, had more fun” (Year 8) and Montessori “focused on enjoyment of learning as opposed to good marks” (Tertiary). Students considered enjoyment to be an important aspect of the Montessori approach to education.

Providing choice and facilitating independent learning was raised by nearly all former students in their responses about the impact of the Montessori philosophy. A typical statement was “… we could do a variety of different things - follow our interests” (Year 9). Similarly, another student referred to “the ability/freedom for us nerds to further look into specific issues for reports etc. if we wanted to or were interested in doing so (as opposed to ‘now you will all learn about …’) (Tertiary). Facilitating independent learning was also seen as an aspect of learner choice:

“Montessori philosophy centres around independent learning and trying to help people live harmoniously and be accepting of one another. I think this impacted on the way we treated our environment as it encouraged us towards looking after it, to choose to do so.” (Year 12).

This comment linked choice with Montessori values about living peacefully, as well as acknowledging people’s relationship with the environment and caring for it. Additionally, the ‘choice’ aspect of the Montessori philosophy linked with community involvement. This is illustrated by the following response: “The impact of the philosophy on sustainability was that rather than making people at the school participate in sustainability, people could choose to participate in it as much as they wanted to” (Year 10). And again, the Montessori philosophy had a “Big [impact]; by getting those solar panels – this was a huge success. More people began to become involved with sustainability as time went by” (Year 10). Clearly community involvement was considered to be an important part of the Montessori experience and EfS.

In brief, former students’ saw the impact of Montessori philosophy on EfS in terms of eco inter-relationships, the learning/classroom environment, values and community involvement (Table 4.7).
Table 4.7  

Student Perspectives: Impact of the Montessori philosophy on EfS (1990-2004)

<table>
<thead>
<tr>
<th>Eco inter-relationships</th>
<th>“Way we treated our environment as it encouraged us towards looking after it”; “Teaching me how to care for the environment ... frogs ... and their place in the eco-system”.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning/classroom environment</td>
<td>“Focused on enjoyment of learning”; “Freedom for us nerds to further look into specific issues for reports”; “Independent learning”; “Learnt more, had more fun”; “Follow our interests”.</td>
</tr>
<tr>
<td>Values</td>
<td>“Help people live harmoniously and be accepting of one another”.</td>
</tr>
<tr>
<td>Community involvement</td>
<td>“People could choose to participate”; “Getting those solar panels ... More people began to become involved”.</td>
</tr>
</tbody>
</table>

Sustainability Lessons

All respondents to Question 7 (Do you remember any sustainability lessons during the time you were at the school?) recalled these lessons during their primary school days. Eight lessons related to biodiversity with water/waste links and six focused on energy. Biodiversity responses typically related to frogs and pit trapping. Four of the biodiversity respondents, ranging from Year 8 to tertiary level, discussed frogs.

“...making the frog pond in Year 4. Helped to build it, clean it, catch fish from a bucket, put plants and fish in the pond, get the pump working. Over the years – I checked no rubbish was in the pond ...Also helped to catch the coy that were put in the pond - we removed them and replaced them with Western Pigmy Perch again” (Year 8).

This response was particularly informative because it provided evidence of student’s spontaneous long term commitment to caring for the frog pond, five years after the frog lessons had been conducted. Other biodiversity topics recalled were:

“...going for science lessons down by the lake to look at the wildlife there ...Learning about turtles ... We learnt what we should do if we found one ... Teaching us about snakes, what to do if we see one, poisonous ones, and their importance” (Year 12).

Again this student’s detailed response reflected considerable recall of different lessons, five to ten years after they were experienced. Clearly such lessons made an impact on the student.

Students linked biodiversity studies with water and waste understandings. Their interest in the frog pond and water quality assessments of the nearby lake illustrated the water link. Further, a Year 12 student recalled lake lessons in terms of inter-dependence of
different species. The link with waste understandings was illustrated by another Year 12’s recall of litter collection during class walks around the lake. Again, because these lessons occurred between three to twelve years earlier, student recall of these learning experiences suggested they were important to them.

Energy lessons related to solar energy and the school’s solar power project. All three Year 10 students spontaneously recalled their work on the solar power project. Students’ detailed memory of different lessons on this topic (pizza box solar ovens, cleaning panels, student talks, installation activities) was surprising, as they were conducted three to six years prior to the survey. In brief, solar energy lessons engaged students and manifest long term impact.

Table 4.8 summarises lessons recalled by former students in terms of AuSSI-WA categories. Waste, water, biodiversity and energy lessons were highlighted. Students’ recognition of links between some of these categories may have been influenced by the Montessori philosophy in operation at the school (Question 6.) Impact of the lessons is explored in more depth in the following survey question.

Table 4.8
Student Perspectives: Efs Lessons (1990-2004)

<table>
<thead>
<tr>
<th>Waste</th>
<th>“Picking up rubbish...by the lake”.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>“Analysed the water...biological tests looking for macroinvertebrates and chemical tests looking at pH, salinity, etc”; “… science lessons down by the lake to look at the wildlife there and to see what they were and how they were connected”.</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“Learning about turtles ... snakes”; “[Lake] wildlife ... to see what they were and how they were connected”; “I dug pit traps for the biological survey and developed the pond for the frogs”; “being taught how to be environmentally friendly, learning ... planting trees to prevent soil erosion”.</td>
</tr>
<tr>
<td>Energy</td>
<td>“Pizza solar oven lessons and the work on the solar power system”; “I remember helping to clean solar panels, attending a talk by students on how the solar panels were going to be installed and what they were going to be used for”.</td>
</tr>
</tbody>
</table>

Impact of sustainability lessons

Responses to Question 8 (What impact did the sustainability lessons you had at the school have on you?) centred on student motivation. Eight students indicated sustainability lessons increased their motivation to care for the environment; two
students were unsure of any impact. One student stated sustainability lessons “motivated me to take part in that [solar power] project” (Year 9). Enhanced motivation was also indicated by comments like, “[The lessons were] fun and enjoyable. Didn’t know all that stuff – like pit traps and water quality testing before. Making it fun means you learnt a lot more” (Year 8). Students linked motivation and action ‘for’ the environment, such as, “I thought about turning off lights etc. and caring for the environment ... because of what I learnt” (Year 9) and lessons “Gave me a broader view on how I was impacting the school, home, environment and the world, and now have become more conscious of my actions” (Year 10). Another response, “They made me more aware of renewable resources and awakened an interest in our environment” (Year 10) highlights growing interest in environmental issues. In brief, sustainability lessons engaged students and motivated some to take action to care for the environment.

**Interests Neglected**

In Question 9 (Do you think the school’s approach to EfS, when you were there, ignored the interests of anyone?) respondents overwhelmingly reported ‘no’ (Table 4.9). Some indicated that over time the approach was progressively more inclusive, for instance, “I thought more people had become aware of the sustainability program ... they had started to think broader” (Year 10). However, suggestions to increase involvement in sustainability were also recorded (Table 4.9).

**Table 4.9**

**Student Perspectives: Interests Ignored by Approach to EfS (1990-2004)**

<table>
<thead>
<tr>
<th></th>
<th>No (x8)</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anyone:</td>
<td>“[Advertise widely in the] outside community and the world”; “[Students] who don’t want to get dirty”.</td>
<td></td>
</tr>
<tr>
<td>Anything:</td>
<td>“Less vague and theoretical”; “Focused on solar energy rather than wind or hydro energy. Only did some bits about solar power while I was there”; “A lot was not very obvious”.</td>
<td></td>
</tr>
</tbody>
</table>

Responses to Question 10 (Do you think the school’s approach to EfS, when you were there, ignored the interests of anything?) were predominantly ‘no’ (Table 4.9). The comment was made that the school’s approach to sustainability “kept expanding” (Year 8). However, two students thought the school’s focus was too narrow (on solar energy) while they were attending the school. Another student, although stating that nothing was ignored in the school’s approach to sustainability, added “a lot was not very
obvious, for example, the compost bin” (Year 9). For this student there was not a clear
connection between hands-on action (composting) and the abstract concept of
sustainability. The following question explicitly explored student understandings of
sustainability over time.

Changes in Understandings of Sustainability

Responses to Question 11 (Do you think there is a difference between your current
understanding of sustainability and the types of sustainability lessons you had at your
primary school?) examined possible changes in understandings of sustainability since
attending primary school. Former students’ opinions in response to this item were
divided; five indicated their understandings about sustainability had changed and five
indicated no change. This division of response was across all year levels, with a wide
spread of ages in both groupings. Typical responses indicating changes in
understandings were:

“Yes but not much, [primary school] and myself taught me everything I know
about sustainability, but I seem to understand more clearly over time” (Year 9).
“I think there is a difference but only because I have been to another school and
learnt more things about sustainability, which I could not have done if I had not
learnt the things taught at [primary school]” (Year 10). “Yes, well the issue
awareness has expanded through further study (particularly geology, biology,
environmental science) and ways of solving unsustainable situations” (Tertiary).

Responses indicating no change in understandings include:

“No, high school has not mentioned ‘sustainability’ at all – I’ve not had to think
about sustainability” (Year 8). “The word ‘sustainability’ was used a lot more
at [primary school] – haven’t heard it used at high school” (Year 9).
“No, I feel the school encouraged many people to be part of the sustainability
team ... People have been taught right” (Year 10).

The foregoing comments by the Year 8 and 9 students indicate that progressive
development of student understandings about sustainability may not be happening in an
effective way in the secondary school context.

Final Comments

Question 12 (Is there anything else you would like to add regarding EfS at the school?),
elicited four final reflections on sustainability. One student focused on “fun” of
sustainability (Year 10). A tertiary student commented that “From what I hear from
younger siblings and parents, friends, etc., the school has become more focused on
sustainability for the future, than I recall”. However, the lack of follow-on when graduating to high school was again raised by two students, for instance: “... high school has not mentioned ‘sustainability’ at all ... I see rubbish after lunch – students only pick up rubbish if they’ve been naughty. Everyone should pick up rubbish and care for the environment” (Year 8). These concluding reflections indicated sustainability lessons were a growing feature of the primary school experience. Students enjoyed and learnt from these studies, but thought such understandings were not built upon when they graduated to high school.

Topics of the students’ final comments were considered from the perspective of whether they were facilitators or barriers to EfS (Table 4.10). Overall, the student survey provided additional data about antecedents of EfS at the school, from the learner’s perspective. The next section draws together all pre-AuSSI-WA data, and summarises the main findings.

Table 4.10
Students’ Final Comments: Facilitators and Barriers to EfS (1990-2004)

<table>
<thead>
<tr>
<th>Facilitators</th>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Fun to get involved”; School has become more focused on sustainability for the future”.</td>
<td>“High school ... [enviro] group ... It is a small group and I'm not involved in it”; “High school has not mentioned 'sustainability' at all”.</td>
</tr>
</tbody>
</table>

4.1.4 Pre AuSSI-WA Summary

During 1990 – 2004 the school was aware of sustainability issues and engaged in various EfS-type projects (RQ 1), as summarized in the sustainability timeline in Figure 4.1. Evidence from document searches, former teachers’ and students’ surveys revealed members of the school community discussed sustainability and implemented some sustainability programs, even though they were not called ‘sustainability programs’ at that time. These EfS programs ranged from environmental projects to social/wellbeing programs – in AuSSI-WA terms these aspects were later recognised as being part of the Eco Footprint and Social Handprint (DET, 2010a). Environmental sustainability was illustrated by the school’s recycling endeavours, the solar power project, keeping animals and the kitchen garden. Instances of social sustainability included participation in The Virtues Project (Popov et al., 1995), concerts for the elderly, innovative school camps and creative community celebrations. Overwhelmingly, former students
1990 School started - nature a key focus; philosophy of sustainability discussed e.g. energy and water saving ideas and gardening.
1991 Celebrations important i.e. community rituals e.g. concert ‘Epic Journey of the Blue People’.
1992-2001 (specific dates unavailable):
  Environmental sustainability projects included: gardening including: permaculture veggie garden with herb spiral; wheat-to-bread hands-on learning activity; keeping hens, a lamb, rabbits and guinea pigs, birds and fish; frog pond development; ‘science by the lake’ water quality monitoring; planting native trees and shrubs in adjacent park land; used recycled rubbish for arts and craft (from CATS); paper recycling within the school.
  Social sustainability of the school community: rituals and concerts; eco-camps e.g. Nanga Bush Camp ‘Council of All Beings’; Yoga classes; Fathers’ group; Virtues Project.
  Social sustainability through community outreach projects: performances at local retirement villages; Shoes for Zaire; Oxfam Walk Against Want.
1994 Social and environmental sustainability: development of Jimmi Jolley adventure playground with recycled wood/tyres and a model of working with community groups plus children’s input e.g. flying fox.
1999 Social sustainability: Year 7 Vision Quest (annual Bibbulmun Track walk commenced).
2000 Principal change.
2002 Sustainability systems thinking: solar power project started; development of multi-sensory playground.
2004 Principal change.
Support to join AuSSI-W.A. Participation in inaugural Perth Sun Fair; Wastewise (paper recycling).
described the impact of these sustainability experiences in positive terms. They recalled being engaged and enjoying the lessons, which enhanced their environmental awareness and motivation to care for the environment and others.

Although the school engaged in various EfS projects before 2005, there were limitations in the approach to sustainability. Lack of a whole school vision for EfS and an associated sustainability policy were identified gaps. An ad hoc, uncoordinated approach to EfS, with reliance on individuals or EfS ‘champions’ was reported. Evidence provided suggested need for project indicators and evaluation tools. In addition, concerns were raised by respondents about external and internal governance issues. Furthermore, it is debatable if all EfS projects discussed by respondents truly addressed sustainability. Some, like the Science-by-the-lake lessons, appeared to be discrete, unconnected environmental projects, related mainly to education ‘in’ and ‘about’ the environment. Data indicated education ‘for’ the environment, where students participated in positive action to enhance sustainability, was not consistently present. So despite the school’s awareness and commitment to a sustainability agenda prior to AuSSI-WA, numerous limitations with the approach were identified. The following section reports on teacher and student experiences after the school joined AuSSI-WA.

4.2 Post AuSSI-WA 2005 - 2010

This section of the chapter reports on data obtained from the post AuSSI-WA (2005-2009) period (RQs 2 and 3). It is divided into two parts, 2005-2007 and 2008-2009, because evidence suggested two distinct phases occurred during this period. Teacher and student surveys were conducted in 2007 and re-administered in 2008. See Appendix 2 for copies of the surveys and Appendix 3 for the observation schedules.

At the end of 2004 the school was nominated by the principal to participate in the AuSSI-WA pilot program. Early in 2005 the school EfS champion (teacher/researcher), along with an interested parent, attended the first AuSSI-WA workshop. The teacher became the school’s AuSSI-WA coordinator and inaugural convenor of the school sustainability committee. Commitment to EfS grew dramatically between 2005-2007.

Key EfS developments during this period related to the school’s participation in the AuSSI-WA pilot during 2005 and as a AuSSI-WA mentor school in 2006/2007, the work of the sustainability committee, staff professional learning, development of the
school’s 2006-2010 Strategic Plan and enhanced student EfS outcomes. Although this period was characterized by significant growth in EfS understandings and achievements, a number of issues were evident and some of these will be mentioned at the end of this section (RQs 2 and 3).

An examination of public historical records, such as school newsletters, yearbooks and promotional materials, revealed an expansion of EfS programs, together with development of a sustainability policy. The word ‘sustainability’, as used in the present study, was not found in pre-AuSSI-WA school documents. It appeared first in relation to AuSSI-WA, which was subsequently documented in school newsletters. The school’s AuSSI–WA coordinator was an active participant at AuSSI-WA workshops during the pilot year and as a mentor to other schools entering the program from 2006 onwards. The school coordinator attended AuSSI-WA update-workshops in 2006/2007 and continued to share AuSSI knowledge and understandings with students, staff, management and the community by attending and giving talks at meetings, presenting professional learning and parent education sessions, making displays, writing articles and conducting evaluation sessions.

The inaugural meeting of the school’s sustainability committee was held on 15th August 2005, attended by staff and community members. The sustainability committee was formed as a sub-committee of the management board. The convenor of the sustainability committee was the school’s AuSSI-WA coordinator. Meetings were conducted fortnightly. Articles in school newsletters about the committee’s work were a rich source of data on this period. The school principal normally attended meetings, along with at least two teachers, a minimum of five parents, together with two or more interested students. During 2005/2006 the average attendance at these meetings was twelve (field notes 06/1).

One of the initial tasks of the sustainability committee was to engage the community in talking about sustainability, to determine the school’s sustainability vision. Various strategies were employed to involve the whole community, including parent education sessions, regular newsletter articles, displays, meetings and a communal mind mapping activity (field notes, 06/3). This community consultation process resulted in development of the school’s model of sustainability. The model was broadly-based, drawn from multiple sources and included education, governance, environment, culture, spirit, economics, communication and health, within a systems thinking approach (Appendix 6). An artistic representation of the model was showcased on 24th March
2006 at a whole day ‘Switch to Sustainability’ celebration, which involved student activities, stalls and a concert. The concert was open to the wider community and culminated in the official switch-on of the school’s solar power system.

Another important role of the sustainability committee was development of the sustainability policy. Evidence of community input into this policy was found in school newsletters and the policy statement itself. The school’s first sustainability policy was approved by the management board in August 2006, with the requirement that it be reviewed after one year (Appendix 6). A revised, more comprehensive sustainability policy was approved by the management board in October 2007 (Appendix 6).

Internal structure and organisation of the sustainability committee was designed to be inclusive, flexible, work systemically and sustainably. The structure aimed to promote capacity building and the ‘sustainability’ of the committee itself (field notes, 07/11). Leadership was shared, and strong networking and delegation behaviours were evident. Tasks of the committee were divided into a number of key working areas, each with separate team leaders. Members chose to work on tasks in which they expressed particular interest. For example, some of the working groups were: visioning, garden development, solar power project, waterwise works, carbon trading and the community co-op. Each working group reported on progress, discussed needs and made decisions in an inclusive manner. Members supported and encouraged each other, with interactions characterised by caring, constructive behaviours. In addition, the main sustainability committee roles (chair and secretary) were rotated amongst members to build confidence and capacity. Further, throughout 2007 the convenor role was shared between the school’s AuSSI-WA coordinator and an interested parent on the management board. Also, when the school’s AuSSI-WA coordinator left the school at the end of 2007, detailed hand-over documentation was prepared and extensive discussions with stakeholders conducted. However, not all stakeholders chose to participate in this aspect of the hand-over process. The hand-over period lasted ten months, four months at the end of 2007 and six months into the following year (field notes, 07/11).

Regular EfS professional learning sessions occurred during 2005-2007. These sessions included in-house presentations by the school’s AuSSI-WA co-ordinator, on topics such as Sustainable Schools (the EfS movement in state, national and international contexts) and Our Story of Sustainability (the EfS program at the school), with each session lasting two and a half hours. EfS experts visited the school to conduct whole staff sessions too,
presenting programs such as *Caring for Places* (DEC, 2006). Staff also attended external presentations, for example, *Seaweek Educators’ Expo* (Naturaliste Marine Discovery Centre, 2007). This strong commitment to EfS professional learning was highlighted in 2006, when the school year started with a whole day, whole staff learning experience at an environmental education centre. During 2007 two whole staff professional development workshops on EfS were conducted. These workshops were presented by the AuSSI-WA co-ordinator, with each session lasting two and a half hours. The workshops topics were: *The Elemental Drop* and *SOS: Science of Sustainability* (both on water management/conservation). Associated with all these professional learning experiences was a dramatic expansion in teaching resources to support EfS programs. Sessions also provided evidence relating to teacher perceptions about EfS, including instances of silo thinking. For example one teacher stated a preference for “*a short term focus on sustainability and then move on to another topic*” (field notes, 07/5). All issues raised by staff contributed to positive discussions and focus of whole systems thinking.

During 2005/6 the whole school community engaged in the development of the school’s next Strategic Plan, for the period 2006-2010. Meetings, newsletters and workshops were utilised to obtain community input. The resultant Strategic Plan reflected the community’s growing commitment to sustainability. The 2006 Strategic Plan was the school’s first plan to employ the word ‘sustainability’. Sustainability was clearly embedded throughout the Plan, in the following six key result areas: governance, systems and infrastructure, education and curriculum, community, finance and staff (Appendix 6). Further, at the end of 2007 the management board approved a sustainability committee annual budget of $2,000 to cover expenses incurred in relation to fulfilling EfS Strategic Plan objectives.

The ‘education and curriculum’ area of the Strategic Plan required sustainability principles be integrated into all aspects of school life. Consequently, to enhance EfS understandings in class programs, every class teacher agreed to include a sustainability focus in their programs every term. This commitment commenced in Term 1 2006 and documentation of this continued until Term 2 2007. Each class’ sustainability focus was recorded in school newsletters. Impact of this strategy on class programming, and personally on each teacher, was investigated in the 2007 teacher survey. Analysis of public school records also reflected this expansion in EfS activity during 2005-2007. EfS projects included, for example, a biological survey, a turtle watch program, water
quality and conservation activities, establishing the community permaculture garden and values education related to EfS (Appendices 8-11).

During 2005-2007 enhanced student outcomes in EfS were obtained. Student work samples, such as concept maps, scientific reports and class notes were examined to ascertain participants’ attitudes, values and knowledge related to different EfS projects, as well as understandings of the term ‘sustainability’. Refer to Appendix 8 for examples of representative work samples. The samples reveal student values about the environment, together with growing understandings and enhanced knowledge about various issues in EfS. Results of the student survey (section 4.2.2) and observation sessions (4.2.2) build on the work sample evidence.

One of the EfS programs, a biological survey, was comprehensively documented in public school records. Started in 2005, this survey was a long term project which was scheduled to run from 2005 to 2010. It included pit trapping, flora collections and water quality assessments every term to monitor changes over time. The water quality testing component was similar to that mentioned in the 1990-2004 period, however, the new feature of this project was a focus on education for the environment. For instance, the school obtained a conservation grant to remove exotic weed species from the lake’s edge, replacing it with native reeds and sedges. Students were actively involved - planning, implementing and evaluating – in a longitudinal context. They assessed water quality and other environmental changes that arose from their actions, 2005-2007. These lessons explicitly linked environmental, economic and socio-political systems in a whole systems thinking manner (E. Lewis & Baudains, 2007a, 2007b). Again, results of the following student survey and observation sessions provide additional evidence to these documentary sources.

Despite enhanced commitment to EfS reflected in many public school documents during 2005-2007, concerns were also identified (field notes, 06/1-3, 07/3). Although the Strategic Plan embedded sustainability into the administration and operation of the school, until 2008 the sustainability committee was the only committee that had no annual school-supported budget (field notes, 07/3). Consistent funding was not the only issue; some staff expressed concern about community attitudes toward sustainability committee members and their endeavours for the school. Whilst the majority of the school community supported the various sustainability projects, as reflected in the Strategic Plan, some members were concerned about the appropriateness of the school’s involvement in sustainability issues. Sometimes this concern was expressed in personal
terms, for example, key members of the sustainability committee were called "sustainability witches", with the convenor (teacher champion) being labelled "head witch" (field notes, 06/2). Another instance of parental concern related to installation of rainwater tanks. Tanks were considered to be "unsightly and dangerous" (field notes, 07/9). Clearly, not everyone in the school community supported the sustainability vision.

Depth of EfS understandings was another issue impacting on AuSS-WA at the school. The AuSSI-WA guidelines (DET, 2005d) and toolkit (DET, 2005c) were employed by the AuSSI–WA coordinator to support EfS planning and assessment. The initial version of the ‘key elements rubric’ (Figure 2.6), called ‘SSI - Common Assessment Planning and Evaluation tool’ (DET, 2005c) was employed with all members of the school community – staff, students and parents. However, it was observed that participants varied in their interpretations of terms and understandings in the tool. For example, one staff member placed the school in the ‘starting’ category for a particular element, while another located the school in the ‘establishing’ category for the same element. Discussion revealed depth of understanding of terms employed in the tool varied greatly between participants (field notes, 07/5 & 9). This situation was also observed at the AuSSI-WA workshop level (field notes, 06/3, 07/5, 08/6). These findings suggested issues related to surface and deep approaches to learning and understanding EfS.

Staff identified constraints impacting on the sustainability vision. They were concerned about inadequate management support, workload pressures, changing whole school priorities and the level of community support. These issues were reported at staff meetings and documented in field notes (06/1-3, 07/3, 12). Such teacher concerns, along with strengths and opportunities afforded by participation in the AuSSI-WA pilot, are reported in more detail in the following section.

4.2.2 Teacher Survey 2007

Six teachers completed the survey (Appendix 2) in 2007 (RQ 3). Responses to items in the teacher survey are presented below.

**Background Information**

In 2007 the school included two Children’s Houses (3-6 year olds), two Lower Primary classes (6-8 years olds), and two Upper Primary classes (9-12 year olds). The first staff survey of class teachers was conducted during Semester 1, 2007. All six teachers of
these classes participated in the teacher survey. Teachers identified strengths and limitations to the school’s approach to EfS.

**SWOT Analysis**

Responses to Question 1 (*Using a SWOT analysis chart, show your understanding of EfS at the school*) were grouped according to the twelve key elements in the AuSSI-WA rubric (DET, 2010a). Representative teacher quotes are presented in Table 4.11, while Table 4.12 summarises teachers’ responses in relation to AuSSI-WA elements (DET, 2010a).

Teacher responses indicated the elements of teaching and learning, curriculum integration and community networks manifested strengths, weaknesses, opportunities and threats. Responses about vision and values suggested strengths, opportunities and threats. School governance was only reported in the context of threats. School policy was not mentioned at all. EfS activity and reporting were viewed only in terms of strengths and opportunities. Professional learning was mentioned in the context of weaknesses and opportunities, while school networks was discussed as involving opportunities and threats. Responses related to student voice and recognition of successful action were only identified as strengths.

**Impact of the Montessori Philosophy**

Responses to Question 2 (*What do you think is the impact of the Montessori philosophy on EfS at the school?*) were all positive. Four categories of response emerged (eco inter-relationships, learning and classroom environment, values and community involvement) reflecting different ways Montessori philosophy was considered to impact on EfS (Table 4.13).

Responses related to eco inter-relationships (5), learning and classroom environment (6), and values (6) predominated; community involvement received only one comment. Overall, teachers maintained the impact of the Montessori philosophy on EfS was reflected in their education programs. The impact of AuSSI-WA on EfS at the school is explored in the next question.
### Table 4.11

**Teachers’ SWOT Analysis of Understandings of EfS at the school (2007)**

<table>
<thead>
<tr>
<th>SWOT</th>
<th>Elements</th>
</tr>
</thead>
</table>
| **Strengths** | **Vision & Values**: “Gives children hope about the future”; “Multifaceted character [of sustainability model] - 8 areas”.

**EfS Activity**: “Good recycling ... waterwise, solar panels, lake studies , frog survey, worm farm”; ” Relate to water in India ... cross-cultural learning”; ” Respect for the garden”.

**Teaching & learning**: “Targeted focus”.

**Curriculum integration**: “A wide variety of sustainable initiatives being undertaken”; “Linked into curriculum wherever possible”.

**Reporting**: “Just such a lot they are learning. Not wasting paper, water ... lot more; plus in their questioning”; “Feedback from home – children are taking it [EfS] home and bringing back”.

**Student voice**: “Tap into interests”; “Children working ... with adults”.

**Community networks**: “Timely sympathetic response”.

**Recognition of successful action**: “Good advertising - conscience raising”; “Openness and commitment to promoting sustainability totally”.

| Weaknesses     | **Professional learning**: “Need to read and think about what is happening to make a responsible contribution; I’m not a scientist”; “More technical expertise”.

**Teaching & learning**: “[Sustainability is] in our thinking but how much in the children’s thinking? Not sure children have a clear understanding of the dangers facing the planet; but how to give this without creating too much fear”; “Time and paid staff to oversee implementation of program”; “Personnel to direct project and retain interest and commitment”; “ Not burning out, doing too much”; “ Keeping it all in focus, things drop off when busy”;

“Time to finish what we have to do in the semester”.

**Curriculum integration**: “Time to fit it all in - Montessori and all other things”.

**Community networks**: “Passive involvement by some members of the community could affect whole school community”.

| Opportunities  | **Vision & Values**: “To be a lighthouse”; “Use the school as a point to which families can gain courage”.

**EfS Activity**: “[More] garden time”.

**Professional learning**: “Educating myself ... into sustainable habits”; “ To learn about areas of sustainability I might not be aware of ... To trial these in a small way”; “ Invite speakers on ... aspects of sustainability to get more guidance”.

**Teaching & learning**: “Learning more about the Earth and more aware of ‘Mother Earth’”.

**Curriculum integration**: “Teachers having to give sustainability at teachable moments”.

**Reporting**: “Children gaining a lot e.g. garden”.

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School networks: "Children to carry... understandings to their high schools".

Community networks: “To link with outside agencies”; “Educate the community about wise use of natural and man-made resources”; “To facilitate children taking their learning home to make a difference there”.

| Threats | Vision & Values: “Children of tomorrow – help them to care, love ... must teach them now”.
| Governance: “Those in management re. school expenditure, not willing to set aside funds for sustainable projects”; “Lack of funding”.
| Teaching & learning: “Burn out by teachers who do most of the work”; “Entrenched patterns... Academic pressure”; “Will the focus on sustainability overwhelm other important learning goals/area/ knowledge/teaching?”.
| Curriculum integration: “Busyness”.
| School networks: “More resources for research programs and involving schools in long term projects”.
| Community networks: “Burn out by the people who do most of the work”; “Challenge of sustaining community - need people to come together to be effective”.

Table 4.12

Elements Identified in Teachers’ SWOT Analysis (2007)

<table>
<thead>
<tr>
<th>Elements</th>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision and values</td>
<td>*</td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>School governance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School policy</td>
<td></td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>EfS Activity</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional learning</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching and learning:</td>
<td>*</td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Curriculum integration</td>
<td></td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Reporting</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student voice</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School networks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community networks</td>
<td>*</td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Recognition of action</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4.13

| Eco inter-relationships | “Maria Montessori was the first ecological educator because she tried to show all the inter-relationships between life. Montessori is very sympathetic to EfS”; “Big time ... when you see troubled children, it brings them back to earth, is very calming e.g. gardening. It satisfies their inner troublesomeness”; “The whole philosophy is taken outside ... the natural and biological sciences”.
| Learning/classroom environment | “Start at a very early age in the Montessori environment eg gardening”; “Montessori and EfS goes hand in hand – allows children to explore their interests”; “The idea of learning together and growing together really works with EfS”; “The children go into each other’s classrooms (i.e. collecting paper, worm food scraps)”; “It is a prepared classroom environment”.
| Values | “Montessori’s ideas for peace ties in with ... sustainability”; “Maria Montessori was more than a peace-maker i.e. regard and reverence for the natural world”; “Montessori teachers already have... feeling for the importance of caring for our earth; therefore personal beliefs in the benefit of EfS are already established”; “Golden rule: do unto others as you do to the wider environment”; “Spirituality and the Earth all linked”.
| Community involvement | “Parents involved with their children in both; it strengthens the community”.

Impact of AuSSI-WA

Responses to Question 3 (What do you think is the impact of the Sustainable Schools Initiative on EfS at the school?) were positive and negative (Table 4.14).

Table 4.14
Teacher Perspectives: Impact of AuSSI-WA (2007)

<table>
<thead>
<tr>
<th>Positive Impact</th>
<th>Negative Impact</th>
</tr>
</thead>
</table>
| “It has created a network with other schools – helps us feel connected and supported”; “Big impact on our school”; “Doing lots of projects”; “Developed our model. Big focus on sustainability”; “Has [school’s AuSSI coordinator] fired up and she’s fed it through to us”; “Teachers are now putting into practice what they believe and teaching it in a practical way that is relevant to the school community and curriculum”. | “I don’t know much”; “I see ... lots of good things happening but sometimes feel removed from them through lack of time”.

Teacher responses were mostly positive (6), indicating involvement in AuSSI-WA resulted in major development of EfS. These developments ranged from the creation of the school model of sustainability (Appendix 6) which involved the AuSSI element of
‘vision and values’, to teaching outcomes that related to the elements of EfS activity, professional learning, teaching and learning, and school networks. The negative responses reflected teacher lack of involvement and workload issues. A similar dichotomy of responses was obtained for the following question about the impact of the school’s Strategic Plan.

**Impact of the Strategic Plan**

Responses to Question 4 (*What do you think is the impact of the Strategic Plan in relation to the sustainability vision on EfS at the school?*) were mostly negative (5). An extract from the Strategic Plan is shown in Appendix 6. Only one response was positive; all other responses indicated issues about effective implementation of the plan and/or a lack of specific knowledge (Table 4.15). Impact of the school’s model of sustainability was investigated in the next question.

**Table 4.15**

**Teacher Perspectives: Impact of the Strategic Plan (2007)**

<table>
<thead>
<tr>
<th>Positive Impact</th>
<th>Negative Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I think it is an excellent and progressive idea to have sustainability linked to all the K.R.A.s in the Strategic Plan.”</td>
<td>“I’m not sure if the initial impact of the EfS vision is being realized and carried through”; “Don’t know”; “Don’t know Plan well enough”; “Not sure”; “New”.</td>
</tr>
</tbody>
</table>

**Impact of the Sustainability Model**

During 2005-2006 the whole school community participated in the development of the school’s vision for sustainability and this process resulted in a unique sustainability model (Appendix 6). Responses to Question 5 (*What do you think is the impact of the sustainability model on EfS at the school?*) were mostly positive (4) (Table 4.16).

**Table 4.16**

**Teacher Perspectives: Impact of the Sustainability Model (2007)**

<table>
<thead>
<tr>
<th>Positive Impact</th>
<th>Negative Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Simple Montessori flower taken to develop our model. Reflects our values and actions”; “It makes it very clear to everyone – is visual and clear and understandable”; “Huge impact – easily understood, summarises underpinning ideas, visually attractive”; “Broaden the scope because high, inspired goal to aim for; good tool for rotating focus e.g. one per term”.</td>
<td>“Need to discuss and talk it through with the children. It would be helpful to have a teacher on board to help in this area”; “New here, don’t know”.</td>
</tr>
</tbody>
</table>

Positive responses to Question 5 reflected links with the following AuSSI elements: vision and values, EfS activity, teaching and learning, and curriculum integration.
Negative response indicated the need for support in using the model in classrooms and ongoing communication regarding EfS with existing and new staff. An explanation of the model is documented in the school’s Sustainability policy (Appendix 6).

**Impact of the Sustainability Policy**

The 2005/6 community consultation process led to development of the school’s sustainability policy. Responses to Question 6 (*What do you think is the impact of the sustainability policy on EfS at the school?*) were mixed (Table 4.17). Positive impacts (2) of the policy included guidance for direction of EfS and promotion of the school as eco-friendly. Negative issues (4) related to lack of engagement with the document and workload concerns. Workload concerns were again raised in response to the next two questions.

**Table 4.17**

**Teacher Perspectives: Impact of the Sustainability Policy (2007)**

<table>
<thead>
<tr>
<th>Positive Impact</th>
<th>Negative Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Gives us clarity and a reference point whenever needed”; “[School name] attracts earthy people”.</td>
<td>“From my point of view I don’t follow or read the policy. I am guided by [school AuSSI coordinator’s] interpretation”; “Not as much as I would like to see – again we need paid staff to work through this area”; “Don’t know”.</td>
</tr>
</tbody>
</table>

**Impact of Sustainability Focus Each Term on Students (2007)**

During 2006 and 2007 all classes embedded a sustainability focus in their programs every term. Responses to Question 7 (*What do you think is the impact on your class of having a sustainability focus every term?*) were overwhelmingly positive (5), with important implications cited. Implications related to the AuSSI elements of EfS activity, teaching and learning, and student voice. Constraints from the periodic sustainability focus related to increased teacher workload and need for volunteer support to assist with classroom activities (Table 4.18). These aspects were elaborated in response to the next question about the impact of the sustainability focus on teachers themselves.
Table 4.18
Teacher Perspectives: Impact of Sustainability Focus Each Term on Students (2007)

<table>
<thead>
<tr>
<th>Positive Impact</th>
<th>Negative Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Keeps everything alive and moving forward. Gives guidance and structure”; “Makes children aware of a variety of sustainable practices... important in building a repertoire of sustainable practices”; “Virtually doing the work... using the same avenues in different ways. Very good to do”; “We are increasingly conscious of minimizing waste”; “Children very keen to keep working on projects”.</td>
<td>“Great when we have volunteers; need help”.</td>
</tr>
</tbody>
</table>

Impact of Sustainability Focus Each Term on Teachers
Representative responses to Question 8 (What do you think is the impact on you of having a sustainability focus every term?) are presented in Table 4.19. Teachers indicated the sustainability focus assisted maintenance of EfS input into programs and supported the AuSSI elements of EfS activity, professional learning, and teaching and learning. However, workload concerns were highlighted: Makes me whip myself”. Examples of sustainability programs implemented are reported in the following section.

Table 4.19
Teacher Perspectives: Impact of Sustainability Focus Each Term on Teachers (2007)

<table>
<thead>
<tr>
<th>Positive Impact</th>
<th>Negative Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Keeps everything ... moving forward”; “It helps me in my own understanding and in developing children’s understanding of sustainability”; “Guidance and structure”; “Doing the work”; “Great for me as it forces me to do something. If not so clear the idea of sustainability may get buried by other class/teaching requirements”.</td>
<td>“Makes me whip myself. More likely as a major focus once a year; not a conscious focus all the time”.</td>
</tr>
</tbody>
</table>

EfS Programs
Question 9 asked teachers to: describe, in as much detail as you can, one program in your class that is a good example of your approach to EfS. Responses referred to waste, water, biodiversity, energy and wellbeing (Table 4.20). One teacher included a comment about how whole school programming was organized: “Approach linked to sustainability as an integrated part of the curriculum have been driven by [school’s AuSSI coordinator]. This ...has enhanced my knowledge and understandings.” This statement related to the AuSSI elements of curriculum integration and professional learning. When undertaking whole school programming for EfS it was important to
determine if teachers perceived any gaps. Aspects of this were investigated in the following questions.

**Table 4.20**

**Teacher Perspectives: EfS Programs (2007)**

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“Recycled constructions – creative thinking and re-use of materials; multiple recyclings”; “Rubbish free lunches”; “Currently have incorporated sustainability in a focused way, apart from incidental activities such as battery recycling and encouraging sustainable use of ... paper in class”.</td>
</tr>
<tr>
<td>Water</td>
<td>“Waterwise program and making a submarine”; “Encouraging sustainable use of ... water in the class”.</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“The school garden, the worm farms”; “[Plant] more natives in our area”; “Shoe gardens – Montessori values and recycling”; “Apart from all the Montessori programs and other school sustainability programs, we have organic olive oil, raw honey, hand made soap etc”.</td>
</tr>
<tr>
<td>Energy</td>
<td>“The solar panels”; “Battery recycling and encouraging sustainable use of power ... in the class”.</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>“Social level too re harmonious way of relating to each other – enhance our time together”; Leadership Program ... the students came up with things they wanted to change [waste and biodiversity actions”; “They were able to take ownership and everything was followed through to completion ... and feel positive about changes they were able to implement”.</td>
</tr>
</tbody>
</table>

**Interests Neglected**

Responses to Question 10 (Do you think the school’s current approach to EfS ignores the interests of anyone?) were mixed (Table 4.21). Most respondents thought no one’s interests were being neglected, but two maintained that hard-working teachers, students who wanted to participate more and people in poverty were not having their interests met. Again, concern about teacher workloads was raised.

Most respondents, in response to question 11 (Do you think the school’s current approach to EfS ignores the interests of anything?), indicated there were ‘things’ being neglected, including teacher workload concerns, waste and recycling issues (Table 4.21). Two teachers reported no issues. The survey concluded with an open-ended question inviting teachers to add further comments about EfS.
Table 4.21
Teacher Perspectives: Interests Ignored by Approach to EfS (2007)

<table>
<thead>
<tr>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
</table>
| Anyone: No (x4) | “Teachers who are overworked”; “Children who want to be more involved. Make children aware of the plight of people in the rest of the world”.
| Anything: No (x2) | “The fact that such an important aspect of our learning is left to volunteers and too little of paid teacher time”; “Paper – although we recycle paper, I think we need to address its overuse and find ways to use paper i.e. in a photocopier use paper which is blank on one side”; “Take children to waste plant to experience the scale of the problem”; “Too abstract – need concrete exemplars and more physical and practical”; “Recycling e.g. clothes at the community festival – call it a ‘recycling’ stall not ‘white elephant’ stall”.

Final Comments

Question 12 invited respondents for their concluding comments (Is there anything else you would like to add regarding EfS at the school? Any improvements? Any concerns?). Teachers responded to this question by outlining what worked (facilitators to EfS) and/or their concerns (barriers to EfS) (Table 4.22). Facilitators included: the EfS champion (teacher), appropriate parent support and sustainability as a lived-experience at the school. Reported barriers were: need for a paid EfS coordination role in the school and an EfS induction process for new staff members.

Table 4.22
Teachers’ Final Comments: Facilitators and Barriers to EfS (2007)

<table>
<thead>
<tr>
<th>Facilitators</th>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>“A most awed and sincere thanks to [school AuSSI coordinator]”; “Couldn’t have done the garden without parent help, the ‘right’ kind of parent help”; “My knowledge, understandings and practice of sustainability issues has already been greatly enhanced by EfS as it is practiced in the school”; “I’m very pleased to be part of it”.</td>
<td>“I think there should be a part-time paid (at least one day per week) teacher with a focus on sustainability to initiate and carry through projects and research with staff and children”; “Need specific EfS induction for new staff – fast track into the community”.</td>
</tr>
</tbody>
</table>

Overall, the 2007 teacher survey provided detailed information about the school’s EfS vision, governance, activity, and teaching and learning (RQ 3). Strengths and constraints to EfS were identified. The next section of this chapter reports on the same educational context, but from the students’ perspective.
4.2.3  Student Survey 2007

Surveys about students’ EfS learning experiences were administered as part of usual class work but only those with signed permission forms (65) were included in the study (RQ 2). All students (150) completed the survey. Three survey formats, designed for children at different stages of development (Appendix 2), were employed. Children’s House students (3-6 years old) drew a picture, Lower Primary children (6-9 years) completed a short survey consisting of six questions and Upper Primary students (9-12 years) participated in a survey with ten questions.

Student responses were categorised using the AuSSI-WA (DET, 2008b) twelve action learning areas: built environment; biodiversity; community partnerships; cultural and social diversity; economics; energy; Indigenous culture; purchasing; student wellbeing; transport and air; waste; and water. However, students only referred to the following areas: biodiversity; energy; student wellbeing; waste; and water. Two additional areas of student response were recorded: ‘cleaning’, because young Montessori students engage with a range of Practical Life activities; and ‘other’ for all remaining responses. Table 4.23 summarises the action learning areas, illustrated by typical student responses. This table facilitated consistent categorisation of student responses.

Children’s House

Prior to the Children’s House survey being conducted the researcher talked with students about the meaning of the word ‘environment’. Using puppets to stimulate discussion, different aspects of the children’s natural and built environment (such as, birds in trees and jigsaw puzzles in the classroom) were reviewed. Students were then invited to draw a picture … “of you outside, doing something good for the environment” (Appendix 2). When the drawings were finished students were asked to explain what was happening in their pictures. Their oral responses were documented by teaching staff. Representative student drawings are presented in Figures 4.2 - 4.3.

Fifteen Children’s House students submitted signed permission forms for the 2007 survey, so only these drawings were analysed. Each student’s picture and words were included in the relevant area/s for the classification process. Some responses were classified in more than one area, for example: Yellow sun with love hearts in the sky and on a flower; person in garden looking after the worms (Figure 4.3). In this case, the happy garden scene with love hearts implied ‘wellbeing’ and was also identified in ‘waste’ due to the student’s worm farming description (words in italics). Frequency of
responses in terms of action learning areas were found to be: biodiversity (10), cleaning (7), wellbeing and waste (both 6), water (5) and other (1), as shown in Table 4.24. In brief, Children’s House students spontaneously identified more aspects of biodiversity than any other area. This interest in biodiversity is continued by Lower Primary respondents, as will be seen in the next section.

**Table 4.23**

Typical Student Responses categorized by Action Learning Areas (2007)

<table>
<thead>
<tr>
<th>Area</th>
<th>Typical Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“Collecting rubbish”; “Worm farming”; “Recycling (paper, batteries, bottles, corks, pots, stamps, cans, etc)”; “Not littering”.</td>
</tr>
<tr>
<td>Water</td>
<td>“Watering”; “Caring for the lake”; “Water quality testing”; “Water tanks, timer taps, waterless urinal”; “Lake investigations”; “Lake reed planting”; “Coolgardie Safe Activities”; “Healing the Swan - river project”; “Groundwater festival”; “Being waterwise”.</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“Caring for nature and environment”; “Caring for birds and other animals”; “Gardening”; “Lake conservation activities”; “Plants and leaves”; “Biological survey”; “Pit traps”; “Animals e.g. frogs, turtles”; “Bird watching”; “Planting trees”; “Climate change”; “Protecting endangered species”.</td>
</tr>
<tr>
<td>Energy</td>
<td>“School solar power system”; “Sun Fair”; “Solar Panels”; “Turn off lights”; “Saving electricity”.</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>“Healthy body”; “Healthy eating”; “Caring for people”; “Helping people”; “Friendship and support”; “Exercise and fitness”; “Values”; “Using the virtues”; “Rock and Water - health program”; “No bullying”; “Food and water”; “Community busy bee”; “Physically caring for or helping people”; “No chemicals in food”; “Eco-shop e.g. honey”; “Concerts and fairs”; “Fair trade”; “Good management”; “Social groups”; “Communication”; “Sharing e.g. food, toys”.</td>
</tr>
<tr>
<td>Cleaning</td>
<td>“Sweeping”; “Raking”; “Tidying shelves”.</td>
</tr>
<tr>
<td>Other</td>
<td>“Guitars”; “Clothes”; “Money”; “Colours”; “Science investigating”; “Can’t remember”; “Not sure”.</td>
</tr>
</tbody>
</table>
Figure 4.2  Children’s House Student Drawing: “Sweeping up rubbish” (2007)

Figure 4.3  Children’s House Student Drawing: “Looking after the worms” (2007)
### Table 4.24

<table>
<thead>
<tr>
<th>Areas</th>
<th>Typical drawing: Content description and “student’s description of picture”</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>Blue sky, sun, girl… “sweeping up rubbish”. Colourful; person… “picking up cans”. Person in garden… “looking after the worms”. Black and white drawing of a person… “recycling the fruit to the worms”.</td>
<td>6</td>
</tr>
<tr>
<td>Water</td>
<td>Colourful, person… “watering some plants with a can”. Girl… “watering the flowers”. Colourful; two people by a lake… “sweeping and don’t throw a can in the lake”. Boy… “sweeping around the lake with two hands”.</td>
<td>5</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>Colourful; girl with watering can in garden… “gardening to make it beautiful and bright for the birds”. Birds in sky, gold sun, plants in garden… “seed growing and planting a flower”.</td>
<td>10</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>Girl near two trees saying… “I love you”. Blue sky, big red sun with two people, one is… “helping someone”. Lots of people doing different jobs… “being helpful”. Yellow sun with love hearts in sky and on flower.</td>
<td>6</td>
</tr>
<tr>
<td>Cleaning</td>
<td>Blue sky, yellow-red sun, girl… “sweeping the sand back into the sandpit”. Blue sky, yellow sun, girl in playground… “sweeping leaves”. Lots of people doing different jobs… “sweeping”.</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>Boy… “doing a science experiment with a bottle”.</td>
<td>1</td>
</tr>
</tbody>
</table>

### Lower Primary

Lower Primary students (6-9 years old) completed a short survey consisting of six questions (Appendix 2) as part of their usual class work. Twenty one students submitted signed permission forms and only these surveys were included in the study. The first question in the survey asked the students how old they were when they started at the school. Nineteen of the twenty one students started when they were three years old. The other two students commenced when they were six years old.

Question 2 provided information about respondents’ year level (*What year are you in now?*). Six students were in Year 1, seven in Year 2 and eight in Year 3. The two students who started at the school when they were six years old, were in Years 1 and 2 at the time of the survey. The eight students who were in Year 3 had attended the school for approximately six years at the time of the survey. Most of the students in the
Lower Primary classes therefore had the opportunity of engaging in numerous EfS learning experiences over their years at the school.

**Mind Map of Sustainability**

Respondents were invited to: *create a mind map of everything you know about sustainability* (Question 3). Typical mind maps are presented in Figures 4.4 - 4.6. Table 4.25 presents frequency of responses in terms of the AuSSI action learning areas: waste (42), wellbeing (32), biodiversity (27), water (7) and energy (7). Lower Primary students spontaneously identified aspects of waste more than any other area. Given this overview of the action learning areas, students were then asked about their favourite and least favourite sustainability lessons.

![Mind Map of Sustainability](image)

*Figure 4.4 Lower Primary Student (Year 1) Mind Map: Everything I know about sustainability (2007)*
Figure 4.5  Lower Primary Student (Year 2) Mind Map:

*Everything I know about sustainability* (2007)

Text left side: Guinea pigs; text bottom left: recycling.

Figure 4.6  Lower Primary Student (Year 3) Mind Map:

*Everything I know about sustainability* (2007)
Table 4.25
Lower Primary Student Mind Maps by Action Learning Area (2007)

<table>
<thead>
<tr>
<th>Areas</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“don’t rubbish, worm farm, paper recycling”; “recycling”; “recycle batteries, paper”; [Recycle]… “Shoes”; “plastic”; “botels”.</td>
<td>42</td>
</tr>
<tr>
<td>Water</td>
<td>“Water testing”; “don’t pollute water”.</td>
<td>7</td>
</tr>
<tr>
<td>Energy</td>
<td>“not wasting electricity”; “don’t waste electricity”; “solar system solar panels”</td>
<td>7</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>feed ourselves + drink water”; “Give people food”; “no bullying [no bullying]”; “values - caring, respect, patience””; “patience, responcabl [values – patience, responsibility]”.</td>
<td>32</td>
</tr>
</tbody>
</table>

Favourite Lessons
Question 4 sought information about respondents’ favourite lessons (What was your favourite sustainability lesson last year?). Some students identified more than one favourite lesson. Table 4.26 presents frequency of responses in terms of action learning areas: biodiversity (16), water and energy (both 5), and waste and wellbeing (both 4). There were three ‘other’ responses, typically “can’t remember”. Lower Primary students’ favourite EfS lessons were in the biodiversity area. Nine of the sixteen responses specifically referred to the biological survey, which included pit trapping activities (E. Lewis & Baudains, 2007a). The following question asked the students about their least favourite sustainability lessons.

Table 4.26
Lower Primary Students’ Favourite EfS Lessons by Action Learning Area (2007)

<table>
<thead>
<tr>
<th>Elements</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“Recycling”; “Worms [referred to mind map]”.</td>
<td>4</td>
</tr>
<tr>
<td>Water</td>
<td>“Water testing – you got to see all the animals you won’t see”.</td>
<td>5</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“Pit traps - frogs wher in them”; “garden - I lickt plating [liked planting]”; “pit traps becors you get to see nature [because … see nature]”; “bird watching beacos it was fun”; “Pet tra - it was fun [pit trap]”; “pit tras - cachc anmils [pit traps - catch animals]”; “pit traps because we cached bugs &amp; insects”.</td>
<td>16</td>
</tr>
<tr>
<td>Energy</td>
<td>“Solar panels [referred to mind map]”; “Sun fear - it was fun [Sun fair]”.</td>
<td>5</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>“All [referred to mind map – included caring &amp; respect]”.</td>
<td>4</td>
</tr>
</tbody>
</table>
Least Favourite Lessons

Question 5 asked respondents: What was your least favourite sustainability lesson last year? Table 4.27 shows sixteen of the twenty one students could not identify an EfS lesson they least liked. Two students did not enjoy the water activities (due to biting ants) and two did not like biodiversity activities (bird watching and gardening). Overwhelming, students were unable to name EfS lessons in which they did not engage. The survey concluded with an open-ended question inviting respondents to suggest improvements to EfS lessons.

Table 4.27
Lower Primary Students’ Least Favourite EfS Lessons by Action Learning Area (2007)

<table>
<thead>
<tr>
<th>Elements</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>“bull ant’s keep on biting me”; “the water sucked - we got bitten by antes”.</td>
<td>2</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“Bird watching - it sucked”; “garden - you had to walk around”.</td>
<td>2</td>
</tr>
<tr>
<td>None</td>
<td>“Nothing”; “no”; “NON”; “NONE. I like It”</td>
<td>16</td>
</tr>
</tbody>
</table>

Changes to EfS Lessons

Respondents to the final survey question (6. What changes would you like to see so that you can do more sustainability lessons that you would enjoy?) outlined ideas to enhance their enjoyment of EfS. Table 4.28 presents frequency of responses in terms of action learning areas: biodiversity (7), water (3), waste (1), and numerous ‘other’ responses (15). Most suggestions involved being actively involved, doing something, such as planting, pit trapping and worm farming. Overall, this interest in biodiversity is carried through by Upper Primary respondents, as shown in the next section.
Table 4.28
Lower Primary Students’ Suggestions to Enhance EfS Lessons by Action Learning Area (2007)

<table>
<thead>
<tr>
<th>Elements</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“more of everything [referred to recycling and worm farming]”.</td>
<td>1</td>
</tr>
<tr>
<td>Water</td>
<td>“water testing - by stopping thr bull ants biting me”; “test the water that we drink”; “lake planting”.</td>
<td>3</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“being kind to animals like insects in jars”; “plants”; “kawting trees [counting trees]”; “mor pit trap”; “helping animals and planting trees”.</td>
<td>7</td>
</tr>
<tr>
<td>Other</td>
<td>“No idea”; “not sure”; “Let you do it”; “mor exesrmin”; “science experiments”.</td>
<td>15</td>
</tr>
</tbody>
</table>

Upper Primary

All Upper Primary (9-12 years old) students completed a survey consisting of ten questions (Appendix 2) as part of their usual class work. Eighteen students submitted signed permission forms, so only these surveys were included in the study. The first question in the survey asked the students how old they were when they started at the school. Fourteen of the eighteen students started when they were three years old. The other four students started when they were four, five, six and seven years old.

Question 2 provided information about: What year are you in now? Eight students were in Year 4, three in Year 5, six in Year 6 and one in Year 7. So in this cohort students had attended the school for a minimum of three years and a maximum of ten years, with the majority of students being at the school for at least seven years. Therefore, most of these students had the opportunity of engaging in numerous EfS learning experiences over an extended period.

Mind Map of Sustainability

Respondents were invited to: create a mind map of everything you know about sustainability (Question 3). Typical mind maps are presented in Figures 4.7 - 4.10. Table 4.29 presents frequency of responses in terms of the AuSSI action learning areas: waste (62), biodiversity (44), wellbeing (16), and water and energy (both 13). Upper Primary students therefore spontaneously identified aspects of waste more than any other area. During that year students had been involved in setting up a recycled-fridge as a worm farm, designing and constructing three compost bins, in addition to their usual recycling activities. These learning opportunities may have influenced the high
waste response frequencies. From this overview of action learning areas students were then invited to identify one class program that was a good example of sustainability in action.

**EfS Program**

Question 4 invited students to: *Describe, in as much detail as you can, one program in your class that is a good example of sustainability in action.* Some students described more than one program. Table 4.30 presents frequency of responses in terms of action learning areas: biodiversity (11), waste (5), water (4) and energy (1). No wellbeing programs were described. Biodiversity programs were most commonly mentioned; specifically, the community permaculture garden and biological survey (included pit trapping). Student opinion was also sought on whether anyone’s or anything’s interests were being neglected in EfS programs. This issue was investigated by the following two survey questions.

Text clockwise: Recycle - use recycled paper; use electricity wisely; don’t litter and pollute the earth (*suk smells*); don’t spend all day watching TV; grow a permaculture garden; grow worms.

**Figure 4.7 Upper Primary Student (Year 4) Mind Map:**

*Everything I know about sustainability* (2007)
Figure 4.8  Upper Primary Student (Year 5) Mind Map:

*Everything I know about sustainability* (2007)
Figure 4.9 Upper Primary Student (Year 6) Mind Map:
Everything I know about sustainability (2007)

Figure 4.10 Upper Primary Student (Year 7) Mind Map:
Everything I know about sustainability (2007)
Table 4.29
Upper Primary Student Mind Maps by Action Learning Area (2007)

<table>
<thead>
<tr>
<th>Elements</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“Use recycled paper ... don’t litter and pollute the earth suck smells ... grow worms”; “Not throwing rubbish”; “Compost, worm farm”; “Doing the worm farm ... stopping pollution ... recycling paper”; “Recycling bin - recycling paper instead of waisting tree’s, the worm food recycling - saving stuff for plants”; “Recycling – paper, food, batteries, pots, worm farm”; “Recycle paper plastic pots batteries and we have a worm farm”; “Recycling – paper corks pot plants, [second hand] solar panels”.</td>
<td>62</td>
</tr>
<tr>
<td>Water</td>
<td>“Ponds/lake”; “Lake testing pH temp. “; “Planting reeds ... going around the lake looking at birds”; “Help our lake wildlife ... we’re cleaning the lake planting natives getting rid of pollution”; “Invertebrates water quality”; “Conserving water”.</td>
<td>13</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“Grow a permaculture garden”; “Pit trap ... herbs”; “Helping the gardain ... helping the world and the things on it”; “Turtle breeding, planting trees”; “The garden – using the earth for growing more stuff”; “Caring for the envirerment”; “Planting seeds, plants ... pit traps”; “Biodiversity survey ... planting vegies, natives ... we’re done ‘ living with tiger snakes’”; “Frogs, permaculture garden, the environment - planting native plants”; “Growing native gardens, trees”.</td>
<td>44</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>“Don’t spend all day watching TV “; “Hony [honey from eco shop]”; “Responsabilaty, respect ... friendship”; “Having LOTE, sharing, triying stuff, honey”; “Behaviour – caring and respect”; “We work together teamwork ... we help care contribute share &amp; accomplish as a team”.</td>
<td>16</td>
</tr>
</tbody>
</table>
Table 4.30
Upper Primary Student Descriptions of Good EfS Programs (2007)

<table>
<thead>
<tr>
<th>Elements</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“I like recycleing, I fed the worms, lots of worms and fertiliser”; “Worm farm, I was in the ... sustainability group, I helped set it up ... the worms made lots of ferterliser so at the craft fair we got a lot of money”; “Paper recycling &amp; by putting my paper in the recycling then at the end of the day putting it in the big recycling bin, it’s still happening”.</td>
<td>5</td>
</tr>
<tr>
<td>Water</td>
<td>“Pond, I helpt how the pond was going, I tested the water level - ok”; “Planting natives because we wanted to do it and help our pond, also because everyone was envolved”; “I think the lake surveys helped save ... our lake. ...survey to see how polluted it was. We brainstormed ideas to help the lake; we came up with planting native because the exotic plants were polluting the lake”; “The quality of the water in the lake was higher, and we knew more”.</td>
<td>4</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“We had to make the garden, by put the malch in, we made pizza out of the tomartos. Garden, to help the envirment, because the hole school was doing it, exelent. Gardning, mum and I wee intrested, picking vegdibals leaves and pulling out leaves, the garden is going well and the food dalishos!”; “Pit traps, it was a class project, going around and finding the animals in the pit traps, we found ...lizards frogs and bugs; I cheked the pit traps; we found frogs and see were they liked to live”; “Help grow native seedlings by taking them home”; “To save the earth, becos I like saving the earth, I learnd stuff, I gained nolige”.</td>
<td>11</td>
</tr>
<tr>
<td>Energy</td>
<td>“Electricity by having solar panels”.</td>
<td>1</td>
</tr>
</tbody>
</table>

**Interests Neglected**

Responses to Question 5 (Do you think anyone is being missed out by the school’s current approach to sustainability?) were overwhelming in the negative. Seventeen of eighteen students thought no one’s interests were neglected. One student suggested that classes could take more environmental action (Table 4.31). Next, respondents were asked if the approach to EfS ignored the interests of anything.
### Table 4.31
Upper Primary Student Perspectives on Interests Ignored by EfS Approach (2007)

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anyone:</strong></td>
<td>No (x17)</td>
<td>“Maybe we could find another way to help the school environment - get the classes to do more work”.</td>
</tr>
<tr>
<td><strong>Anything:</strong></td>
<td>No (x16)</td>
<td>“I think we should go on an excursion [excursion]”; “Maybe we could work on getting a positive attitude towards the environment from the whole school”.</td>
</tr>
</tbody>
</table>

**Gaps in EfS**

Most respondents, in response to question 6 (*Do you think anything is being missed out by the school’s current approach to sustainability*?), indicated no ‘things’ were neglected. Two concerns were raised - facilitating whole school involvement and incorporating more excursions (Table 4.31). The survey continued by inviting student feedback on their favourite and least favourite lessons.

**Favourite Lessons**

Question 7 sought information about: *What was your favourite sustainability lesson last year?* Table 4.32 presents frequency of responses in terms of action learning areas: biodiversity (13), water (5) and energy (1). One student identified two favourite lessons (biodiversity and energy). No responses were made in the waste and wellbeing areas. Ten of the biodiversity responses referred to the biological survey that included pit trapping activities (E. Lewis & Baudains, 2007a), while the remaining three related to the garden project. All water responses were about water quality testing at the local lake and actions taken to improve that environment. Energy response referred to the school’s solar power project. Clearly students were readily able to identify their favourite lessons. The following question asked the students about their least favourite sustainability lessons.
Table 4.32
Upper Primary Students’ Favourite EfS Lessons by Action Learning Area (2007)

<table>
<thead>
<tr>
<th>Elements</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water</strong></td>
<td>“Lake water testing, because it was fun using the instruments”; “Doing the lake, because I had never used that sort of equipment before and we where more out doors than the rest”; “Lake - the last one in term four and the bird searching one because it was fun and we all worked together”; “Water quality testing, I liked doing all the tests on the water, and I like learning”.</td>
<td>5</td>
</tr>
<tr>
<td><strong>Biodiversity</strong></td>
<td>“Garden, because we made pizza with some of it”; “Pit traps, it was very very fun seeing so mene crechers [many creatures]”; “Pit traps, I liked looking at the frogs and weighing them”; “The pit traps, seeing what kind of animals live in the area”; “The pit traps, because we got to see the frogs and it was fun”; “I liked the pit traps ... because they were really exiting and FUN! : )”</td>
<td>13</td>
</tr>
<tr>
<td><strong>Energy</strong></td>
<td>“I liked the … solar panels because they were really exiting and FUN!”.</td>
<td>1</td>
</tr>
</tbody>
</table>

**Least Favourite Lessons**

Question 8 invited respondents to identify: What was your least favourite sustainability lesson last year? Table 4.33 shows thirteen of the eighteen students could not identify an EfS lesson they least liked. Two students did not enjoy the waste activities (worms) and three did not like biodiversity activities (guest speaker and biological survey findings on particular days). The next part of the survey sought student input on how to enhance enjoyment of EfS lessons.

Table 4.33
Upper Primary Students’ Least Favourite EfS Lessons by Action Learning Area (2007)

<table>
<thead>
<tr>
<th>Elements</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Waste</strong></td>
<td>The worm farm, my hands and clothes got really dirty and we had to keep caching all the escaped worms”; “Worms, I have worms at home”.</td>
<td>2</td>
</tr>
<tr>
<td><strong>Biodiversity</strong></td>
<td>“The pit traps (I didn’t hate it) because I didn’t see any animals”; “[Guest speaker] because I didn’t learn anything ... it was boring”.</td>
<td>3</td>
</tr>
<tr>
<td><strong>None</strong></td>
<td>“No”; “None! “; “None - I didn’t hate any some I enjoyed and some I thought it was so-so”; “NONE! They were all good”; “Did not have one. I enjoyed it”.</td>
<td>13</td>
</tr>
</tbody>
</table>
Changes to EfS Lessons

Half the respondents to Question 9 (What changes would you like to see so that you can do more sustainability lessons that you would enjoy?) could not suggest any changes that would make the EfS lessons more enjoyable (Table 4.34). Respondents who did suggest changes generally wanted more hands-on activities with plants and animals. The survey concluded with an open-ended question inviting respondents to suggest improvements to EfS lessons.

Table 4.34

Upper Primary Students’ Suggestions to Enhance Enjoyment of EfS Lessons by Action Learning Area (2007)

<table>
<thead>
<tr>
<th>Elements</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>“Plant more [reeds] and do more searching around the lake”.</td>
<td>1</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“More people in the garden and caring for it”; “Tertel breeding [turtle breeding]”; “Doing more planting or environmental activities. Like planting trees”; “That we could do more work with animals”.</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>“Do more experiments”; “Get the computer game I think its called ‘Oli’s World’ it is entirely based of sustainability”; “More protesting”.</td>
<td>3</td>
</tr>
<tr>
<td>None</td>
<td>“No”; “I don’t really know”; “I can’t think of any changes to be done”; “None! “; “I’m not sure”.</td>
<td>9</td>
</tr>
</tbody>
</table>

Improvements to EfS

Half the respondents to the final survey question (10. What changes would you like to see so that sustainability at school could be improved?) outlined improvements in areas of waste (3), biodiversity (3) and ‘other’ (3). Most suggestions related to being actively involved, such as having fun planting and following school rules (Table 4.35). This degree of engagement in lessons is explored further in the next section, which reports on findings from lesson observations.
Table 4.35  
Upper Primary Students’ Suggestions to Improve EfS Lessons by Action Learning Area (2007)

<table>
<thead>
<tr>
<th>Elements</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“A rule that we have to pick up all our rubbish and not leave it lying around. Kids actually putting rubbish in the bin, kids putting paper in the paper bin, kids putting food scraps in the worm food container instead of putting it in the normal bin”; “People remembering to put batteries in the battery box”.</td>
<td>3</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“That each Friday afternoon we go to the garden”; “More garden area!”; “Do funner activities like planting native trees”.</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>“Make it really fun! “; “Every single person contributing ideas and activities”; “More protesting”.</td>
<td>3</td>
</tr>
<tr>
<td>None</td>
<td>“Nothing”; “Don’t know”; “No”; “NONE!”</td>
<td>9</td>
</tr>
</tbody>
</table>

4.2.4 Student Observations 2007

Six hours of student observations were undertaken in 2007, one hour each in all six classes during different EfS lessons. Class teachers selected lessons that were observed. The observation process was based on the Australian *Environmental Learning Outcomes Survey - Student Observation Schedule* and the *Environmental Learning Outcomes Survey - Interview Schedule* (Appendix 4), designed and tested by Ballantyne, Packer and Everett (2005). The aim of the observations and associated interviews was to provide further evidence on the impact of the EfS program (RQ 2). Survey results for Children’s Houses, and Lower and Upper Primary classes, are presented in the following sections.

Children’s House

The EfS learning context for the two Children’s Houses was lake water quality, in which students worked by the lake edge and in the classroom. Children investigated lake water samples by looking for different species of macroinvertebrates. They studied macroinvertebrates using magnifying glasses and microscopes, and discussed implications of their discoveries with parents and staff. See Appendix 6 for student work samples from these lessons. Teachers made explicit links between the species of macroinvertebrate found, water quality and environmental sustainability. Table 4.36 presents results of these observations. Overall, students enthusiastically participated in
water quality sessions; they shared their learning with others, they purposefully manipulated objects and ideas, were actively involved in learning and responded to new information. However, students displayed limited evidence for making links and transferring ideas and skills, showing responsibility for their own learning, and confidence in personal learning abilities.

Table 4.36

Student Engagement in Learning Behaviours for Water Quality Lessons (2007)

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Frequency of Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CH 1</td>
</tr>
<tr>
<td>Sharing learning with peers and experts</td>
<td>4</td>
</tr>
<tr>
<td>Making links and transferring ideas and skills</td>
<td>1</td>
</tr>
<tr>
<td>Initiating/showing responsibility for their own learning</td>
<td>1</td>
</tr>
<tr>
<td>Purposefully manipulating objects and ideas</td>
<td>4</td>
</tr>
<tr>
<td>Showing confidence in personal learning abilities</td>
<td>1</td>
</tr>
<tr>
<td>Actively involved in learning</td>
<td>4</td>
</tr>
<tr>
<td>Responding to new information or evidence</td>
<td>4</td>
</tr>
<tr>
<td>Disengagement</td>
<td>1</td>
</tr>
</tbody>
</table>

CH = Children’s House

Frequency codes: 1 = rarely; 2 = sometimes; 3 = most of the time; 4 = all of the time.
### Table 4.37
#### Knowledge, Attitudes and Behavioural Intentions of Typical Student involved in Water Quality Lessons (2007)

<table>
<thead>
<tr>
<th>Knowledge:</th>
<th>What helped me learn?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Things I learned about caring for the environment?</td>
<td>“There’s more than fish in the lake. All kinds of little bugs”. Seeing &amp; doing something in the environment.</td>
<td>Interested</td>
</tr>
<tr>
<td>Attitudes:</td>
<td>What was it that made me change?</td>
<td>My feelings</td>
</tr>
<tr>
<td>Have I changed the way I feel about the environment?</td>
<td>“Yes, didn’t know there were snails and worms in the water”. Seeing &amp; doing something in the environment.</td>
<td>Surprised</td>
</tr>
<tr>
<td>Behavioural Intentions:</td>
<td>What made me think about doing something for the environment?</td>
<td>My feelings</td>
</tr>
<tr>
<td>Do I think what I learned will change what I’ll do for the environment?</td>
<td>“Go looking for more things. I’m playing with [child’s name] after school and we are going to make a worm farm”. Seeing &amp; doing something in the environment.</td>
<td>Excited</td>
</tr>
</tbody>
</table>

Orally administered student interviews were conducted after the lessons. Table 4.37 presents one student’s responses to questions about knowledge, attitudes and behavioural intentions arising from the water quality learning experience. These responses were typical of the answers provided by students who were interviewed. In brief, students were surprised by the variety of macroinvertebrates, learnt by seeing and doing, and felt ‘interested’, ‘surprised’ and ‘excited’ by the lesson.

#### Lower Primary

The EfS learning context for one of the Lower Primary classes was lake water quality and for the other class the permaculture garden. Children investigated lake water samples by conducting chemical and physical assessments. Chemical assessments included determining pH, salinity, turbidity and water temperature. Physical assessments involved a visual site assessment and looking for different species of...
Students discussed implications of their findings. Children in the other class planted seeds and seedlings in the garden. They asked questions about how to plant and care for seeds/seedlings, such as, “Why do we plant bean seeds near the fence?” Teachers made explicit links between lesson content and environmental sustainability. Table 4.38 presents results of these observations. Overall, students at the lake participated enthusiastically, “couldn’t wait to start”; in particular they shared their learning with others, purposefully manipulated objects, were actively involved in learning and responded to new information. Students rarely showed responsibility for their own learning. Although the garden students did not appear as excited as those at the lake, they worked quietly and calmly in a focused manner. Their frequency of engagement in learning behaviours was similar to the ‘lake’ class.

Orally administered student interviews were conducted after the lessons. Table 4.39 presents a typical student’s responses to questions about knowledge, attitudes and behavioural intentions arising from the water quality learning experience, while Table 4.40 presents the same information from a typical garden student. In brief, even though students from the two classes participated in different learning contexts, they both enjoyed the sessions and discussed changed behaviours.

Table 4.38

Student Engagement in Learning Behaviours for Water Quality and Gardening Lessons (2007)

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Frequency of Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LP Lake</td>
</tr>
<tr>
<td>Sharing learning with peers and experts</td>
<td>4</td>
</tr>
<tr>
<td>Making links and transferring ideas and skills</td>
<td>2</td>
</tr>
<tr>
<td>Initiating/showing responsibility for their own learning</td>
<td>1</td>
</tr>
<tr>
<td>Purposefully manipulating objects and ideas</td>
<td>3</td>
</tr>
<tr>
<td>Showing confidence in personal learning abilities</td>
<td>2</td>
</tr>
<tr>
<td>Actively involved in learning</td>
<td>4</td>
</tr>
<tr>
<td>Responding to new information or evidence</td>
<td>3</td>
</tr>
<tr>
<td>Disengagement</td>
<td>1</td>
</tr>
</tbody>
</table>

LP = Lower Primary

Frequency codes: 1 = rarely; 2 = sometimes; 3 = most of the time; 4 = all of the time.
Table 4.39
Knowledge, Attitudes and Behavioural Intentions of Typical Student involved in Water Quality Lesson (2007)

<table>
<thead>
<tr>
<th>Knowledge:</th>
<th>What helped me learn?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Things I learned about caring for the environment?</td>
<td>“The water has improved a lot since last year. Last year when we poured water into the tube it was very dirty; this year it was clear”.</td>
<td>“Being at the lake”. Listening to an adult or teacher; talking to a friend, &amp; doing something in the environment.</td>
</tr>
<tr>
<td>Attitudes:</td>
<td>What was it that made me change?</td>
<td>My feelings</td>
</tr>
<tr>
<td>Have I changed the way I feel about the environment?</td>
<td>“Yes, learnt something new and feel happy about this. Remembering how dirty the water was last year and how clean it is this year”.</td>
<td>“I found more creatures in the lake and saw the water was cleaner”. Seeing &amp; doing something in the environment.</td>
</tr>
<tr>
<td>Behavioural Intentions:</td>
<td>What made me think about doing something for the environment?</td>
<td>My feelings</td>
</tr>
<tr>
<td>Do I think what I learned will change what I’ll do for the environment?</td>
<td>“Yes, I will clean up rubbish from around the lake. I have been going for walks with mum. We take a plastic bag and pick up rubbish as we go. We walk around a local lake”.</td>
<td>“Seeing the rubbish. Something I saw later - there was less rubbish around”. Seeing something in the environment.</td>
</tr>
</tbody>
</table>
Table 4.40
Knowledge, Attitudes and Behavioural Intentions of Typical Student involved in Garden Lesson (2007)

<table>
<thead>
<tr>
<th>Knowledge:</th>
<th>What helped me learn?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Things I learned about caring for the environment?</td>
<td>“No hurting plants. Not to step on roots. Plants need care and watering. Beans need a frame to grow up”</td>
<td>“Being in our garden. You did it and heard what the teacher said”. Listening to an adult or teacher &amp; doing something in the environment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attitudes:</th>
<th>What was it that made me change?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have I changed the way I feel about the environment?</td>
<td>“Fun – gardening is a lot of fun. Doing the planting, digging the hole and covering over the seed with dirt”.</td>
<td>“Doing it with my friends”. Talking to a friend &amp; doing something in the environment.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Behavioural Intentions:</th>
<th>What made me think about doing something for the environment?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do I think what I learned will change what I’ll do for the environment?</td>
<td>“Gardening at home. I’ll do more of it. I like it”.</td>
<td>“Doing things in the school garden”. Doing something in the environment.</td>
</tr>
</tbody>
</table>

Upper Primary

The EfS learning context for both Upper Primary classes was a visit to the oblong turtle research site, located adjacent to a nearby lake. Prior to the observed lessons the students had discussed many issues associated with turtle habitat, classification, internal and external features, diet, life cycle, nesting requirements and threats to survival. During the observed lesson children were engaged in a ‘turtle egg hunt’, searching for predated turtle nests surrounded by broken eggs shells. They also collected rubbish walking to and from the site, and at the site; two full buckets each time. Teachers made explicit links between issues impacting on turtles and environmental sustainability. Table 4.41 presents results of these observations. Overall, students were very focused and active during the egg hunt and follow-up discussions; in particular they shared their learning with others, purposefully manipulated objects and ideas, were actively involved in learning and responded to new information. Students in one class rarely made links and transferred skills, but sometimes did in the other class. Both classes were rarely disengaged.
Table 4.41

Student Engagement in Learning Behaviours for Turtle Research Lessons (2007)

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Frequency of Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UP 1</td>
</tr>
<tr>
<td>Sharing learning with peers and experts</td>
<td>4</td>
</tr>
<tr>
<td>Making links and transferring ideas and skills</td>
<td>1</td>
</tr>
<tr>
<td>Initiating/showing responsibility for their own learning</td>
<td>2</td>
</tr>
<tr>
<td>Purposefully manipulating objects and ideas</td>
<td>3</td>
</tr>
<tr>
<td>Showing confidence in personal learning abilities</td>
<td>2</td>
</tr>
<tr>
<td>Actively involved in learning</td>
<td>4</td>
</tr>
<tr>
<td>Responding to new information or evidence</td>
<td>3</td>
</tr>
<tr>
<td>Disengagement</td>
<td>1</td>
</tr>
</tbody>
</table>

UP = Upper Primary

Frequency codes: 1 = rarely; 2 = sometimes; 3 = most of the time; 4 = all of the time.

Self administered student questionnaires were conducted after the lessons. Table 4.42 presents a typical student’s response to questions about knowledge, attitudes and behavioural intentions arising from the turtle site experience. In brief, the student was interested and surprised by the new things learnt about caring for the environment and intended to be more conscientious about keeping her dog on a lead and disposing of rubbish appropriately.
Table 4.42
Knowledge, Attitudes and Behavioural Intentions of Typical Student involved in Turtle Research Lesson (2007)

<table>
<thead>
<tr>
<th>Knowledge: Things I learned about caring for the environment?</th>
<th>What helped me learn?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Rubbish dropped in the street ends up in the water system. Not controlling animals and consequences for turtle nests. Turtles have difficulty in finding a place to breed – weeds, predation and grass on the verge of the lake. Turtles have fabricy, soft eggs, not hard like a chook egg. Don’t wander off into the grass – if you see a snake back away quietly”.</td>
<td>“Rubbish – seeing it all collected in big amounts. No trace of hatchlings getting there to the lake. How many nests were predated”.</td>
<td>Interested</td>
</tr>
<tr>
<td></td>
<td>Listening to an adult or teacher, seeing &amp; doing something in the environment.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attitudes: Have I changed the way I feel about the environment?</th>
<th>What was it that made me change?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>“If I see a snake I know what to do. More conscientious about my dog when walking [so he doesn’t predate any nests]. Sad to see how much rubbish is about - more conscientious about walking to the bin”.</td>
<td>“Seeing the impact of predation on turtles, and rubbish and weeds at the site”.</td>
<td>Surprised</td>
</tr>
<tr>
<td></td>
<td>Seeing something in the environment.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Behavioural Intentions: Do I think what I learned will change what I’ll do for the environment?</th>
<th>What made me think about doing something for the environment?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>“More conscientious in the environment and look after it better, especially regarding my dog and correct disposal of rubbish”.</td>
<td>“Seeing nests being destroyed by predation and weeds brought into Australia”.</td>
<td>Interested</td>
</tr>
<tr>
<td></td>
<td>Seeing something in the environment.</td>
<td></td>
</tr>
</tbody>
</table>

Observations 2007

Students from all classes were observed working in a range of learning contexts – conducting lake water quality assessments, planting seedlings in the permaculture garden and participating in the turtle research project. Across the various lessons students shared their learning with others, purposefully manipulated objects and ideas, were actively involved in learning throughout the whole lesson and responded to new
information or evidence. Behaviours that were less frequently observed were making links and transferring ideas and skills, showing responsibility for their own learning and confidence in personal learning abilities.

Interviews conducted after each observation found students gained new knowledge about caring for the environment, changed their attitudes about the environment and indicated changed behavioural intentions. New knowledge about caring for the environment ranged from enhanced awareness of diversity of lake life, gardening skills and the impact of weeds and predation on native animals. Typically, students indicated listening to the teacher, as well as seeing and doing something in the environment, facilitated this learning. Furthermore, across all classes, children were interested in what they learnt. Students reported changed attitudes about the environment, including the importance of appropriate rubbish disposal and enjoyment of gardening. Students stated these changed attitudes arose from group discussions, and seeing and doing something in the environment, and they felt excited, surprised or happy about this. Changed behavioural intentions were also reported by students. These intentions ranged from independently studying bugs and worms in the local environment, engaging in more gardening activities and being more conscientious about keeping pets under control in bush areas. Students indicated seeing and doing something in the environment influenced their behavioural intentions, and they were calm, interested or excited about participating in these actions.

Overall, the Environmental Learning Outcomes Survey provided additional evidence supporting the positive impact of the EfS program (RQ 2). The following section draws on these findings, together with the 2007 teacher and student surveys and document search data, to summarise developments in the school between 2005-2007 in relation to the impact of the EfS program and AuSSI-WA.

### 4.2.5 Summary Post AuSSI-WA 2005 – 2007

The school joined the AuSSI-WA pilot program at the beginning of 2005. During the following three years, 2005 - 2007, major developments in EfS occurred. These developments are summarized in the sustainability timeline in Figure 4.11. Document searches, field notes, teacher and student surveys and observations provided evidence for this steady growth in EfS understandings and policy and procedural documentation (RQs 2 and 3). The community was consulted about its vision for sustainability, a
1990 School started - *nature* a key focus; philosophy of sustainability discussed e.g. energy and water saving ideas and gardening.

1991 Celebrations important i.e. community rituals e.g. concert ‘Epic Journey of the Blue People’.

1992-2001 (specific dates unavailable):
- **Environmental sustainability** projects included: gardening including; permaculture veggie garden with herb spiral; wheat-to-bread hands-on learning activity; keeping hens, a lamb, rabbits and guinea pigs, birds and fish; frog pond development; ‘science by the lake’ water quality monitoring; planting native trees and shrubs in adjacent park land; used recycled rubbish for arts and craft (from CATS); paper recycling within the school.
- **Social sustainability** of the school community: rituals and concerts; eco-camps e.g. Nanga Bush Camp ‘Council of All Beings’; Yoga classes; Fathers’ group; Virtues Project.
- **Social sustainability** through community outreach projects: performances at local retirement villages; Shoes for Zaire; Oxfam Walk Against Want.

1994 **Social and environmental sustainability**: development of Jimmi Jolley adventure playground with recycled wood/tyres and a model of working with community groups plus children’s input e.g. flying fox.

1999 **Social sustainability**: Year 7 Vision Quest (annual Bibbulmun Track walk commenced).

2000 Principal change.

2002 **Sustainability systems thinking**: solar power project started; development of multi-sensory playground.

2004 Principal change.

- Support to join AuSSI-WA. Participation in inaugural Perth Sun Fair; Wastewise (paper recycling).

2005 **AuSII-WA**: Pilot school in the Sustainable Schools Initiative - vision and policy development; sustainability committee formed; other projects include solar power and the Perth Sun Fair stall; bird nest boxes; tiger snakes; tree planting; longitudinal biological survey; permaculture garden; eco-footprints; peace studies; Airwatch; Wastewise; community outreach (e.g. MakePovertyHistory, Activ Foundation City to Surf, Dolls for Africa, Knitting for the needy).

2006 Sustainability embedded into school Strategic Plan; *Switch to Sustainability* celebration; Perth Sun Fair stall; permaculture garden; many Wastewise initiatives; solar power project completed; longitudinal biological survey; park tree planting project and school planting.

2007 Principal change.

- Major sustainability projects continued including Community Water Grant (tanks, taps, toilets), Perth Sun Fair; Science of Sustainability (water resources) grant, Values Eco-education grant, Community Conservation grant (turtle watch), SALT Landcare grant (lake water quality); local sustainability festival; permaculture garden; science leaders course; longitudinal biological survey; tree planting; Waterwise. 3 EIS champions left.
unique model of sustainability was created, sustainability policies were developed, EfS activity in the school was expanded, along with teachers’ professional learning in this field. The extent of EfS activity at the school is summarised in the school’s Ecological Footprint (Figure 4.12) and Social Handprint (Figure 4.13), which were compiled by staff in Term 4, 2007.

Despite the steady expansion in the EfS vision and enactment, limitations to the school’s approach to sustainability were evident. Cautious school board support for EfS, together with declining interest from some sections of the parent community, reduced the effectiveness of a whole school approach towards sustainability. Staff concerns about workload, possible burnout, academic outcomes pressure and time to fit EfS into an already full curriculum were identified by teachers as key issues. How these various issues played out over time is reported in the following section, post AuSSI-WA 2008 - 2009.

![Figure 4.12 Ecological Footprint 2007](image-url)
4.2.6 Context 2008-2009 from Document Search and Field Notes

At the beginning of 2008 promotional materials and publications about the school continued to promote the school as a sustainable school. For example, newspaper articles about the school’s numerous sustainability endeavours (Anthony, 2008) and its participation in the Water Corporation’s water saving campaign (Hodge, 2008) highlighted the school’s previous achievements in EfS. Despite this recognition, the 2008-2009 period is characterized by a major disruption to EfS at the school.

During 2008 nearly all EfS projects and integrated EfS programming ceased. Staff reported a lack of support and the management board, sustainability committee and school community struggled with sustainability issues. Changes in school priorities appeared to gradually impact on commitment to EfS. An examination of public school records, as well as information from field notes, revealed growing staff and community awareness of constraints impacting on the approach to EfS. Consequently, by the end of 2008 it appeared the school was operating at the least sustainable end of the school sustainability continuum. (RQs 2 and 3). Documentary evidence indicated EfS policy and procedures no longer had priority in education, administration and operation of the
school. However, this perspective was by no means universal. Two staff members considered the school’s approach to EfS during this period to be satisfactory.

Three staff members with a strong active commitment to EfS, including the school’s AuSSI-WA coordinator, left the school in Term 4 2007. Evidence sourced from field notes and newsletter items suggested personnel changes impacted on the depth and breadth of EfS. Sustainability ceased to be a regular item in the school newsletter and discussion topic at staff meetings. The following vignette about the 2008 EfS priority is illustrative:

| Staff selected the EfS priority for 2008 at the end of term 4 in 2007 following a series of staff meetings that reviewed aspects of the school’s EfS program. Using resources from the AuSSI-WA toolkit, the priority staff identified for 2008 was: Recognition and promotion of successful action. However, in the 2008 teacher survey, all teachers reported being unaware of this priority. It was not articulated by school managers at any staff meetings during 2008. Interestingly, one survey respondent did not realise the EfS priority was actually being addressed in her class in Term 1, 2008. This opportunity arose as a result of class participation in the Water Corporation’s water saving campaign, ‘Students to name water conscious frog’. The publicity reportedly occurred because Water Corporation staff wanted to acknowledge the school’s 2007 work in the ‘Science of Sustainability: Healing the Swan’ project and the ‘Water Wise School’ program [field notes 08/4]. |

So although the water saving campaign resulted in positive publicity for the school, none of the teachers indicated they knew it addressed the 2008 EfS priority. EfS was no longer a priority. Indeed, throughout 2008 there was “no evaluation or discussion of EfS at a whole staff level” and by the end of the year no EfS priority for 2009 had been identified (field notes, 08/41).

Support for the EfS program decreased following staff changes at the end of 2007. Despite sustainability objectives in the Strategic Plan and Sustainability Policy, management gave no priority to ensuring existing EfS initiatives were continued by new or existing staff. The biological survey (E. Lewis & Baudains, 2007a, 2007b) and EfS values project (Sparvell, 2007) ceased. The education components of the solar power project also stopped (field notes, 09/26). The garden lacked staff support (field notes, 08/39, 09/10). A few projects were completed on a voluntary basis by one of the former EfS champions at the school, to document former successful EfS outcomes and fulfill grant acquittal requirements (field notes, 09/12). Clearly, EfS at the school faced a major challenge in 2008.
Other indications of lack of engagement with the complexities of the EfS program were obtained from field notes and an examination of school newsletters. These sources identified ‘silo’ thinking in relation to the implementation of EfS projects and the whole school Cosmic Education plan. For example, during 2008 a connection between sustainability and science was indicated in some school newsletter articles, together with commentaries on final reports of EfS grants, but information about EfS was not presented in the context of a whole school approach. Newsletters no longer outlined the EfS program in each class for each term. There appeared to be a lack of coherence between EfS programming and whole systems thinking. The total absence of any EfS professional development during 2008 appeared to contribute to this situation. As one teacher stated “Perhaps sustainability education is like when computers first came in. I found it hard to integrate computers into my lessons initially but now I do it automatically. But I had a lot of PD and support to get to the stage I am at now” (field notes, 08/19). Ongoing professional learning was recognised as an important component of a whole school approach to EfS.

Use of the school’s physical model of sustainability decreased during 2008-2009 (field notes, 08/11). At the end of Term 2 2008 the artistic representation of the sustainability model was removed from the wall of school atrium so that renovations could be undertaken. The model ceased to be taken into classrooms on a regular basis to visually reinforce the interaction of the different systems - environmental, educational, economic, health and so on. As one teacher stated “the model was only brought into the class once last year – when you [researcher] visited the class to observe” (field notes, 08/7b). This situation was typical and suggested that EfS and a whole systems thinking approach was no longer an important part of the curriculum. At the end of 2008 another teacher stated, “nothing [was] happening in sustainability any more – it is not a sustainable school any more ... sustainability is not on the radar at the school any more” (field notes, 08/34). However, it was not only staff who were experiencing difficulties engaging with sustainability. The management board and the parent community appeared to manifest challenges in addressing sustainability issues too.

Field notes and notices in school newsletters indicated that management was struggling with sustainability issues. For example, during 2008-9 the position of convenor for the sustainability committee was left vacant for over five months, and when a convenor was named, the person only stayed in the role for a short period, to be replaced by another, and so on (field notes, 08/8, 17). New convenors seemed to be overwhelmed by the
amount of work required by the position and indicated there were time-constraints regarding their degree of involvement (field notes, 08/7c). It was reported that one of the new convenors in 2008 was, allegedly, “very critical of the past” EfS endeavours, so decisions were made “without reference to the sustainability policy, and with little understanding of curriculum aspects of sustainability and links with AuSSI-WA” (field notes, 08/30). In addition, biannual sustainability reports were no longer presented to the management board (field notes, 08/7c). Finally, school management, after five years involvement in AuSSI-WA, had not formally endorsed the sustainability committee as a sub-committee of the management board (field notes, 09/4, 25 and school website November 2011). These instances suggest limited importance given to the sustainability agenda by school management (field notes, 09/5, 25).

Analysis of school newsletters in 2008 indicated that the members of the sustainability committee needed support. Frequent requests for additional community assistance appeared in newsletter items. Staff very rarely attended sustainability committee meetings and meetings were no longer held regularly (field notes, 08/7c). By the end of 2008 only three parents attended meetings regularly, and they were mainly focused on garden development, not the broad EfS vision and policy implementation (field notes, 08/7, 23 & 35). Another vignette further illustrates this level of engagement with EfS during 2008.

A newspaper article, ‘Students join parents and staff in school green team’, glowingly reported on the school’s garden and other sustainability projects. As one teacher reported, providing information for this article was a challenge for parents and staff because “the garden was in an embarrassing [neglected] condition” and “all the projects referred to were conducted in 2005–2007 and no new projects were planned for 2008” [field notes, 08/4].

Parent concern about support for the garden was an ongoing issue throughout 2008. School newsletter articles repeatedly requested support, but none appeared forthcoming. Further, denigrating references to sustainability committee members, such as, “silly ladies sitting in the garden” did not facilitate co-operative understanding and positive community relationships (field notes, 08/30). However, this situation appeared to change in 2009.

The sustainability committee was reinvigorated at the beginning of 2009 school year. As reported in the school newsletter, new parents joined the committee, the principal contributed as the staff representative, regular meetings were scheduled and the sustainability committee convenor (parent) and representative on the management board
was declared. In March 2009, a school newsletter article on sustainability at the school discussed garden developments and battery recycling. However, the newsletter made no reference to whole school EfS planning.

Analysis of school newsletters in Semester 2, 2009, revealed important developments for EfS occurred at the school. A EfS teacher was employed part-time. Furthermore, ‘Sustainability’ was identified as the curriculum topic for the semester (field notes, 09/13). A whole school focus on ‘waste’ was adopted and newsletters frequently reported lessons, excursions and initiatives on this topic (field notes, 09/16-23). Although considerable re-engagement in EfS appeared to occur this semester, whole staff engagement with the AuSSI-WA rubric for planning and assessment was not undertaken (field notes, 09/24). There seemed to be a ‘silo’ focus on ‘Sustainability’, specifically on ‘waste’, without reference to explicit teaching from a whole systems thinking approach or evaluation from a whole school perspective. Further evidence about the school’s position in relation to EfS is explored in the following sections, which report on teacher and student surveys and class observation sessions conducted during 2008.

4.2.7 Teacher Survey 2008

Eight teachers completed the survey (Appendix 2) in 2008 (RQ 3). Responses to items in the survey are presented below.

**Background Information**

In 2008 there were still six classes at the school, two Children’s Houses (3-6 year olds), two Lower Primary classes (6-8 years olds), and two Upper Primary classes (9-12 year olds). A second staff survey of class teachers employed at the school was administered. However, due to staff changes, eight class teachers participated in the 2008 teacher survey. Teachers identified strengths and limitations of the school’s approach to EfS.

**SWOT Analysis**

Responses to Question 1 (*Using a SWOT analysis chart, show your understanding of EfS at the school*) were grouped according to the twelve key elements for AuSSI-WA assessment, planning and evaluation (DET, 2010a). Representative teacher quotes are presented in Table 4.43. Responses to the SWOT analysis in 2008 indicated dramatic changes in EfS had occurred at the school since the administration of the 2007 survey.
The EfS champion had left the school and there was “not the same drive, sense of purpose and direction”, the “sustainability focus isn’t there!”.

Table 4.43
Teachers’ SWOT Analysis of Understandings of EfS at the school (2008)

<table>
<thead>
<tr>
<th>SWOT</th>
<th>Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strengths</td>
<td>Vision &amp; values: “Legacy of former EfS champion: Model”; “Children becoming used to the language and big ideas”.</td>
</tr>
<tr>
<td></td>
<td>Governance: “Legacy of former EfS champion”; “Written into the school plan”; “Cohort of original and new people in sustainability”.</td>
</tr>
<tr>
<td></td>
<td>Policy: “Legacy of former EfS champion: Four policies developed”.</td>
</tr>
<tr>
<td></td>
<td>EfS Activity: “Hands on. Making a real difference i.e. saving water (taps, tanks); solar panels; garden; worm juice”; “Legacy of former EfS champion: Kids very aware from environmental point of view”; “Wetlands/ park environment around the school – making a difference”; “Enjoying benefits e.g. fruits of garden, financial, healthier lifestyle”; “Many other interests e.g. Sunfair; lakes – revegetation, turtles, frogs, Rock and Water – emotional &amp; inner strength”.</td>
</tr>
<tr>
<td></td>
<td>Teaching &amp; learning: “Legacy of former EfS champion: High awareness amongst ... staff and children on certain aspects of it”; “Staff commitment with assistance”.</td>
</tr>
</tbody>
</table>
|            | Curriculum integration: “Teachers integrate sustainability into lessons”;
<p>|            | “Slightly more embedded in the curriculum when teachers do planning. Some sustainability activities are embedded into usual behaviours e.g. worm farming, the garden, recycling paper and batteries”; “Legacy of former EfS champion: documentation”. |
|            | Reporting: “Legacy of former champion: Info collected to improve outcomes”.                                      |
|            | Student voice: “Involves lots of children and especially caters for children with strong interest”; “Legacy of former EfS champion: strong student involvement”. |
|            | School networks: “Legacy of former EfS champion: Values and ASISTM projects linked other schools”.                |
|            | Community networks: “Sense of community involvement. Sweet potatoes... on big tray for everyone”; “Legacy of former EfS champion: High awareness amongst parents ... on certain aspects”. |
|            | Recognize action: “Legacy of former EfS champion: conference posters &amp; newspapers”.                              |</p>
<table>
<thead>
<tr>
<th>SWOT</th>
<th>Elements</th>
</tr>
</thead>
</table>
| **Weaknesses** | **Vision & values**: “Sustainability lost its [champion] so EfS program isn’t as ‘in your face’ – not the same drive, sense of purpose and direction; almost as if there is no clarity about where we are going”; “Since [champion] left I don’t know what is happening and I don’t know who is co-ord it. Getting everyone on board to make a whole school focus”; “[Sustainability] runs the risk of being only environmental because of limited understandings by some members of staff and the community”; “Not one hundred percent applicable to Children’s House – more applicable to upper primary”.  
**Governance**: “Since convenor [teacher] left I don’t know who what is happening and I don’t know who is co-ordinating it [committee]. Principal and management board and changes in school – sustainability focus isn’t there!”; “Capacity building in sustainability was not adequate due to turnover in management board; there have been 4 convenors of [sustainability committee] plus 2 periods with no …convenor”; “People couldn’t handle the sustainability work; they realized how much time it takes”; “Sustainability is written into the school plan …[but] commitment and focus is not well understood”.  
**Professional learning**: “Staff lack of understanding of what EfS is about; didn’t click that Human Development is part of EfS”; “No professional development”; “Staff changes”.  
**Teaching & learning**: “Time – impacts on class program; large amount of time to write grant applications, proof of enactment and people to man stations i.e. organizing. People had to see the time it takes to co-ordinate sustainability”.  
**Curriculum integration**: “Inclusion in the timetable everyday, every week”.  
**Community networks**: “Burn out of the few people actively involved. Consistent help not available –depend on variable parent help”; “Parents [understand] at a basic level”; “One pressure group within sustainability trying to dominate”. |
<table>
<thead>
<tr>
<th>SWOT</th>
<th>Elements</th>
</tr>
</thead>
</table>
| **Opportunities** | **Vision & values:** “Ease of focus on environmental – but sustainability is much more than environmental; need to return to being a sustainable school and where it fits in the big picture of sustainability”; “Opportunities to see ongoing results of effort”; “Knowledge that individuals can make a difference”; “Develop our understandings re living a sustainable lifestyle”.
| **Policy:** | “New people had to build on EfS - need consistency in articulation”.
| **EfS Activity:** | “[Leader] brings up new ideas [for environmental sustainability]”; “Children to be exposed to [sustainability] issues and work at them”; “Actively involved in the local environment”.
| **Teaching & learning:** | “[Leader] very keen on environmental education for the gifted program”; “Concerned so much is wasted e.g. paper was being wasted in the class so I stopped some of this waste e.g. children making countless paper aeroplanes”.
| **Curriculum integration:** | “Science, SOS, language, maths responsibility. Life skills for strength & flexibility. Huge, across all areas”.
| **School networks:** | “Partial working knowledge for things to do outside school e.g. in the community, with other schools and organizations”.
| **Community networks:** | “For the community to work together on common projects”; “Sharing produce”; “Same opportunities for the children to be involved in worm farming, the garden, recycling paper and batteries”; “Partial working knowledge for things to do outside school e.g. at home, in the community”; “Staff and parents step up to the mark & take on a responsibility”.

<table>
<thead>
<tr>
<th>SWOT</th>
<th>Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threats</td>
<td><strong>Governance:</strong> “Not having a passionate leader at the school. Without someone strong to drive it, it will eventually fall apart. Need the principal to be on board. Without someone strong to drive it, it will eventually fall apart”; “[Principal]... talks the talk and won’t take the time to learn to understand it; need to find a way to engage”; “Need [school board] to be on board - in 2008 there have been 4 convenors [of sustainability committee] plus 2 periods, over two months long, with no one accepting the role of convenor”; “Need principal and management to be on board from a Strategic Plan point of view – not really engaging with the sustainability aspect at all; just token support”.</td>
</tr>
<tr>
<td></td>
<td><strong>Policy:</strong> “New people had to build on EfS ... some people too busy to e.g. read and understand existing... policies and so did their own thing!”; “Lack of support - money for seedlings”.</td>
</tr>
<tr>
<td></td>
<td><strong>EfS activity:</strong> “Not a way of living that can be done half-heartedly e.g. algae growth in tanks over summer needed cleaning; ongoing collection of food scraps for worms”.</td>
</tr>
<tr>
<td></td>
<td><strong>Professional learning:</strong> “No professional development for EfS planned so knowledge as a staff is not going to move forward”.</td>
</tr>
<tr>
<td></td>
<td><strong>Teaching &amp; learning:</strong> “Loss of personal life - as ‘passion’ or project takes up way too much time to be sustainable”; “Enormity of things you can get involved in re sustainability – how to prioritise?”.</td>
</tr>
<tr>
<td></td>
<td><strong>Community networks:</strong> “Lack of support - need parent helpers”; “Parents saying [teachers] not doing enough to support them re sustainability endeavours”; “Burden on too few e.g. only 3 people worked in the garden digging up the sweet potatoes”.</td>
</tr>
</tbody>
</table>

Nevertheless, teachers referred to the strengths of EfS and indicated some of these resulted from the “legacy of former EfS champion”. Various opportunities arising from their EfS approach were highlighted, such as curriculum integration. One respondent considered the potential for this to be “Huge, across all areas”. Numerous threats to EfS were identified. For instance, in relation to the school’s sustainability policy, “people [were] too busy to e.g. read and understand existing... policies and so did their own thing!”. Table 4.44 summarises where teacher responses occurred in terms of the AuSSEI-WA elements for assessment, planning and evaluation (DET, 2010a).
Table 4.44
Elements Identified in Teachers’ SWOT Analysis (2008)

<table>
<thead>
<tr>
<th>Elements</th>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vision and values</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>School governance</td>
<td>*</td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>School policy</td>
<td>*</td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>EfS Activity</td>
<td>*</td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Professional learning</td>
<td>*</td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Teaching and learning:</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td></td>
</tr>
<tr>
<td>Curriculum integration</td>
<td>*</td>
<td>*</td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Reporting</td>
<td>*</td>
<td></td>
<td></td>
<td>*</td>
</tr>
<tr>
<td>Student voice</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>School networks</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Community networks</td>
<td>*</td>
<td>*</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Recognition of action</td>
<td>*</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Teacher responses indicated the elements of professional learning, teaching and learning, and community networks manifested strengths, weaknesses, opportunities and threats. Responses about vision and values and curriculum integration related to strengths, weaknesses and opportunities, while policy was strengths, opportunities and threats. School governance was reported in the context of strengths, weaknesses and threats and EfS activity was viewed in terms of strengths, opportunities and threats. Reporting and school networks were discussed as involving strengths and opportunities. Student voice and recognition of successful action were identified as strengths only, as in 2007. Overall however, the 2008 SWOT analysis suggested major changes in EfS had occurred since the administration of the 2007 SWOT.

**Impact of the Montessori Philosophy**

Responses to Question 2 (*What do you think is the impact of the Montessori philosophy on EfS at the school?*) were all positive. Respondents outlined the impact of Montessori philosophy in terms of eco inter-relationships, the learning and classroom environment and values (Table 4.45). Overall, teachers maintained the impact of Montessori philosophy on EfS was beneficial to students, staff and the wider world. The impact of AuSSI-WA on EfS at the school was explored in the next question.
Table 4.45

| Eco inter-relationships | “Montessori’s biggest focus was on children and nature”; “Need to bring the children back to nature to calm them”; “Preserving environmental and ecological balance e.g. frogs and reeds beyond school boundaries – impact in the wider world”; “Ecology in the Cosmic Curriculum fits perfectly – all those inter-connections (enviro & human spheres)”.
| Learning/classroom environment | “Practical life activities go hand in hand with sustainability. All the work on the human body is all in the Montessori curriculum”; “It has given staff good motivation to take on EfS as a greater part of their program – they see it as important”.
| Values | “Child-centred; Montessori’s belief in sustainability and spirituality, love of nature; incorporates sustainability into the curriculum - definite benefits for the children. Idea that humans are responsible for their world and what happens on a small scale impacts on the whole ie cosmic responsibility”; “Most staff feel and believe we have a responsibility today for tomorrow. Montessorians look to the future society”.

Impact of AuSSSI-WA

Responses to Question 3 (What do you think is the impact of the Sustainable Schools Initiative on EfS at the school?) were positive and negative (Table 4.46). Teacher responses were mixed, indicating involvement in AuSSSI-WA had substantially decreased. Negative responses reflected lack of teacher and community engagement in sustainability since the EfS champion left the school and support withdrawn. Positive impacts included the AuSSSI guidelines (toolkit) and carry-over projects from previous years. A similar dichotomy of responses was obtained in the following question about the impact of the school’s Strategic Plan.
Table 4.46

<table>
<thead>
<tr>
<th>Positive Impact</th>
<th>Negative Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Regular contact with other schools, able to get ideas from them, collaboration”</td>
<td>“Not much since [EfS champion] left – need volunteers and an organizer. Only active in the garden at present. Not mentioned at Staff Meetings at all now; going on without the SSI input that we had in the past”; “Not hooked into it in the last few terms”; “Montessori children know not to waste paper i.e. paper to write/draw on, not make paper planes – shouldn’t be wasting paper”; “Can’t comment; don’t know”</td>
</tr>
<tr>
<td>“Gives us guidelines on how to work with the children, projects, etc. Opens up research to companies and other schools in the same project. Made aware of grants”; “Impact e.g. the bicycle/car smart program from last year – there is a family I know that is still riding to school”; “Staff keen to keep it going e.g. batteries, garden etc”</td>
<td></td>
</tr>
</tbody>
</table>

Impact of the Strategic Plan
As above, responses to Question 4 (What do you think is the impact of the Strategic Plan in relation to the sustainability vision on EfS at the school?) were mixed (Table 4.47). Positive responses focused on possible potential benefits from the Strategic Plan for EfS, however, other responses documented the failure of the Plan to have any impact on EfS. Impact of the school’s model of sustainability is investigated in the next question.

Table 4.47
Teacher Perspectives on the Impact of the Strategic Plan (2008)

<table>
<thead>
<tr>
<th>Positive Impact</th>
<th>Negative Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Supports EfS commitment to future of sustainability at our school; consciousness raising; ability to participate recognized; offering science to those who enjoy it. Because EfS is in the Strategic Plan it is something we are forced to address; this is a positive thing for the future because it is documented and embedded into the Plan. In theory, excellent umbrella for EfS vision for whole school. At the Strategic Plan meeting people were passionate about sustainability”; “Means we review our progress regularly – sustainability is built into all areas of the plan - ensures our commitment”</td>
<td>“No impact because no one has looked at the Strategic Plan so far this year”; “Not aware. Have heard talk about the Strategic Plan, but not seen any action or direct link”; “NOT effective – sustainability vision is in there [the Strategic Plan] but not living. Need to work on EfS in the Operational Plan”</td>
</tr>
</tbody>
</table>

Impact of the Sustainability Model
Responses to Question 5 (What do you think is the impact of the sustainability model on EfS at the school?) were varied (Table 4.48). Respondents noted the gap between the potential and the actual impact of the model. Even though teachers thought the model
helped children understand the interconnectedness of different aspects of sustainability, it was not being used. A description of the model is presented in the school’s Sustainability policy (Appendix 6), and the respondents’ ideas about the impact of this policy are explored in the following question.

Table 4.48
Teacher Perspectives on the Impact of the Sustainability Model (2008)

<table>
<thead>
<tr>
<th>Positive Impact</th>
<th>Negative Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Shows how everything works together and helps everyone to see links”; “Huge - very clear, graphically shows interconnectedness, categorises specific areas clearly and introduces the terminology of sustainability”; “Visual - we see it; the children see the flower; the 5 year olds see the colour and the colour is what they connect with the word”; “The way the model is drawn- the children seem to know the colourful flower. It demonstrates how all things link back or connect with sustainability”; “Very well developed and presented and language used. Links into all our curriculum and mission as a school. Impact of model personally – huge; it is a visual way to develop my understanding of EfS. Plus, it has helped the children because I refer to it when talking about sustainability ... and I’ve heard parents talk about it”; “Enormous; represents the whole approach”.</td>
<td>“Don’t know what the model is”; “The model was removed from the atrium at the beginning of July – it is behind the Library door; the walls are being repainted and then I understand the model is going to go up again. Model is not up and/or used for months”; “The model needs to be active - hands-on and doing”; “Model may be lost in the curriculum”; “The model is on display behind the computers in the library; not used in lessons”.</td>
</tr>
</tbody>
</table>

Impact of the Sustainability Policy

Responses to Question 6 (What do you think is the impact of the sustainability policy on EfS at the school?) were mixed (Table 4.49) and highlighted the disparity between the potential of the policy and its actual impact. As one teacher stated, the policy had “Not operated at all”. Numerous responses indicated teachers had not read the policy.

Table 4.49

<table>
<thead>
<tr>
<th>Positive Impact</th>
<th>Negative Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Clear about each area which helps the school to focus their direction”; “Good to have the policy”; “Impact – school and community share the focus; all have identified the need and desire for sustainability education”.</td>
<td>“Can’t comment; not read it”; “I don’t know if it [policy] is followed”; “I don’t know what it says”; “Not as big impact as could have. Needs to be reviewed to see where we are at”; “Not sure; not read. Not operated at all”.</td>
</tr>
</tbody>
</table>
Impact of Sustainability Focus Each Term on Students

Although teachers were encouraged to embed a sustainability focus into their programs every term, it appeared to decrease between the 2007 and 2008 surveys. Responses to Question 7 (What do you think is the impact on your class of having a sustainability focus every term?) were generally positive, however negative comments suggested implementation was ad hoc and superficial. Teachers said there is “too much lip service about EfS” and there “no integration of EfS into the curriculum in the other classes” (Table 4.50). These aspects were elaborated further in responses to the next question about the impact of the sustainability focus on teachers themselves.

Table 4.50
Teacher Perspectives: Impact of Sustainability Focus Each Term on Students (2008)

<table>
<thead>
<tr>
<th>Positive Impact</th>
<th>Negative Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Keeps the focus alive, builds on previous knowledge and deepens their awareness. In the past, really important because it was good training for me and all staff; I had a practical understanding of EfS</em>; “Currently, for my class - garden and battery recycling etc. is ongoing; I have integrated EfS into my Mayan and Inca societies curriculum”; “In Science – Natural and Processed Materials – did … bees, Indigenous component, dying from skins of plants, crystals for Upper Primary. Life and Living – birds ‘Stepping Stones’ approach, bugs and birds – connectedness of thing”; “Yes, recycle every day, saving water every day, recognizes humans co-dependence in the environment, lifestyles protected – both humans and animals, local and global issues, concern about whales. Positive e.g. paper recycling and worm farming. Children seem very aware and use sustainability language in other subjects. They are aware of the paper, water, etc. that they use and they are aware of the contribution they can make. If they catch bugs they are aware they need to return them to the right environment”.</td>
<td>“Hasn’t happened - no sustainability focus; although we have just started feeding the worms again [June]”; “In the past, really important ... Now, too much lip service about EfS”; “There is no integration of EfS into the curriculum in the other classes”.</td>
</tr>
</tbody>
</table>

Impact of Sustainability Focus Each Term on Teachers

Representative responses to Question 8 (What do you think is the impact on you of having a sustainability focus every term?) are presented in Table 4.51. Teachers indicated having the sustainability focus helped them “with planning” but these responses were general and vaguely worded. In contrast, the negative impacts on the teachers themselves referred to time constraints, difficulty integrating sustainability into the curriculum and the lack of parent support. Examples of actual sustainability programs the teachers implemented are reported in the following section.
### Table 4.51
**Teacher Perspectives: Impact of Sustainability Focus Each Term on Teachers (2008)**

<table>
<thead>
<tr>
<th>Positive Impact</th>
<th>Negative Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Helps with planning – means we know it will always be part of the program. Love it- for Montessori; sustainability and Montessori blend in. Children are the future of this Earth so I see it as a duty, an opportunity, to share what we can with the future in mind – children need to be taught in school about sustainability; this will have an impact at home; it will change a person’s thinking. Share knowledge and skills with the kids. Reinforce notion that kids soak enviro science up. Very heartening. I live sustainably at my house so it is easy to maintain at school”; “Two impacts: (i) forces me to examine my own understandings of sustainability and how it links into the real world; and (ii) children become more aware; make it easier – they point things out now; make links to sustainability”</td>
<td>“Time for focus on integrated themes i.e. next term is Ancient China; it would be looking at sustainability from that angle”; “Integrating it into the curriculum because there is so much other stuff to cover”; “Not having parent help e.g. need a certain adult/student ratio to go to the lake but hard to get”; “How to integrate it into every part of the curriculum – in a minor way”</td>
</tr>
</tbody>
</table>

### EFS Programs

Teachers were asked to: describe, in as much detail as you can, one program in your class that is a good example of your approach to EFS (Question 9). Program responses varied in length and covered the categories of waste, water, biodiversity and wellbeing, although three teachers indicated they had not implemented any programs that year (end of Term 2, 2008) which reflected their approach to EFS (Table 4.52). So, although six programs were described, some were implemented in the same class, and some were conducted during the previous year. Two of the six programs mentioned (Worm farm and ‘Healing the Swan’) were 2007 projects, not part of the 2008 program. The ‘bird focus’ 2008 program was an EFS program, however it focused on ‘Life and Living’ outcomes rather than a ‘Natural and Processed Materials’ outcomes (Curriculum Council, 1998) as required by the whole school curriculum plan. The remaining three programs (Needs & Wants, Mayan and Inca societies, Human Body) followed the curriculum plan for 2008 but links with EFS appeared to be vague, ad hoc or non-existent.

In responding to this question three teachers discussed incidental, ad hoc ‘teachable moments’, rather than their class programs. Incidental lessons were reported in the categories of waste, water, biodiversity, energy and wellbeing. Table 4.52 separately
identifies these incidental lessons from the programs outlined above. Nearly all these incidental lessons referred to EfS programs from previous years: waste (recycling program, 2006); water (design and technology for construction of a Coolgardie Safe, 2007; water audits and installation of rainwater tanks, 2007); biodiversity (garden project, 2006-7; reed planting, 2007); and energy (solar power project, 2002-2006). These responses indicated, therefore, that some pre-2008 whole school EfS programs displayed long term recall by teachers and students. The following section reports on another aspect of whole school programming, specifically, the relationship between the programs and the EfS priority identified to be addressed in these programs.

At the end of 2007 teachers utilised the planning resources in the AuSSI-WA toolkit (DET, 2010a) to identify the whole school EfS priority for 2008. They selected ‘recognition and promotion of successful action’ as the EfS priority for the following year. Teacher feedback about the EfS priority was sought because it related to effective whole school programming for EfS. Consequently, an addendum to question 9, about the 2008 EfS priority, was included in the 2008 teacher survey. Respondents were asked *What action, if any, have you taken so far this year regarding the identified EfS priority for 2008?* Teachers responded in three ways: stated they didn’t know what the EfS priority was; had taken no action; and/or had numerous concerns about the priority (Table 4.53).

All respondents stated they did not know the EfS priority for 2008. Three teachers also made clear statements indicating that no action had been taken on the priority, including “not this year; not seeing anything happening”. Respondent concerns about the EfS priority related to insufficient principal support, lack of whole school focus and commitment, and immediate operational problems (like smelly water tanks and fire in the garden). In brief, possible relationships between the identified EfS priority and class programs were not reported.
### Table 4.52

**Teacher Perspectives on EfS Programs (2008)**

<table>
<thead>
<tr>
<th>Waste</th>
<th>Program (2007): “Worm farm – language, play, whole science topic on worms and classification of annelids.”.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Incidental (2008): “Recycling: waste paper has been significantly reduced. I read them the book called “the Living Tree” – to get every bit of paper trees get chopped down, so don’t waste paper”.”</strong></td>
</tr>
<tr>
<td>Water</td>
<td><strong>Program (2007): “Healing the Swan” involved working with other schools, collaborating in groups, using experts from the community including an Aboriginal elder. Involved visiting many sites along the Swan River and taking water samples, assessing the area and learning about the Aboriginal significance. The students put into practice some of what they had learned previously (i.e. water testing) and had a clear picture of the state of the river, how it had changed, what was likely to change and why, as well as what could be done)”.</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Incidental (2008): “Using water – Coolgardie safe to keep food cool. Water tanks stank and we couldn’t turn the taps on. Floods in the bathroom – children were concerned about the waste of water”.”</strong></td>
</tr>
<tr>
<td>Biodiversity</td>
<td><strong>Program (2008): “Bird focus - all the complexities depending on the year level. I was looking at e.g. Children’s House – adaptations of birds, how they feed and impact in own gardens; older children – connections e.g. ravens and litter around the school. Children starting to think about the complexities – this throws questions to them; solve it themselves”.”</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Incidental (2008): “Re-planting reeds at the lake [in 2007] - Children’s House students with older siblings told them about it. Fire in garden outside the class in the front garden; children concerned the trees would die and this would impact on the local wildlife”.”</strong></td>
</tr>
<tr>
<td>Energy</td>
<td><strong>Incidental (2008): “Students do work without lights on – links to math activities and to the weather – don’t need as much light in summer”.”</strong></td>
</tr>
<tr>
<td>Wellbeing</td>
<td><strong>Programs (2008): “We are studying ‘Needs and Wants’…about the human body and S&amp;E. In S&amp;E we are comparing Africa &amp; Australia re shelter, food, clothing. I want our children to know how fortunate Australians are”; “Studying Mayan and Inca societies; groups of children research set topics e.g. food and farming, clothing, the rise and fall of the civilization. At the end of the unit we will have a big cross-classification chart re how they met their needs &amp; what caused them to die out”; “Human Body-healthy eating - fruit and vege”.”</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Incidental (2008): “Leadership e.g. (i)EfS must start in the Children’s House; (ii) I am working with staff in Science – resulted in the teachers’ “lights going on” re issues explored”.”</strong></td>
</tr>
</tbody>
</table>
### Table 4.53

**Teacher Action on EfS Priority (2008)**

<table>
<thead>
<tr>
<th>Don’t know EfS priority</th>
<th>“What is the priority?”; “Don’t know what the priority is”; “No idea what the priority is”; “What do you mean?”</th>
</tr>
</thead>
<tbody>
<tr>
<td>No action</td>
<td>“Not this year; not seeing anything happening”; “Haven’t taken action yet”; “On the backburner overall”</td>
</tr>
<tr>
<td>Concerns</td>
<td>“Lack of Principal support - sustainability not a priority, EfS grants and projects terminated; all gloss - talk the talk, that’s all. Not operating at the whole school level”; “Day to day careful usage of resources in the classroom – water, paper, pencils, etc. but sustainability not big focus”; “Even though we’re meant to be a WaterWise school – no commitment to this year; it is not priority. Being Water Wise was not raised for discussion in any context this year. Priorities – the water tanks stank and we couldn’t turn the taps on. Floods in the bathroom … fire in the garden outside the class”.</td>
</tr>
</tbody>
</table>

**Interests Neglected**

Responses to Question 10 (Do you think the school’s current approach to EfS ignores the interests of anyone?) were dichotomous (Table 4.54). Five respondents thought no interests were being neglected, but two expressed concern about perceived inadequacies related to the level of school community involvement. These concerns were inferred again, in response to Question 11, which asked whether any other interests were being ignored.
Table 4.54
Teacher Perspectives: Interests Ignored by Approach to EfS (2008)

<table>
<thead>
<tr>
<th></th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anyone:</td>
<td>No (x5). &quot;Open forum allows and encourages anyone with a passion to come forward&quot;.</td>
<td>&quot;Some people don’t feel part of the project. How to get everyone on board? … The sense of belonging more evident? Need to get to people not converted [to sustainability] in the school community. How do different cultural groups get hooked in - even less opportunity with the current principal&quot;.</td>
</tr>
<tr>
<td>Anything:</td>
<td>No (x4). &quot;Wholistic approach adopted here, staff are well informed; most teachers live principles [of sustainability] personally; there are opportunities to be included in sustainability activities on a regular basis&quot;.</td>
<td>&quot;Don’t know where to begin; the school’s current approach ignores most of sustainability; … leader’s philosophy inherently linked to this lack of focus. The children, staff and parents voices have been silenced. There is a lack of understanding of what sustainability means. The sustainability part of the Strategic Plan – too much lip service. The EfS priority for 2008 – no mention at Staff Meetings this year – not important. Lately lots left out because [EfS champions] left; interest in sustainability is waning. People who feel strongly about sustainability are not feeling supported and children miss out on great projects&quot;.</td>
</tr>
</tbody>
</table>

In response to question 11 (Do you think the school’s current approach to EfS ignores the interests of anything?), four teachers indicated that no ‘things’ were being neglected by the school’s approach to EfS. One respondent added, a “wholistic approach adopted here... there are opportunities to be included in sustainability activities on a regular basis” (Table 4.55). This response may be juxtaposed with feedback from one of the three respondents who thought that many ‘things’ were being ignored: “Don’t know where to begin; the school’s current approach ignores most of sustainability” (interviewee laughed before responding). This dichotomy in teacher response (lived experience) was reinforced by other concerned respondents who mentioned “lip service” to sustainability, “people not feeling supported” and students “miss out on great projects”. From an AuSSI-WA perspective, these issues relate to concerns with vision and values, governance, EfS activity and community networks. The survey concluded with an open-ended question inviting teachers to add comments about EfS.

**Final Comments**

Question 12 asked respondents for concluding comments (Is there anything else you would like to add regarding EfS at the school? Any improvements? Any concerns?). Comments were classified as facilitators or barriers to EfS. All five responses to this question mentioned barriers for implementation of EfS, including leadership, lack of
support, loss of the EfS champion and the need for ongoing staff professional development (Table 4.55).

Table 4.55
Teachers’ Final Comments: Barriers to EfS (2008)

<table>
<thead>
<tr>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>“EfS was something that sets the school apart; would really market the school like it used to. Can’t sell it that way anymore – the principal doesn’t understand EfS … [or] community; leadership doesn’t have an understanding of what interconnectedness means … [the school] can’t articulate a wholistic EfS framework in this context. Historical philosophy of [the school] was very sound. The school is now in no-man’s-land; in a divide between what the school had and where it is now. Need commitment from passionate people. Sustainability committee needs to be supported – too few people. Management [school board] and the principal need to look at the Operational Plan so that we can put new energy into the policy and this will flow out to teachers, students and the community”; “Need ongoing PD”; “My concern is finding someone prepared to step into the empty space [left by EfS champion] and commit 30-40 hrs a week to ensure all these projects can take place”; “Too far for Children’s House students to work in the permaculture garden – so gardening… neglected”.</td>
</tr>
</tbody>
</table>

Overall, the 2008 teacher survey provided detailed information about the school’s approach to EfS (RQ 3). Barriers to EfS were identified. The next section of this chapter reports on the same educational time period, from the student perspective.

4.2.8 Student Survey 2008

All students attending the school completed a second survey about their sustainability learning experiences a year after the initial student survey (RQ 2). The surveys were again completed as part of students’ usual class work and only those with signed permission forms (54) were included in the study. The 2008 survey was identical to the 2007 student survey. The same three survey forms – for Children’s House, Lower Primary and Upper Primary – were administered. Student responses were categorized, as previously, using the AuSSI-WA (DET, 2008b) action learning areas. Results from the 2008 Children’s House survey are presented next.

Children’s House

Before the Children’s House survey was conducted the researcher talked with the students about the meaning of the word ‘environment’. Using a book reading of The Giving Tree (Silverstein, 1999) to stimulate discussion, different aspects of the children’s natural and built environment were reviewed. The students were then invited to draw a picture … “of you outside, doing something good for the environment”
(Appendix 2). When the drawings were finished students were invited to explain what was happening in their pictures. Their oral responses were documented by staff members. Representative student drawings are presented in Figures 4.3 and 4.4 (and Appendix 4).

Figure 4.14 Children’s House Student Drawing:

“I am caring for my house and …” (2008)

Figure 4.15 Children’s House Student Drawing:

“Boy outside placing fish bones …” (2008)

Twelve Children’s House students submitted signed permission forms for the 2008 student survey, so only these drawings were analysed (Table 4.56). Frequency of responses in terms of action learning areas were: wellbeing and ‘other’ (both 6),
biodiversity (4), cleaning (3) and waste (1). Some responses were classified in more than one area. For instance, Boy with four guitars: *This is me playing my guitars* (Appendix 3). In this case, the joyful outstretched arms of the boy in the drawing implied personal ‘wellbeing’, but was also identified as ‘other’ because it was not necessarily about being outside “doing something good for the environment”. In brief, Children’s House students spontaneously identified aspects of ‘wellbeing’, together with miscellaneous ‘other’ responses, the most. This ‘wellbeing’ finding is repeated in Question 3 of the Lower Primary students’ survey and is reported in the following section.

**Table 4.56**

**Children’s House Student Drawings by Action Learning Area (2008)**

<table>
<thead>
<tr>
<th>Areas</th>
<th>Typical drawing: Content description and “student’s description of picture”</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>Boy outside placing fish bones in a bin…”Picking up the dead fish to help the environment and Clean-up Australia Day”.</td>
<td>1</td>
</tr>
</tbody>
</table>
| Biodiversity | Girl standing next to a tree, with snow and snails…”I am checking to see if the tree is going to fall down”.  
Boy standing near two trees and two flowers…”I have planted two trees and two flowers”. | 4     |
| Wellbeing | Boy with four guitars…”This is me playing my guitars”.  
Boy sitting under a tree… “Singing a song and being friends”.  
Boy, parents and dog…”Walking the dog because ort parents walk the dog”. | 6     |
| Cleaning | House with a rainbow overhead, and a girl standing next to shelves…”I am caring for my house and the school - Tidying the shelves”.  
Boy’s bedroom …“We cleaned our room so Dad didn’t have to do it”. | 3     |
| Other   | Well-dressed girl…”I am caring about my clothes”.  
Orange and green colours …”I am doing nice colours”.  
Boy…under an apple tree …”sell [apples] to make money to buy a playstation”.  
Money…”I give everyone money so they don’t lose any”. | 6     |

**Lower Primary**

The short survey for Lower Primary students (6-9 years old) was re-administered in 2008 as part of their usual class work (Appendix 2). Nineteen students submitted signed permission forms, so only these surveys were included in the study. The first question in the survey asked the students how old they were when they started at the
school. Seventeen of the nineteen students started school in the Children’s House, sixteen when three years old and one when five years old. The remaining two students started at the ages of six and seven years.

Question 2 provided information about the year level of the respondents (What year are you in now?). Two of the students were in Year 1, six in Year 2 and eleven in Year 3. The three students who started at the school when they were five, six and seven years old, were in Years 3, 2 and 3 respectively at the time of the survey, so they had attended the school for at least one year. Nine of the eleven Year 3 students had attended the school for approximately six years at the time of the survey; the other two had been at the school for four and two years respectively. Most of the students in the Lower Primary classes therefore had the opportunity of engaging in numerous EfS learning experiences over a number of years.

**Mind Map of Sustainability**

Respondents were invited to create a mind map of everything you know about sustainability (Question 3). Typical mind maps are presented in Figures 4.16 - 4.19. Table 4.57 presents the frequency of responses in terms of the AuSSI action learning areas: wellbeing (40), biodiversity (25), water (23) waste (16), and energy (11). Lower Primary students therefore spontaneously identified aspects of wellbeing more than any other area. However, the wellbeing area may have been artificially inflated because the students completed a Health lesson (healthy body) just prior to the administration of the survey. Nine of the nineteen surveys referred to the healthy body topic, elaborating on the subject with between two and six comments. Figure 4.18 illustrates a Year 3 mind map with five ‘wellbeing’ comments and Figure 4.19 six ‘wellbeing’ comments. Apart from the ‘busy bee’ reference in the Year 2 mind map (Figure 4.17) all the ‘wellbeing’ comments related to the healthy body topic. Given this possible aberration to the frequency of responses, biodiversity was registered by the students as the next most important action learning area. From this overview of the action learning areas the students could recall, they were then invited to comment on their favourite and least favourite sustainability lessons.
Figure 4.16  Lower Primary Student (Year 1) Mind Map:

*Everything I know about sustainability* (2008)

Figure 4.17  Lower Primary Student (Year 2) Mind Map:

*Everything I know about sustainability* (2008)
Figure 4.18  Lower Primary Student (Year 3) Mind Map 1:
Everything I know about sustainability (2008)

Figure 4.19  Lower Primary Student (Year 3) Mind Map 2:
Everything I know about sustainability (2008)
### Table 4.57

**Lower Primary Student Mind Maps by Action Learning Area (2008)**

<table>
<thead>
<tr>
<th>Areas</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“Worm farming”; “collecting worm juice”; “Recyling – paper, fruit.”; “5R’s”</td>
<td>16</td>
</tr>
<tr>
<td>Water</td>
<td>“Grow plants near the lake”; “water tanks”; “test water in lake - plant reeds”; “Coolgardie safe”</td>
<td>23</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“Garden – plants”; “garden – no chemicals”; “Pit traps”</td>
<td>25</td>
</tr>
<tr>
<td>Energy</td>
<td>“Solar panels”; “saving electricity”.</td>
<td>11</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>“Busy bee”; “Healthy body – exercise, plenty of water, heart, good food, brain”</td>
<td>40</td>
</tr>
</tbody>
</table>

### Favourite Lessons

Question 4 sought information about: *What was your favourite sustainability lesson last year?* A few students identified more than one favourite lesson. Table 4.58 presents frequency of responses in terms of the action learning areas: biodiversity and water (both 8), waste and other responses (3), wellbeing (2) and energy (1). Lower Primary students’ favourite EfS lessons were in the areas of biodiversity and water. Five of the eight biodiversity responses specifically referred to the biological survey which was conducted two years previously (in 2006, not in 2007 as indicated by the question). The biological survey included pit trapping activities (E. Lewis & Baudains, 2007a) and the children reported ‘checking the pit traps’ to be very engaging. For example, one student stated his favourite lesson was pit trapping because “we got to check if we had any animals”. The remaining three biodiversity responses referred to gardening activities at the school. All ‘water’ responses referred to water testing and reed planting at the local lake (E. Lewis, Mansfield, & Baudains, 2008), except for one response that involved the design and construction of a Coolgardie Safe to keep lunches cool.
Table 4.58

Lower Primary Students’ Favourite EfS Lessons by Action Learning Area (2008)

<table>
<thead>
<tr>
<th>Areas</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“When we did the worm farm becus we got to make a worm farm in a bottle”; “Feeding worms and collecting juice. They were slimy. They ate our food scraps”</td>
<td>3</td>
</tr>
<tr>
<td>Water</td>
<td>“Planting weeds becase I like the mud [reeds]”; “Coolgardie safe”; “Lake testing. I like using the equipment”; “It was fun lernin about the lake”.</td>
<td>8</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“Gardening”; “Planting plants”; “The pit traps because we got to see the frogs”; “Pit traps because I like looking at the creatures”.</td>
<td>8</td>
</tr>
<tr>
<td>Energy</td>
<td>“All of them because they were fun and I learnt a lot [attended Perth Sun Fair]”.</td>
<td>1</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>“Healthy body”.</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>“Can’t remember”.</td>
<td>3</td>
</tr>
</tbody>
</table>

Despite the large number of ‘healthy body’ wellbeing responses in Table 4.57, only two wellbeing responses were reported as favourite lessons. The following question addressed the students’ least favourite sustainability lessons.

**Least Favourite Lessons**

Question 5 asked respondents about their least favourite EfS lessons (*What was your least favourite sustainability lesson last year?*). Table 4.59 shows that eight of the nineteen students could not identify an EfS lesson they least liked. Three students didn’t like waste activities because of the smell and boredom; while three didn’t like water activities due to the heat and mess. In contrast to the 2007 survey result for this item, less than half the students were unable to name EfS lessons in which they did not engage. The 2008 respondents seemed less tolerant to lesson situations. The survey concluded with an open-ended question inviting respondents to suggest improvements to EfS lessons.
Table 4.59
Lower Primary Students’ Least Favourite EfS Lessons by Action Learning Area (2008)

<table>
<thead>
<tr>
<th>Areas</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“Worm farming – it melt way to bad [smell]”; “Fruit reeling becu[s] it was boring” ; “Worm farm – stincks”.</td>
<td>3</td>
</tr>
<tr>
<td>Water</td>
<td>“Planting reeds. It was so hot that day”; “Lake testing because you get wet”; “Planting weeds because you get dirty [reeds in lake mud]”.</td>
<td>3</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“Garden becu[s] we only had to plant plants in the hot sun”.</td>
<td>1</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>“Healthy body – wating for ages”.</td>
<td>1</td>
</tr>
<tr>
<td>None</td>
<td>“None of them”; “They were all really good”.</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>“Can’t remember”.</td>
<td>3</td>
</tr>
</tbody>
</table>

Changes to EfS Lessons
Respondents to the final survey question (6. *What changes would you like to see so that you can do more sustainability lessons that you would enjoy?*) outlined various ideas to enhance enjoyment of EfS. Table 4.60 presents frequency of responses in terms of action learning areas: biodiversity (13), wellbeing (3), energy (2), water (1), and numerous ‘other’ responses (5). As for the 2007 result for this item, most of the 2008 suggestions involved being actively involved, doing something, such as pit trapping, planting, water testing and fixing solar panels. Student interest in biodiversity is again highlighted in the results of the Upper Primary survey, which is reported next.

Table 4.60
Lower Primary Students’ Suggestions to Enhance EfS Lessons by Action Learning Area (2008)

<table>
<thead>
<tr>
<th>Areas</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>“More lake testing”.</td>
<td>1</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“I would like to do more planting. More animals and plants and amphibians ... &amp; insects. Plants and animals that fly. More gardening”; “More of pit trap. Catching more animals”.</td>
<td>13</td>
</tr>
<tr>
<td>Energy</td>
<td>“More ... solar power system”; “be allowed to fix the solar panels”.</td>
<td>2</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>“Getting more healthy so I can have a healthy body”; “Do more rock and water [a physical/social development program]”.</td>
<td>3</td>
</tr>
<tr>
<td>Other</td>
<td>“Painting”; “Making things”; “More lessons”; “Increas the deces of plooshen [increase the decrease of pollution]”.</td>
<td>5</td>
</tr>
</tbody>
</table>
Upper Primary

The survey for Upper Primary students (6-9 years old), consisting of ten questions, was re-administered in 2008 as part of usual class work (Appendix 2). Twenty three students submitted signed permission forms, so only these surveys were included in the study. The first question in the survey asked students how old they were when they started at the school. Nineteen of the twenty three students started school in the Children’s House, when they were three years old. The remaining four students started when they were five, seven, eight and nine years old.

Question 2 provided information about respondent year level (*What year are you in now?*). Eight students were in Year 4, nine in Year 5, four in Year 6 and two in Year 7. In this cohort the majority of students had attended the school for between six and ten years. However, one child had attended for only one year, one for two years, and another for three years. In brief, most Upper Primary students had the opportunity of engaging in numerous EfS learning experiences over a long period.

Mind Map of Sustainability

Respondents were invited to *create a mind map of everything you know about sustainability* (Question 3). Student mind maps are presented in Figures 4.20 - 4.25. Table 4.61 presents frequency of responses in terms of AuSSI action learning areas: biodiversity (61), wellbeing (58), water (23), waste (17) and energy (12). Upper Primary students therefore spontaneously identified more aspects of biodiversity than any other area. The high frequency of wellbeing responses was influenced by one student’s mind map which contained predominantly wellbeing responses (Figure 4.20). This was not a typical mind map, as indicated by the other Upper Primary mind maps (Figures 4.21 – 4.25). Representative examples of mind maps that included wellbeing responses are shown in Figures 4.21 and 4.22, with fewer wellbeing responses recorded. From this overview of the action learning areas students could recall, they were then asked to identify one class program that was a good example of sustainability in action.
Figure 4.20  Upper Primary Student (Year 4) Mind Map:

*Everything I know about sustainability* (2008)

Figure 4.21  Upper Primary Student (Year 5) Mind Map 1:

*Everything I know about sustainability* (2008)
Figure 4.22 Upper Primary Student (Year 5) Mind Map 2:

Everything I know about sustainability (2008)

Figure 4.23 Upper Primary Student (Year 5) Mind Map 3:

Everything I know about sustainability (2008)
Figure 4.24 Upper Primary Student (Year 6) Mind Map:
Everything I know about sustainability (2008)

Figure 4.25 Upper Primary Student (Year 7) Mind Map:
Everything I know about sustainability (2008)
Table 4.61
Upper Primary Student Mind Maps by Action Learning Area (2008)

<table>
<thead>
<tr>
<th>Areas</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“Worm farming”; “not littering, having a worm farm - not throwing everything away”; “Recycling stuff”; “battery recycling”; “paper recycling”.</td>
<td>17</td>
</tr>
<tr>
<td>Water</td>
<td>“Planting reeds, Coolgardie Safe”; “lakes, ponds”; “timer taps”; “water tanks”; “beng waterwise by turning taps of, automatic taps, rainwater tanks”; “Putting in a water tank … water testing, cleaning the environment … clearing alien reeds and planting native reeds”; “planted plants near the lake, water quality testing”; “Healing the Swan, groundwater festival”; “Waterless urinal, water saving taps”</td>
<td>23</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“Environment, climate change … pollution, trees. Gardening”; “Environment - don’t cut down trees”; “Environment: Helping turtles”; “Planting trees … Turtles, inviroment, pit traps, frog watch”; “save the tertess [turtles]”; “Animals - don’t be cruel to animals”; “protecting endangered species, looking after environment, looking after sick wild animals, turtles”; “Environment – help the environment around you, don’t cut down trees”; “ amphibians, pit traps, helped with turtles, frog pond”; “Turtle watching”; “Looked for turtle eggs, pit traps, planted trees”</td>
<td>61</td>
</tr>
<tr>
<td>Energy</td>
<td>“Sustainability – solar panels”; “using solar power”; “solar power … walk or ride do not drive”; “solar energy”; “Solar power = no global warming! Solar power cars.”</td>
<td>12</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>“Working as a community”; “Communication - communicate friendly, health - have a healthy lunch; Community - help us to help you. at school help ech ther [each other] out , wore together … sharing - shar toys, shar food, give to others; Values - to keep our school picefull and feel safe; using the virtues”; “Health – don’t eat junk food; Community – don’t fight our… community will fall apart; Spirit – Winter Solstes … Socialise – work together and socialise”; “Fitness= Health =Happy! … Talking &amp; conversations= ideas and new friends=Happiness … Good management=Community spirit =encouragement for more sustainability … Concerts &amp; Fairs … Buy fairtrade=more happiness in poor places = global friendship…”.</td>
<td>58</td>
</tr>
</tbody>
</table>

EfS Program

Question 4 invited students to: Describe, in as much detail as you can, one program in your class that is a good example of sustainability in action. Three students described more than one program. Table 4.62 presents frequency of responses in terms of action learning areas: biodiversity (16), water (7), waste (4), energy (2) and wellbeing (2).
### Table 4.62
Upper Primary Student Descriptions of Good EfS Programs (2008)

<table>
<thead>
<tr>
<th>Areas</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“Worm farm, we fed them, it was our job, the worms [juice] helps the garden grow”; “Worm farm, because I wanted to help and it was fun”.</td>
<td>4</td>
</tr>
<tr>
<td>Water</td>
<td>“When we went to test the water in the lake, to make sure our environment is safe for all animals”; “Planting reeds ... I wanted to help the environment ... lots of reeds by the water”; “Planting native reeds”; “Lake planting, everyone was involved, we got chosen, the lake planting was helping frog and stuff live well - grew into bigger reeds. first we pulled up alien reeds [then] I helped plant native reeds”; “Reed planting at the lake, because it’s important for environment, we planted trees/bushes, more trees - around 2000”.</td>
<td>7</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“Garden because I wanted to be and I thought it would be fun, by planting the plants and putting in the molch, they were very good”; “Turtles”; “We used pit traps, I like animals and insects, checking the numbers of animals, we found out the population of the insects and frogs”; “Gardening and pit traps, to research sustainability and animals ... Research and checking pit traps &amp; collecting flowers; new animals”; “Pit traps, to find different animals, looking at the pit traps, we found mostly frogs like motorbike frogs”; “The garden, we needed people to help with the garden; I helped design it, helped choose the herbs ... It has been built and it looks really really good”; “Gardening because I like nature and food, I came on Saturday morning’s and stayed after school on Friday, [working in] a beautiful garden with food growing everywhere”; “Planting trees, so we could grow more trees, I planted lots of trees with lots of other people, The trees will make the earth healthier”; “Pit traps, cos it was fun and a new learning experience, with my class I checked the pit traps to see if there were any frogs so we could tell which frog lived around our school and if the environment was good for them to live in, we found 2 of 10 species of frog around our area so then we planted more native plants to create a better environment for them so we then could find all 10 species. Pit traps ... making and recording ... knowledge of the animals around our school”.</td>
<td>16</td>
</tr>
<tr>
<td>Energy</td>
<td>“Because of sustainability ... at the school, I got to be on TV”; “Soler panel”.</td>
<td>2</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>“Working together to bake food, everyone in the class had turns in groups; there were different food groups each week; it was a lot better than the food from the stores”.</td>
<td>2</td>
</tr>
</tbody>
</table>
Biodiversity programs were most commonly mentioned; specifically, the community permaculture garden, the biological survey (including pit trapping) planting trees and the turtle-watch project. Student opinion was also sought on whether anyone’s or anything’s interests were being neglected in school EfS programs. This issue was investigated by the following two survey questions.

**Interests Neglected**

Responses to Question 5 (*Do you think anyone is being missed out by the school’s current approach to sustainability?*) were overwhelmingly in the positive. Nineteen of the twenty-three Upper Primary students thought no interests were being neglected, however concerns were expressed about including young children, the poor and infirmed (Table 4.63). Next, respondents were asked if the school’s approach to EfS ignored the interests of anything.

Most respondents, in response to question 6 (*Do you think anything is being missed out by the school’s current approach to sustainability?*), indicated no ‘things’ were neglected. Three respondents who commented suggested numerous issues for further action (Table 4.63). The survey continued by inviting student feedback on favourite and least favourite lessons.

**Table 4.63**

**Upper Primary Student Perspectives on Interests Ignored by EfS Approach (2008)**

<table>
<thead>
<tr>
<th></th>
<th>No (x19)</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Anyone:</strong></td>
<td>“Pepel now don’t have enuf muny [enough money]”; “Childrens house because they do not do as there told”; “People who don’t have enogh money and people who are sick”; “Children’s house ... should get to take part in activities”.</td>
<td></td>
</tr>
<tr>
<td><strong>Anything:</strong></td>
<td>“Saving the trees”; “Garden and lake”; “Recycle!”; “Water cleaning – we don’t have to take part!”</td>
<td></td>
</tr>
</tbody>
</table>

**Favourite Lessons**

Question 7 sought information about: *What was your favourite sustainability lesson last year?* Three students identified more than one favourite lesson. Table 4.64 presents frequency of responses in terms of action learning areas: biodiversity (16), water (6), wellbeing (3), and waste and energy (both 1). Ten biodiversity responses referred to the biological survey, and the remaining six to the turtle-watch project and gardening.

Nearly all water responses were about water quality testing at the local lake and actions
taken to improve that environment. One water response related to the design and construction of a Coolgardie Safe (illustrating the properties of water). Clearly, students were readily able to identify favourite lessons. The following question invited students to comment on their least favourite sustainability lessons.

**Least Favourite Lessons**

Question 8 asked respondents about their least favourite EfS lessons (*What was your least favourite sustainability lesson last year?*). Table 4.65 shows fifteen of the twenty-three students could not identify an EfS lesson they least liked. Three students didn’t enjoy the ‘water’ activities due to dirty planting conditions and one was bored by a long (forty minutes) bus ride during an excursion; two didn’t like ‘waste’ activities with worms, and two indicated ‘biodiversity’ because it was hard work. Most students however were unable to name EfS lessons in which they did not engage. The next part of the survey sought student advice on how to enhance enjoyment of EfS lessons.

**Table 4.64**

**Upper Primary Students’ Favourite EfS Lessons by Action Learning Area (2008)**

<table>
<thead>
<tr>
<th>Areas</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste and Energy</td>
<td>“All of them becos they were fun”.</td>
<td>1</td>
</tr>
<tr>
<td>Water</td>
<td>“Water testing, we got to see little bugs”; “Planting reeds”; “chequfore macroinvertebrates, I like creturs [creatures]”; “The coolgardie safe becaus we got to make it”.</td>
<td>6</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“Pit trap beacase you get to see cool things”; “Pit traps because we get to catch things”; “Pit traps because we saw frog”; “The pit traps becuse it was a good learning experience and it was lots of fun”; “The turtle activity because I LOVE turtles”; “The turtles ( by the lake), I like animals and the enviroment. Looking for turtle eggs, it was fun finding the little turtle eggs and thinking what would have happened”; “Gowing to the wildlife senter [centre] cos I got to be in the nos paper [newspaper]”; ”Garden - planting the trees because we where able to get our hans dirty”; “Planting trees because we got 2 miss school and help the environment”; “Night stalk”.</td>
<td>16</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>”Craft fair”; “Virtues”.</td>
<td>3</td>
</tr>
</tbody>
</table>
Table 4.65
Upper Primary Students’ Least Favourite EfS Lessons by Action Learning Area (2008)

<table>
<thead>
<tr>
<th>Areas</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“Worm farm, I didn’t like being peed on”; “Worm farming, its gross”.</td>
<td>2</td>
</tr>
<tr>
<td>Water</td>
<td>“Lake planting, it was too messy”; “Planting plants near the lake, we got mud in our shoes and socks and all over us and we got wet”; “Healing the Swan because we drove to Freo 2 get 1 bucket of water &amp; there was lots of driving”.</td>
<td>4</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“Gardening because it was hard work”.</td>
<td>2</td>
</tr>
<tr>
<td>None</td>
<td>“None!”; “no”; “I liked every activity”; “I didn’t have one”.</td>
<td>15</td>
</tr>
</tbody>
</table>

Changes to EfS Lessons
Over half the respondents to Question 9 (What changes would you like to see so that you can do more sustainability lessons that you would enjoy?) could not suggest any changes (Table 4.66).

Table 4.66
Upper Primary Students’ Suggestions to Enhance Enjoyment of EfS Lessons by Action Learning Area (2008)

<table>
<thead>
<tr>
<th>Areas</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biodiversity</td>
<td>“More pit traps”; “Looking fore the turtles and the pit traps”; “More stuff in the garden”; “Wildlife stuff – saving endangered animals”; “We should fill the frog pond up &amp; put tadpoles in it &amp; look after it”.</td>
<td>6</td>
</tr>
<tr>
<td>Other</td>
<td>“More time”; “Do fun activities that are based on sustainability”.</td>
<td>3</td>
</tr>
<tr>
<td>None</td>
<td>“No”; “none”.</td>
<td>14</td>
</tr>
</tbody>
</table>

Those who did suggest changes generally wanted more hands-on activities with plants and animals. The survey concluded with an open-ended question inviting respondents to suggest improvements to EfS lessons.

Improvements to EfS
Nine respondents suggested various improvements to EfS in answer to the final survey question (10. What changes would you like to see so that sustainability at school could be improved?). These improvements related to all action learning areas: biodiversity (5 suggestions), waste (3), wellbeing (2), water and energy (1 each). The ‘other’ category included two comments which indicated students recognized the gap left by former EfS
teachers who had left the school. Two of the nine students made suggestions in more than one area. Most suggestions related to being actively involved, such as more tree planting, keeping chickens and following school rules (Table 4.67). Fourteen respondents made no suggestions for improvement. This aspect of student involvement in lessons is explored further in the next section, which reports on findings from lesson observation sessions.

**Table 4.67**

Upper Primary Students’ Suggestions to Improve EfS Lessons by Action Learning Area (2008)

<table>
<thead>
<tr>
<th>Areas</th>
<th>Typical responses</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Waste</td>
<td>“Save more paper; keep chickens to get ... manure for garden”; “Recycling: strict rules - [use] right bin”.</td>
<td>3</td>
</tr>
<tr>
<td>Water and Energy</td>
<td>“More activities all”.</td>
<td>1 each</td>
</tr>
<tr>
<td>Biodiversity</td>
<td>“More gardens”; “More tree planting. Go on more trips to wildlife centers”; “keep chickens to get ... eggs”.</td>
<td>5</td>
</tr>
<tr>
<td>Wellbeing</td>
<td>“More working together”.</td>
<td>2</td>
</tr>
<tr>
<td>Other</td>
<td>“Teachers be part of the main committee”; “[Former] sustainability teacher did a good job!”</td>
<td>2</td>
</tr>
<tr>
<td>None</td>
<td>“Nothing”; “none”; “No changes”.</td>
<td>14</td>
</tr>
</tbody>
</table>

### 4.2.9 Student Observations 2008

Six hours of student observations were undertaken in 2008, one hour each in all six classes during different EfS lessons. Class teachers selected lessons that were observed. As in 2007, the observation process utilised the Australian Environmental Learning Outcomes Survey - Student Observation Schedule and the Environmental Learning Outcomes Survey - Interview Schedule (Appendix 4), designed and tested by Ballantyne, Packer and Everett (2005). The aim of the observations and associated interviews was to provide further evidence on the impact of the EfS program (RQ 2). Survey results for Children’s Houses, and Lower and Upper Primary classes, are presented in the following sections.

**Children’s House**

The EfS learning context for both Children’s Houses was Health. As part of a ‘healthy living’ theme, one class was observed during planting activities in the permaculture
garden (‘garden’ class), and the other during an in-class lesson on disease prevention (‘disease’ class). Students in each class were observed for one hour. Garden lesson involved children planting strawberry and silverbeet seedlings with parents and staff. During the disease prevention lesson children participated in a question-and-answer session with the teacher and completed a worksheet. No explicit links were made by either teacher between healthy living and sustainability; and the school’s model of sustainability was not mentioned. Table 4.68 presents results of these observations. Students who worked in the garden shared their learning with others, purposefully manipulated objects and ideas, were actively involved in learning all the time. They responded to new information most of the time. Student engagement during the in-class lesson was more subdued for some behaviours.

Table 4.68
Student Engagement in Learning Behaviours for Health Lessons (2008)

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Frequency of Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CH Garden</td>
</tr>
<tr>
<td>Sharing learning with peers and experts</td>
<td>4</td>
</tr>
<tr>
<td>Making links and transferring ideas and skills</td>
<td>1</td>
</tr>
<tr>
<td>Initiating/showing responsibility for their own learning</td>
<td>1</td>
</tr>
<tr>
<td>Purposefully manipulating objects and ideas</td>
<td>4</td>
</tr>
<tr>
<td>Showing confidence in personal learning abilities</td>
<td>2</td>
</tr>
<tr>
<td>Actively involved in learning</td>
<td>4</td>
</tr>
<tr>
<td>Responding to new information or evidence</td>
<td>3</td>
</tr>
<tr>
<td>Disengagement</td>
<td>1</td>
</tr>
</tbody>
</table>

CH = Children’s House
Frequency codes: 1 = rarely; 2 = sometimes; 3 = most of the time; 4 = all of the time.

Orally administered student interviews were conducted after the lessons. Typical student responses to questions about knowledge, attitudes and behavioural intentions are presented in Tables 4.69 and 4.70. In brief, garden students learnt by seeing and doing something in the environment and felt ‘interested’ and ‘excited’ by the planting activity. Typically, students in the other class learnt by listening, discussing, seeing and doing, and were mostly ‘calm’ during the lesson.
### Table 4.69
Knowledge, Attitudes and Behavioural Intentions of Typical Student involved in Health (Garden) Lesson (2008)

<table>
<thead>
<tr>
<th><strong>Knowledge:</strong> Things I learned about caring for the environment?</th>
<th>What helped me learn?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>“To dig the hole carefully, place the strawberry in gently and then spread the ground around the plant. I watered the plant”.</td>
<td>“What I saw and did in the [class name] garden bed”. Doing &amp; seeing something in the environment.</td>
<td>Interested</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Attitudes:</strong> Have I changed the way I feel about the environment?</th>
<th>What was it that made me change?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Yes, I want to do more gardening and I want to make strawberry jam”.</td>
<td>“What I did planting the strawberry”. Doing something in the environment.</td>
<td>Excited</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Behavioural Intentions:</strong> Do I think what I learned will change what I’ll do for the environment?</th>
<th>What made me think about doing something for the environment?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Yes, I’ll plant more fruit and veggies and flowers”.</td>
<td>“What I did”. Doing something in the environment.</td>
<td>Interested</td>
</tr>
</tbody>
</table>
Table 4.70
Knowledge, Attitudes and Behavioural Intentions of Typical Student involved in Health (Disease Prevention) Lesson (2008)

<table>
<thead>
<tr>
<th>Knowledge: Things I learned about caring for the environment?</th>
<th>What helped me learn?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Caring for my body so I don’t get sick”.</td>
<td>“When I was in the classroom I saw, I listened and talked in my group”. 2, 4 &amp; Listening to an adult or teacher, discussing with a small group &amp; seeing something in the environment.</td>
<td>Calm</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attitudes: Have I changed the way I feel about the environment?</th>
<th>What was it that made me change?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I need to cover my mouth when I cough”.</td>
<td>“When we sat on the mat coughing. We all coughed; everyone in the class. We laughed”. Listening to an adult or teacher, discussing with a small group &amp; doing something in the environment.</td>
<td>Excited</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Behavioural Intentions: Do I think what I learned will change what I’ll do for the environment?</th>
<th>What made me think about doing something for the environment?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Cover my mouth when I cough”.</td>
<td>“We all coughed together – on the group mat in the classroom”. Doing something in the environment.</td>
<td>Calm</td>
</tr>
</tbody>
</table>
Lower Primary

Health was also the EfS learning context for the Lower Primary classes. Students in each of the Lower Primary classes were observed for two hours, one hour each. In one class children worked in the garden, planting spinach, sweet peas and marigolds (‘garden’ class). They also inserted stakes for the sweet peas and weeded around mature eggplant, silverbeet and capsicums. Students in the other class participated in a whole class discussion about healthy foods and then worked in small groups on a related worksheet activity (‘food’ class). During lessons both teachers made links between healthy eating and sustainability. However, after the lessons, teachers admitted that it was the first time they had mentioned sustainability in the health context and only did so because they knew the lesson was being observed by the researcher. Table 4.71 presents results of these observations. Overall, students in both classes shared their learning with others all the time, but students in the garden lesson were also actively involved and purposefully manipulated objects and ideas. Furthermore, students who worked in the garden were rarely disengaged, while the in-class students were sometimes disengaged.

Table 4.71

Student Engagement in Learning Behaviours for Health Lessons (2008)

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Frequency of Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>LP Food</td>
</tr>
<tr>
<td>Sharing learning with peers and experts</td>
<td>4</td>
</tr>
<tr>
<td>Making links and transferring ideas and skills</td>
<td>2</td>
</tr>
<tr>
<td>Initiating/showing responsibility for their own learning</td>
<td>1</td>
</tr>
<tr>
<td>Purposefully manipulating objects and ideas</td>
<td>2</td>
</tr>
<tr>
<td>Showing confidence in personal learning abilities</td>
<td>2</td>
</tr>
<tr>
<td>Actively involved in learning</td>
<td>3</td>
</tr>
<tr>
<td>Responding to new information or evidence</td>
<td>1</td>
</tr>
<tr>
<td>Disengagement</td>
<td>2</td>
</tr>
</tbody>
</table>

LP = Lower Primary

Frequency codes: 1 = rarely; 2 = sometimes; 3 = most of the time; 4 = all of the time.
Orally administered student interviews were conducted after these Health lessons. Table 4.72 presents a typical student’s response to questions about knowledge, attitudes and behavioural intentions arising from the in-class learning experience, while Table 4.73 presents the same information from a typical garden student. In brief, even though the students from the two classes participated in different learning settings, they both ‘learned things’ and discussed ‘changed behaviours’.

**Table 4.72**

**Knowledge, Attitudes and Behavioural Intentions of Typical Student involved in Health (Food) Lesson (2008)**

<table>
<thead>
<tr>
<th>Knowledge:</th>
<th>What helped me learn?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Things I learned about caring for the environment?</td>
<td>&quot;Listening to [name of teacher] and talking in my group&quot;. Listening to an adult or teacher &amp; discussing with a small group.</td>
<td>Calm</td>
</tr>
<tr>
<td>&quot;You need to eat healthy food, drink lots of water and get good exercise&quot;.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attitudes:</th>
<th>What was it that made me change?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have I changed the way I feel about the environment?</td>
<td>&quot;Listening to [name of teacher]&quot;. Listening to an adult or teacher &amp; discussing with a small group.</td>
<td>Relaxed</td>
</tr>
<tr>
<td>&quot;Yes, I know more about why it is important to eat good food&quot;.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Behavioural Intentions:</th>
<th>What made me think about doing something for the environment?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do I think what I learned will change what I’ll do for the environment?</td>
<td>&quot;Listening to [name of teacher]&quot;. Listening to an adult or teacher.</td>
<td>Relaxed</td>
</tr>
<tr>
<td>&quot;Eat more good food&quot;.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4.73
Knowledge, Attitudes and Behavioural Intentions of Typical Student involved in Health (Garden) Lesson (2008)

<table>
<thead>
<tr>
<th>Knowledge:</th>
<th>Things I learned about caring for the environment?</th>
<th>What helped me learn?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>“Not step on plants; and learnt about different plants in the garden – silverbeet and capsicums. And sweet peas and marigolds to attract good bugs”.</td>
<td>“Being in our garden doing it and the teacher telling me”.</td>
<td>Happy</td>
</tr>
<tr>
<td>Attitudes:</td>
<td>Have I changed the way I feel about the environment?</td>
<td>What was it that made me change?</td>
<td>My feelings</td>
</tr>
<tr>
<td></td>
<td>“No, I’m already very interested in Nature. It is a very nice place to be in – the garden and cubby”.</td>
<td>“Doing gardening and [former teacher’s name] telling me how”.</td>
<td>Calm</td>
</tr>
<tr>
<td>Behavioural Intentions:</td>
<td>Do I think what I learned will change what I’ll do for the environment?</td>
<td>What made me think about doing something for the environment?</td>
<td>My feelings</td>
</tr>
<tr>
<td></td>
<td>“Yes, gardening more at home. Cleaning up the leaves, building a cubby in my backyard. It is made of wood and metal. Gardening at home. I’ll do more of it. I like it. Eat the food”.</td>
<td>“Doing things in [school] garden”.</td>
<td>Interested</td>
</tr>
</tbody>
</table>

Upper Primary

The EfS learning area for both Upper Primary classes was Society and Environment, focusing on Early Man. Classes were observed for one hour each. Prior to the observed lessons, students had been investigating ‘Early Man’ for over a month. Before the observations were conducted class teachers requested advice from the EfS researcher about how to incorporate sustainability into their programs. A sustainability focus had not been adopted in this unit of work until the observation session was scheduled. In one class students were observed using a thinking tool (T-Chart) to distinguish characteristics of early man that sustained, or otherwise, their life on Earth. Students in the other Upper Primary class also used a thinking tool, adapted from the school’s model of sustainability. Students were required to link sustainability with the needs of Early Man by identifying different facilitators and constraints in the various petals of
the school sustainability model. The thinking tool was passed around the class, in a round-robin format, to different groups in the class, each adding their own ideas onto a blank petal. See Appendix 6 for typical student work samples from both classes. Table 4.74 presents results of these observations. Overall, students shared their learning with others all the time but displayed less engagement in other behaviours.

Table 4.74
Student Engagement in Learning Behaviours for Early Man Lessons (2008)

<table>
<thead>
<tr>
<th>Behaviour</th>
<th>Frequency of Engagement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>UP T-Chart</td>
</tr>
<tr>
<td>Sharing learning with peers and experts</td>
<td>4</td>
</tr>
<tr>
<td>Making links and transferring ideas and skills</td>
<td>2</td>
</tr>
<tr>
<td>Initiating/showing responsibility for their own learning</td>
<td>2</td>
</tr>
<tr>
<td>Purposefully manipulating objects and ideas</td>
<td>1</td>
</tr>
<tr>
<td>Showing confidence in personal learning abilities</td>
<td>2</td>
</tr>
<tr>
<td>Actively involved in learning</td>
<td>2</td>
</tr>
<tr>
<td>Responding to new information or evidence</td>
<td>2</td>
</tr>
<tr>
<td>Disengagement</td>
<td>1</td>
</tr>
</tbody>
</table>

CH = Children’s House

Frequency codes: 1 = rarely; 2 = sometimes; 3 = most of the time; 4 = all of the time.

Self administered student questionnaires were conducted after the lessons. Table 4.75 presents a typical student’s response to questions about knowledge, attitudes and behavioural intentions arising from the Early Man (T-Chart) lesson, while Table 4.76 presents representative findings from the other (Model) lesson. In brief, students were not highly motivated by the Early Man sessions but spoke with animation and excitement about pit trap and frog lessons conducted three years before.
### Table 4.75
Knowledge, Attitudes and Behavioural Intentions of Typical Student involved in Early Man (T-Chart) Lesson (2008)

<table>
<thead>
<tr>
<th>Knowledge:</th>
<th>What helped me learn?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Things I learned about caring for the environment?</td>
<td>“I saw a video, [teacher’s name] talked and we did work in groups”. Listening to an adult or teacher, discussing with a small group &amp; seeing something in the environment.</td>
<td>Interested</td>
</tr>
<tr>
<td>“The environment influenced whether some hominid species lived or died out”.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student talked about pit traps, a 2006 project: “When can we open the pit traps again? Can we open them today?”</td>
<td>“I loved it when we checked the pit traps each morning. You never knew what you were going to find”. Seeing &amp; doing something in the environment.</td>
<td>Excited</td>
</tr>
<tr>
<td>Attitudes:</td>
<td>What was it that made me change?</td>
<td>My feelings</td>
</tr>
<tr>
<td>Have I changed the way I feel about the environment?</td>
<td>“I didn’t”.</td>
<td>Disinterested</td>
</tr>
<tr>
<td>“No”.</td>
<td>“Finding what was in the pit trap. It was fun and a good learning experience”. Seeing &amp; doing something in the environment.</td>
<td>Excited</td>
</tr>
<tr>
<td>Student returned to the topic of the pit traps: “Can we do the pit traps again?”</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Behavioural Intentions:</td>
<td>What made me think about doing something for the environment?</td>
<td>My feelings</td>
</tr>
<tr>
<td>Do I think what I learned will change what I’ll do for the environment?</td>
<td>“Nothing”.</td>
<td>Nothing</td>
</tr>
<tr>
<td>“No”.</td>
<td>“It was fun and we made a better environment”. Doing something in the environment.</td>
<td>Excited</td>
</tr>
<tr>
<td>Student talked about outcomes from the pit traps work: “We planted more native plants to create a better environment for the frogs”.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Observations Summary 2008

Students from all classes were observed working in the learning areas of either Health (Healthy Living) or Society and Environment (Early Man). The behaviour consistently displayed in all classes was students sharing their learning with others. Other Observation Schedule (Ballantyne et al., 2005) behaviours were less frequently observed and varied across the different lessons.
Table 4.76
Knowledge, Attitudes and Behavioural Intentions of Typical Student involved in Early Man (Model) Lesson (2008)

<table>
<thead>
<tr>
<th>Knowledge: Things I learned about caring for the environment?</th>
<th>What helped me learn?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Early man had to live sustainably too”.</td>
<td>“Making models and the timeline, listening to [teacher’s name] and talking with my friends”.</td>
<td>Calm</td>
</tr>
<tr>
<td>However, the student was more interested in talking about other things he had learned today:</td>
<td>Listening to an adult or teacher, talking to a friend &amp; doing something in the environment.</td>
<td></td>
</tr>
<tr>
<td>“I found two frogs in the drain trap at the front of the school. The frogs are camouflaged brown like the leaves in the trap”.</td>
<td>Seeing &amp; doing something in the environment.</td>
<td>Excited</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Attitudes: Have I changed the way I feel about the environment?</th>
<th>What was it that made me change?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>“No”.</td>
<td>Researcher went with the student to look at the frogs: “Come and see the frogs ... now please, they might move!” [The researcher did.] Seeing something in the environment.</td>
<td>Relaxed</td>
</tr>
<tr>
<td>The student continued to talk enthusiastically about the frogs:</td>
<td>Relaxed</td>
<td></td>
</tr>
<tr>
<td>“I check the frogs regularly and see if they move from one drain to the other”.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Behavioural Intentions: Do I think what I learned will change what I’ll do for the environment?</th>
<th>What made me think about doing something for the environment?</th>
<th>My feelings</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Early man has gone”.</td>
<td>“Thinking about what we saw when we did the pit traps – I think about it on many occasions”.</td>
<td>Nothing</td>
</tr>
<tr>
<td>Talk about frogs continued:</td>
<td>Seeing &amp; doing something in the environment.</td>
<td></td>
</tr>
<tr>
<td>“I care for the frogs. I remember the pit traps and catching frogs. I really, really want to do this again”.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Interviews conducted after each observation generally revealed students gained new knowledge about caring for the environment, changed their attitudes about the environment and indicated changed behavioural intentions. New knowledge about caring for the environment ranged from gardening skills, living a healthy lifestyle, to
understandings about interconnections between the natural environment and the survival of different hominid species. Students indicated a wide range of strategies helped them to learn, including listening to the teacher, talking to friends and in small groups, and seeing and doing something in the environment. Feelings associated with this learning were: ‘happy’, ‘calm’, ‘excited’ and ‘interested’. Changed student attitudes about the environment were reported by some interviewees, such as the enjoyment to be experienced from gardening. Students stated changed attitudes arose from listening to their teacher, group discussions, and seeing and doing something in the environment, and they felt ‘relaxed’, ‘calm’ or ‘excited’ about this. Interviewees participating in the Early Man lessons, or who said they already cared for Nature, stated that their attitudes had not changed. Changed behavioural intentions were also reported by the students. These intentions ranged from living a healthy lifestyle to wanting to participate in more pit trapping activities. Students indicated listening to their teacher, as well as seeing and doing something in the environment influenced their behavioural intentions, and they were ‘calm’, ‘interested’ or ‘excited’ about participating in these actions. Both Upper Primary interviewees, independently, went off topic during the surveys. Interview questions elicited a spontaneous focus on lessons conducted in 2006, on pit trapping and associated frog studies.

Overall, the “Environmental Learning Outcomes Survey” provided additional evidence supporting the positive impact of the 2005-2007 EfS program (RQ 2). Section 4.2.11 draws on these findings, together with the 2008 teacher and student surveys and document search data, to summarise developments in the school between 2008-2009 in relation to the impact of the EfS program and AuSSI-WA.

4.2.10 Member Checks

Member checks were attempted throughout the study. During 2006-2011, school staff were invited to attend numerous presentations about the research. Further, research progress reports were submitted periodically to the school, together with copies of thesis drafts and journal articles, for feedback. The school responded with occasional verbal acknowledgement of receipt of these documents, together with brief statements of approval for publication. However, no detailed written feedback was provided. Therefore, to provide further opportunity for critical comment, thesis drafts and journal articles were submitted to professional colleagues in two university research groups.
This feedback facilitated deeper provocations in the researcher’s professional reflections.

The main issue raised in feedback related to whole systems thinking. During 1990s and early 2000s, it appeared systems thinking was not the norm at the case study school. Many projects were undertaken that could contribute to ‘sustainability’, such as the first vegetable garden, but they were not explicitly linked to the bigger picture of sustainability. Such endeavours were typically discrete lessons, like making compost, in which students did not necessarily make the connection to the broader, more complex context of waste and sustainability. Nevertheless, the school was ‘open’ to engagement with a systems approach to EfS, since a few projects reflecting whole systems thinking were initiated before AuSSI-WA commenced, such as the solar power project.

The major challenge for EfS at the school appeared to relate to achieving deeper EfS understandings, where all learning embedded sustainability concepts and whole systems thinking. To facilitate this all staff require ongoing targeted professional learning and support, as does the broader school community. Further engagement with and commitment to whole systems thinking is essential for EfS to become sustaining, tenable, healthy and durable (Sterling, 2003a). The ‘Eagle Eye Model’, presented in Chapter 6, is an attempt to provide one learning strategy to support teachers implement whole systems thinking with their classes. The development of this model arose from provocations from professional colleagues.

4.2.11 Summary Post AuSSI-WA 2008 - 2009

During 2008-2009 EfS at the school appeared to experience a set-back, a shift towards the least sustainable end of the sustainability continuum. The existing EfS program ceased operating and various EfS projects were terminated. The AuSSI-WA assessment tool was not employed and the school’s 2007 Ecological Footprint (Figure 4.12) and Social Handprint (Figure 4.13) were not updated. Whole staff professional learning in EfS did not occur during this time. Overall, document searches, teacher and student surveys, observations and field notes provided evidence suggesting a decrease in priority for EfS during this period and a reduction in EfS engagement (RQs 2 and 3). The situation is summarized in the sustainability timeline in Figure 4.26.
1990
School started - *nature* a key focus; philosophy of sustainability discussed e.g. energy and water saving ideas and gardening.

1991
Celebrations important i.e. community rituals e.g. concert ‘Epic Journey of the Blue People’.

1992-2001 (specific dates unavailable):
- **Environmental sustainability** projects included: gardening including; permaculture veggie garden with herb spiral; wheat-to-bread hands-on learning activity; keeping hens, a lamb, rabbits and guinea pigs, birds and fish; frog pond development; ‘science by the lake’ water quality monitoring; planting native trees and shrubs in adjacent park land; used recycled rubbish for arts and craft (from CATS); paper recycling within the school.
- **Social sustainability** of the school community: rituals and concerts; eco-camps e.g. Nanga Bush Camp ‘Council of All Beings’; Yoga classes; Fathers’ group; Virtues Project.
- **Social sustainability** through community outreach projects: performances at local retirement villages; Shoes for Zaire; Oxfam Walk Against Want.

1994
**Social and environmental sustainability**: development of Jimmi Jolley adventure playground with recycled wood/tyres and a model of working with community groups plus children’s input e.g. flying fox.

1999
**Social sustainability**: Year 7 Vision Quest (annual Bibbulmun Track walk commenced).

2000
Principal change

2002
**Sustainability systems thinking**: solar power project started; development of multi-sensory playground.

2004
Principal change
- Support to join AuSSI-WA. Participation in inaugural Perth Sun Fair; Wastewise (paper recycling).

2005
**AuSSI-WA**: Pilot school in the Sustainable Schools Initiative - vision and policy development; sustainability committee formed; other projects include solar power and the Perth Sun Fair stall; bird nest boxes; tiger snakes; tree planting; longitudinal biological survey; permaculture garden; eco-footprints; peace studies; Airwatch; Wastewise; community outreach (e.g. MakePovertyHistory, Activ Foundation City to Surf, Dolls for Africa, Knitting for the needy).

2006
Sustainability embedded into school Strategic Plan; *Switch to Sustainability* celebration; Perth Sun Fair stall; permaculture garden; many Wastewise initiatives; solar power project completed; longitudinal biological survey; park tree planting project and school planting.

2007
Principal change
- Major sustainability projects continued including Community Water Grant (tanks, taps, toilets), Perth Sun Fair; Science of Sustainability (water resources) grant, Values Eco-education grant, Community Conservation grant (turtle watch), SALP Landcare grant (lake water quality), local sustainability festival; permaculture garden; science leaders course; longitudinal biological survey; tree planting; Waterwise. 3 EfS champions left.

2008
Whole school approach to sustainability not functioning.
- Principal and other staff changes.

2009
Permaculture garden revitalised. Semester 2 focus on sustainability. Whole school approach to sustainability revisited.
Constraints upon EfS at the school, foreshadowed in the 2007 surveys, came to fruition. Overall the 2008 surveys explicitly identified barriers for EfS, ranging from lack of teacher support (EfS priority, leadership support, funding, curriculum pressures, …) to the need for community education and vision commitment. Clearly, management, staff and community concerns highlighted in 2007 impacted dramatically on EfS in the 2008 - mid 2009 period. Adopting McNaughton’s (2007) terminology, the ‘beauty’ (EfS at the school) had gone to sleep, she was a ‘sleeping beauty’! However, it appeared by mid 2009, the ‘beauty’ was stirring, as evidence of resurgence in management support for EfS occurred. Despite this development vital EfS understandings regarding whole systems thinking did not appear under consideration by the school when data collection concluded at the end of 2009.

4.2.12 Post AuSSI-WA Summary 2005-2009

During the first half of the post AuSSI-WA period (2005-2007), whole school assessment employing the AuSSI-WA assessment rubric (DET, 2010a) indicated the school’s approach to sustainability had progressed (Table 4.77). In 2005 the school was in a ‘starting’ position for the vast majority of sustainability elements. By the end of 2006 progress had been achieved on nearly all elements, shifting the school’s EfS commitment to an ‘establishing’ position. The table shows further progress in 2007, with most elements in the ‘achieving’ category. Clearly, joining AuSSI-WA made a dramatic difference to EfS at the case study school.
Table 4.77  
**Assessment of the school’s approach to sustainability using the AuSSI-WA rubric**

<table>
<thead>
<tr>
<th>Elements</th>
<th>Starting</th>
<th>Establishing</th>
<th>Achieving</th>
<th>Excelling</th>
</tr>
</thead>
<tbody>
<tr>
<td>School governance</td>
<td>☀</td>
<td>☐</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>School policy</td>
<td>☀</td>
<td>☐</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>Vision and values</td>
<td>☀</td>
<td>☐</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>Review EfS activity</td>
<td>☀</td>
<td>☐</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>Professional learning</td>
<td>☀</td>
<td>☐</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>Teaching and learning</td>
<td>☀</td>
<td>☐</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>Curriculum integration</td>
<td>☀</td>
<td>☐</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>Reporting on learning</td>
<td>☀</td>
<td>☐</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>Student voice</td>
<td>☀</td>
<td>☐</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>School networks</td>
<td>☀</td>
<td>☐</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>Community networks and partnerships</td>
<td>☀</td>
<td>☐</td>
<td>☀</td>
<td>☀</td>
</tr>
<tr>
<td>Recognition/ promotion of successful action</td>
<td>☀</td>
<td>☐</td>
<td>☀</td>
<td>☀</td>
</tr>
</tbody>
</table>

**Key:**
- ☀ 2005
- ☐ 2006
- ☀ 2007

The second half of the post AuSSI-WA study period, 2008-2009, was characterized by a reduction in EfS activity at the school. Leadership and staff changes appeared to impact dramatically on the priority given to EfS. Most teachers expressed a lack of management support and many students positively recalled former EfS programs that were no longer in operation. Planning and evaluation of EfS using the AuSSI-WA toolkit was not undertaken. However, the research period finished with the suggestion that EfS was back on the agenda, with the employment of a staff member in the EfS role. Research findings will be summarised in the following section.
4.3 Summary of Main Findings

The main findings were interpreted in relation to the research questions and the AuSSI-WA context in terms of elements of EfS and facilitators and barriers to EfS.

4.3.1 Research Questions

The main findings are summarized in the context of the research questions, as follows:

**RQ 1:** *What are the antecedents of EfS in the Montessori approach to education?*

Four antecedents of EfS in the Montessori approach to education were identified. These broadly related to the whole child approach, learning environment, Cosmic Curriculum, and Montessori values.

**What elements of education for sustainability were in operation in the school immediately prior to involvement in the AuSSI-WA?**

Seven of the twelve AuSSI-WA elements were in operation in the school immediately prior to involvement AuSSI-WA. These elements were vision and values, school governance, EfS activity, teaching and learning, reporting, student voice and community networks.

**RQ 2:** *What are the outcomes, in terms of student attitudes and values, knowledge and understandings, and skills and behaviours related to education for sustainability, after engagement with whole systems thinking and five years of involvement in AuSSI-WA?*

Enhanced student outcomes for all year levels were demonstrated for attitudes and values, knowledge and understandings, and skills and behaviours related to EfS, especially during the first three years of involvement in AUSSI-WA, 2005-2007. In 2008, however, a change in school EfS priorities appeared to occur because nearly all former EfS programs ceased that year, with consequent impact on students’ EfS attitudes and values, knowledge and understandings, and skills and behaviours. With regards to the other component of the research question - student engagement with whole systems thinking - students were found to need further experience with the whole systems thinking approach. Students typically appeared to think and behave within silo scenarios, so deeper engagement with whole systems thinking was warranted.

**RQ 3:** *What are the outcomes, in terms of teacher perceptions of the EfS program, after engagement with whole systems thinking and five years of involvement in AuSSI-WA?*
Overall teacher outcomes in terms of their perceptions of the EfS program, from key elements to the impact of AuSSI-WA at the school, were that the program was growing and highly effective in the initial three years after joining AuSSI-WA but lack of leadership, training, staff with designated EfS responsibilities and broad support resulted in the cessation of the EfS program for more than a year. The other component of the research question - teacher outcomes in terms of the whole systems thinking approach - was investigated in relation to Montessori philosophy, the school’s Strategic Plan, sustainability model and policy, as well as values education in EfS. Alignment between Montessori philosophy, EfS and whole system thinking was found to be more in theory than in practice. To enable effective teaching and learning about whole systems thinking, substantial engagement in professional learning about the approach, together with leadership support was found to be needed.

4.3.2 Elements of EfS

Critical elements of EfS emerged from the findings, from student and teacher perspectives. These elements, from pre 2005, 2007 and 2008 survey findings, are summarized in Table 4.78.
### Table 4.78
Elements of EfS Emerging from Research Findings

<table>
<thead>
<tr>
<th>Participants</th>
<th>Elements</th>
<th>Pre 2005</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students</td>
<td>EfS activity</td>
<td>Enjoyed science (EfS?) lessons; high level of engagement.</td>
<td>Enjoyed EfS lessons; high level of engagement.</td>
<td>Silo, isolated, disconnected EfS lessons typical; disengaged.</td>
</tr>
<tr>
<td></td>
<td>Curriculum integration</td>
<td>Silo understandings.</td>
<td>Exposure to whole systems thinking; limited understandings.</td>
<td>Silo understandings.</td>
</tr>
<tr>
<td></td>
<td>Student voice</td>
<td>Chose participation.</td>
<td>Student leadership encouraged and supported; chose participation.</td>
<td>Student requests for EfS activities ignored.</td>
</tr>
<tr>
<td>Teachers</td>
<td>School policy</td>
<td>No EfS policy.</td>
<td>EfS policy and model developed by school community.</td>
<td>EfS policy and model ignored.</td>
</tr>
<tr>
<td></td>
<td>EfS activity</td>
<td>Some social and environmental EfS activities with limited action component.</td>
<td>Expansion of EfS activities with strong action component.</td>
<td>EfS activities dramatically decreased; existing EfS projects ceased.</td>
</tr>
<tr>
<td></td>
<td>Curriculum integration</td>
<td>Predominantly silo, ad hoc approach.</td>
<td>Shift to whole systems thinking evident in projects.</td>
<td>Silo, ad hoc approach.</td>
</tr>
<tr>
<td></td>
<td>Professional learning</td>
<td>Whole staff and community talked about EfS.</td>
<td>Whole staff and community EfS PL ongoing.</td>
<td>Whole staff and community EfS PL ceased.</td>
</tr>
</tbody>
</table>

#### 4.3.3 Facilitators and Barriers to EfS

To foreground facilitators and barriers to EfS in an AuSSI-WA context, evidence from teachers and students (1990-2009) was examined to identify critical issues. Facilitators and barriers to EfS were then classified according to the AuSSI-WA key elements. These are presented in summary format in Table 4.79.
Table 4.79
Facilitators and Barriers to EfS in an AuSSI-WA Context

<table>
<thead>
<tr>
<th>Elements</th>
<th>Facilitators</th>
<th>Barriers</th>
</tr>
</thead>
<tbody>
<tr>
<td>School governance</td>
<td>Some ongoing funding support for paid staff time to facilitate EfS.</td>
<td>Ad hoc or lack of funding support for staff time to facilitate EfS.</td>
</tr>
<tr>
<td></td>
<td>Active Principal support for EfS program through participation in/support for sustainability committee and provision of whole school PL.</td>
<td>Lack of management/leadership recognition of value/service of champions and of the contribution of the sustainability committee.</td>
</tr>
<tr>
<td></td>
<td>Active Principal support for school membership of AuSSI-WA (with staff time) and alignment with Australian government EfS priorities and other EfS approaches.</td>
<td>Ad hoc or absence of funding support for EfS program costs.</td>
</tr>
<tr>
<td></td>
<td>Management and leadership support for EfS grants.</td>
<td>Indifference towards or termination of EfS grants.</td>
</tr>
<tr>
<td>School policy</td>
<td>Whole school direction for EfS provided by policy.</td>
<td>Lack of management/leadership understanding of the policy with associated support for policy implications.</td>
</tr>
<tr>
<td></td>
<td>Policy integral to actions taken.</td>
<td>Ignoring the policy.</td>
</tr>
<tr>
<td>Vision and values</td>
<td>Opportunity for whole school participation in development/review of EfS vision and values. Decision-making reflected vision.</td>
<td>Depth of understanding and engagement with EfS vision/values.</td>
</tr>
<tr>
<td>Review EfS activity</td>
<td>Priorities and actions support enhancement of school’s ecological footprint and social handprint. Regular evaluation of EfS activities at staff, student and community levels using AuSSI-WA key elements rubric.</td>
<td>AuSSI-WA key elements rubric not employed. EfS activity viewed as parent responsibility, not whole school. Existence of physical distance (~50m) between EfS experiences (e.g. gardening, worm farming) and Early Childhood classrooms.</td>
</tr>
<tr>
<td>Elements</td>
<td>Facilitators</td>
<td>Barriers</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Professional learning</td>
<td>Targeted whole school PL plan developed for EfS – for staff and wider school community. Principal attended EfS PL with staff. EfS PL with other schools both on and off school site. Ongoing access to EfS expertise.</td>
<td>Ad hoc approach to staff/community PL in EfS. Lack of ongoing targeted PL in EfS and whole systems thinking.</td>
</tr>
<tr>
<td>Teaching and learning</td>
<td>Collection of baseline information linked to collaborative enquiry approach to EfS commenced in 2005. Ongoing access to EfS expertise.</td>
<td>Collection of baseline information ceased. Token link between school’s EfS vision and operational plan. When staff changes occurred no management/leadership priority given to ensuring existing EfS initiatives were continued by new or existing staff. Whole curriculum too full.</td>
</tr>
<tr>
<td>Curriculum integration</td>
<td>EfS addressed by all classes. Key concepts linked to Curriculum Framework outcomes.</td>
<td>EfS ceased to be addressed by all classes in co-ordinated, whole school approach.</td>
</tr>
<tr>
<td>Reporting on learning</td>
<td>Range of information collected by all staff to report on student EfS learning.</td>
<td>Ad hoc approach to reporting on EfS learning.</td>
</tr>
<tr>
<td>Student voice</td>
<td>Students actively involved in EfS decision making.</td>
<td>Student preferences for EfS lessons ignored.</td>
</tr>
<tr>
<td>School networks</td>
<td>EfS grant projects and social initiatives between schools actively supported by management/leadership.</td>
<td>Action and support to develop networks with other schools withdrawn by management/leadership.</td>
</tr>
<tr>
<td>Community networks and partnerships</td>
<td>Active, genuine management/leadership support for staff and community members working to establishment and enhancement of multi-stakeholder partnerships.</td>
<td>Action and support to develop networks and partnerships withdrawn by management/leadership.</td>
</tr>
<tr>
<td>Recognition/ promotion of successful action</td>
<td>Active, genuine management/leadership support for EfS individuals, groups and whole school.</td>
<td>Gap between reality and publicity identified by staff and school community members.</td>
</tr>
</tbody>
</table>
Clearly, successful implementation of EfS at the school was a multi-dimensional experience and at different times reflected different facilitators and barriers. The scope of present study did not permit an examination of reasons contributing to the various circumstances, such as withdrawal of leadership support for EfS grants, as such situations were complex and warrant study in their own right. Findings will be discussed further in the following chapters in relation to the research questions. Conclusions will be drawn, leading to recommendations for enhancing the impact of AuSSI-WA.
CHAPTER 5
DISCUSSION OF RESEARCH

This research set out to examine the antecedents of EfS in the Montessori approach to education at the case study school and to determine student outcomes and teacher perceptions after engagement with whole systems thinking and five years of involvement in AuSSI-WA. This longitudinal study first obtained data from teachers and students who attended the school during the fifteen years prior to the commencement of AuSSI-WA, and then obtained data from teachers and students who attended the school during the five years since the commencement of AuSSI-WA at the school in 2005. The chapter begins with a brief overview of the key influences impacting on the research and then the findings of each research question are discussed in relation to the literature.

The literature review identified three groups of influences relevant to the study, these being: EfS research themes, curriculum, and school setting (Figure 2.9). Emerging from the EfS research themes group, eight influences were identified: whole school approaches, student voice, sense of place, leadership model, learning model, whole systems thinking, behaviour change, and alignment with state, national and international objectives (Figure 2.10). The four curriculum influences included: engagement with the state curriculum, national curriculum, Montessori philosophy and Montessori curriculum (Figure 2.11). In relation to the school setting, six influences were important: school priorities and approach, community education, student voice, researcher position, sense of place, and professional learning (Figure 2.12). These influences are summarised in Figure 5.1. They will be re-examined in relation to the research question results and the literature.

The discussion will examine the antecedents and elements of EfS at the case study school prior to joining AuSSI-WA (RQ 1) and explore how curriculum and school setting influences in particular impacted on future developments in EfS. Next, student outcomes will be examined (RQ 2) and discussed in relation to linkages between research, curriculum and school setting influences. Finally, teacher perceptions will be explored (RQ 3) and linked with emerging issues. Overall, this discussion will demonstrate the impact of AuSSI in an individual school, highlighting the complexity and dynamic interplay of influences involved.
5.1 Antecedents and Elements of EfS (RQ 1)

This study found:

- Four antecedents of EfS in the Montessori approach to education: whole child approach, learning environment, Cosmic Curriculum and Montessori values.
- Seven of the twelve AuSSI-WA elements in operation at the school immediately prior to involvement AuSSI-WA: vision and values, school governance, EfS activity, teaching and learning, reporting, student voice and community networks.

Findings related to antecedents of EfS will be discussed in two sections: first, antecedents in terms of alignment with Montessori; and second, elements of EfS in operation. These will be linked with curriculum and school setting influences.
5.1.1 Alignment of EfS and Montessori

**Congruence**

Antecedents of EfS were evident in the Montessori approach to education. The literature suggested the approach appeared, in theory, to align with the basic precepts of EfS in four ways. Firstly, a fundamental point of congruence related to the Montessori focus on the whole child (Montessori, 1964). This holistic perspective is congruent with the whole systems thinking approach, in contrast to a narrower academic emphasis in the education of the child. The second point of congruence related to students taking responsibility for their own learning and actions (Montessori, 1964, 1966). This was considered to facilitate children becoming progressively more independent, responsible for their own learning and making contributions to humanity. Such contributions to humanity and action for future generations are characteristic of EfS programs.

The third point in the literature that indicated the Montessori approach appeared congruent with EfS was the Montessori ‘Cosmic Education’ curriculum (Montessori, 1966, 1992). Cosmic Education encouraged children’s respect and care for the environment through hands-on engagement with the main disciplines of learning related to the natural world (living and non-living), such as biology, chemistry and geology (J. K. Miller, 1974; Sillick, 1987). The fourth point of possible congruence between Montessori and EfS related to the development of self-awareness, ultimately resulting in humane contributions to the wider world (Montessori, 1967, 1989).

Results of document searches and analyses of teacher and student surveys provided evidence that supported the notion of alignment between the Montessori educational approach and EfS. Document searches located information and policies that indicated some congruence between Montessori and EfS. Teacher surveys - former and current teachers - also revealed categories of alignment identified in the teachers’ own words. Similarly, student survey findings suggested spheres of congruence.

The document searches provided some evidence for congruence between Montessori and EfS. The ‘School Handbook’ identified the Cosmic Curriculum as the foundation for most areas of primary study, while school policies, such as the ‘Whole Child Policy’, emphasized a holistic approach to each child’s education. However, no unequivocal statements linking the Montessori approach and EfS were found in school documents.
Results of the former teacher survey indicated Montessori philosophy was adopted in the school as a foundation principle. Montessori equipment was used in the school and the Montessori values of caring for self, others and the environment were considered very important. Respondents indicated that the philosophy and values were enacted through classroom education programs and various rituals and celebrations. These findings support suggestions in the literature outlining possible areas of alignment between Montessori and EfS.

The 2007-2008 teacher surveys also provided evidence supporting congruence between Montessori philosophy and EfS. Alignment was reported in the categories of the learning and classroom environment, eco inter-relationships, values and community involvement. Such categories can be readily linked with the evidence from the literature. Learning and classroom environment coincide with the first two ways of alignment proposed from the literature, that is, the focus on the whole child and encouraging personal responsibility. Eco inter-relationships and community involvement can be linked with the last two forms of alignment suggested by the literature, namely curriculum and contributions to humanity. Clearly, the teacher survey findings provided evidence of congruence between the Montessori approach to education and EfS.

The former student survey also provided evidence of congruence between Montessori and EfS. Respondents identified four categories of alignment – eco inter-relationships, learning/classroom environment, values, and community involvement. Students commented on caring for the environment, their place in the environment in terms of eco inter-relationships and the practical impact Montessori values and philosophy had on both the eco system and social system.

In brief, documentary and survey evidence supported the notion of congruence between Montessori and EfS. These findings agree with the literature, especially in relation to the Montessori philosophy and curriculum. This curriculum encouraged children to respect and care for the environment through hands-on engagement and learning related to the natural world.

**Constraints**

Despite evidence for alignment between Montessori and EfS, four constraints were identified - in document searches and reported by Montessori teachers. Firstly, teacher issues related to curriculum, specifically, teaching demands to fulfil requirements of
both the Montessori and state curricula. Secondly, Montessori teachers concerns about heavy workload pressures with associated reluctance to take on more responsibilities. Other research conducted in the Montessori setting (E. Lewis, 2004; Schonleber, 2006) reported similar issues and pressures on Montessori teachers. This situation was observed in the current study to impact on teacher’s willingness to engage in lessons that involved working for the environment, consequently more focus was given to a classroom approach that involved learning about the environment.

The third constraint related to the philosophical debate about what is fundamental to the Montessori Method, in terms of use of Montessori equipment and the approach adopted within the modern educational context. An over-emphasis on individualisation and strict adherence of the rules for use of equipment were cited by former teachers as situations that could be detrimental to the alignment between Montessori and EfS. Montessori authors have similarly argued for a more flexible response to the Montessori approach, with increased, explicit inclusion of new understandings and developments in education (A. Alegria, The June Shelton School and Evaluation Centre, personal communication, February 3, 2000; Cossentino, 2005; Erskine, 1998).

The fourth constraint identified in relation to the alignment between Montessori and EfS concerned the need for governance, administrative and management structures that facilitated a whole school approach to EfS. Teachers reported this to be a significant issue of concern. They identified deficits in the ad hoc, ‘do your own thing’ approach in relation to the effectiveness of EfS. These concerns have also been reported in the literature (Eames, 2010; E. Lewis, 2004; E. Lewis & Baudains, 2007a; Schonleber, 2006).

In summary, this study found evidence of four constraints in the alignment between Montessori and EfS. Teachers identified workload pressures and governance/management structures as key constraints. These issues appeared to impact on the effective implementation of EfS within the school. Similar constraints have been reported in other studies, especially in terms of curriculum and school setting influences (Erskine, 1998; Schonleber, 2006). Workload pressure arising from engagement with both the State curriculum and the Montessori curriculum was reported in the present study and in Schonleber’s (2006) research at another Montessori school. School setting, particularly in relation to school priorities and approach, was also identified as a critical constraint in several studies (Erskine, 1998; E. Lewis, 2004; Schonleber, 2006). These influences are highlighted below.
5.1.2 Elements of EfS

During 1990 – 2004, seven elements of EfS were in operation immediately prior to involvement in AuSSI-WA (DET, 2008a). Evidence from document searches, as well as teacher and student surveys revealed members of the school community discussed sustainability and implemented some sustainability programs, even though they were not called ‘sustainability programs’ at that time. The school was aware of sustainability issues and engaged in various EfS-type projects prior to involvement in AuSSI-WA.

Sustainability projects in operation prior to 2005 related to environmental and social sustainability. Examples of environmental sustainability projects were reported in school ‘Year Books’ and by former teachers and students. These projects included the permaculture vegetable garden and hen-keeping, recycling activities, the solar power project, along with planting native trees and shrubs in the local park. Social sustainability was also a major focus. Projects in this sphere included community rituals and concerts, together with community outreach programs such as involvement in Oxfam’s ‘Walk Against Want’ and student performances at local retirement villages. These pre-2005 environmental and social sustainability projects may be viewed as on-ground fore-runners of AuSSI-WA’s Eco-Footprint and Social Handprint (DET, 2010a).

Employing the AuSSI-WA ‘elements of sustainability’ framework (DET, 2008a) to former teacher survey responses, numerous ‘strengths’ and ‘opportunities’, as well as ‘weaknesses’ and ‘threats’, were identified (Table 4.1). For example, former teachers identified the school’s vision and values as manifesting strengths, opportunities and threats to EfS, while school governance, teaching and learning, and reporting were mentioned in the context of weaknesses and threats. Former students recalled environmental and social sustainability projects in which they were involved. Environmental projects were in the categories of waste, water, biodiversity and energy. Participating students overwhelmingly indicated sustainability lessons increased their motivation to care for the environment. Students also commented on aspects of social sustainability in operation, such as an emphasis on cooperation.

Overall seven elements of EfS were found to be in operation at the school immediately prior to involvement in AuSSI-WA. However, limitations in the approach to EfS were also identified, including lack of a whole school plan for EfS and associated policies.
Concerns were raised by respondents about external and internal governance issues at the school. The ad hoc, uncoordinated approach to EfS activity, with reliance on individuals or EfS ‘champions’ was reported. In addition, some of the EfS-type activity did not truly address sustainability. For example, Science lessons at the lake were discrete, unconnected environmental projects, related mainly to education ‘in’ and ‘about’ the environment. Students did not participate in positive action ‘for’ the environment as an outcome of these lessons. Evidence provided also suggested the need for project indicators and improved evaluation tools. So despite the school’s awareness and commitment to a ‘sustainability’ agenda prior to AuSSI-WA, numerous constraints were identified.

Referring specifically to RQ 1, research findings were not only consistent with the existing literature but also provided original, unique evidence. Four antecedents of EfS in the Montessori approach to education emerged from the research - whole child approach, learning environment, Cosmic Curriculum and Montessori values. However, the study also found evidence of constraints in the alignment between Montessori and EfS, including workload pressures and governance/management structures (Figure 5.2). This too was consistent with the literature in this area. With regards to the other component of RQ1 - elements of EfS that were in operation in the school immediately prior to involvement AuSSI-WA - seven of the twelve elements were mentioned by former teachers. These elements were vision and values, school governance, EfS activity, teaching and learning, reporting, student voice and community networks. For example, the element of ‘vision and values’ was perceived as aligning with EfS, while school governance was mentioned as a constraint to EfS. This finding about the elements of EfS in operation before the implementation of AuSSI-WA is unique, with no parallels found in the literature.
5.2 Student Outcomes (RQ 2)

In relation to student outcomes, results of this study showed:

- Enhanced student outcomes for all year levels were demonstrated for attitudes and values, knowledge and understandings, and skills and behaviours related to EfS, during the initial years of involvement in AuSSI-WA.

- Change in school priorities several years after joining AuSSI-WA resulted in the cessation of nearly all components of the EfS program, with consequent impacts on students’ EfS attitudes and values, knowledge and understandings, skills and behaviours.

- Explicit student engagement with the whole systems thinking approach is warranted.
Student outcome findings will be discussed in three sections: attitudes and values; knowledge and understandings; skills and behaviours. Research findings and confounding issues arising from this evidence will be examined in the context of the literature.

5.2.1 Attitudes and Values in EfS

In brief, attitudes are inferred from behaviour (Bell et al., 2005), while values are the principles which act as a guide to behaviour (Halstead et al., 2000). Evidence relating to student attitudes will be discussed first, followed by findings relating to values. This discussion will proceed in the order of Children’s House, lower primary and finally upper primary responses. It will be shown, overall, that student responses from all year levels indicated positive awareness of attitudes and values associated with EfS after involvement in AuSSI-WA.

Attitudes

To determine Children’s House student (3-6 years old) attitudes towards sustainability, their drawings, observed behaviours and self-reflections were analysed. Responses from the 2007 Children’s House drawings reflected student enjoyment and engagement from being involved in EfS activities, whether it was sweeping outdoor areas, picking up rubbish or watering the garden. These positive attitudes were again observed in the 2008 set of drawings, however there appeared to be a greater focus on self and money that year. Overall however, student responses reflected an awareness of positive attitudes toward the environment.

An Environmental Learning Outcomes Survey (ELOS) - Student Observation Schedule (SOS) and Interview Schedule (IS) (Ballantyne et al., 2005) was also employed with Children’s House students to provide attitudinal evidence. These students were up to three years younger than those who participated in the study conducted by Ballantyne and others (2005). Students were asked if they had changed the way they felt about the environment and why they had changed. In 2007, responses revealed new knowledge rather than an explicit statement on feelings about the environment; they also reflected student engagement and delight. The 2008 responses, however, provided some evidence of attitudinal change. Students wanted to do more gardening and to make strawberry jam because they had planted strawberries. The students were excited about this prospect. Clearly this indicated enjoyment in the activity, so much so the students
wanted to do more. This evidence on the environmental attitudes of very young children supplements scarce research in this area (G. W. Evans et al., 2007; Kopnina, 2011).

To ascertain lower primary attitudes towards EfS, students completed surveys, and were observed and interviewed to facilitate self-reflection. Responses from the 2007 lower primary survey reflected student enjoyment and engagement from being involved in EfS activities. Students typically wrote about having adventures and fun with pit traps, and they liked planting. The 2008 survey recorded students’ favourite EfS lessons to be in the areas of biodiversity and water. The majority of biodiversity responses specifically referred to the biological survey, with students reporting pit trapping to be very engaging. This seemed to be the case, especially as these lessons were conducted in 2006 and were still being recalled as ‘favourites’ in 2008!

Overwhelmingly though, students in 2007 were unable to name EfS lessons in which they did not engage. In contrast to this result nearly half the 2008 respondents indicated EfS lessons in which they did not engage. They seemed less tolerant of EfS lesson situations. Students complained about the smell of worm farming, or that recycling was boring, and that they had to work in the sun when planting. Students did not complain about these issues in 2007. Clearly, something was happening in 2008 that was impacting on student attitudes to EfS.

Further evidence for a change in student attitudes over time was provided by the findings of the lower primary student interviews employing the ELOS-IS (Ballantyne et al., 2005). In 2007, students were asked if they had changed the way they felt about the environment and why they had changed. For example, in relation to water quality testing and lake reed planting, one student recalled how dirty the water was the previous year and that it was cleaner after planting. Another student indicated changed feelings about the environment due to enjoyment experienced while gardening with friends. The reasons given for changed attitudes related to feelings of empowerment (student involvement in action to improve water quality) and social enjoyment. However, attitudinal evidence provided by the 2008 lower primary interviews drew attention to ongoing student interest in gardening. The impact of a former teacher on the development of positive environmental attitudes was highlighted. This teacher was an EfS champion who had since left the school.
To determine upper primary attitudes toward EfS, students completed surveys, and were observed and interviewed to facilitate self-reflection. 2007 survey responses reflected learning opportunities offered at the time. In considering action learning areas they were exposed to, students spontaneously identified aspects of waste more than any other area, although biodiversity, wellbeing, water and energy activities were also recorded. That year the students had been involved in setting up a recycled fridge as a worm farm and designing and constructing three compost bins, in addition to their usual recycling activities. They expressed enjoyment and positive attitudes towards these waste activities. Students were also asked to identify one class program that was a good example of sustainability in action. Biodiversity programs were most commonly mentioned; specifically the community permaculture garden and the biological survey. Again students expressed positive, active environmental attitudes – they wanted to help, to save the Earth. However, 2008 survey responses referred to programs conducted during previous years. Biodiversity projects were most frequently mentioned, especially the community permaculture garden, biological survey, planting trees and turtle research. Students spontaneously expressed clear links between lesson content and positive feelings and attitudes about the environment. Furthermore, these attitudes appeared to be long term because they related to EfS projects conducted during the previous seven years. This unique finding contributes evidence toward the issue mentioned previously, the need for long term evidence for attitudinal change (Gralton et al., 2004).

Attitudinal evidence was also obtained from upper primary interviews (Ballantyne et al., 2005). 2007 interview data provided some evidence for attitudinal change associated with reported new knowledge and changed behaviour. However, the 2008 data juxtaposed different attitudes – one of disinterest in EfS lessons conducted at the time of the survey compared to enthusiasm about EfS lessons conducted two years before (Table 4.76). Thus, the interview data was found to agree with survey and observational findings, namely, there appeared to be a change in school priorities away from EfS. This finding reinforced the reported need for the collection of long term evidence for the determination of EfS outcomes (Gralton et al., 2004).

**Values**

Values are the principles which act as a guide to behaviour (Halstead et al., 2000). There are many formulations of the essential components of ‘environmental values’ (Gralton et al., 2004; Martin, 2007; Smyth, 1996). Such formulations include, for
example, living harmoniously within ecological systems, developing a caring, responsible attitude toward nature, and promoting a sense of continuity and community with other people and all living things. The *Curriculum Framework* (Curriculum Council, 1998), the document guiding education in Western Australia, explicitly outlined environmental and other values to be addressed.

The *Curriculum Framework* values of ‘social and civic responsibility’ and ‘environmental responsibility’ (Curriculum Council, 1998) were particularly relevant at the case study school. Social and civic responsibility refers to the promotion of the value of ‘community’, specifically, “*Interpersonal co-operation and social responsibility are encouraged*” (Curriculum Council, 1998, p. 325). Social and civic responsibility also acknowledges the ‘benefits of research’, that is, “*Society should support the advancement of knowledge in all its domains, promote scholarship and research that promise to improve the quality of life and share the benefits as widely as possible*” (Curriculum Council, 1998, p. 325). Two of four aspects of ‘environmental responsibility’ are identified here, being particularly relevant to the study context: ‘conservation of the environment’ and ‘diversity of species’ (Curriculum Council, 1998). The value promoting the ‘conservation of the environment’ states “*The management of the environment should take into account the need to preserve its diversity and balance for the future*” (Curriculum Council, 1998, p. 325). ‘Diversity of species’ refers to “*Each person should recognize a need to preserve native habitats and arrest the extinction of presently-surviving native species*” (Curriculum Council, 1998, p. 325). All these values underpinned the work of students at the case study school and teachers explicitly discussed these values with students in relation to local projects.

Children’s House students engaged in a Values Education Good Practice Schools (VEGPS) Project which aimed to determine successful ways of implementing the *National Framework for Values Education in Australian Schools* (Curriculum Corporation, 2006b). This project, outlined in the Literature Review, involved three mini-projects at the school: development of the school’s permaculture garden, a native reeds/sedges lake replanting program and turtle research (E. Lewis, Mansfield et al., 2008). Values made explicit during the permaculture garden development will be discussed in relation to Children’s House student outcomes.

Values explicitly taught in the garden program were ‘community’, ‘conservation of the environment’ and ‘diversity of species’. The ‘community’ values were made explicit and reinforced with the children through support provided by the whole school
community - students, parents and staff – who worked in the garden with them. Students actively participated in the garden, throughout all phases of its development, from filling buckets of mulch to planting, harvesting and cooking produce. Explicit expression of this community value was observed in children’s drawings (Figure 4.15 and Appendix 7).

Students also participated in ‘conservation of the environment’ and ‘diversity of species’ activities through worm farming. These lessons enabled children to understand in a concrete, physical manner the processes and environmental benefits of worm farming and how it linked to creating a healthy, organic, productive garden eco-system. The drawing shown in Figure 4.3 illustrates a young child’s awareness of worm farming as a component of ‘doing something good for the environment’. This provides some evidence of student awareness of the overlap between values and sustainability. Again, this evidence on the environmental values of very young children makes a unique contribution to very limited research in this domain (EPA, 2003; Kopnina, 2011; Tilbury et al., 2005).

Although student responses in 2008 appeared more self-focused than in 2007, overall findings agreed with evidence reported by Tilbury and others (2005) that steps were being taken in the school to enhance EfS in the early childhood sector. Furthermore, the potential of early childhood education centres to be not only a hub for children’s health and welfare but sustainability issues too (Tilbury et al., 2005), was seen in the present study. Parents from the school worked with their youngsters in the school garden and during water quality investigations. This participation exposed parents to sustainability values raised during lessons.

Values associated with sustainability were identified by lower primary students in their survey responses. In 2007 they wrote about the values of caring, respect, patience and responsibility. In 2008 only one student mentioned anything related to social and civic responsibility, the school busy bee (Figure 4.17). All other wellbeing comments related to a ‘healthy body’ theme and no explicit statements about values were made. Again there appears to be a difference between 2007 and 2008 student responses related to values, with more explicit statements about values noted in 2007.

Evidence relating to upper primary student values following involvement in AuSSI-WA were highlighted in work samples. For example, Appendix 7 includes student work samples of brainstorms on ‘values for the environment’. These samples were collected
at the start of the school year in 2007. They documented components of the environment (plants, animals and lakes), values associated with doing things in the environment (nature walks, conserving trees), values associated with human relationships (people helping) and services provided by the environment (fresh air, water, food, shelter). Clearly, students expressed a wide range of positive values associated with the environment.

The foregoing evidence from the three age groupings on attitudes and values toward EfS will now be examined from the perspective of key influences that emerged from the results. Influences discussed include school priorities, sense of place and whole systems thinking.

**School Priorities**

Overall, considering all age groupings, evidence suggested student outcomes in terms of attitudes and values were enhanced during the initial years following involvement in AuSSI-WA. In terms of the conceptual framework, this finding suggests movement on the sustainability continuum toward the more sustainable end. Students were explicitly exposed to attitudes and values that related to EfS and they subsequently expressed positive attitudes and values about sustainability issues. Analysis of young children’s drawings, older students survey responses and findings of ELOS (Ballantyne et al., 2005) provided evidence supporting the positive impact of the EfS program on students’ attitudes and values. This finding is in agreement with the limited literature available which outlines the benefits of EfS on children’s attitudes and values (Armstrong et al., 2004; Ballantyne et al., 2005; Donaldson, 2009a; NEEF, 2003).

However, 2007 student responses appeared more positive than 2008 evidence. This suggested school priorities may have changed in 2008. The 2007/8 variation in student responses reinforces the importance of long term research, as other researchers have also argued (Gralton et al., 2004; McNaughton, 2007; Pepper, 2007). Nevertheless, it was surprising that EfS projects conducted up to seven years prior to 2008, were still being mentioned by students in very positive terms. Such longevity of learning outcomes was not anticipated. Clearly, those projects – and the school priorities that enabled implementation - had a major impact on students in relation to long term awareness of and explicit expression of positive attitudes and values associated with sustainability.
**Sense of Place**

Numerous studies document the strong relationship between attitudes and values in EfS and the importance of ‘sense of place’ (Cameron, 2008; E. Lewis, Mansfield et al., 2008; Miles, 2008a; Netherwood et al., 2006; Sparvell, 2008). Findings of enhanced attitudes and values for sustainability also supported engagement with EfS in meaningful situations in local places. These real life contexts appeared to raise awareness of attitudes and values associated with caring for the environment. Furthermore, evidence indicated students felt empowered to take environmental action in non-school time, so these enhanced attitudes and values were not necessarily context and time specific. These findings are in agreement with the literature in terms of the importance of focusing on developing a ‘sense of place’ in EfS programs.

**Whole School Approach**

Results suggested the whole school focus on EfS appeared to diminish in 2008. Students - from Children’s House to Year 7 - expressed in drawings, words and behaviours this change in direction. They also stated their dissatisfaction with reduced opportunities for active engagement in real life EfS projects. The lack of whole school support for these active whole school projects, such as the biological survey, appeared to impact on the practical manifestation of caring attitudes and values embedded (and explicit) in them. Henderson and colleagues (2004) outlined the importance of a whole school approach for EfS and the findings of the present study contribute evidence of consequences arising from diminished whole school commitment to EfS.

In summary, enhanced student outcomes for all year levels were demonstrated for attitudes and values related to EfS during the initial years of involvement in AuSSI-WA. School priorities, sense of place and whole systems thinking were identified as key influences emerging from the attitudes and values data. The complex dynamic interplay between these influences were discussed, with the emergence of a confounding juxtaposition of improved attachment to place and reduced school support for real life, locally based EfS endeavours. This situation will be explored further in the next section on student outcomes for knowledge and understandings related to EfS.

**5.2.2 Knowledge and Understandings in EfS**

Knowledge and understandings about environmental, economic and socio-cultural systems are vital for effective EfS (Sterling, 2003b). Evidence relating to student
knowledge and understandings for all age groupings at the case study school will be discussed in the context of the literature. It will be shown that, overall, enhanced knowledge and understandings associated with EfS occurred following involvement in AuSSI-WA.

Sustainability knowledge and understandings of very young students (3-6 years old) participating in the research was ascertained from their drawings, together with observational and interview evidence. Drawings by these students in 2007 focused on a wide range of topics, for example, suitable food for worms, plants grow from seed, and plants need water. Frequency of responses in terms of action learning areas was found to be highest for biodiversity, followed by cleaning, wellbeing, waste, and water (Table 4.23). Instances of knowledge were again observed in the 2008 drawings. Frequency of responses in terms of action learning areas were highest for wellbeing and other, followed by biodiversity, cleaning and waste (Table 4.56). Clearly young children were able to express their knowledge about sustainability through their drawings and scribed statements.

Although most of the sustainability knowledge expressed by students was about the environment, as directed by the survey instructions, some students responded in terms of social and economic sustainability. Thus, in 2007 there were drawings of love hearts in the sky and on a flower (social sustainability). There were no references to money (economic sustainability) in the 2007 Children’s House data. However, in 2008 the word ‘love’ was not used at all, nor were love hearts drawn in any of the pictures, however there was a focus on knowledge reflecting the power of money, as illustrated by the student comment on selling apples to provide funds to purchase a play station. Furthermore, a comparison of the overall tone of student knowledge in 2007 (Figure 4.24) with 2008 (Figure 4.56) revealed that 2007 knowledge appeared more positively worded than 2008 responses. For instance, 2007 biodiversity knowledge about seed growing and planting flowers, may be contrasted with less positive statements in 2008, about trees falling down. These findings demonstrated a wide range of knowledge about the environment was represented in the drawings of very young children, and that this knowledge appeared to include different spheres (or pillars) of sustainability – environmental, social and economic. This provides unique evidence from this age group in an area characterised by limited research (Gambino, Davis, & Rowntree, 2009).
Environmental knowledge of Children’s House students was also obtained by the observational/interview schedule employed (Ballantyne et al., 2005). Students were invited to state ideas they had learned about caring for the environment and what helped them learn. 2007 evidence focused on water quality. Students were extremely interested and engaged in discovering a hitherto unknown range of macroinvertebrates in the lake (Appendix 7). In 2008 some students referred to interesting gardening experiences, planting and watering strawberries. Responses indicated knowledge gained from the program and the importance of being actively involved during the learning process. This finding supports results reported by Gambino and colleagues (2009) in a study involving four and five year old children. These authors found their children gained new knowledge as a result of participating in a forest field adventure. Similarly, young children in the present study were involved outdoors, on the lake shore and in the garden, and this active engagement appeared to support the learning process.

Overall, Children’s House participants provided evidence supporting the positive impact of the EfS program on their EfS knowledge and understandings. Again there were indications that 2007 student responses were more positive than in 2008. This research thus contributes to the limited evidence in the literature that EfS in early childhood can be effective in enhancing knowledge and understandings about sustainability (Gambino et al., 2009; Tilbury et al., 2005).

To determine lower primary students’ knowledge and understandings about sustainability, a range of instruments were employed. Student knowledge was indicated in their survey responses. The highest frequency of responses in the 2007 lower primary survey in terms of the AuSSI action learning areas, were for waste, followed by wellbeing, biodiversity, water and energy. Most waste responses focused on the importance of recycling - paper, batteries, shoes, bottles and so on, reflecting knowledge that a wide range of materials can be recycled. In 2008, the highest frequency of responses targeted the AuSSI action learning areas of: wellbeing, followed by biodiversity, water, waste and energy. However, as noted in the Chapter 4, the wellbeing responses appeared to be artificially inflated due to the ‘healthy body’ lesson conducted prior to administration of the survey.

The action learning area of biodiversity was overwhelmingly identified by lower primary students in 2007 as the favourite EfS lesson, with the majority of responses specifically referring to the biological survey (E. Lewis & Baudains, 2007a). It was clear that student learning was enriched by pit trapping activities (for example, the
trapping process, identification of spider and frog species). Furthermore, students enjoyed their adventures with the pit traps. Students were also asked to identify their least favourite sustainability lesson. Overwhelmingly students in 2007 were unable to name EfS lessons in which they did not engage; although a few referred to biting ants during water quality testing at the lake. Favourite EfS lessons in 2008 were in the areas of biodiversity and water. The majority of biodiversity responses specifically referred to the biological survey which was conducted two years previously. All the ‘water’ responses related to the Making Waves project (Appendix 8), which predominantly involved water testing and reed planting (E. Lewis, Mansfield et al., 2008). Responses to the 2008 survey item about students’ least favourite EfS lessons indicated they seemed less tolerant to outdoor lesson situations than in 2007. Well over half the students in 2008 identified EfS lessons they least liked. They did not like waste activities because of the smell and boredom, nor water activities due to the heat and mess. In contrast to the 2007 survey result for this item, where nineteen percent of students named EfS lessons in which they did not engage, forty two percent of students in 2008 indicated lack of engagement. These findings contribute unique evidence to the literature, showing variation in student EfS outcomes over time, an issue of concern to some authors (Gralton et al., 2004).

Additional evidence about lower primary students’ knowledge and understandings was provided by and observational/interview schedule (Ballantyne et al., 2005). In answer to questions about their learning in 2007, students elaborated on water quality assessments at a local lake and gardening experiences. Responses demonstrated deep interest, for example, one student recalled and specifically mentioned improved water quality assessments from those conducted in 2006 to those in 2007. Responses in 2008 referred to specific knowledge learned during garden lessons, their enjoyment, and highlighted the importance of active involvement during the learning process. Interestingly, the gardening context illustrated Baudains’ (2003) adaptation of the cyclic model of environmental education and the self-regulation of learning model (Figure 2.2). Students learnt about different types of plants (knowledge), liked gardening (action), and felt happy (attitude), within the context of planning and monitoring where they stepped, knowing the consequences of stepping on plants (metacognition).

To ascertain upper primary knowledge and understandings about sustainability, mind maps, surveys, work samples, observed behaviours and self-reflections were analysed.
Responses to the 2007 upper primary student survey placed waste as the most frequently identified action learning area; students knew a wide range of materials could be recycled, like paper, food, batteries, plastic pots, corks, and second hand solar panels. Furthermore, students expressed explicit knowledge about reasons for recycling, such as, reduced pollution and improved use of resources. Some student comments suggested partial links between behaviours and systems, such as recycling food to provide nutrition for worms, which in turn enriched the soil and provided nutrients for plants to grow.

Students were asked to identify one class program that was a good example of sustainability in action. Biodiversity programs were most commonly mentioned – pit trapping and gardening. Specific knowledge included the characteristics of different species of frog found in pit traps. Overall, the 2007 survey responses expressed positive, active environmental knowledge. Work samples also provided evidence of knowledge gained during participation in EfS projects in 2007. At the start of the school year, nine and ten year old students expressed their understandings of the term ‘sustainability’. Responses demonstrated most students thought about the concept in terms of environmental sustainability. Some months later, when they participated in the 2007 upper primary survey they indicated broader understandings of the term, particularly of social sustainability issues. Other work sample evidence (Appendix 8), such as students’ before and after biological survey brainstorms, clearly displayed knowledge gained as an outcome of participating in the project.

Findings of the 2008 upper primary survey focused on whole school programs that were conducted during previous years. Biodiversity projects were most frequently mentioned. Students expressed detailed knowledge about the biological survey conducted in the school grounds and the nearby lake area (Tables 4.30, 4.32, .62 & 4.75). Knowledge about the garden project was also mentioned frequently (Tables 4.29, 4.30 & 4.62). Clearly, students gained knowledge as a result of participating in EfS projects. Furthermore, this knowledge was retained long term because most of the projects mentioned were undertaken between two-seven years before the survey was conducted, rather than in the previous year as instructed.

The 2007 upper primary student ELOS - IS (Ballantyne et al., 2005) provided evidence relating to student knowledge. Students were asked to state things they had learned about caring for the environment and what helped them to learn. For example, knowledge learnt during the Turtle Watch project was highlighted. (Tables 4.42 &
The *ELOS - SOS* (Ballantyne et al., 2005) conducted in 2007 provided further evidence of student knowledge and understandings. During in-class Turtle Watch discussions, students were observed debating sources of pollution in the lake and implications of project findings for the health of turtles, the ecosystem and people. *ELOS-IS* (Ballantyne et al., 2005) in 2008 provided additional evidence regarding student knowledge gained through EfS. Students indicated learning about the sustainability of Early Man, specifically environmental and cultural conditions that contributed to the survival or otherwise of different hominid species (Table 4.75 & Appendix 7 for work sample evidence of students’ knowledge and understandings in ‘Early Man’ studies).

Field notes confirmed foregoing findings. It was documented in relation to the Turtle Watch project, for instance, that a few students expressed understandings about the survival of the turtles being viewed as a means of monitoring changes to the aquatic ecosystem (Field notes 07/11). Furthermore, one student expressed an understanding that even though turtles were not endangered, they were at the top of the under-water food chain so provided a meaningful indicator of environmental quality; and since all members of the ecosystem are interdependent turtle wellbeing impacted on humans (Fieldnotes 07/11). However, these big picture understandings were unusual; students typically expressed understandings indicating turtles were interesting to study as an isolated topic.

Overall, analysis of upper primary data provided evidence supporting the positive impact of the EfS program on student knowledge and understandings. Findings indicated that undertaking relevant, active, real life EfS projects was an effective, meaningful way of teaching knowledge. These results reflect the positive impact of involvement with AuSSI-WA during the initial years of AuSSI-WA membership. Evidence about knowledge and understandings from the three student age groups will now be examined from the perspective of key influences that emerged. Influences discussed include school priorities and whole systems thinking.

**School Priorities**

Student survey and interview results indicated EfS was a school priority in the years immediately following involvement in AuSSI-WA. However, findings suggested the school did not continue to actively support EfS champions and projects in 2008. Student responses across the school indicated a shift, a change in priority, related to the
whole school focus on EfS. Students seemed less tolerant to EfS lesson contexts and requested their favourite EfS projects be re-activated. Students enthusiastically recalled enjoyable pre 2008 EfS projects, and this high level of engagement appeared to have an ongoing favourable impact on student perceptions about EfS, with concomitant enthusiasm for associated EfS knowledge and understandings gained during the earlier period.

Whole Systems Thinking

Student exposure to whole systems thinking appeared to increase following participation in AuSSI-WA. However, findings suggested additional focus on student understandings and engagement with whole systems thinking (RQ 2) was needed. Evidence relating to whole systems thinking arose from responses in relation to particular projects, such as turtle nest monitoring and native reed planting.

The Turtle Watch project was planned and implemented with whole systems thinking as an overarching learning principle. Some student responses illustrated whole systems thinking, however overall results indicated students typically considered the wellbeing of turtles as an isolated phenomena. An examination of the literature in Chapter 2 emphasised knowledge and motivation as important components of behaviour change (Baudains, 2003; Schultz, 2002). The Turtle Watch scenario in which students enthusiastically collected rubbish at the turtle site and subsequently littered at school, supports the reported findings that knowledge alone will not necessarily result in changed behaviour. Furthermore, the littering observation suggests students needed further experience with the whole systems thinking. As Sterling (2003b) argued, systems thinking recognises valid knowledge and meaningful understandings come from building up a complete picture of a phenomenon and the recognition that this impacts on sustainability of the whole system. Clearly, students were not making the connection between littering at school and the rubbish they were concerned about and collected at the nearby lake. It appeared students needed to be exposed to modified teaching strategies together with further exposure in real life contexts to develop and consolidate ‘whole systems thinking’ understandings. Students required more experience in seeing the big picture, establishing interrelationships and understanding phenomena as an integrated whole. Similar students needs have been recognized internationally (Babiuk & Falkenberg, 2010; Sterling, 2003a, 2003b, 2004, 2010).
The native reed planting project provides another illustrative example in relation to outcomes for whole system thinking. In this project students were encouraged to think about interrelated issues including: findings from their ongoing long term water quality assessments at the local lake; environmental responsibility and social and civic values; origins of lake pollution; implications of project findings for ecosystem and human health; hands-on environmental action involving removal of weeds and replanting with native species; and community education about project results. However, whole systems thinking was not typically demonstrated in student responses. For example, representative student mind maps identified ‘lake testing’ and ‘reed planting’ as separate elements of sustainability, rather than being linked together (Figure 4.19). Seeing the whole picture and establishing interrelationships between fragmentary pieces of information, such as pollution and the health of an eco-system, is important if students are to understand phenomena in their world as an integrated whole. In particular, thinking about the connections and relevance of their learning experiences and associated values needs to be facilitated, as it did not occur without continual prompting and explicit teacher-led discussion in the case study school.

This foregoing evidence was confirmed by a former student’s comments about primary school composting lessons. A Year 9 student maintained there was no clear connection between hands-on action (making compost) and its relationship with the organic gardening cycle, other aspects of waste management and other systems (economic, social, etc). Nor was there any understanding of a link between composting and the abstract concept of sustainability. Thus, explicit teaching and deeper engagement with the whole systems thinking approach appears essential.

Research results therefore suggested ongoing explicit instruction from a whole systems thinking perspective is warranted, as only a few students displayed increased awareness of the interconnectedness of phenomena. Most students appeared to view different project issues as separate fragmented knowledge. Interrelationships between phenomena were not typically reflected in their responses. Consequently students need further learning opportunities in real life, local contexts that showcase whole systems thinking. Parallels to these results have not been found in the literature; they provide specific, initial, unique results in relation to whole system thinking in the class room. Furthermore, it is argued that students need further experience with whole systems thinking otherwise they will continue to gain knowledge and understandings within
silos. Such an outcome would situate the school towards the least sustainable end of the sustainability continuum in ‘teaching and learning’.

In summary, enhanced student outcomes in terms of knowledge and understandings were found for all age groupings during the initial years following involvement in AuSSI-WA. However, in 2008 student responses across the school indicated a change in priority related to the whole school focus on EfS. In terms of the conceptual framework, these results suggest an overall shift toward the most sustainable end of the continuum in the 2005-2007 period, followed by movement in the other direction in 2008. Furthermore, analysis of student data on knowledge and understandings revealed a surprising appreciation of EfS projects conducted many years earlier. Clearly, those projects had a major impact on students in terms of their long term knowledge and understandings associated with sustainability. Finally, school priorities and whole systems thinking emerged as key influences from the knowledge and understandings data. School support for EfS initiatives led to positive movement toward the sustainable end of the continuum, while changed school priorities appeared to impact on student outcomes, contributing to a shift towards the least sustainable end of the continuum. Likewise, the complexities of teaching whole systems thinking was highlighted, with the Turtle Watch litter issue being illustrative of challenges at the student level. On the one hand teaching whole systems thinking contributed positive movement on the continuum, however poor student understandings of whole systems thinking suggested movement in the other direction. The next section on student outcomes for skills and behaviours in EfS will add further evidence highlighting confounding forces in EfS.

5.2.3 Skills and Behaviours in EfS

A wide range of skills is required for EfS to contribute to student outcomes that reflect improved behaviours. These skills vary from practical environmental action skills like planting seedlings, to critical thinking skills, and skills developed across the curriculum, such as literacy skills (Henderson & Tilbury, 2004; Howe & Disinger, 1988; Sia et al., 1985). Evidence relating to student skills and behaviours for all age groupings at the case study school will be discussed in the context of the literature. It will be shown that, overall, student responses from all year levels indicated enhanced skills and behaviours associated with EfS after involvement in AuSSI-WA.
Skills and behaviours learnt by young students (3-6 years) were illustrated in their drawings. For example, in 2007 students drew and reported to their scribe skills and behaviours such as sweeping up rubbish, picking up cans and watering plants. Clearly these children displayed a range of environmentally positive skills and behaviours through their pictures. Other instances of skills and behaviours were observed in the 2008 set of drawings, including collecting rubbish, planting flowers and trees, as well as assessment of tree safety. Student drawings again indicated a wide range of environmental skills.

Further evidence on the skills and behaviours of Children’s House students was provided by observation and interview schedules, *ELOS-SOS and ELOS-IS* (Ballantyne et al., 2005). In 2007 students were observed during a lesson by the lake as they investigated macroinvertebrates in lake water samples. Frequencies of student engagement in seven learning behaviours were assessed. Overall, students enthusiastically participated: they shared their learning with others; purposefully manipulated objects and ideas; were actively involved in learning; and responded to new information (Table 4.36). In 2008, students were observed during an outdoors garden lesson and an in-class health lesson. The garden lesson resulted in similar findings to the 2007 behavioural outcomes: students shared their learning with others; purposefully manipulated objects and ideas; and were actively involved in learning all the time (Table 4.68). However, student engagement during the in-class lesson was more subdued for some behaviours assessed (Table 4.68). These findings suggested students responded more enthusiastically when they were outdoors, actively employing their skills for the benefit of the environment.

The *ELOS-IS* (Ballantyne et al., 2005) sought information on students’ behavioural intentions, specifically relating to whether what they had learned would change what they did for the environment. In 2007, a representative student response involved making a worm farm at home because finding red worms in lake water was exciting. Typical student response in 2008 related to planting flowers, vegetables and fruit trees at home. Clearly young children felt inspired to engage in additional gardening behaviours as a result of skills they had learned and experiences they had at school.

Overall, analysis of young children’s drawings and findings of *ELOS* provided evidence supporting the positive impact of the EfS program on the young children’s skills and behaviours. This finding is important because it reinforces the value of early childhood EfS programs. Other authors similarly recommend the vital role such programs can
have in building children’s skills and understandings over time (J. Davis & Elliott, 2003b; QUT, 2009; Tilbury et al., 2005).

EfS skills and behaviours of lower primary students were determined through analysis of mind maps, survey responses and observed actions. Supportive environmental skills and behaviours were indicated in students’ 2007 survey responses. Students referred to various skills related to the use of equipment for water quality testing, such as pH scans and turbidity measuring instruments. Pit trapping skills learnt during the biological survey were also frequently mentioned. In addition, students listed a wide range of recycling behaviours in which they engaged. The 2008 survey responses similarly referred to the biological survey, water testing and subsequent reed planting as major EfS events in which they utilized their skills. These activities were very memorable to the children, especially checking pit traps for the biological survey as these skills were recalled as part of favourite lessons two years after that aspect of the project finished.

Additional evidence about students’ skills and behaviours was obtained from analysis of the observation and interview schedules. The observation schedule, *ELOS-SOS* (Ballantyne et al., 2005), was employed in 2007 during lessons by the lake and in the garden. The lake lesson involved physical and chemical water assessments. Frequencies of student engagement in seven learning behaviours were assessed. Overall, students involved in the lake lessons participated enthusiastically: they shared their learning with others; purposefully manipulated objects; were actively involved in learning; and responded to new information. Frequencies of engagement in learning behaviours for the garden students were similar to the ‘lake’ class (Table 4.36). In 2008, students were observed during an outdoors garden lesson and an in-class health lesson. The garden lesson resulted in findings similar to the 2007 behavioural outcomes but student engagement during the in-class lesson was subdued for some behaviours assessed (Table 4.68). Again these findings suggest students respond more enthusiastically when they are outdoors, actively employing skills for environmental benefit.

Students’ behavioural intentions were ascertained through interviews, using the *ELOS-IS* (Ballantyne et al., 2005). For instance, in 2007 one student involved in water quality assessments indicated family walks around the lake would include rubbish collection, as the impact of rubbish at the lake was a personal concern. A 2008 example from the administration of the *ELOS-IS* related to the student doing more gardening at home as
this was an interesting activity. Clearly children felt inspired to engage in out-of-school environmental actions as a result of experiences and skills learnt at school.

Overall, analysis of lower primary students’ survey results and observational data provided evidence supporting the positive impact of the EFS program on the children’s skills and behaviours. This finding is important because it further reinforces the value of early childhood EFS programs (J. Davis & Elliott, 2003b; QUT, 2009; Tilbury et al., 2005).

To determine EFS skills and behaviours of upper primary students, mind map, survey and observation data was collected and analysed. Students’ positive environmental skills and behaviours were indicated in their 2007 survey responses. They referred to pit trapping, worm farming, various recycling behaviours and planting reeds. Students expressed empowerment from the behaviours in which they were involved that resulted in follow-up environmental action being undertaken (Tables 4.29 & 4.30). Findings of the 2008 upper primary survey reflected programs that were conducted during previous years. The 2008 responses similarly referred to the biological survey, water testing and subsequent reed planting, along with turtle research and gardening, as major EFS actions in which they engaged. Students reported these activities were very empowering; their quotes explicitly linked knowledge and consequent behaviour (Tables 4.30, 4.61 & 4.62). Furthermore, as the biological survey (pit trapping) was conducted in 2006 these lessons were clearly very memorable, so much so that they were overwhelming recalled as ‘last year’s favourite lesson’ in 2008.

Installation and care of the school garden was an important part of the EFS program during 2006/7. Skills involved in the garden project were mentioned frequently in 2007 and 2008 survey responses (Tables 4.30 & 4.62). Some students reported the garden was so important they worked in it with others, in non-school hours.

In brief, upper primary student survey data provided evidence of skills and behaviours engaged in following school participation in AuSSI-WA. Furthermore, 2008 responses indicated forty percent of students wanted some earlier projects re-activated, as they were no longer operational (Table 4.66 & 4.67). However, student feedback appeared to be “unheard voices” (Holdsworth & August, 2005, p. 1) as no action occurred during 2008 & 2009 to respond to their input. This situation is unfortunate, as other researchers such as Donaldson (2009b) have reported that apart from environmental
benefits participation in outdoor environmental education results in improved student concentration on school work.

Evidence on upper primary students’ skills and behaviours was supplemented by the collection of observational and interview data. The observation schedule, ELOS-SOS (Ballantyne et al., 2005), was employed in 2007 during lessons involving turtle research. Students engaged in a ‘turtle egg hunt’, searching for predated turtle nests with broken eggs shells scattered nearby. They also collected rubbish walking to and from the lake site, and at the site. Overall, students were extremely focused and active during the egg hunt and follow-up discussions, in particular they: shared their learning with others; purposefully manipulated objects and ideas; were actively involved in learning; and responded to new information (Table 4.41). In 2008, students were observed during in-class EfS lessons on Early Man (Table 4.74). Overall, students shared their learning with others all the time but displayed less engagement in other behaviours compared with 2007 results (4.41). Again these findings indicate students responded more enthusiastically when they had opportunities to be outdoors, actively employing their skills in the environment.

Behavioural intentions of upper primary students were ascertained through the ELOS-IS (Ballantyne et al., 2005). The 2007 interview elicited a response involving correct disposal of rubbish (Table 4.42), however 2008 data found an absence of changed behavioural intentions in relation to the Early Man studies (Table 4.75). Unexpectedly, however, the 2008 findings reinforced evidence relating to skills developed during the biological survey. Students at these interviews spontaneously talked about outcomes from the pit trap research, specifically increased planting of native vegetation to provide improved habitat for frogs (Table 4.75). Clearly students felt empowered by the skills and behaviours associated with their previous biological survey work.

Other sources of evidence relating to upper primary student actions following involvement in AuSSI-WA was obtained from student work samples. Student brainstorms on ‘actions for the environment’ (Appendix 8) collected at the start of the school year in 2007, documented aspects of six AuSSI-WA action learning areas: waste (recycling, don’t use plastic bags), transport and air (walk/cycle to the school/shops), biodiversity (grow more trees, don’t chop trees), water (catch rain water), energy (use more solar panels) and wellbeing (help people...). Clearly, students expressed a wide range of behaviours associated with caring for the environment. Another set of upper primary work samples recorded aspects of learning and action during a Science Leaders
Course conducted in second term 2007 (Appendix 8). This course was conducted as part of the Making Waves EfS project (Appendix 11). These work samples present student understandings on leadership and how to improve local biodiversity. Students subsequently took action and planted native trees and reeds (E. Lewis, Baudains, & Mansfield, 2008a; E. Lewis, Mansfield et al., 2008).

Overall, the EfS program was found to provide a positive impact on upper primary students’ EfS skills and behaviours. This finding agrees with other research documenting the effectiveness of active, outdoor, meaningful, place-based EfS programs (Armstrong et al., 2004; J. Davis, 2005; Tangen & Fielding-Barnsley, 2007).

Overall student responses from all year levels indicated enhanced skills and behaviours associated with EfS after involvement in AuSSI-WA. However, in 2008 numerous students indicated the active, outdoor EfS projects were no longer operating consistently and requested involvement in such activities again. These findings, together with overall student responses suggesting improved attitudes and values, and knowledge and understandings, highlight student benefits arising from participation in AuSSI-WA.

Evidence about skills and behaviours will now be examined from the perspective of influences that emerged. These relate to behaviour change, sense of place, whole school approach and whole systems thinking. The complex interplay between these influences will be illustrated with reference to cognitive dissonance.

Confounding Influences - Behaviour Change, Sense of Place, Whole School Approach, Whole systems Thinking and Cognitive Dissonance

To illustrate the complexity of student outcomes and the interplay between behaviour and values, behaviour change, sense of place and whole systems thinking will be brought together as confounding influences impacting on each other, whilst simultaneously demonstrating cognitive dissonance. The Water Quality/Reed Planting and Turtle Watch projects will be used as the on-ground contexts in which this complexity is made concrete.

The water quality/native reed planting project is illustrative of a whole school approach and behavioural outcomes achieved across the whole school. In 2006, student (K-Yr 7) water quality monitoring activities at a local lake revealed issues with pollution. Macroinvertebrate counts showed a predominance of species that were very tolerant or moderately tolerant to polluted water conditions. Students learned the presence of weed species at the edge of the lake contributed to poor water quality and this finding led to
student generated questions about improving the situation. In 2007, weed species were removed and students (Yr 1-7) planted native reeds.

Water quality/reed planting project values were explicitly discussed: ‘social and civic responsibility’ (specifically ‘community’) and ‘environmental responsibility’ (‘conservation of the environment’ and ‘diversity of species’) (Curriculum Council, 1998; E. Lewis, Mansfield et al., 2008). Expressions of these values were noted in student mind maps (Figures 4.4, 4.6, 4.18 and 4.19), indicated by love hearts, words like ‘caring’ and ‘respect’ and actions taken (lake testing and reed planting). Analysis of the 2007 ELOS-SOS (Ballantyne et al., 2005) found overall, students displayed positive engagement in learning behaviours that reflected these values. They actively worked for the conservation of the environment and to increase diversity of species by improving water quality. Research field notes also supported this evidence. For example, after school on the reed planting day, one student observed birds had pulled up some of the newly planted reeds, so spent time re-planting disturbed reeds. This project clearly illustrates whole school participation in actions to improve the local environment, with associated values demonstrated.

Turtle Watch was similarly a whole school project, an environmental education for sustainability project in which the values of ‘social and civic responsibility’ and ‘environmental responsibility’ were explicitly embedded (Curriculum Council, 1998; E. Lewis, Baudains, & Mansfield, 2008b; E. Lewis, Baudains, & Mansfield, 2009a; Sparvell, 2007, 2008). Turtle Watch grew from student and community concern about the local Oblong Turtle (Chelodina oblonga). Specifically, road deaths and a lack of suitable nesting sites were identified as key issues impacting on the turtles. To address these concerns the school conducted a trial involving provision of a suitable, safe nesting site for turtles.

Values education and whole systems thinking were among the overarching learning principles of Turtle Watch. ‘Social and civic responsibility’ (specifically ‘community’ and ‘benefits of research’) and ‘environmental responsibility’ (‘conservation of the environment’ and ‘diversity of species’) were embedded in the project. For example, ‘community’ values were manifest by effective collaboration between the various stakeholders (school, government conservation department, local council, friends groups), while ‘benefits of research’ was highlighted by the collection of turtle nest-watch finding of thirty one predated nests at the site (Appendix 8). Students were passionate about the project (Tables 4.41 and 4.42); they wanted to make a difference to
their local environment, to turtle conservation. Students developed a strong attachment to their local wetlands; they displayed an enhanced ‘sense of place’ for the area. This attachment was expected to result in deeper stewardship for their local area (Miles, 2008a).

‘Environmental responsibility’, specifically ‘conservation of the environment’, was demonstrated by upper primary students through site observations and monitoring. Students observed rubbish at the site and evidence of water pollution. They volunteered to collect litter each site visit. However, this action, this environmental stewardship, did not translate into overall changed behaviour in other school contexts. Student discussions while on site generally reflected understandings about different species within an eco-system, as biological phenomena, but not relevant to personal behaviour and health. Field notes documenting observations of student littering at school (a short walk from the turtle site) supports this position. So, despite a whole school approach being undertaken and overall selective behavioural change noted, a persistent problem with littering at school remained. Even though students had the skills to collect rubbish and enthusiastically engaged in this activity at the turtle site, it is clear that skills alone did not necessarily translate into changed behaviour. Furthermore, students in general were not viewing waste management from a whole systems thinking perspective. This example highlights the importance of the strength of local attachment, commitment to place and understandings about the whole systems thinking. In terms of the conceptual framework, it also demonstrates issues supporting the school in its progress to the more sustainable end of the continuum, whilst simultaneously grappling with the same or other issues shifting it towards the least sustainable end. Finally, this dynamic interplay of influences relates to the phenomenon of ‘cognitive dissonance’ discussed in the literature (Section 2.1.2).

Cognitive dissonance refers to inconsistencies between beliefs, attitudes and behaviours (Aronson, 2008; Festinger, 1957). The literature presents considerable evidence of cognitive dissonance in adults (Baudains, 2003; Kagawa, 2007; Malet, 2009; Travis & Aronson, 2007) in the field of sustainability, but little evidence of possible cognitive dissonance in children. The foregoing littering example suggests children may also display cognitive dissonance with respect to sustainability. This is a new finding contributing unique evidence in this field.

Referring specifically to RQ 2, results were sometimes consistent with the existing literature and at other times provided new unique evidence. Enhanced student outcomes
for all age grouping were demonstrated for attitudes and values, knowledge and understandings, and skills and behaviours related to EfS, especially during the first three years of involvement in AuSSI-WA, 2005-2007. During 2008, however, it appeared there was a change in priorities at the school regarding EfS, because nearly all former EfS programs ceased that year, with consequent impacts on students’ EfS attitudes and values, knowledge and understandings, and skills and behaviours. Figure 5.3 illustrates key confounding influences impacting student outcomes.

![Figure 5.3 Confounding Influences Impacting on Student Outcomes Following Participation in AuSSI-WA Post 2005](image)

In terms of the conceptual framework, involvement in AuSSI-WA facilitated overall movement towards the most sustainable end of the sustainability continuum. However, changed school circumstances in 2008 seemed to result in a shift in direction towards the less sustainable end. It is enlightening to view this finding in the context of the
wider literature. The majority of studies reported in the literature involve short term research and similarly report a high level of success early in the Initiative (Armstrong et al., 2004; J. Davis, 2005; Potter, 2007). The present longitudinal study provides vital new evidence, adding to a very small body of research from longitudinal studies that have found variable long term commitment to EfS initiatives in schools (McNaughton, 2007; Thomas, 2005). Student engagement with and understanding of whole systems thinking, the other component of this research question, was overall found to be limited. Students needed further experience with the whole systems thinking approach. Students typically appeared to think and behave within silo scenarios, so deeper engagement with whole systems thinking is warranted. With reference to the aspects of ‘EfS activity’ and ‘teaching and learning’ in the conceptual framework, this finding indicated need for focused intervention to support movement towards the most sustainable end of the continuum. Further evidence relating to the whole systems thinking perspective will be addressed in the following section on teacher perceptions.

5.3 Teacher Perceptions (RQ 3)

This study found:

• Teachers perceived the EfS program, in relation to key elements and the impact of AuSSI-WA, was growing and highly effective in the initial three years after joining AuSSI-WA.

• Teachers perceived the EfS program ceased operating effectively for over a year following the aforementioned initial success, due to a lack of leadership and professional learning, staff not having designated EfS responsibilities and inadequate support from the school community.

• Teachers perceived the re-emergence of the EfS program as a result of renewed support from the school board, with outstanding identifiable challenges yet to be addressed.

• Teachers engagement with whole systems thinking approach was demonstrated more in theory than practice.

• Effective teaching and learning, utilising whole systems thinking, warrants engagement in professional learning about the approach, together with leadership support.

Teacher perceptions will be discussed in three main sections: first, the whole systems thinking approach; second, the impact of AuSSI-WA at the school; third, teacher
perceptions of the EfS program after five years of involvement in AuSSI-WA. Teacher responses from the surveys will be presented first and then other evidence from document searches and field notes will be discussed in relation to the literature.

5.3.1 Whole Systems Thinking

Five aspects of the school’s approach to EfS will be discussed to determine teacher perceptions in relation to whole systems thinking. These aspects include Montessori philosophy, the school’s strategic plan, sustainability model and policy, and values education in EfS.

Montessori Philosophy

In theory, the Montessori educational approach, particularly the Cosmic Curriculum, has been shown to align positively with EfS especially in terms of the interconnectedness of all things (Gausman, 2001a; Hayes, 2005; Montessori, 1966, 1992; Sillick, 1987). Montessori philosophy appeared to incorporate some understanding of whole systems thinking before the latter approach was widely discussed in the literature (Capra, 1996; Clayton et al., 1996; Flood, 2000; Sterling, 2003b). To provide current evidence regarding this alignment, teachers were invited to comment on the impact of the Montessori philosophy on EfS at the school. All responses, in both 2007 and 2008, indicated positive alignment between the philosophy and EfS, thereby agreeing with the literature. As one teacher succinctly stated, “Maria Montessori was the first ecological educator because she tried to show all the inter-relationships between life. Montessori is very sympathetic to EfS”. Teacher responses were categorized into four areas of impact: eco inter-relationships, learning and classroom environment, values, and community involvement (Tables 4.13 & 4.45). It therefore appears, inherent in the Montessori approach to education, there is some understanding of the interconnectedness of all systems.

Strategic Plan

The school’s Strategic Plan attempted to embed sustainability within a whole systems thinking approach. Thus sustainability was addressed in the administration, finance, community and education sections of the Plan. Teachers were asked to comment on the impact of the Strategic Plan in relation to the school’s EfS vision. 2007 survey responses were predominantly negative, reflecting concern about effective implementation of the plan and/or lack of specific knowledge about the Strategic Plan.
A representative teacher response indicated, “I'm not sure if the initial impact of the EfS vision is being realized and carried through”. Similar responses were recorded in 2008 (Table 4.47). Positive responses focused on possible potential benefits from the Plan for EfS, such as “In theory, excellent umbrella for EfS vision for whole school”. However, other responses documented the failure of the Plan to have any impact on EfS. Typical comments included, “NOT effective – sustainability vision is in there [Strategic Plan] but not living” and “No impact because no one has looked at the Strategic Plan so far this year”. Clearly, having sustainability embedded into the Strategic Plan did not necessarily mean that genuine action would follow. From a strategic planning perspective, a whole systems approach to EfS did not appear to operate.

**Sustainability Model**

Whole systems thinking at the school was reflected in the school’s sustainability model (Appendix 5). This model was an outcome of input from the whole school community. The model’s interconnecting circles represented the interconnectedness of all living and non-living things, of all the systems that make up the world. Thus teacher responses about the model indicated some understanding of the application of whole systems thinking.

Teacher responses in both 2007 and 2008 surveys indicated the school’s model of sustainability had a major impact on them. Representative comments were “Huge impact – easily understood, summarises underpinning ideas, visually attractive” (2007) and “Huge - very clear, graphically shows interconnectedness” (2008). However teachers reported a lack of engagement with the model in 2008. So although teachers indicated the usefulness and powerfulness of the model, it was not used in lessons in 2008 (Table 4.48). This lack of engagement with the model suggested that EfS was no longer a priority in the school, with consequent lack of focus on whole systems thinking.

**Sustainability Policy**

The school’s Sustainability Policy was developed as an outcome of involvement with AuSSI-WA. In 2006, an early version of the AuSSI-WA tool for planning and assessment, the ‘Key Elements Rubric’ (DET, 2010a) was employed, resulting in identification of the need for a policy. Thus policy development was determined to be a school priority that year. An initial policy was approved by the school’s management
board in 2006, with a requirement for review after twelve months. A revised policy was approved in 2007. Whole systems thinking was embedded into the policy: “...most importantly, the EfS program focus will integrate all fields of sustainability in a ‘whole systems thinking’ approach (Appendix 5, 2007 version). Clearly the sustainability policy was employed as a strategy to embed whole systems thinking into EfS at the school.

However, both the 2007 and 2008 teacher survey responses indicated the sustainability policy had minimal impact on teachers. Although they admitted, in 2007, that the policy gave “clarity and a reference point”, teachers generally were “guided by [school AuSSI coordinator’s] interpretation” and stated “we need paid staff to work through this area”. The 2008 teacher responses were more outspoken. They highlighted the gap between the potential of the policy and its actual impact. As one teacher stated, the policy had “Not operated at all”. Another response focused on the lack of attention given to the policy, “New people had to build on EfS - need consistency in how it is articulated but some people too busy to e.g. read and understand existing ... policies and so did their own thing!”. This situation led to disagreements between community members and impacted negatively on the implementation of EfS. Without leadership and management support, EfS programs ceased to operate. A whole school approach to EfS no longer existed. Having a written Sustainability Policy, like the Strategic Plan, did not necessarily mean it was read, understood and implemented. From a policy perspective a whole school, whole systems thinking approach to EfS was no longer operational. As other researchers have commented, “... policy success is defined as ‘effectiveness on the ground’. When these effects are lacking, the policy concerned has failed” (Arts & Buizer, 2009). This clearly appeared to be the situation at the school in 2008.

**Funding Implications of the Policy**

Lack of funding support for the EfS program was reported by teachers as a policy weakness. Funding was required to conduct professional water and energy audits, as well as for smaller expenses like the purchase of reticulation and garden plants. However, management maintained EfS projects needed to be self-sustainable, consequently funding was obtained from grants and fundraising. This situation suggested EfS was not viewed systemically, in the context of a whole school, whole systems thinking approach.
It appeared EfS was viewed as a silo activity in the school. It was not seen as a core educational responsibility, embedded into the curriculum within a whole school approach, rather it was an extra to be included if grant applications were successful. Furthermore, it appeared EfS was not seen as an important administrative/infrastructure issue. For instance, potential energy and water savings from EfS projects seemed to lack value from a whole school perspective. Thus all hands-on student projects, from the installation of solar panels, to planting native trees and the provision of rainwater tanks appeared to be recognised as environmental activities that enhanced the status of the school, but were not viewed from a whole school systems thinking perspective. Such silo thinking placed the ongoing status of hands-on EfS projects at risk if grants were not obtained. This situation appeared to arise in 2008, when teachers no longer participated in new grant applications for EfS projects. This scenario contributed to the termination of EfS projects that had been in operation: the biological survey ceased; water quality assessment program ceased; native planting program ceased; waterwise and wastewise programs ceased; and the kitchen garden program struggled to keep going. Clearly, lack of funding support contributed to the change in priority towards EfS. In terms of the aspects of ‘vision’ and ‘governance’ in the conceptual framework, the foregoing findings situated the school towards the least sustainable end of the continuum.

Values Education in EfS
Another outcome of AuSSI-WA at the school was that EfS programs increasingly included a values focus. Values were considered important to the development and maintenance of a whole systems thinking approach to EfS. A major theorist in whole systems thinking argued “we are educated by and large to 'compete and consume' rather than to 'care and conserve'” (Sterling, 2003a, p. 2). Furthermore, the same author maintained that because of the imposition of managerial and economic values on education, people have lost touch with social values and real life contexts of authentic education (Sterling, 2003a). These understandings informed EfS projects in the initial years following membership of AuSSI-WA.

Turtle Watch, planting native reeds and the kitchen garden were three EfS projects that attempted to engage students in whole systems thinking, explicitly connecting values and systems (economic, environmental, social, and others in the school model). It appeared that although some progress was achieved in this regard, “further opportunities to engage in this approach to thinking are required” (E. Lewis,
Furthermore, a challenge remained for the school to find “ways to deeply embed values and sustainable practices within other site plans and curricula” (E. Lewis, Mansfield et al., 2008, p. 153). In addition the authors argued that although there was a shift from an abstract notion of ‘teaching’ values to a focus that provided opportunities which facilitated deep links between values and the real world, further EfS learning contexts needed to be provided to consolidate that shift (E. Lewis, Mansfield et al., 2008). In brief, values education within the EfS program was found to contribute to and support whole systems thinking, but explicit attention to the link between values education and EfS appeared to lose priority after 2007.

In summary, teacher perceptions in relation to whole systems thinking were discussed, and although broad alignment between Montessori philosophy, EfS and whole system thinking was reported, it appeared such alignment was more in theory, documentary (in policy and plans), than in practice. Overall, teachers needed deeper engagement in professional learning about whole systems thinking, with concomitant management/leadership involvement, to effectively teach EfS from a whole systems thinking perspective. These findings supported limited research evidence currently available in the literature. With reference to the conceptual framework, the results suggest placement towards the least sustainable end of the continuum.

5.3.2 Teacher Perceptions on the Impact of AuSSI-WA

Two aspects of the school’s approach to EfS will be discussed to determine teacher perceptions after five years of involvement in AuSSI-WA. These aspects relate to teacher assessments based on AuSSI-WA’s Key Elements Rubric (DET, 2008a) and responses about the perceived impact of AuSSI-WA. Evidence was drawn from survey responses, document searches and field notes, and discussed in relation to the literature.

Elements of EfS

Key elements of EfS, as identified by AuSSI-WA were presented in Figure 2.7. Teachers, in 2007, reported the following elements to be ‘strengths’: vision and values, teaching and learning, curriculum integration, student voice, and recognition of successful action (Table 4.11). Some of these ‘strengths’ were also considered to have ‘weaknesses’ and ‘opportunities’. Teachers were also invited to describe one of their programs that was a good example of their approach to EfS. Responses included the AuSSI-WA areas of waste, water, biodiversity, energy and wellbeing (Table 4.20). In 2007, it appeared that teachers were engaged in a range of EfS activities and valued
support from their AuSSI coordinator.

Teacher survey responses in 2008 indicated dramatic changes in EfS had occurred at the school since the administration of the 2007 survey (Table 4.43). EfS champions had left the school and teachers reported there was “not the same drive, sense of purpose and direction”, the “sustainability focus isn’t there!” Constraints in the ‘community network’ were seen as ‘threats’, as teachers reported inadequate parent support. This situation contrasted with strong community support documented in 2005 (ASTA, 2005a, 2005b; Rennie, Evans, Koul, Harris, & Lewis, 2005). Nevertheless, teachers elaborated numerous strengths of EfS at the school and indicated that some of these resulted from the legacy of the former EfS champions (Table 4.43). Again governance was considered to be a major ‘threat’ to sustainability. “Not having a passionate leader [for EfS] at the school” was reported as a major concern to teachers (Table 4.43). One teacher stated:

“Need the principal to be on board. Without someone strong to drive it, it will eventually fall apart. [Principal]... talks the talk and won’t take the time to learn to understand it; need to find a way to engage. Need [management] to be on board - in 2008 there have been 4 convenors of [sustainability committee] plus 2 periods, over two months long, with no one accepting the role of convenor. Need principal and management to be on board from a Strategic Plan point of view – not really engaging with the sustainability aspect at all; just token support.”

Thus, in 2008, most teachers perceived the school as a ‘sustainable’ school in name only. In conceptual framework terms, these findings placed the school towards the least sustainable end of the continuum.

Other influences also reflected a change in school priority away from active engagement with EfS. Teachers indicated staff no longer regularly attended Sustainability Committee meetings due to lack of leadership, management support and commitment to EfS. Furthermore, no staff member/s were assigned the duties of AuSSI-WA teacher coordinator. In addition, teachers expressed concern that no whole staff professional learning on EfS was scheduled or undertaken during 2008. Likewise, the school’s EfS priority for 2008 was not addressed that year.

The 2008 EfS priority had been identified through whole staff participation in planning meetings during Term 4 2007, using the AuSSI-WA toolkit (DET, 2010a). However, all teacher survey respondents in 2008 stated they did not know about the EfS priority for
2008 and had consequently taken no action on it (Table 4.53). As one teacher reported: “not this year; not seeing anything happening”. Teachers expressed concerns related to inadequate principal support, lack of whole school focus and commitment to EfS, and immediate operational problems. Consequently no whole staff engagement with the identified EfS priority occurred during 2008. It therefore appeared that at best, during that year, an ad hoc silo approach to EfS dominated. This finding is an important contribution to the literature as challenges are not widely reported. Comparatively few authors (McNaughton, 2007; Pepper, 2007) have documented similar setbacks in EfS programs.

Impact of AuSSI-WA

Teacher surveys specifically invited comment about the impact of AuSSI-WA. Teacher responses in 2007 were mostly positive, indicating involvement in AuSSI-WA had resulted in major developments in EfS. These ranged from the development of a school model of sustainability (Appendix 5) involving the AuSSI elements of vision and values, to teacher perceptions, associated with EfS activity, professional learning, teaching and learning, and school networks (Table 4.14). As one teacher stated, AuSSI-WA had a “Big impact on our school. Doing lots of projects. Developed our model. Big focus on sustainability”. In contrast, the 2008 responses were predominantly negative (Table 4.46). Typical comments were, “Not much ... need volunteers and an organizer”, “Not mentioned at Staff Meetings at all now; going on without the SSI input that we had in the past” and “Not hooked into it in the last few terms”. Clearly, AuSSI-WA had a major impact on the school prior to 2008, but it decreased dramatically that year. However, document search evidence suggested renewed interest in EfS occurred in Semester 2, 2009, along with renewed links with AuSSI-WA. These results align with McNaughton’s (2007) “sleeping beauty syndrome”, in which EfS program implementation was found to be intermittent in some contexts.

Summarising, teacher perceptions after five years of involvement in AuSSI-WA were discussed in relation to the key elements rubric and the perceived impact of AuSSI-WA. Overall, teachers perceived AuSSI-WA had a huge initial impact at the school, but this impact decreased dramatically. Strong leadership and management support were reported as key concerns. These results relating to the impact of AuSSI-WA are unique, contributing original longitudinal evidence about the impact of AuSSI in Western Australia. Another study on the impact of AuSSI-WA is underway, with initial results indicating early EfS program success (Salter, 2009; Salter et al., 2011).
5.3.3 Teacher Perceptions of EfS Program

Five aspects of the EfS program will be discussed to determine teacher perceptions: teacher understandings of EfS; components of the EfS program; impact of having a sustainability focus every term; whether the program neglected any interests; and finally, facilitators and barriers to EfS. Evidence to address this part of the research question was drawn from survey responses, document searches and field notes, and will be discussed in relation to the literature.

Teacher Understandings of EfS

Teachers were invited to conduct a Strengths-Weaknesses-Opportunities-Threats (SWOT) analysis to show their understandings of EfS. Responses were grouped according to the twelve key elements for AuSSI-WA assessment, planning and evaluation (DET, 2010a). In 2007 ‘strengths’ were identified in eight of the twelve elements (Tables 4.11 & 4.12). Related to the element of ‘curriculum integration’, for example, it was stated “A wide variety of sustainable initiatives being undertaken. Linked into curriculum wherever possible”. ‘Weaknesses’ were identified in four elements. For instance, a ‘weakness’ reported in the ‘teaching and learning’ element was “Time and paid staff to oversee implementation of program”. ‘Opportunities’ were outlined for eight elements, while six ‘threats’ were discussed. Some of the identified ‘threats’ became reality during the following two years (2008/9). For example, teachers in 2007 identified “Those in management re. school expenditure not willing to set aside funds for sustainable projects” as an important ‘threat’ to EfS. In brief, the teachers’ 2007 SWOT analysis presented a picture of considerable EfS activity, with numerous challenges to EfS foreseen.

Teacher responses in the 2008 SWOT analysis indicated dramatic changes in EfS occurred (Tables 4.43 & 4.44). EfS champions had left the school and there was “not the same drive, sense of purpose and direction”, the “sustainability focus isn’t there!” Nevertheless, teachers elaborated on many EfS ‘strengths’ and indicated some of these resulted from the “legacy of former EfS champion” (Table 4.43). Various opportunities arising from the school’s approach to EfS were highlighted, such as curriculum integration of EfS. One respondent considered the potential for this to be “Huge, across all areas”, however it was not happening that year (Table 4.43). Numerous ‘threats’ to EfS were identified. Lack of leadership support and an absence of professional learning
were recognized as ‘threats’ to EfS. As one teacher stated, for example, “No professional development for EfS planned so knowledge as a staff is not going to move forward” (Table 4.43). Clearly, a review of these two SWOT charts (Table 4.11 & 4.43) indicated the impact of AuSSI-WA decreased dramatically between the two years. This result is a new, original contribution to our knowledge concerning teacher perceptions of the impact of this EfS initiative in a WA school.

**EfS Programs**

Teacher surveys explored EfS programs in operation at the school. 2007 teacher responses covered the categories of waste, water, biodiversity, energy and wellbeing, and all referred to programs implemented that year (Table 4.20). EfS programs were in operation in all classes and teachers indicated support from the school’s AuSSI coordinator. In 2008, survey responses covered the categories of waste, water, biodiversity and wellbeing. However, half the teachers indicated they had not implemented any EfS programs so far that year (end of Term 2, 2008). So, although six programs were described, some were conducted during the previous year, not the current year. For example, two of the six programs mentioned, ‘Worm farm’ and ‘Healing the Swan’, were 2007 projects, not part of the 2008 program. A coordinated implementation of the school’s ‘whole school curriculum plan’ did not appear to occur in 2008, with consequent impacts on EfS. Furthermore, in responding to this question three teachers discussed incidental, ad hoc ‘teachable moments’, rather than their class EfS program. In addition, nearly all these incidental lessons referred to EfS programs from previous years, for instance, the ‘water’ program in 2007 and the 2002-7 solar project (Table 4.52). This finding suggested specific pre-2008 whole school EfS programs displayed long term impacts for some teachers.

**Sustainability Focus Every Term**

Since 2006 all teachers were required, as a component of the Sustainability Policy, to include a sustainability focus in their teaching programs every term. Two forms of impact from this requirement were explored in the teacher surveys – those on the class and those on teachers themselves. The impact on the class will be discussed first, then the impact on the teachers.

Teacher responses to the 2007 survey question about having a sustainability focus in their class every term were overwhelmingly positive (Table 4.18). As one teacher said, the focus “Makes children aware of a variety of sustainable practices; important in
building a repertoire of sustainable practices”. The only negative aspect raised concerned the need for more volunteer support to assist with classroom activities. However, findings from the 2008 survey appeared less positive, implying implementation of the focus was ad hoc and superficial. Although some EfS was reported, teachers said there is “too much lip service about EfS”, “Hasn’t happened - no sustainability focus” and one teacher stated there is “no integration of EfS into the curriculum in the other classes” (Table 4.50). It therefore appeared that despite having a policy requiring a sustainability focus every term, as well as a Strategic Plan that attempted to embed sustainability at the school, this did not occur during 2008.

Teachers were also asked about the personal impact of having a sustainability focus every term. Teacher responses in 2007 indicated that having the sustainability focus assisted them to maintain focus in this field (Table 4.19). Typical comments were, “It helps me in my own understanding and in developing children’s understanding of sustainability” and “If not so clear the idea of sustainability may get buried by other class/teaching requirements”. However, one teacher expressed stress arising from having the focus all the time, it “Makes me whip myself”. This teacher preferred to address ‘sustainability’ once a year, not every term. Clearly, having a sustainability focus every term influenced teachers’ programs, mostly positively, but also negatively, in relation to workload concerns.

Results of the 2008 survey indicated having the sustainability focus helped teachers “with planning” but responses were characteristically worded in general, vague terms (Table 4.51). In contrast, negative impacts on teachers themselves were specific, referring to time constraints and the lack of parent support. Other frequently cited negative comments related to difficulty integrating sustainability into the curriculum because, as one teacher said, “Integrating it into the curriculum because there is so much other stuff to cover”. In brief, most teachers expressed the need for more support to enable them to have a sustainability focus every term. This lack of support clearly impacted on their ability to fulfill the sustainability policy requirement.

**Interests of Anyone/Anything Neglected**

Teacher surveys invited comment about whether the school’s current approach to EfS ignored the interests of anyone or anything. Most respondents in 2007 thought no one’s interests were being neglected by the school’s approach to EfS. However, teacher workloads were of greatest concern in responses to both items. Teachers stated they
were “overworked” and “The fact that such an important aspect of our learning is left to volunteers and too little of paid teacher time” (Table 4.21). Thus, in 2007 some teacher concerns were raised. However in 2008, teacher responses to these survey items were dichotomous (Table 4.54). On the one hand the perception was that no one/things interests were being neglected, as typified by the statement:

> wholistic approach adopted here, staff are well informed … there are opportunities to be included in sustainability activities on a regular basis

while on the other hand there were teacher responses like:

> Don’t know where to begin; the school’s current approach ignores most of sustainability; ... leader’s philosophy inherently linked to this lack of focus. The children, staff and parents voices have been silenced. There is a lack of understanding of what sustainability means

and

> Lately lots left out because [EfS champions] left; interest in sustainability is waning. People who feel strongly about sustainability are not feeling supported and children miss out on great projects.

These quotes highlight divergent teacher perspectives in the school at that time, with half of the teachers indicating satisfaction and the rest expressing overwhelming feelings of concern that EfS was no longer supported or thriving at the school.

Although there was still EfS talk at the school during 2008, it appeared to be tokenistic as a whole school approach to EfS ceased, along with the whole school EfS program. As one teacher said, “nothing is happening in sustainability any more – it is not a sustainable school any more”. This teacher also reported parents wanted to know “what they could do to get sustainability on the school curriculum again”. In addition, the teacher stated:

> the 2008 priority for EfS has not been mentioned in any context, at any staff meetings etc. Sustainability is not on the radar at the school any more. No talk of sustainability at the staff level, no reflections on EfS, no use of the AuSSI assessment rubric, no review of EfS outcomes. It is no longer a sustainable school from a AuSSI perspective”.

This evidence clearly indicated a shift by the school from being an active AuSSI-WA school to a less sustainable position on the continuum.
Facilitators and Barriers to EfS

Evidence relating to facilitators and barriers to EfS at the school was drawn from teacher surveys, document searches and field notes. Final responses to the 2007 teacher survey were classified as facilitators or barriers to EfS (Table 4.22). Facilitators included EfS teacher champions, appropriate parent support and sustainability as a lived-experience at the school. Barriers related to the need for a paid EfS coordination role in the school and an EfS induction process for new staff members. No facilitators were mentioned in the 2008 responses. Indeed five of the eight teachers referred only to barriers, barriers to the implementation of EfS at the school. These barriers predominantly related to leadership issues - lack of support and commitment, loss of EfS staff champions and need for ongoing staff professional development (Table 4.55).

Typical comments included:

*EfS was something that sets the school apart; would really market the school like it used to. Can’t sell it that way anymore – the principal doesn’t understand EfS … [or] community; leadership doesn’t have an understanding of what interconnectedness means … [the school] can’t articulate a wholistic EfS framework in this context. Historical philosophy of [the school] was very sound. The school is now in no-man's-land; in a divide between what the school had and where it is now. Need commitment from passionate people …*

and

*Need ongoing PD [professional development] … Sustainability committee needs to be supported – too few people. Management and the principal need to look at the Operational Plan so that we can put new energy into the policy and this will flow out to teachers, students and the community.*

Clearly, the 2008 teacher survey results unequivocally documented major challenges for EfS at the school. Similar findings were reported in recent Canadian research, in which the ‘crowded curriculum’ was reported as a teacher-identified barrier (Belton, 2011). This research also highlighted the importance of ongoing EfS professional learning for teachers, staff time and resources support for EfS, as well as the implementation of strategies to empower students in environmental stewardship (Belton, 2011).

Document search and field note findings also provided evidence about the school’s EfS program since involvement in AuSSI-WA. For instance, school newsletters indicated active engagement in the garden during 2006 and 2007 with many articles outlining the children’s achievements. However, during 2008 the garden fell into disarray and it was
no longer an active part of a whole school EfS program. A few newsletter articles requested community support but no action appeared forthcoming. Field notes reflected the same situation. One parent indicated she was questioning whether to stay at the school “because she came to the school because of it’s commitment to sustainability but this is not a ‘lived’ experience any more”. Similarly, a staff member stated “Sustainability is not being ‘done’ this year. Staff need help. Could do it during the last two years but no support now”. Clearly something had changed in the management and organisation of the school, resulting in a dramatic lack of engagement with EfS. A whole school approach to EfS was no longer in operation in 2008. EfS was no longer an active whole school priority, reflecting a shift towards the least sustainable end of the sustainability continuum.

However, engagement with the EfS program appeared to gradually move towards the more sustainable end of the curriculum in 2009. In Semester 1 teachers reported “no sustainability work this semester” and “nothing [was] happening in the garden ...derelict”, while parents indicated “no teacher wanted to be involved [in the garden]”. However, school newsletter articles indicated that some progress was achieved in re-activating the garden with a parent report in late June stating that “Our garden is now looking good”. Furthermore, teachers reported “Semester 2 has curriculum focus on sustainability – in the hope that it might continue” and the “school is trying to embed sustainability – is tokenistic but is trying”. In addition, the school newsletter (11/8/09 edition) reported a staff member “joined the sustainability sub-committee as a staff representative”. This staff member reported “this semester sees the school refocus on Sustainability. In particular this term we will be looking at waste”. Clearly in late 2009 the school was working to reactivate its commitment to EfS.

The decision to make ‘sustainability’ the curriculum focus for one semester may indicate, however, an inherent misunderstanding about EfS. It may reflect silo thinking. EfS, as conceived by AuSSI-WA, is not a topic or theme that is studied for a semester and then subsequently a different topic becomes the curriculum focus. Sustainability, in AuSSI-WA terms, needs to be embedded into the curriculum long term, rather than be a focus for one semester, with a different theme adopted in following semesters. This position is supported by the new Australian Curriculum in which ‘Sustainability’ is presented as an ongoing cross curriculum priority with on-ground actions required (ACARA, 2011c). It is therefore essential the EfS program is embedded into existing
curriculum areas and is not a theme to be covered … and then finished. A whole systems thinking, whole school approach to EfS programming is essential (Krasny, Lundholm, & Plummer, 2010; Sterling, 2003a, 2003b; Tilbury et al., 2005). Furthermore, such an approach supports movement of the school on the sustainability continuum towards the most sustainable end.

In brief, teachers generally perceived the EfS program as growing and highly effective in the initial years after joining AuSSI-WA. However, lack of leadership support, training, funding, staff with designated EfS responsibilities and broad support resulted in the EfS program diminishing and the school becoming less sustainable. In terms of the conceptual framework, involvement in AuSSI-WA resulted in a shift towards the most sustainable end of the sustainability continuum, and then changed circumstances at the school led to movement in the other direction on the continuum.

Referring specifically to RQ 3, results agreed with many short term studies in this field, yet also contributed vital new evidence reported in the few longitudinal studies found. Initially, overall teacher perceptions of the EfS program indicated the EfS program was growing and highly effective in the first three years after joining AuSSI-WA. These findings are consistent with evidence provided by most short term studies on the impact of sustainability initiatives in schools. Studies by Armstrong et al. (2004), Davis (2005) and Potter (2007) similarly document overwhelming early success. However, the longitudinal nature of the present research clearly demonstrated initial success and engagement with the EfS program, followed by a dramatic set-back. Various barriers to EfS in the case study school relating to leadership, teacher training and support resulted in the cessation of the EfS program at the school for over a year. The EfS program then appeared to re-emerge, with identifiable challenges to be addressed. Strong leadership and management support were found to be essential for ongoing success. This longer term finding has some parallels with a few studies. Thomas (2005) for example, found a discrepancy between theory and practice in environmental education; while Blair (2008) reported set-backs in a community education program due to a lack of support and other factors. Pepper (2007) reported instances of set-backs in EfS programs investigated in her secondary school research. The longitudinal study of EfS in the Scottish formal school system, 1993-2007, reported three phases - emergence of EfS, obscurity and re-emergence (McNaughton, 2007). Thus, the present study adds to a small but growing body of evidence indicating greatly fluctuating outcomes for EfS initiatives in schools in the long term.
The other component of RQ 3, teacher perceptions in terms of the whole systems thinking approach, was investigated in relation to Montessori philosophy, the school’s strategic plan, sustainability model and policy, as well as values education in EfS. In brief, it seemed alignment between Montessori philosophy, EfS and whole system thinking was more in theory than in practice. To enable effective teaching and learning about whole systems thinking, substantial engagement in professional learning about the approach, together with leadership support was warranted. This finding is unique in the Montessori literature, yet appears aligned with recent developments in the Montessori approach (Cossentino, 2005; Erskine, 1998).

In summary, this chapter examined the results of each research question and discussed them in relation to the literature. Aspects of agreement with other studies were identified, as well as the emergence of new, unique findings from the current study. The next chapter discusses these results in terms of professional and conceptual implications.
CHAPTER 6
PROFESSIONAL AND CONCEPTUAL IMPLICATIONS

This chapter presents professional and conceptual implications arising from the results of the present study, and draws on these to elicit recommendations. Implications are discussed in terms of: organisational change; school administration; curriculum; teacher support; issues influencing AuSSI-WA; and the conceptual framework. The chapter concludes with possible areas for future research, along with four key recommendations to enhance the effectiveness of AuSSI-WA.

6.1 Implications of Findings
Implications of the research include the challenge of embedding change in schools, issues relevant to school administration, curriculum development and implementation, teacher support, and the conceptual framework. Systems thinking is embedded into this discussion to facilitate enhanced outcomes for EfS in schools. Matters particularly relating to the environmental system include discussions on the whole school approach, professional learning, curriculum, and the conceptual framework. Of relevance to the economic system are funding issues and these are addressed in the sections on school administration and teacher support. Issues relating to the social system include organisational change and school administration. By understanding these interrelationships and acting upon the implications, it is anticipated that improvements to EfS and AuSSI-WA will be facilitated, with possible relevance to other schools identified.

6.1.1 Organisational Change
Embedding and sustaining change in schools is difficult (Babiuk & Falkenberg, 2010; Hargreaves & Fink, 2003; Pepper, 2007; P. Senge et al., 2007; Shulman, 2004). The findings of the present study confirm this experience. Some studies outline strategies for sustaining change. For instance, Bennett (2008) argued sustained change required every aspect – from curriculum, instruction and assessment, to school partnerships involving all stakeholders and principals attending teacher professional learning sessions - to be built into the system for effective, sustained, systemic educational change. Since the AuSSI-WA approach represents organizational change, it is therefore
recommended that research findings that support sustained change be embedded into the AuSSI-WA framework. Thus, for instance, it is vital that principals attend EfS professional learning sessions and are exposed to understandings related to EfS. This could potentially increase leadership support for EfS in schools, which was an issue at the case study school.

The *Australian National Action Plan for EfS* (DEWHA, 2009e) acknowledged systemic thinking as a fundamental principle for effective EfS. Progressive experience with whole systems thinking facilitates the shift from silo understandings to systemic thinking in EfS. However, whole systems thinking was found to be poorly understood by students and staff in the current study, so appropriate engagement with this approach requires further attention. It is therefore essential that a whole systems thinking approach to organizational change be adopted and explicit within AuSSI-WA itself, as well as by individual AuSSI-WA schools.

### 6.1.2 School Administration

The findings of the present study identified four main areas of relevance to school administration. These areas relate to leadership, strategic planning and policy, whole school approach, and professional learning.

**Leadership**

As suggested in the literature, the impact of school leadership on EfS was shown to be critical (Babiuk & Falkenberg, 2010; Pepper, 2007). The present study provided additional evidence that leadership support was vital for a sustained successful EfS program. It was demonstrated that without ongoing commitment by the school leadership team, the EfS program effectively ceased. Four key concepts related to school leadership have been identified as essential for embedding EfS into schools: understanding sustainability; imagining the future; building relationships; and taking action (Pepper, 2007). Research evidence from the current study was congruent with these findings. Without leadership that understood sustainability and actively facilitated implementation of the EfS program, the program faulted and became inert.

Since joining AuSSI-WA, the type of EfS leadership in operation at the school changed over time. As outlined in the Literature Review (2.4.1) four broad categories of leaders were identified: dynamic, passive, champions and leadership communities. During 2005-2007, teacher and student evidence indicated dynamic leaders and champions at
work in the school, with some aspects of a co-operative leadership community in operation. However, between 2007-2009 features typical of passive leadership were in operation; characterized by unsupported EfS teacher-champions and termination of some EfS initiatives. Since mid-2009 new EfS champions appeared to emerge at the school, however it seems there is a way to go to build a co-operative, informed leadership community for EfS.

**Strategic plan and policy**
The study found a sustainability agenda was included in the school’s Strategic Plan. However, research evidence revealed that this inclusion seemed to be tokenistic, as it appeared the on-ground EfS program was not supported by management over time. Deeply embedded commitment to EfS would ensure continued priority for EfS, minimising the impact of staff changes. Such commitment to EfS would provide support and prioritise ongoing EfS funding, staff training and community education. Similarly, the sustainability policy became a meaningless document when management ignored its content, as was found to be the case during some stages of this study. This illustrates, not surprisingly, that strategic documentation about an approach to sustainability education does not necessarily imply on-ground action. The whole school community needs to be vigilant about genuine commitment to plans and policies related to EfS. EfS must be more than a fashionable phrase in school strategic plans and policies if the National Action Plan for EfS (DEWHA, 2009e) is to be achieved.

**Whole school approach**
Evidence is available on the critical success factors for whole school sustainability programs. Seven factors have been identified (Henderson & Tilbury, 2004) and were outlined in the Literature Review (2.2.2). Table 6.1 outlines these factors applied to the case study school. It is clear from this analysis that the school shifted from the more sustainable end of the sustainability continuum to the less sustainable end after 2007. All success factors were no longer operational in 2008 to mid 2009. These factors need to be addressed for a school to move towards becoming more sustainable.

Eight features of AuSSI-WA (DET, 2009) as a whole school approach were also outlined in the Literature Review (2.2.2). Like the factors in Table 6.1, these features including - ‘real-life’ meaningful EfS learning tasks for students and teachers, curriculum development with explicit links to all learning areas and values, building community partnerships, and providing EfS professional learning and networking opportunities - were found to be very strong components of EfS at the school in the
Table 6.1 Critical success factors for whole school sustainability programs

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<tr>
<td>Alignment with national government priorities</td>
<td>√ EfS model, policy and strategic plan implemented; active engagement with AuSSI-WA.</td>
<td>× EfS model, policy and strategic plan not implemented; active engagement with AuSSI-WA ceased</td>
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<tr>
<td>Access to expertise in EE and/or EfS during program design and implementation</td>
<td>√ Active engagement with AuSSI-WA community; school membership of Austn Assoc. Environ. Educ. and state/national science teachers’ associations.</td>
<td>× Active involvement with AuSSI-WA ceased.</td>
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<tr>
<td>Significant and continuous funding</td>
<td>? School required EfS projects to be funded by grants and fundraising. No school funding. Active grant and fundraising schedule implemented by EfS champions.</td>
<td>× School required EfS projects to be funded by grants and fundraising. Available funds not accessed. EfS projects ceased.</td>
</tr>
<tr>
<td>Alignment with EfS approaches</td>
<td>√ Active engagement with AuSSI-WA and the EfS community; model, policy and strategic plan aligned with EfS.</td>
<td>× Whole school EfS program ceased. EfS components of strategic plan and policy not addressed.</td>
</tr>
<tr>
<td>Investment in professional development of program team as well as school partners</td>
<td>√ Attendance of staff and community at AuSSI-WA workshops; whole staff attendance at EfS presentations; school community EfS seminars; workshops with partners.</td>
<td>× EfS professional learning (whole staff and individual) ceased; school EfS seminars for parents and partners ceased.</td>
</tr>
<tr>
<td>Creating links with EE initiatives already in operation</td>
<td>√ Solar power and frog projects (ASTA, 2005a; E. Lewis &amp; Baudains, 2007a). Links with State govt initiatives e.g. AuSSI-WA, Wastewise, Waterwise, Ribbons of Blue, Airwatch.</td>
<td>× Links with existing projects and initiatives ceased. Existing initiatives terminated.</td>
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<tr>
<td>Establishment of multi-stakeholder partnerships</td>
<td>√ ASISTM Making Waves, Turtle Watch, lake native planting and tiger snake projects (ASTA, 2005b; E. Lewis, Baudains et al., 2008a, 2008b; E. Lewis, Mansfield et al., 2008).</td>
<td>× Links with existing EfS partnerships terminated.</td>
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initial years after joining the Initiative. However, they too became less relevant in 2008 as school priorities changed. As some teachers reported, the school was no longer a
sustainable school in the AuSSI-WA meaning of the term. To facilitate movement towards the most sustainable end of the sustainability continuum the school needed to adopt a whole school approach aligned with the AuSSI-WA features, utilizing the provided planning, evaluation and assessment criteria.

**Professional learning**

Numerous authors have reported teacher knowledge and education about EfS theories and pedagogy to be inadequate (Birdsall, 2010; Cutter-Mackenzie & Smith, 2003; Eames, Cowie, & Bolstad, 2008). For instance, Cutter-Mackenzie and Smith (2003) found 42.3% of primary teachers surveyed in Australia rated their knowledge of EE theories and pedagogy as ‘low’ or ‘very low’ and most were unfamiliar with relevant curriculum documents. Results of the present study supported this finding and indicated need for professional development in this field remains an issue of concern. Aspects of professional learning for principals and school administrator; Early Childhood, Middle Childhood and Adolescence teachers; as well as pre-service education students are outlined below.

*Principals and school administrators*

To support the mainstreaming of sustainability “reculturation at the leadership level” is essential for substantial and sustained educational change (Babiuk & Falkenberg, 2010, p. 209). Other authors have similarly argued that targeted professional learning for school principals and administrators is a key factor that facilitates successful educational change (Bennett, 2008). This factor reveals a potential weakness in the AuSSI-WA approach, a weakness that may have contributed to set-backs in the ongoing implementation of the Initiative at the case study school. None of the three post-2005 principals at the school attended any AuSSI-WA professional learning, although one actively supported and attended whole school EfS professional learning. This situation may have contributed to changed priorities.

*Early Childhood*

As a Montessori school, children can commence at the age of three years. Some teacher evidence indicated that EfS was seen to be more relevant to older students. This finding needs to be challenged through professional learning experiences. EfS must start in the early childhood years (EEEC, 2009; Hughes, 2007; E. Lewis, Mansfield, & Baudains, 2010; Pearson, 2010). AuSSI-WA could support this endeavour by explicitly addressing the special needs of the early childhood sector. There are existing programs
that AuSSI-WA could actively support, such as *Little Green Steps* (DET, 2010a; Hughes, 2007; E. Lewis & Pearson, 2010) J. Pearson, , November 20, 2009).

*Middle Childhood*

Research evidence suggested that AuSSI-WA professional learning was effective for the middle childhood sector teachers, as indicated by teacher and student outcomes at the case study school. However, AuSSI-WA funding needs to be sufficient to cover additional professional learning experiences to address staff changes within schools, as well as ongoing learning needs of staff that have already completed the initial AuSSI-WA workshops. Ongoing professional learning, within a whole systems thinking context, is essential for the sustainability of the AuSSI-WA approach within Western Australian schools. This position is supported by other authors in international contexts (Babiuk & Falkenberg, 2010; Krasny et al., 2010; Sterling, 2004).

*Adolescence*

Research evidence suggested that the AuSSI-WA program experienced by primary students was not followed through in the high school context. The secondary school setting appeared to provide special challenges for EfS programming (Prabawa-Sear, 2010; A. Abreu, personal communication, December 3, 2008). As for the early childhood sector, the adolescent sector requires targeted professional learning intervention by AuSSI-WA, and consequently, targeted funding support.

*Pre-service*

Research evidence revealed some teachers at the school had not addressed EfS in their pre-service education. Pre-service teachers from all sectors require exposure to and engagement with EfS. This foundation training is critical for the success of EfS programs in schools and is recognised as essential in the Australian *National Action Plan for EfS* (DEWHA, 2009e). Furthermore, recent reports document the urgent need for mainstreaming sustainability education at the preservice level, both nationally and internationally (Babiuk & Falkenberg, 2010; Ferreira et al., 2009; Steele, 2010).

6.1.3 Curriculum

The implications for Curriculum are discussed in three phases: development, implementation and evaluation.

**Development**

Research evidence indicated that teachers at the school experienced work load pressure related to EfS programming. EfS was generally viewed as an extra, additional task and
when leadership support for EfS waned, EfS dramatically decreased in teacher programs. Although EfS is embedded in Western Australia’s *Curriculum Framework* (Curriculum Council, 1998), teachers appeared to need considerable support in developing their learning programs in a way that embedded EfS into student outcomes. Linking EfS with *Curriculum Framework* outcomes is essential; otherwise teachers will continue to regard EfS as an ‘extra’ job. This issue is equally applicable to the future *Australian Curriculum* (ACARA, 2011a; DEWHA, 2009e) and the *Sustainability Curriculum Framework* (DEWHA, 2010). The critical need for “integrated and interconnected curricula” is also recognised internationally (Babiuk & Falkenberg, 2010). Unless teachers understand how EfS is embedded into the curriculum, EfS may be undertaken in an ad hoc, tokenistic manner, as the current study found when management/leadership priorities changed. Finally, AuSSI-WA could play a significant role in the development of teachers’ deeper understandings of the sustainability curriculum.

**Implementation**

The present study found teachers experienced some difficulty in consistently embedding EfS into their programs, particularly from a whole systems thinking perspective. This finding is represented in Figure 6.1 in the context of the case study school’s model of sustainability. Teachers required further professional learning about what whole systems thinking entailed in a practical, programming sense. See Figure 6.2. A recent publication by Littledyke, Taylor and Eames (2009, pp. 35, 42 & 54-56) similarly highlighted the need for integrating EfS across the curriculum and engagement with systems thinking at the classroom level.

Developments to support teachers implement whole systems thinking into their programs are beginning to emerge. Two such developments, which provide tangible representations of what whole thinking means, will be considered. These proposals, the Eagle Eye Model and the 10 Tonne Plan, arose from reflections on the research findings.
An ‘Eagle Eye Model’ is proposed to support teachers to be explicit about whole systems thinking with their students. This model was developed from an understanding of the structure and function of the Wedge-Tailed Eagle’s eye (FAUNA, 2009; Olsen, 2005) and a zoom-in zoom-out approach in grammar education (Anderson, 2006). Wedge-Tailed Eagles can see in two ways while flying: they can see the whole countryside beneath, and at the same time, see a small part of it, as if looking through a telescope. The Eagle Eye Model is utilised at the commencement of an EfS program to assist students understand the big picture perspective, the interdependence of different systems. As an eagle circles and glides, reaching heights up to 2000 metres, it can see a vast perspective, a whole systems view. However, while in flight it can also see a moving rabbit, from 1.5 km away (Olsen, 2005). Thus the eagle can keep it’s prey in sharp focus as it swoops down. In the same way a teacher may shift, or zoom in, from the systems perspective to a detailed focus on some particular outcome of the curriculum. Once this outcome is grasped by the students, the teacher facilitates the move back out, or zooms out, to the systems view to examine how this detailed new understanding impacts on the whole system.
Using the sustainability model developed by the case study school, the proposed Eagle Eye Model enables teachers to start a topic or theme by presenting the big picture, engaging children in activities that reveal where the sustainability topic may be located from a whole systems thinking point of view. Students could make initial explorations that involve investigations into interrelationships and interdependence between systems, for instance, how teeth cleaning is related to water in the dams and climate change. Teachers may then facilitate their young students on a learning journey that swoops them in on the detailed components of teeth-cleaning from a water-saving perspective. Finally, students swoop out and over again to review how this teeth-cleaning behaviour relates to water conservation from a local, state, national, global perspective. Through this process students are explicitly challenged to think from a whole systems thinking perspective, while also investigating detailed aspects of a topic so that they can achieve specific curriculum outcomes. Figure 6.3 shows this approach demonstrated in the case study school context.
The Eagle Eye Model therefore provides a tool for teachers to address silo thinking, enabling a practical process that develops critical thinking skills and supports whole systems thinking. Appendix 12 contains figures illustrating the application of the model in a range of contexts relevant to the case study school. Drawing upon this school specific model, and extending it for use in other primary school contexts, a generic Eagle Eye Model based on Lang’s (2007) nested systems of relationships is proposed (Figure 6.4). Adoption of this generic model in a small trial context at an independent public school (not the case study school) has suggested that it may be beneficial to student understandings in terms of whole systems thinking (Appendix 13). However, further research is warranted to verify its usefulness for effectively teaching whole systems thinking in the classroom.
The ‘10 Tonne Plan’ is another proposal that may support teachers to implement whole systems thinking. This Plan, currently being trialled, could assist teachers (and students) conceptualise whole systems thinking. It grapples with the issue of silo sustainability projects in schools by pulling projects together into a whole systems thinking plan based on the AuSSI-WA eco footprint and social handprint (CPS, 2011; Maia Maia Project, 2011). This development, while recognising the complexity of the whole systems thinking, may help to make the approach more accessible to teachers and students (Appendix 13). However, research is needed to assess the outcomes of the 10 Tonne Plan from this perspective.

Another critical issue related to the implementation of whole systems thinking involves reflection on the purpose of education. A simplistic dichotomy on this issue places the intrinsic learner on one side and the attainment of an external outcome on the other. In terms of EfS, is the purpose of education achievement of an empowered, resilient learner or behaviour change? An integrative holistic view, seeking to reconcile these different positions, has been proposed:
... a transformative educational paradigm – drawing on both extrinsic and intrinsic views of sustainability education and further drawing on ‘resilient learner’ and ‘learning for resilience’ discourses – is necessary to nurture resilient learners who are able to develop resilient social–ecological systems in the face of a future of threat and uncertainty (Sterling, 2010, p. 512).

Furthermore, the author maintains neglect of this transformative educational paradigm would be detrimental to the advancement and effectiveness of sustainability education (Sterling, 2010). Other authors have similarly argued for the adoption of this transformative pedagogy, where students examine current patterns of behaviour, consider alternatives and take action, in contrast to EfS involving predetermined teacher identified learning outcomes (Birdsall, 2010; R. Stevenson, 2007; Tilbury, 2007). Perhaps the incidents of cognitive dissonance found in present study were related to this issue. In developing EfS programs, teachers need to reflect on the purposes of their programs, ensuring they are transformative, integrative and holistic.

**Evaluation**

AuSSI-WA recognised evaluation in EfS was critical (DET, 2008c, 2010a). Various levels of evaluation require consideration: evaluation of learning; evaluation of teaching; and evaluation of programs. Evaluation of EfS learning in schools appeared confused, especially in the situation where the EfS program was viewed as an ‘extra’ and not embedded into student outcomes and assessments. For instance, student involvement in the case study school garden was not consistently assessed from a perspective of student outcomes in Society and Environment, Health, Science, English, or Mathematics; rather it was generally viewed as an optional extra, enjoyable activity. Furthermore, the ‘active citizenship’ component of the Society and Environment curriculum (Curriculum Council, 1998), for example, provided some opportunity for evaluation of an embedded EfS program (DET, 2009a) but further teacher understanding and development in this field appeared warranted.

A rubric to assist in the planning and evaluation of EfS programs was provided by AuSSI-WA (DET, 2010a). However, as illustrated by the case study school, this tool was only employed intermittently, when management commitment to EfS was evident. It appeared that this situation is not unusual in AuSSI-WA schools (J. Pearson, personal communication, May 5, 2009).
More detailed approaches to assessing change and program evaluation are recommended. For example, Davis and Ferreira (2009) proposed a continuum for evaluating the effectiveness of AuSSI school initiatives. At one end of this continuum was the product approach, where the ‘knowing expert’ provided an information kit for the ‘unknowing teacher’. Next was the facilitated product approach, then a network of facilitators approach. At the other end of the continuum was the webbed network approach which aimed to bring about change by linking together all participants in a dynamic way. Alternatively, Collier and Smith’s (2006) approach provided for a hierarchy of clearly stated outcomes: immediate, intermediate and ultimate outcomes, which facilitated detailed analysis of EfS program outcomes. In reviewing evaluation of AuSSI school programs, an initial key issue appears to be supporting participant schools to understand the difference between a one-off excursion/incursion approach to EfS and programs that facilitate deeply embedded behavioural change.

6.1.4 Teacher Support

The research found that teachers needed support to implement their EfS programs; support in various forms, particularly professional learning, funding, time, and school management support. As the current study clearly documented, without this support, EfS commitment was token. It is recommended that this need for ongoing teacher support requires further action by AuSSI-WA.

6.1.5 Influences Impacting on AuSSI-WA

A conceptualisation of the relationships between influences impacting on AuSSI-WA in a school after joining the Initiative was presented in Figure 2.9. The findings of the study have identified facilitators and barriers to effective engagement in AuSSI-WA. As a consequence of these findings, modifications to the original conceptual framework are warranted. Facilitators, or success factors, for EfS have been previously identified (Henderson & Tilbury, 2004) and the findings from the present study confirmed their importance. Alignment of school with government EfS initiatives, together with commitment to continue existing successful EfS school initiatives acted as facilitators. However, depth of learning and governance model adopted acted as gatekeepers to AuSSI-WA in the current study (Figure 6.5). Depth of learning about sustainability, particularly the degree of deep engagement by all stakeholders (Chapman, Ramondt, & Smiley, 2005; Gordon & Debus, 2002; Strang, 2005; Warburton, 2003) was critical.
The governance model, especially openness to the development of a leadership community (Mawson, 2008b; P. Senge et al., 2007; Taylor, 2008a, 2008b) was another vital issue. These are discussed below.

Deep learning is very important in EfS because of the interconnectedness of environmental, social and economic issues, and the vital contribution possible from whole systems thinking (Warburton, 2003). Deep learning focuses on meaning and understanding, in contrast to surface learning which focuses on recall and reproduction (Scouller, 1998; Warburton, 2003). For example, deep learning integrates conceptual and practical aspects of an EfS issue, with the intention to understand and make sense of

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Figure 6.5 Revised understandings: Influences impacting on AuSSI-WA at the case study school
circumstances involved; while surface learning might include rote reproduction of projects and tick-the-box mentality in order to comply with EfS requirements (Scouller, 1998). Conscious, explicit, ongoing engagement with deep learning processes in EfS for all stakeholders is vital for effective school programs and the achievement of AuSSI-WA objectives.

Deep learning in schools involves the participation of the whole school community: leaders; administrators and managers; all teaching, garden and cleaning staff; students; parents; and interested members of the wider community. A major component of this participation involves ongoing professional learning experiences that continually build upon preliminary understandings and challenge participants to deeper engagement in planning, implementation and assessment of EfS programs.

Another aspect of deep learning relates to AuSSI-WA itself. AuSSI-WA needs to enact a deep learning philosophy, so that participants progressively develop deeper EfS engagement. For example, it was observed during the research that participants’ understandings of phases in the AuSSI-WA key elements rubric varied greatly (section 4.2.1). This suggested AuSSI-WA needed to distinguish between new AuSSI-WA participants and well-established practitioners engaging at a deep level, so that appropriate targeted professional learning could be provided for both groups. In terms of the conceptual framework employed in this research, targeted professional learning required by schools operating at the least sustainable end of the sustainability continuum would be different to that which is provided for schools working at the most sustainable end of the continuum. As Strang (2005) documented in her EfS research process, preliminary understandings were broad and incomplete, but as information was integrated from various sources and new viewpoints redefined, understandings developed until a point of deep learning was reached. This was referred to as the ‘deeper understanding spiral’ (Strang, 2005). Experienced AuSSI-WA practitioners could, for instance, utilise their deeper understandings to assist in the development of more rigorous evaluation in the AuSSI-WA program. Improved evaluation is a recognised gap in this field and authors such as Breiting and others (2005) have proposed quality criteria for a European EfS school network.

Deep learning is supported by the adoption of the constructivist perspective (Chapman et al., 2005). Likewise, EfS engagement in the context of self-regulated learning in which metacognition plays a significant role, also supports deep learning (Baudains, 2003). A focus on deep learning, however, does not simply imply additional ‘head’
knowledge, rather it embraces all aspects of beliefs, values and actions (Baudains, 2003; Strang, 2005). Furthermore, deep learning recognises multiple viewpoints and encourages collaboration, sharing and conversations, in both formal and informal learning contexts, scaffolding participants and enabling progressively deeper understandings to be attained together (Chapman et al., 2005). Such collaboration links directly with the notions of ‘leadership community’ discussed in the literature review (2.4.1).

‘Leadership communities’ bring together and value dynamic leaders, champions and other members of a community who work together cooperatively (Mawson, 2008b; Price, 2010; P. Senge et al., 2007; Taylor, 2008a, 2008b). A school leadership community could have numerous ‘leaders’ at different levels in the hierarchy who play critical roles in generating and sustaining the educational change involved in their EfS program, including active participation in AuSSI-WA. The present findings illustrated the consequences of a passive, unsupportive management approach to EfS. Clearly, it is vital for school leadership/management to support EfS if empowering whole school approaches to EfS are to be achieved. In terms of the revised framework identifying influences impacting on AuSSI-WA, depth of learning and the governance model adopted were found to be critical gatekeepers.

Summarising implications of the research results, it seems clear that school EfS programs need to be examined from a whole systems thinking perspective. For instance, for a school leadership team to support EfS, it was shown to be vital that the team understood the breadth and depth of fundamental principles informing AuSSI and whole systems thinking (engage in targeted professional learning, work towards leadership communities), provided practical support to staff (funding, time, etc.), and facilitated the development of deep learning within the context of a broad range of partnerships (school to local environment, government, businesses, etc.). This approach provides scope to enhance AuSSI-WA outcomes further than those already identified in the current study. Moving from research implications to conceptual implications, the following section reflects on the conceptual framework.

6.2 Reflections on the Conceptual Framework

Three major implications emerged from reflection on the conceptual framework (Figure 2.13). Firstly, there appears an overall direction a school may be taking in terms of movement on the conceptual framework. In terms of sustainability characteristics
demonstrated, a school, taken as a whole, may be moving towards the most sustainable end of the sustainability continuum, or it may be shifting towards the least sustainable end, or it may be static at some point on the continuum with no movement. Secondly, there may be conflicting positions on the continuum between different key aspects. For example, a focus on ‘school networks’ may be shifting the school towards the most sustainable end of the continuum, however, at the same time ‘governance’ characteristics of the school may be moving the school towards the least sustainable end. Thirdly, within any key concept there may be movement in one direction as well as in the opposite direction on the continuum. For instance, within ‘EfS activity’ the case study school demonstrated the characteristic of working towards behaviour change while utilising a silo approach. These approaches are in conflict with each other. Refer to Figures 6.6 and 6.7 for an illustration of these outcomes during the two phases following involvement in AuSSI-WA. In brief, these figures highlight the vital need for a whole school, whole systems approach to EfS, otherwise progress towards living sustainably may be spasmodic, tokenistic, unsustainable and even in conflict with itself.

**Figure 6.6 Conceptual framework:**
Illustration of EfS outcomes during 2005-2007 period
From an overall perspective, a school may be situated anywhere along the sustainability continuum, static or moving towards a more sustainable position or away from it. However, Figures 6.6 and 6.7 highlight the complexities of the conceptual framework, identifying conflict between concept positions as well as within a concept. In addition, individual perceptions, ‘lived experiences’, about EfS may vary. Figure 6.8 illustrates multiple perspectives on aspects of the EfS program; differences between self-assessed perceptions as well as independent evidence. This figure emphasises the complexity of assessing school EfS programs and the importance of ‘leadership communities’ and open discussion to achieve consensus of understandings. The conceptual framework, in all its complexity, aligns with research findings in management theory. Management literature, for instance, makes reference to ‘thrusting’ and ‘sleepy’ characteristics of effective management (Political and Economic Planning, 1965). For instance, in relation to management education, a thruster characteristic includes “Regularly using outside training courses or internal equivalent” while the sleeper characteristic refers to “Haphazardly indulging in occasional training, if any” (Political and Economic Planning, 1965, p. 198). This is reminiscent of teacher comments on professional learning opportunities for EfS at different times during the research. Another example
drawn from management literature relates to organizational behaviour models. The ‘competing values model’ of organizational effectiveness, for instance, identifies ten characteristics that an organization values, such as, ‘group emphasis’ and ‘open system focus’ (Quinn, Hildebrandt, & Rogers, 1991; Schein, 1992). These characteristics exist on a continuum, so ‘group emphasis’ ranges from ‘individual’ to ‘group’ and ‘open system focus’ ranges from ‘internal’ to ‘external’ (Quinn et al., 1991; Robbins, Waters-March, Capcioppe, & Millet, 1994). These findings align with the results of other environmental studies such as Baudains (2003) and the present study.

Another link with more recent management literature relates to learning organizations. Learning organizations are those in which “everyone is engaged in identifying and solving problems, enabling the organization to continuously experiment, improve and increase its capability” (Samson & Daft, 2005, p. 50). Leadership is identified as the only means by which an organization can develop into a learning organization (Samson & Daft, 2005). Leadership, in which managers ‘control with’, rather than ‘control over’ others, building a shared vision that embraced the whole system (Samson & Daft, 2005). Again, such issues appeared relevant in the current research setting.
Bearing in mind the multiple perspectives illustrated in Figures 6.6 – 6.8, a final link with organisational management literature (Blake & Mouton, 1985; Samson & Daft, 2005) may be utilised in the current context. The managerial grid model (Samson & Daft, 2005) was adapted to develop a Sustainability Circle, with ‘most sustainable’ schools on a grid closer to the outer circle and ‘least sustainable’ schools closer to the inner circle. Aspects identified in the conceptual framework radiate from a central position of the Sustainability Circle. Each concept has its own continuum, from ‘least sustainable’, 1 in the middle, to ‘most sustainable’, 5 on the outer circle.

Using the Sustainability Circle as a tool, school stakeholders may identify strengths and weaknesses for each key concept and negotiate placement on the concept continuum. Lines are then drawn joining the different aspects. To identify strengths and weaknesses the proposed tool needs to be employed with another tool specifying indicators for each concept, such as the AuSSI-WA Key Elements Rubric or other whole school approaches frameworks (DET, 2010a; Eames, 2010; Henderson & Tilbury, 2004). When negotiated and completed over time, a school can observe the direction of movement. Overall a school may be transitioning to a more or less sustainable status, and it can identify weaknesses it may choose to address. See Figure 6.9 illustrating the use of the Sustainability Circle. This figure shows the positioning of the case study school pre- and post-AuSSI WA. Information to locate positions on the continua was drawn from research evidence, with typical participant quotes from survey responses to support placement. Ideally however, school stakeholders would employ this tool themselves, since discussion would aid reflection and clarification. The tool could be used in conjunction with quality evaluation criteria that facilitate objective review. It is anticipated the Sustainability Circle could become part of a school’s evaluation process, providing input for the creation of the annual sustainability action plan (DET, 2010b).

With reference to the silos and systems sub-title of the thesis, instances of silo and whole systems thinking emerged from this research, and concept positions on the Sustainability Continuum were illustrated enabling placement on the proposed Sustainability Circle. A final observation relates to the school’s EfS journey. It appears to be a circular journey. As shown in Figure 6.10, the school started from a position of being committed to EfS, but mostly with an ad hoc, silo approach to EfS (1990-2004). After joining AuSSI-WA in 2005, the school adopted a whole school, whole systems approach to EfS (2005-2007). However, student and teacher responses suggested a shift
back to an ad hoc silo approach in 2008. Finally, late in 2009, evidence suggested a shift towards a whole school approach again … silos, systems, silos, systems! This finding may be unique to the present school but is worthy of follow-up research, as discussed in the next section.

Figure 6.9 Sustainability circle: Pre- and post-AuSSI-WA circles
6.3 Future Research

Emerging from the results of the present study, in the context of the literature, six main areas are identified as warranting further investigation. Firstly, improvement to pre-service teacher education related to EfS; secondly, enhancement of the AuSSI-WA toolkit; thirdly, understandings and implementation of whole systems thinking; fourthly, depth of EfS engagement; fifthly, longitudinal comparative studies of a range of WA schools; and sixthly, follow-up research at the case study school.

Pre-service teacher education

Pre-service teacher education in sustainability is fundamental for mainstreaming sustainability in Australia (Ferreira et al., 2009; Steele, 2010). The present study found teachers needed considerable support in programming for EfS. This indicates a major gap in pre-service teacher education, as well as in-service education. Research is essential in WA to plan, implement and monitor necessary changes to pre-service education courses.
AuSSI-WA

Research into developing enhancements for the AuSSI-WA toolkit is warranted. For instance, what facilitators and barriers contribute to the regular use, or otherwise, of the AuSSI-WA toolkit by AuSSI-WA schools? Understanding the extent to which AuSSI-WA schools actually develop, and then follow-up on their EfS action plans and policies, would also support EfS leaders develop strategies to support the on-going up-take of the AuSSI approach. To facilitate deep learning (Strang, 2005) in EfS, targeted professional learning is required for schools located at different positions on the sustainability continuum, as well as for practitioners in different educational phases (Early Childhood, Middle Childhood and Adolescence). Next, the usefulness of the proposed Sustainability Circle needs to be assessed. Finally, for AuSSI-WA to develop further, it is vital that effective, quality criteria are employed to evaluate AuSSI-WA outcomes. It is timely to review the AuSSI-WA Key Elements Rubric in the context of recent national and international developments (Arts & Buizer, 2009; Eames, 2010; ENSI, 2006; L. A. Sheehy, 2005).

Whole systems thinking

Further research into school-based, classroom-focussed application of the whole systems thinking approach is essential. Research into understandings, implementation and assessment of whole systems thinking in schools is needed (Babiuk & Falkenberg, 2010; Krasny et al., 2010; Plummer, 2010; Sterling, 2004, 2010). Future researchers may contact the author to determine the progress in this aspect of research in relation to the Eagle Eye Model trial and other developments implemented since the completion of data collection for the current study.

Depth of EfS engagement

It is vital that AuSSI schools develop an understanding about their depth of engagement in EfS, in other words, about their placement on the proposed sustainability continuum. As was argued, there is a dramatic difference between the least and most sustainable positions, as there is between a products approach and a webbed network approach in terms of creating change (J. M. Davis & Ferreira, 2009). Likewise, there is a difference between the silo and systems approaches to teaching EfS reported in this study. Furthermore, there is an important difference between an in and about the environment approach, to a for the environment approach that results in behaviour change. Depth of engagement in EfS may also be investigated in relation to a one-off excursion and ongoing local action for change (Miles, 2008a; Tooth & Renshaw, 2009). Such research
is necessary to examine the depth of behaviour change in AuSSI schools as an outcome of initiatives implemented.

**Comparative studies**

Conducting longitudinal comparative studies in a range of WA schools is another area requiring further investigation. Studies of other AuSSI-WA primary and secondary schools, metropolitan and rural schools, state and independent, and schools with different socio-economic profiles, are needed to determine the long term outcomes of joining AuSSI-WA. Similar research could be conducted comparing AuSSI-WA schools in terms of student, teacher and community outcomes in EfS.

**Follow-up at study school**

Follow-up research at the case study school could provide additional evidence of long term outcomes for EfS and AuSSI-WA. For example, students and teachers could be re-interviewed periodically to ascertain outcomes over the next ten years. The fifteen year Scottish study (McNaughton, 2007) provided invaluable evidence, along with recommendations to enhance EfS outcomes. Similarly, ongoing evidence from the case study school could provide unique Australian data.

**6.4 Recommendations**

The research process identified various aspects of EfS that warrant further attention in WA. Recommendations include:

1. Enhanced professional learning through AuSSI-WA:
   - specifically for school principals, administrators and management personnel;
   - for all stakeholders, focusing on the need for behaviour change rather than the utilization of EfS products;
   - highlighting the importance of the local ‘place’ as the site for change;
   - allowing for more surface or deep learning experiences according to the needs of participants;
   - highlighting the importance and application of whole systems thinking; and
   - linked with the objectives of the *Sustainability Curriculum Framework* (DEWHA, 2010), the *Australian National Action Plan for EfS* (DEWHA, 2009e), the United Nation’s *Decade for Sustainable*
Development (UNESCO, 2008) and the Sustainability priority of the Australian Curriculum (ACARA, 2011c).

2. Funding support:
   - specific AuSSI-WA funding to address the identified, substantial professional learning requirements; and
   - ongoing, specific school-based funding to support staff with personnel, time and resources to implement EfS initiatives that promote changed behaviour.

3. Future research to address six key areas identified:
   - pre-service teacher education;
   - toolkit development and quality evaluation criteria for AuSSI-WA;
   - school-based implementation of whole systems thinking;
   - depth of EfS/AuSSI-WA engagement;
   - longitudinal comparative studies of a range of AuSSI-WA schools; and
   - follow-up research at the case study school.

On the basis of the research evidence, it is anticipated that adopting these recommendations will enhance the effectiveness of AuSSI-WA, ensuring a growing contribution and impact upon EfS in local, state, national and international contexts.
CHAPTER 7
CONCLUSIONS

Objectives, results and implications of the research are reviewed and located in terms of contribution to theoretical and applied knowledge in the field of EfS. Limitations of the research are then presented. The chapter concludes by looking back over the whole study so that ongoing improvements can be achieved in EfS.

7.1 Research Context

This research investigated EfS at a small independent Montessori primary school, located in the Perth metropolitan area of Western Australia. A longitudinal case study was conducted to determine the effectiveness of EfS, with particular focus on the impact of the AuSSI-WA. AuSSI provides a broad framework incorporating a wide range of activities to help schools and their communities become more sustainable (DSEWPC, 2011). AuSSI promotes a whole school, whole systems thinking approach to EfS, supporting schools to engage students in real-life learning experiences, exploring aspects of waste, biodiversity, air, energy, water, landscape design and student wellbeing.

The twenty year longitudinal case study involved the collection and analysis of data related to EfS from 1990-2009; 2005 marking the implementation of AuSSI-WA. The study investigated the impact of EfS at the Montessori school, in terms of student outcomes and teacher perceptions of the EfS program.

7.2 Research Questions

This study examined three school-based issues of EfS. The first objective was to determine what elements of EfS were in operation in the school before involvement in AuSSI-WA. The second objective focused on student outcomes, including engagement with whole systems thinking, attitudes and values, knowledge and understandings, and skills and behaviours related to EfS, after the first five years of participation in AuSSI-WA. The third objective was to ascertain teacher perceptions of the EfS program,
including engagement with whole systems thinking, after the first five years of involvement in AuSSI-WA.

7.3 Literature Review

The conceptual and theoretical framework was developed through a thorough examination of the literature in the fields of EfS, the Montessori approach to education and leadership for EfS.

Analysis of the conceptualization and contextualization of EfS research revealed a complex picture, with particular areas of EfS receiving considerable attention while others were neglected. During the 1990s in Australia, for example, critical analysis dominated EE research, followed by a focus on the environmental/sustainability curriculum, whereas some areas received little or no attention, such as, informal and non-formal education, pre-service teacher education, special needs education, and vocational and technical education (R. B. Stevenson & Evans, 2011). The 1990s also saw the growth of many whole school sustainability programs across the world. However, studies examining whole school approaches to sustainability were rare (Henderson & Tilbury, 2004; Potter, 2007). Research typically fitted into the areas outlined above and focused on particular specialisations, such as waste (Armstrong et al., 2004) and the application of various eco-connected pedagogies (Appleby, 2005). Furthermore, these studies were typically short term investigations (Tilbury & Cooke, 2005b). Long term studies were very rare due to practical, institutional and financial difficulties in conducting longitudinal research (Belk, 2006; Denzin & Lincoln, 2000; Mertens, 2005). Various researchers indicated the need for more longitudinal research to be conducted to ascertain more accurate, deeper understandings of long term EfS outcomes (Gralton et al., 2004; Hargreaves & Fink, 2003). The only significant long term study located investigated EfS policy in the Scottish school system over a fifteen year period, 1993 to 2007 (McNaughton, 2007). In addition, no comprehensive research on the impact of AuSSI-WA or systems thinking in a primary school context was found. The limited research involving whole school, whole systems approaches, in a longitudinal context thus informed the conceptual and theoretical framework for this study.

Literature on the Montessori approach to education demonstrated considerable philosophical alignment between the Montessori curriculum and EfS (Gausman, 2001b;
Montessori, 1964, 1973; Schonleber, 2006; Sillick, 1987). However, weaknesses in the alignment between Montessori and EfS could be present in some educational contexts. Four possible weaknesses were identified: curriculum pressures, staff workload, philosophical emphasis and governance issues (E. Lewis, 2004; Schonleber, 2006). Thus, from the review of Montessori literature emerged the need for more and better research on outcomes arising from the alignment between the Montessori curriculum and the impact of an EfS program.

Literature on leadership in EfS indicated different leadership styles facilitated or constrained EfS. Four broad types of leaders were identified: dynamic leaders, passive leaders, champions and leadership communities. Leadership communities emerged as most supportive for EfS (Mawson, 2008b; Price, 2010; P. Senge et al., 2007; Taylor, 2008a, 2008b). This leadership style brings together dynamic leaders, champions and other members of a community to work together cooperatively for EfS. The present study documented the impact of varying leadership styles on the school’s EfS program over the twenty year period of the case study, contributing long term evidence to this aspect of EfS.

7.4 Methodology

A case study approach was employed to enable in-depth investigation of EfS in the life of the school prior to, during and post AuSSI-WA. This approach facilitated revelation of participants' lived experiences, their perceptions and understandings of EfS, as well as detailed information about student outcomes in EfS. Case study methodology was also compatible with the culture and processes of the participating school and provided an opportunity for utilising a whole systems thinking approach.

Data was gathered through surveys, observation and document analysis. Former teachers and students who attended the school for at least five years during the period 1990-2004, completed surveys in 2007. Three former teachers and ten former students participated in these surveys. In addition, a comprehensive analysis of public school documents relating to this period was undertaken.

Teachers and students attending the school since 2005, the commencement of AuSSI-WA, participated in surveys and observation sessions in 2007 and 2008. Eight teachers completed pre/post surveys. Sixty five students, consisting of twenty two aged 3-6 years, twenty three aged 6-9 years and twenty students aged 9-12 years, completed
pre/post surveys. Observations were undertaken twice, a year apart in a pre/post-test context (2007/2008), in all six classes during EfS lessons. Immediately following the observation sessions, thirty six individual face-to-face interviews were conducted over the two year period, eighteen per year with three students from each of the six classes. In addition, the comprehensive document search continued, 2005 - 2009.

7.5 Results

The first research question investigated the antecedents of EfS in the Montessori method of education as implemented at the case study school, focusing on the period 1990-2004. Antecedents of EfS, prior to AuSSI-WA, were identified as the whole child approach and the Montessori learning environment, curriculum and values. Furthermore, respondents identified four key impacts of Montessori on EfS: eco-inter-relationships, demonstrated through gardening and engagement with animals at school; the learning/classroom environment, which included early childhood education links to sustainability; values that embraced caring for self, others and the environment; and community involvement which was highlighted through participation in busy bees, ceremonies, rituals and concerts that brought the community together in cooperative enterprises. All these endeavours supported EfS, as they were components of what was later to be known as the AuSSI Ecological Footprint and Social Handprint. Further, seven elements of EfS were reported to be in operation in the school before involvement in AuSSI-WA. These elements were vision and values, school governance, EfS activity, teaching and learning, reporting, student voice and community networks. For example, the school espoused EfS values, a strong vision for sustainability, and enacted recycling behaviours that reflected these values and aligned with the vision.

The second research question examined student outcomes emerging from the EfS program. During the period 2005-2007, immediately following participation in AuSSI, student EfS outcomes revealed that attitudes and values, knowledge and understandings, and skills and behaviours related to EfS were enhanced for all year levels. However, after three years when specific EfS actions and projects ceased, student EfS outcomes were limited. Findings on student engagement with whole systems thinking indicated students typically thought and behaved from silo perspectives, so deeper engagement with whole systems thinking was warranted.

The third research question investigated teacher perceptions of the EfS program. Overall, after joining AuSSI-WA in 2005, teachers reported the EfS program was
growing and highly effective, especially during the first three years. Key elements that enhanced EfS included: EfS staff champions who had access to EfS networks; leadership support; and active school community involvement in all EfS processes. However, after three years of being part of AuSSI-WA, the combined effect of reduced leadership support, lack of staff training, vague designation of staff with EfS responsibilities and inadequate community involvement, resulted in cessation of the EfS program. This situation occurred despite the school’s EfS policy and inclusion of EfS in strategic planning documents. Results of the whole systems thinking component of the third research question revealed teacher perceptions indicated alignment between Montessori philosophy, EfS and whole system thinking was more in theory than in practice. To enable effective teaching and learning about whole systems thinking, substantial engagement in professional learning about the approach, together with leadership support was found to be needed.

The study contributes to the field of EfS in both theory and application through investigation of an EfS program in one school context over a period of twenty years. From a theoretical perspective, it contributed evidence on the alignment of Montessori philosophy, values and structures with EfS. In addition, it built on limited research on whole systems thinking as the theory underpinning school EfS programs. In terms of application of EfS in authentic contexts, the study provided empirical evidence indicating positive EfS outcomes for students and teachers through participation in AuSSI-WA, whereas previous evidence was largely anecdotal. Further, the research examined outcomes of an EfS program that explicitly used and applied whole systems thinking. Systems thinking approaches are advocated in the Australian school context, however the application and impact of such approaches had yet to be explicitly investigated. The present empirical study has contributed initial, unique evidence.

7.6 Implications and Recommendations

Professional and conceptual implications arising from the results of the present study warrant a whole systems thinking approach to organisational change, school administration, curriculum, teacher support, AuSSI-WA services, and the conceptual framework. Sustained change requires every aspect of school life - vision, governance, funding, whole school professional learning, EfS activity, teaching and learning, curriculum, student voice, school and community partnerships, publicity and acknowledgement - to be built into the system in an ongoing context for effective,
sustained, systemic educational change. Usefulness of the conceptual framework involving a Sustainability Continuum was highlighted as a valuable tool for monitoring the longevity of change. It is strongly recommended that improvements to pre-service teacher education in EfS be implemented, together with a review of the AuSSI-WA toolkit to address EfS professional learning needs of teachers at different stages of schooling and to enhance understandings and implementation of whole systems thinking and depth of EfS engagement.

7.7 Limitations of Research

Four main limitations to this research were identified: the Montessori context, sample size, research scope, and the case study method. The Montessori educational setting in which the study was conducted had particular characteristics and values that may not be readily found in other educational contexts. To this extent the findings related to the Montessori curriculum and prepared learning environment may not be generalisable to other contexts. However, the Montessori emphasis on child-centred education, addressing the needs of the ‘whole child’ and recognition of the vital role of real life experiences in nature, have been adopted in many other school settings, so this research may inform EfS in similar contexts. The size of the teacher and former student samples is another limitation of this study. These relatively small sample sizes mean the results may have limited generalisability beyond the target population studied, but again, the mainstreaming of key Montessori ideas extends the applicability of the findings. The third limitation, the scope of the present research, meant comprehensive feedback from all stakeholders, parents and care givers at the school and community partners, could not be included. Nevertheless, this weakness was in part addressed through examination of school documentary sources. The fourth limitation, the case study method, relates to reliance on subjective judgements and possible researcher bias, however, these shortcomings were minimised by the use of triangulation. Finally, while the specific contextual findings of the current study may not necessarily be transferable to other settings, the processes employed and understandings developed could find wider applicability, especially in educational settings that share the same EfS emphasis as the Montessori case study school.
7.8 Informing the Future …

At the start of this study the overall intention was to look at the EfS journey of a school, moving both backwards and forwards in time. On reflection, this research process appears somewhat Janus-like. Janus, the two-faced Roman god, could not only look forwards and backwards, could see beginnings and endings, but was also the god of portals to new beginnings. This thesis therefore seems to have a Janus view, to reflect upon the beginnings and endings of EfS at the case study school, and also open new portals to improvements in EfS. From a big picture Janus perspective this research followed a twenty year EfS journey at a school - from limited hands-on action for change, to significant action for change after joining the AuSSI-WA pilot, then a period of reduced engagement with EfS, to renewed interest and tentative steps towards more fully engaging with EfS and AuSSI-WA. This study found AuSSI-WA had a profound positive impact on EfS at the case study school. Student benefits were reported, including a range of learning outcomes achieved through innovative, real life EfS projects that enhanced attachment to the local environment and provided considerable enjoyment during the learning process. Teachers highlighted a number of issues that enhanced the impact of EfS at the school, such as professional learning opportunities and funding support. Teachers also identified barriers, issues that limited the impact of AuSSI-WA, including lack of management support and teacher time.

This EfS journey, however, predominantly reflected silo thinking, rather than whole systems thinking. Overall it was found the school’s sustainability model with overlapping circles of systems, were mainly viewed and implemented in isolation rather than as interdependent systems. Nevertheless, increased focus on systemic thinking was found during the years immediately after joining AuSSI-WA. So, from silos, to systems and back to silos again, and then to re-engagement with EfS issues, the school was observed to shift towards and away from the ‘most sustainable’ position on the Sustainability Continuum in relation to its EfS understandings and actions for change. The dynamic and sometimes confounding interplay between EfS facilitators and barriers at the school contributed to movement to more or less sustainable positions on the continuum at different times during the journey.

Finally, the EfS journey was found to be extremely complex, with many dynamic interrelationships impacting on EfS outcomes at the case study school. The conclusions and recommendations drawn from the results warrant urgent attention to support ongoing EfS action at the school, and more broadly in the field of EfS. This thesis
therefore provides a portal, like Janus, to inform our future, to facilitate enhanced EfS action. This is vital for the wellbeing of our children, our nation, our world … as we, and all living and non-living things in our world, are interrelated … through systems.


Vienna, Austria: School Development through Environmental Education (SEED) and Socrates Comenius.


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IMPACT OF EDUCATION FOR SUSTAINABILITY AT A MONTESSORI PRIMARY SCHOOL: FROM SILOS TO SYSTEMS THINKING

APPENDICES
## APPENDICES

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Appendix 1: Information Letters
3 March 2007

Dear [name of Principal/Chairperson]

Project Title: *The impact of Education for Sustainability at a Montessori school*

I am a Doctor of Education student at Murdoch University and I am seeking your assistance for a research project on education for sustainability in our school. My research will be under the supervision of Associate Professor Irene Styles and Dr Catherine Baudains. The purpose of this study is to provide information about the impact of education for sustainability in a Montessori context. It is proposed that the research will be a longitudinal study that will enable the clarification of the past and current situation in terms of Montessori educational philosophy, values and structures as they relate to education for sustainability. Outcomes arising from the school’s participation in the WA Sustainable Schools Initiative will be the main focus of the study. The resulting report will determine evidence, evaluate and make recommendations about the education for sustainability program at the school.

You can help this study by consenting to the conduct of the research in the school. There are two aspects to the study, a staff level and a student level. Specifically, at the staff level, I want to investigate how I can improve the quality of education for sustainability teaching in this school. Working as a team member with the staff, I intend to explore education programs related to sustainability, and the understandings embedded within these programs that inform their implementation in the classroom. This research will entail teacher surveys/interviews of approximately 30 minutes, completed during the teachers’ own time. Also, I would need to take notes from public school documents, as well as workshops, staff meetings and classroom observation sessions which are part of the teachers’ usual work.

The student aspect of the research will involve approaching ten former students to complete one survey, of 15-30 minutes duration, and asking current students to complete two surveys, of 10-30 minutes each, on sustainability lessons in which they have participated. Student work samples will also be collected from each of the current multi-age group levels, in order to help determine student understandings and the effectiveness of the teaching programs. Observation sessions will be conducted by me with the current classes to help identify students’ understandings about sustainability in
terms of their actions and words. This will complement the students’ written work. All student information will be collected as part of their normal classroom activities. The decision about whether or not to participate in the study will not impact on any student’s progress or assessment in the school. Furthermore, I will not be involved in assessing the children’s work for school purposes.

Through participation in this research, it is hoped that you will be able to gain new and specific information about issues involved in education for sustainability. Feedback on the study will be provided initially by giving you the opportunity to read all draft reports and by attending a workshop on the research findings.

All data gathered will remain anonymous and no one will be identified by name in any written work as a result of this research. Written permission from all participants is a requirement for inclusion of their information in the research. If you are willing for the school to participate in this study, could you please complete the details below?

If you have any questions regarding the project please feel free to contact either myself, Elaine Lewis, at school, or one of my research supervisors, Associate Professor Irene Styles on 9360 2613 or Dr Catherine Baudains on 9360 6393. My supervisors and I are happy to discuss with you any concerns you may have on how this study will be conducted. If you wish to talk to an independent person about your concerns you can contact the Murdoch University’s Human Research Ethics Committee on 9360 6677.

Thank you for taking the time to read this letter and your anticipated support for this research project.

Sincerely

Elaine Lewis
D. Ed. Student

I, ____________________________, have read the information above. Any questions I have asked have been answered to my satisfaction. I agree to this research being undertaken at this school, however, I know that I may change my mind and stop at any time without prejudice to the school.

I understand that all information provided is treated as confidential and will not be released by the investigator unless required to do so by law.

I agree that research data gathered for this study may be published provided my name or other information which might identify me is not used.

Participant:
Date:

Investigator:
Date:

Two copies provided for each participant - researcher keeps the signed copy + participant keeps a copy of this letter for follow up if needed.

Please place researcher’s signed copy in Elaine Lewis’ pocket.
Letter to Current Teachers (2007):

10 March 2007

Dear [name of teacher]

Project Title: The impact of Education for Sustainability at a Montessori school

I am a Doctor of Education student at Murdoch University and I am seeking your assistance for a research project on education for sustainability in our school. My research will be under the supervision of Associate Professor Irene Styles and Dr Catherine Baudains. The purpose of this study is to provide information about the impact of education for sustainability in a Montessori context. It is proposed that the research will be a longitudinal study that will enable the clarification of the past and current situation in terms of Montessori educational philosophy, values and structures as they relate to education for sustainability. Outcomes arising from the school’s participation in the WA Sustainable Schools Initiative will be the main focus of the study. The resulting report will determine evidence, evaluate and make recommendations about the education for sustainability program at the school.

You can help this study by consenting to complete two half-hour surveys in your own time, one in 2007 and one in 2008. Contained in the surveys are questions about the school’s approach to education for sustainability and the impact this has had on you. The surveys may be completed on your own or in an interview context with me. The interviews will be audio-recorded to facilitate detailed analysis. All other contributions to the research will be made during normal school hours. This will involve, over the next two years, completing ten hours of professional development, ten hours of observation of classroom activities and attending the usual staff meetings.

The student aspect of the research will involve approaching ten former students to complete one survey, of 15-30 minutes duration, and asking current students to complete two surveys, of 10-30 minutes each, on sustainability lessons in which they have participated. Student work samples will also be collected and analysed to determine their understandings and the effectiveness of the teaching programs. Observation sessions will be conducted by me to help identify students’ understandings about sustainability in terms of their actions and words. This will complement understandings reflected in the students’ written work. All student information will be collected as part of their normal classroom activities. The decision about whether or not to participate in the study will not impact on any student’s progress or assessment in the
school. Furthermore, I will not be involved in assessing the children’s work for school purposes.

Through participation in this research, it is hoped that you will be able to gain new and specific information about issues involved in education for sustainability. Feedback on the study will be provided initially by giving you the opportunity to read all draft reports and make changes to your contributions, and subsequently by attending a workshop on the research findings.

All data gathered will remain anonymous and no one will be identified by name in any written work as a result of this research. Written permission from all participants is a requirement for inclusion of their information in the research. If you are willing for the school to participate in this study, could you please complete the details below.

If you have any questions regarding the project please feel free to contact either myself, Elaine Lewis, at school, or one of my research supervisors, Associate Professor Irene Styles on 9360 2613 or Dr Catherine Baudains on 9360 6393. My supervisors and I are happy to discuss with you any concerns you may have on how this study will be conducted. If you wish to talk to an independent person about your concerns you can contact the Murdoch University’s Human Research Ethics Committee on 9360 6677.

Thank you for taking the time to read this letter and your anticipated support for this research project.

Sincerely

Elaine Lewis
D. Ed. Student

I, _______________________________________, have read the information above. Any questions I have asked have been answered to my satisfaction. I agree to take part in this research, however, I know that I may change my mind, without prejudice, and stop at any time.

I understand that all information provided is treated as confidential and will not be released by the investigator unless required to do so by law.

I agree that research data gathered for this study may be published provided my name or other information which might identify me is not used.

Participant:
Date:

Investigator:
Date:

Two copies provided for each participant - researcher keeps the signed copy + participant keeps a copy of this letter for follow up if needed.
Please place researcher’s signed copy in Elaine Lewis’ pocket.
Dear [name of existing current teacher],

Research Project Update: The impact of Education for Sustainability at a Montessori school

I am a Doctor of Education candidate at Murdoch University and I am conducting a research project on education for sustainability in our school. My research is under the supervision of Professor Simone Volet, Dr Caroline Mansfield and Dr Catherine Baudains. The purpose of this study is to provide information about the impact of education for sustainability in a Montessori context. The research is a longitudinal study that will enable the clarification of the past and current situation in terms of Montessori educational philosophy, values and structures as they relate to education for sustainability. Outcomes arising from the school’s participation in the WA Sustainable Schools Initiative will be the main focus of the study. The resulting report will determine evidence, evaluate and make recommendations about the education for sustainability program at the school.

The data collection phase of the research will be completed this year. You may recall that it involves your participation in two 15-30 minute surveys, one in 2007 and the other in 2008, about the school’s approach to education for sustainability and the impact this has had on you. In addition I request the opportunity for your students to complete a survey, taking 10-30 minutes, on sustainability lessons in which they have participated. Student work samples will also be collected and analysed to determine their understandings and the effectiveness of the teaching programs. Observation sessions will be conducted by me to help identify students’ understandings about sustainability in terms of their actions and words.

If you have any questions regarding the study please feel free to contact either myself, Elaine Lewis on 9272 8531, or one of my research supervisors, Dr Catherine Baudains on 9360 6393, Dr Caroline Mansfield on 9360 2467 or Professor Simone Volet on 9360 2119. My supervisors and I are happy to discuss with you any concerns you may have.
on how this study will be conducted. If you wish to talk to an independent person about your concerns you can contact the Murdoch University’s Human Research Ethics Committee on 9360 6677.

Thank you for completing the permission form and supporting this research project.

Sincerely

Elaine Lewis
D. Ed. Candidate
Dear [name of new current teacher]

Project Title: *The impact of Education for Sustainability at a Montessori school*

I am a Doctor of Education candidate at Murdoch University and I am seeking your assistance for a research project on education for sustainability in our school. My research is under the supervision of Professor Simone Volet, Dr Caroline Mansfield and Dr Catherine Baudains. The purpose of this study is to provide information about the impact of education for sustainability in a Montessori context. The research is a longitudinal study that will enable the clarification of the past and current situation in terms of Montessori educational philosophy, values and structures as they relate to education for sustainability. Outcomes arising from the school’s participation in the WA Sustainable Schools Initiative will be the main focus of the study. The resulting report will determine evidence, evaluate and make recommendations about the education for sustainability program at the school.

You can help this study by consenting to complete one 15-30 minute survey in your own time. Contained in the survey are questions about the school’s approach to education for sustainability and the impact this has had on you. The survey may be completed on your own or in an interview context with me. The interview will be audio-recorded to facilitate detailed analysis.

The student aspect of the research will involve asking current students to complete a survey, taking 10-30 minutes, on sustainability lessons in which they have participated. Student work samples will also be collected and analysed to determine their understandings and the effectiveness of the teaching programs. Observation sessions will be conducted by me to help identify students’ understandings about sustainability in terms of their actions and words. This will complement understandings reflected in the students’ written work. All student information will be collected as part of their normal classroom activities. The decision about whether or not to participate in the study will not impact on any student’s progress or assessment in the school.
Furthermore, I will not be involved in assessing the children’s work for school purposes.

Through participation in this research, it is hoped that you will be able to gain new and specific information about issues involved in education for sustainability. Feedback on the study will be provided initially by giving you the opportunity to read all draft reports and make changes to your contributions, and subsequently by attending a workshop on the research findings.

All data gathered will remain anonymous and no one will be identified by name in any written work as a result of this research. Written permission from all participants is a requirement for inclusion of their information in the research. If you are willing to participate in this study, could you please complete the details below.

If you have any questions regarding the project please feel free to contact either myself, Elaine Lewis on 9272 8531, or one of my research supervisors, Dr Catherine Baudains on 9360 6393, Dr Caroline Mansfield on 9360 2467 or Professor Simone Volet on 9360 2119. My supervisors and I are happy to discuss with you any concerns you may have on how this study will be conducted. If you wish to talk to an independent person about your concerns you can contact the Murdoch University’s Human Research Ethics Committee on 9360 6677.

Thank you for taking the time to read this letter and your anticipated support for this research project.

Sincerely

Elaine Lewis
D. Ed. Candidate

I, ____________________________________________, have read the information above. Any questions I have asked have been answered to my satisfaction. I agree to take part in this research, however, I know that I may change my mind, without prejudice, and stop at any time.

I understand that all information provided is treated as confidential and will not be released by the investigator unless required to do so by law.

I agree that research data gathered for this study may be published provided my name or other information which might identify me is not used.

Participant:
Date:

Investigator:
Date:

Two copies provided for each participant - researcher keeps the signed copy + participant keeps a copy of this letter for follow up if needed. Please place researcher’s signed copy in Elaine Lewis’ pocket.
Letter to Former Teachers (2007):

DIVISION OF ARTS
School of Education

Associate Professor Irene Styles, BSc Hons, PhD Rhodes, DipEd Murd, MAPS

Phone: (61-8) 9360 2613
Fax: (61-8) 9360 6280
e-mail: I.Styles@murdoch.edu.au

10 March 2007

Dear [former teacher]

Project Title: The impact of Education for Sustainability at a Montessori school

I am a Doctor of Education candidate at Murdoch University and I am seeking your assistance for a research project on education for sustainability in our school. My research will be under the supervision of Associate Professor Irene Styles and Dr Catherine Baudains. The purpose of this study is to provide information about the impact of education for sustainability in a Montessori context. The research is a longitudinal study that will enable the clarification of the past and current situation in terms of Montessori educational philosophy, values and structures as they relate to education for sustainability. Outcomes arising from the school’s participation in the WA Sustainable Schools Initiative will be the main focus of the study. The resulting report will determine evidence, evaluate and make recommendations about the education for sustainability program at the school.

You can help this study by consenting to complete one thirty minute survey. Contained in the survey are questions about the school’s approach to education for sustainability when you were Principal of the school. The survey may be completed on your own or in an interview context with me. The interview will be audio-recorded to facilitate detailed analysis.

Through participation in this research, it is hoped that you will be able to gain new and specific information about issues involved in education for sustainability. Feedback on the study will be provided initially by giving you the opportunity to read all draft reports and make changes to your contributions, and subsequently by attending a workshop on the research findings.

All data gathered will remain anonymous and no one will be identified by name in any written work as a result of this research. Written permission from all participants is a requirement for inclusion of their information in the research. If you are willing to participate in this study, could you please complete the details below.

If you have any questions regarding the project please feel free to contact either myself, Elaine Lewis, at school, or one of my research supervisors, Associate Professor Irene
Styles on 9360 2613 or Dr Catherine Baudains on 9360 6393. My supervisors and I are happy to discuss with you any concerns you may have on how this study will be conducted. If you wish to talk to an independent person about your concerns you can contact the Murdoch University’s Human Research Ethics Committee on 9360 6677.

Thank you for taking the time to read this letter and your anticipated support for this research project.

Sincerely

Elaine Lewis
D. Ed. Candidate

I,_____________________________________, have read the information above. Any questions I have asked have been answered to my satisfaction. I agree to take part in this research, however, I know that I may change my mind, without prejudice, and stop at any time.

I understand that all information provided is treated as confidential and will not be released by the investigator unless required to do so by law.

I agree that research data gathered for this study may be published provided my name or other information which might identify me is not used.

Participant:
Date:

Investigator:
Date:

Two copies provided for each participant - researcher keeps the signed copy + participant keeps a copy of this letter for follow up if needed.
Please place researcher’s signed copy in Elaine Lewis’ pocket.
Letter to Former Teachers (2008):

**FACULTY of ARTS AND EDUCATION, Education**

**FACULTY of SUSTAINABILITY, Environmental Science**

Professor Simone Volet, Faculty of Arts and Education  
Phone: (61-8) 9360 2119  
Email: S.Volet@murdoch.edu.au

Dr Caroline Mansfield, Faculty of Arts and Education  
Phone: (61-8) 9360 2467  
Email: Caroline.Mansfield@murdoch.edu.au

Dr Catherine Baudains, Faculty of Sustainability  
Phone: (61-8) 9360 6393  
Email: c.baudains@murdoch.edu.au

7 March 2008  
[School address]

Dear [former teacher]

Project Title: *The impact of Education for Sustainability at a Montessori school*

I am a Doctor of Education candidate at Murdoch University and I am seeking your assistance for a research project on education for sustainability in our school. My research is under the supervision of Professor Simone Volet, Dr Caroline Mansfield and Dr Catherine Baudains. The purpose of this study is to provide information about the impact of education for sustainability in a Montessori context. The research is a longitudinal study that will enable the clarification of the past and current situation in terms of Montessori educational philosophy, values and structures as they relate to education for sustainability. Outcomes arising from the school’s participation in the WA Sustainable Schools Initiative will be the main focus of the study. The resulting report will determine evidence, evaluate and make recommendations about the education for sustainability program at the school.

You can help this study by consenting to complete one thirty minute survey. Contained in the survey are questions about the school’s approach to education for sustainability when you were Principal of the school. The survey may be completed on your own or in an interview context with me. The interview will be audio-recorded to facilitate detailed analysis.

Through participation in this research, it is hoped that you will be able to gain new and specific information about issues involved in education for sustainability. Feedback on the study will be provided initially by giving you the opportunity to read all draft reports and make changes to your contributions, and subsequently by attending a workshop on the research findings.

All data gathered will remain anonymous and no one will be identified by name in any written work as a result of this research. Written permission from all participants is a requirement for inclusion of their information in the research. If you are willing to participate in this study, could you please complete the details below.
If you have any questions regarding the project please feel free to contact either myself, Elaine Lewis on 9272 8531, or one of my research supervisors, Dr Catherine Baudains on 9360 6393, Dr Caroline Mansfield on 9360 2467 or Professor Simone Volet on 9360 2119. My supervisors and I are happy to discuss with you any concerns you may have on how this study will be conducted. If you wish to talk to an independent person about your concerns you can contact the Murdoch University’s Human Research Ethics Committee on 9360 6677.

Thank you for taking the time to read this letter and your anticipated support for this research project.

Sincerely

Elaine Lewis
D. Ed. Candidate

I, ____________________________, have read the information above. Any questions I have asked have been answered to my satisfaction. I agree to take part in this research, however, I know that I may change my mind, without prejudice, and stop at any time.

I understand that all information provided is treated as confidential and will not be released by the investigator unless required to do so by law.

I agree that research data gathered for this study may be published provided my name or other information which might identify me is not used.

Participant:
Date:

Investigator:
Date:

Two copies provided for each participant - researcher keeps the signed copy + participant keeps a copy of this letter for follow up if needed.
Please place researcher’s signed copy in Elaine Lewis’ pocket.
3 March 2007

[School address]

Dear Parents and Care Givers

Project Title: *The impact of Education for Sustainability at a Montessori school*

I am a Doctor of Education student at Murdoch University and I am seeking your assistance for a research project on education for sustainability in our school. My research will be under the supervision of Associate Professor Irene Styles and Dr Catherine Baudains. The purpose of this study is to provide information about the impact of education for sustainability at a Montessori school. The resulting report will determine evidence, evaluate and make recommendations about the education for sustainability program at the school.

You can help this study by consenting to your child’s/children’s participation in this project. As part of their normal classroom activities students will be asked to complete two short surveys on their sustainability lessons. Student work samples will also be collected and analysed in order to help determine their understandings and the effectiveness of the teaching programs. In addition, observation sessions will be conducted by me to identify students’ understandings about sustainability in terms of their actions and words.

Through participation in this research, it is intended that improvements will be made to the education for sustainability curriculum in the school. Feedback on the study will be provided by giving you the opportunity to read all draft reports and by attending a workshop on the research findings. All information gathered will remain anonymous and no one will be identified by name in any written work as a result of this research.

Please understand that the decision about whether or not to participate in the study will not impact on your child’s progress or assessment in the school. Furthermore, I will not be involved in assessing your child’s work for school purposes. If you are willing for your child (or children) to participate in this study, could you please complete the details below. If you have any questions regarding the project please feel free to contact either myself, Elaine Lewis, at school, or one of my research supervisors, Associate Professor Irene Styles on 9360 2613 or Dr Catherine Baudains on 9360 6393.

My supervisors and I are happy to discuss with you any concerns you may have on how this study will be conducted. If you wish to talk to an independent person about your
concerns you can contact the Murdoch University’s Human Research Ethics Committee on 9360 6677.

Thank you for taking the time to read this letter and your anticipated support for this research project.

Sincerely

Elaine Lewis
D. Ed. Student

I/we, ____________________________________________, have read the information above. Any questions I have asked have been answered to my satisfaction. I/we agree to my/our child/children,

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

taking part in this activity, however, I/we know that I/we may change my mind, without prejudice, and stop at any time.

I/we understand that all information provided is treated as confidential and will not be released by the investigator unless required to do so by law.

I/we agree that research data gathered for this study may be published provided my/our name/s or other information which might identify me/us is not used.

Participants (Parents/Care Givers):

Date:
I/We have discussed this with my/our child/children and s/he agrees to participate.
Child/children to sign here please:

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

Investigator:

Date:

Two copies provided for each participant - researcher keeps the signed copy + participant keeps a copy of this letter for follow up if needed.
Please place researcher’s signed copy in Elaine Lewis’ pocket.

FACULTY of ARTS AND EDUCATION, Education
FACULTY of SUSTAINABILITY, Environmental Science

Professor Simone Volet, Faculty of Arts and Education
Phone: (61-8) 9360 2119
Email: S.Volet@murdoch.edu.au

Dr Caroline Mansfield, Faculty of Arts and Education
Phone: (61-8) 9360 2467
Email: Caroline.Mansfield@murdoch.edu.au

Dr Catherine Baudains, Faculty of Sustainability
Phone: (61-8) 9360 6393
Email: c.baudains@murdoch.edu.au

12 February 2008

School address

Dear Parents and Care Givers

Research Project Update: The impact of Education for Sustainability at a Montessori school

I am a Doctor of Education candidate at Murdoch University and I am conducting a research project on education for sustainability in our school. The purpose of this study is to provide information about the impact of education for sustainability at a Montessori school. The resulting report will determine evidence, evaluate and make recommendations about the education for sustainability program at the school. This project commenced last year and you provided written permission for your child’s (children’s) participation in this project. In appreciation of this support your child’s name (children) has been automatically entered in a draw to win one of three movie vouchers.

The research project will continue this year. If you have any questions regarding the study please feel free to contact either myself, Elaine Lewis on 9272 8531, or one of my research supervisors, Dr Catherine Baudains on 9360 6393, Dr Caroline Mansfield on 9360 2467 or Professor Simone Volet on 9360 2119. My supervisors and I are happy to discuss with you any concerns you may have on how this study will be conducted. If you wish to talk to an independent person about your concerns you can contact the Murdoch University’s Human Research Ethics Committee on 9360 6677.

Thank you for supporting for this research project.

Sincerely

Elaine Lewis
D. Ed. Candidate
Dear Parents and Care Givers

Project Title: The impact of Education for Sustainability at a Montessori school

I am a Doctor of Education candidate at Murdoch University and I am seeking your assistance for a research project on education for sustainability in our school. My research will be under the supervision of Professor Simone Volet, Dr Caroline Mansfield and Dr Catherine Baudains. It also has the approval of the Principal and the Chairperson of the Management Committee. The purpose of this study is to provide information about the impact of education for sustainability at a Montessori school. The resulting report will determine evidence, evaluate and make recommendations about the education for sustainability program at the school.

You can help this study by consenting to your child’s/children’s participation in this project. As part of their normal classroom activities students will be asked to complete a 15-30 minute survey on their sustainability lessons. Student work samples will also be collected and analysed in order to help determine their understandings and the effectiveness of the teaching programs. In addition, observation sessions will be conducted by me to identify students’ understandings about sustainability in terms of their actions and words. Through participation in this research, it is intended that improvements will be made to the education for sustainability curriculum in the school. Feedback on the study will be provided by giving you the opportunity to read all draft reports and by attending a workshop on the research findings. All information gathered will remain anonymous and no one will be identified by name in any written work as a result of this research.

Please understand that the decision about whether or not to participate in the study will not impact on your child’s progress or assessment in the school. Furthermore, I will not be involved in assessing your child’s work for school purposes. Please complete the details on the next page and return the form to the Lewis pocket by Friday 22 February. In appreciation for the return of your form your child/children will be automatically entered in a draw to win one of three movie vouchers.
If you have any questions regarding the project please feel free to contact either myself, Elaine Lewis on 9272 8531, or one of my research supervisors, Dr Catherine Baudains on 9360 6393, Dr Caroline Mansfield on 9360 2467 or Professor Simone Volet on 9360 2119. My supervisors and I are happy to discuss with you any concerns you may have on how this study will be conducted. If you wish to talk to an independent person about your concerns you can contact the Murdoch University’s Human Research Ethics Committee on 9360 6677.

Thank you for taking the time to read this letter and your anticipated support for this research project.

Sincerely

Elaine Lewis
D. Ed. Candidate

I/we,_____________________________________, have read the information above. Any questions I have asked have been answered to my satisfaction.
I/we agree/do not agree to my/our child/children

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

taking part in this activity, however, I/we know that I/we may change my mind, without prejudice, and stop at any time.
I/we understand that all information provided is treated as confidential and will not be released by the investigator unless required to do so by law.
I/we agree that research data gathered for this study may be published provided my/our name/s or other information which might identify me/us is not used.

Participants (Parents/Care Givers):

Date:

I/We have discussed this with my/our child/children and s/he agrees to participate.
Child/children to sign here please:

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

Investigator:

Date:
Two copies provided for each participant - researcher keeps the signed copy + participant keeps a copy of this letter for follow up if needed. Please place researcher’s signed copy in Elaine Lewis’ pocket.
Dear [former student’s name]

Project Title: *The impact of Education for Sustainability at a Montessori school*

I am a Doctor of Education student at Murdoch University and I am seeking your assistance for a research project on education for sustainability at your former school. My research will be under the supervision of Associate Professor Irene Styles and Dr Catherine Baudains. The purpose of this study is to provide information about the impact of education for sustainability at a Montessori school. The resulting report will determine evidence, evaluate and make recommendations about the education for sustainability program at the school.

You can help this study by consenting to complete one half-hour survey. The survey asks questions about sustainability lessons at the school. If you are willing to participate in the survey please complete one copy of the enclosed statement of consent and the survey form and return it in the envelope provided. Two copies of the letter/statement of consent have been enclosed so that you have a copy if you need it for follow-up. Through participation in this research, it is intended that improvements will be made to the education for sustainability curriculum at the school.

All information gathered will remain anonymous and no one will be identified by name in any written work as a result of this research. Feedback on the study will be provided by giving you the opportunity to read all draft reports and by attending a workshop on the research findings.

If you have any questions regarding the project please feel free to contact either myself, Elaine Lewis, at school, or one of my research supervisors, Associate Professor Irene Styles on 9360 2613 or Dr Catherine Baudains on 9360 6393. My supervisors and I are happy to discuss with you any concerns you may have on how this study will be conducted. If you wish to talk to an independent person about your concerns you can contact the Murdoch University’s Human Research Ethics Committee on 9360 6677.

Many thanks for taking the time to read this letter and your anticipated support for this research project. I have enclosed a stamped addressed envelope for your convenience. Your ongoing membership of and contribution to the school community is valued.
Thank you

Elaine Lewis
D. Ed. Student

I, __________________________, have read the information above. Any questions I have asked have been answered to my satisfaction. I agree to taking part in this activity, however, I know that I may change my mind, without prejudice, and stop at any time.

I understand that all information provided is treated as confidential and will not be released by the investigator unless required to do so by law.

I agree that research data gathered for this study may be published provided my name or other information which might identify me is not used.

Participant:
Date:

Investigator:
Date:

Two copies provided for each participant - researcher keeps the signed copy + participant keeps a copy of this letter for follow up if needed.
Stamped addressed envelope enclosed for return of signed copy and survey.
Dear Parents and Care Givers,

Project Title: The impact of Education for Sustainability at a Montessori school

I am a Doctor of Education student at Murdoch University and I am seeking your assistance for a research project on education for sustainability at your former school. My research will be under the supervision of Associate Professor Irene Styles and Dr Catherine Baudains. The purpose of this study is to provide information about the impact of education for sustainability at a Montessori school. The resulting report will determine evidence, evaluate and make recommendations about the education for sustainability program at the school.

You can help this study by consenting to your child’s/children’s participation in this project. Would you be willing for your child/children to participate in this research through involvement in a one-off survey? The survey asks questions about sustainability lessons at the school and will take no longer than 30 minutes to complete.

Through participation in this research, it is intended that improvements will be made to the education for sustainability curriculum in the school. All information gathered will remain anonymous and no one will be identified by name in any written work as a result of this research. Feedback on the study will be provided by giving you and your child/children the opportunity to read all draft reports and by attending a workshop on the research findings.

If you are willing for your child/children to participate in this study, could you please complete the details below. Could this signed consent statement, together with the completed survey form, please be returned in the envelope provided. Two copies of the letter/statement of consent have been enclosed so that you have a copy if you need it for follow-up.

If you have any questions regarding the project please feel free to contact either myself, Elaine Lewis, at school, or one of my research supervisors, Associate Professor Irene Styles on 9360 2613 or Dr Catherine Baudains on 9360 6393. My supervisors and I are happy to discuss with you any concerns you may have on how this study will be conducted. If you wish to talk to an independent person about your concerns you can contact the Murdoch University’s Human Research Ethics Committee on 9360 6677.
Thank you for taking the time to read this letter and your anticipated support for this research project. I have enclosed a stamped addressed envelope for your convenience.

Sincerely

Elaine Lewis
D. Ed. Student

I/we,_____________________________________, have read the information above. Any questions I have asked have been answered to my satisfaction. I/we agree to my/our child/children, ________________________________

______________________________________________

taking part in this activity, however, I/we know that I/we may change my mind, without prejudice, and stop at any time.

I/we understand that all information provided is treated as confidential and will not be released by the investigator unless required to do so by law.

I/we agree that research data gathered for this study may be published provided my/our child’s/children’s name/s or other information which might identify us is not used.

Participants (Parents/Care Givers):

Date:

I/We have discussed this with my/our child/children and s/he agrees to participate.

Child/children to sign here please:

______________________________________________

______________________________________________

______________________________________________

Investigator:

Date:

Two copies provided for each participant - researcher keeps the signed copy + participant keeps a copy of this letter for follow up if needed.

Stamped addressed envelope enclosed for return of signed copy and survey.
Appendix 2: Questionnaires
QUESTIONS FOR CURRENT STUDENTS’ SURVEY
CHILDREN’S HOUSE (2007 & 2008)

Introduction
Thank you for agreeing to do a drawing for me. I will keep your name secret, so draw whatever your ideas are. I’m learning about caring for the environment, today and for always, and this picture will help me to find out your ideas.

Task: Draw a picture of you outside, doing something good for the environment. You may add words or sentences to explain your ideas if you want to.

Thank you for your picture.
QUESTIONS FOR CURRENT STUDENTS’ SURVEY
LOWER PRIMARY (2007 & 2008)

Introduction
Thank you for agreeing to take part in this survey. I do not need you to write your name on this page, I just want you to write down whatever your ideas are. I’m learning about sustainability and this survey aims to find out your ideas on this topic.

1. How old were you when you started at XXX? ________________________

2. What year are you in now? ____________________________

3. Create a mind map showing everything you know about sustainability:
4. What was your favourite sustainability lesson last year?

______________________________________________________________________
Why was it your favourite?: ____________________________________________
______________________________________________________________________

5. What was your least favourite sustainability lesson last year?

______________________________________________________________________
Why didn’t you enjoy it?: _____________________________________________
______________________________________________________________________

6. What changes would you like to see so that you can do more sustainability lessons that you would enjoy?

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

Thank you for sharing your ideas.
QUESTIONS FOR CURRENT STUDENTS’ SURVEY
UPPER PRIMARY (2007 & 2008)

Introduction
Thank you for agreeing to take part in this survey. I do not need you to write your name on this survey. As you are aware I’m undertaking my doctoral study on Education for Sustainability (EfS) and this survey aims to find out your thoughts on this topic.

1. How old were you when you started at XXX?____________________________

2. What year are you in now?____________________________

3. Create a mind map showing everything you know about sustainability:
4. Describe, in as much detail as you can, one program in your class that is a good example of sustainability in action. What was the program:

**Why** you were involved:

______________________________________________________________________

**How** you were involved:

______________________________________________________________________

**Results** of the program:

______________________________________________________________________

______________________________________________________________________

5. Do you think anyone is being missed out by the school’s current approach to sustainability? “Anyone” could refer to a person, a group or class at the school, and/or groups in the wider community or the whole world. If yes, please explain.

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

6. Do you think anything is being missed out by the school’s current approach to sustainability? “Anything” could refer to any aspect or understanding about sustainability. If yes, please explain.

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

7. What was your favourite sustainability lesson last year?

______________________________________________________________________

Why was it your favourite?: ____________________________________________

______________________________________________________________________

8. What was your least favourite sustainability lesson last year?
Why didn’t you enjoy it?:

9. What changes would you like to see so that you can do more sustainability lessons that you would enjoy?

10. What changes would you like to see so that sustainability at school could be improved?

Conclusion
Thank you for agreeing to take part in this survey. I really appreciate your willingness to share your ideas. I am surveying other teachers and students in this study because I’m hoping to develop a clear picture of sustainability at the school. This information is going to be featured in my doctoral report, which will keep secret the real names of all the people who participated in the survey and the name of the school. So, once again thanks for your ideas.
QUESTIONs FOR FORMER STUDENTS’ SURVEY (2007)

Introduction
Thank you for agreeing to take part in this survey. Please be assured that your contribution will be kept strictly confidential. As you are aware I’m undertaking my doctoral study on Education for Sustainability and this survey aims to find out your thoughts on this topic.

1. How old were you when you started at XXX? __________________________

2. How old were you when you left XXX? __________________________

3. What are you doing now? Please tick relevant box.

   High school   Yes ☐ No ☐
   TAFE    Yes ☐ No ☐
   Course: __________________________
   University Yes ☐ No ☐
   Course: __________________________
   Employed Yes ☐ No ☐
   Position: __________________________
   Other (please specify):
   __________________________________________

4. What are your current understandings of the term ‘sustainability’?
   __________________________________________
   __________________________________________
   __________________________________________

5. Think back to when you were at XXX, what do you think were your understandings of ‘sustainability’ then?
   __________________________________________
   __________________________________________
   __________________________________________
6. What do you think was the impact of the Montessori philosophy on sustainability at the school?

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

7. Do you remember any sustainability lessons during the time you were at the school? 

________________ If yes, describe these lessons in as much detail as you can:

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

8. What impact did the sustainability lessons you had at the school have on you?

____________________________________________________________________

____________________________________________________________________

____________________________________________________________________

9. Do you think the school’s approach to sustainability, while you were there, ignored the interests of anyone? “Anyone” could refer to an individual, a group or class at the school, and/or groups in the wider community or the whole world. If yes, please explain.

____________________________________________________________________

____________________________________________________________________

10. Do you think the school’s approach to sustainability, while you were there, ignored the interests of anything? “Anything” could refer to any aspect or understanding about sustainability. If yes, please explain.

____________________________________________________________________
10. Do you think there is a difference between your current understanding of sustainability and the types of sustainability lessons you had at your primary school? If yes, please explain.

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

11. Is there anything else you would like to add regarding sustainability at the school? Any other comments?

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

Conclusion
Thank you for agreeing to take part in this survey. I really appreciate your willingness to share your ideas. I am surveying teachers and students in this study because I’m hoping to develop a clear picture of sustainability at the school since it started. This is going to be featured in my doctoral thesis, which will keep confidential the real names of all the people who participated in the survey and the name of the school. So, once again thanks for your ideas.
QUESTIONS FOR CURRENT TEACHERS’ SURVEY (2007)

Introduction
Thank you for agreeing to take part in this survey. Please be assured that your contribution will be kept strictly confidential. As you are aware I’m undertaking my doctoral study on Education for Sustainability and this survey aims to find out your thoughts on this topic.

1. Using the SWOT analysis chart below, show your understandings of Education for Sustainability (EfS) at the school:

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
</table>

2. What do you think is the impact of the Montessori philosophy on EfS at the school?

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
3. What do you think is the impact of the Sustainable Schools Initiative on EfS at the school?

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

4. What do you think is the impact of the Strategic Plan in relation to the sustainability vision on EfS at the school?

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

5. What do you think is the impact of the sustainability model on EfS at the school?

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

6. What do you think is the impact of the sustainability policy on EfS at the school?

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

7. What do you think is the impact on your class of having a sustainability focus every term?

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

8. What do you think is the impact on you of having a sustainability focus every term?

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
9. Describe, in as much detail as you can, one program in your class that is a good example of your approach to EfS. Include the philosophy behind the program, its implementation and outcomes. (Alternatively, please attach your program or other documentation if you already have it in writing.)

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

10. Do you think the school’s current approach to EfS ignores the interests of anyone? “Anyone” could refer to an individual, a group or class at the school, and/or a group in the wider community. If yes, please explain.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
____________________________________________________________________

11. Do you think the school’s current approach to EfS ignores the interests of anything? “Anything” could refer to any aspect or understanding about sustainability. If yes, please explain.

____________________________________________________________________
____________________________________________________________________
____________________________________________________________________
12. Is there anything else you would like to add regarding EfS at the school? Any improvements? Any concerns? Any other comments?

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

Conclusion
Thank you for participating. I really appreciate your willingness to share your ideas and make time available to answer these questions. I am surveying other teachers and students in this longitudinal study because I’m hoping to develop a clear picture of education for sustainability at the school since it started. This is going to be featured in my doctoral thesis, which will strictly maintain the confidentiality of all individuals as well as the school. So, once again thank you for your thoughtful support.
QUESTIONS FOR CURRENT TEACHERS’ SURVEY (2008)

Introduction
Thank you for agreeing to take part in this survey. Please be assured that your contribution will be kept strictly confidential. As you are aware I’m undertaking my doctoral study on Education for Sustainability and this survey aims to find out your thoughts on this topic.

1. Using the SWOT analysis chart below, show your understandings of Education for Sustainability (EfS) at the school:

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
</table>

2. What do you think is the impact of the Montessori philosophy on EfS at the school?
3. What do you think is the impact of the Sustainable Schools Initiative on EfS at the school?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

4. What do you think is the impact of the Strategic Plan in relation to the sustainability vision on EfS at the school?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

5. What do you think is the impact of the sustainability model on EfS at the school?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

6. What do you think is the impact of the sustainability policy on EfS at the school?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

7. What do you think is the impact on your class of having a sustainability focus every term?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

8. What do you think is the impact on you of having a sustainability focus every term?

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

377
9a. Describe, in as much detail as you can, one program in your class that is a good example of your approach to EfS. Include the philosophy behind the program, its implementation and outcomes. (Alternatively, please attach your program or other documentation if you already have it in writing.)

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

9b. Have you taken any action on the EfS priority for 2008 that you developed with the staff at the end of last year?

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

10. Do you think the school’s current approach to EfS ignores the interests of anyone? “Anyone” could refer to an individual, a group or class at the school, and/or a group in the wider community. If yes, please explain.

______________________________________________________________________
______________________________________________________________________
______________________________________________________________________

11. Do you think the school’s current approach to EfS ignores the interests of anything? “Anything” could refer to any aspect or understanding about sustainability. If yes, please explain.

______________________________________________________________________
______________________________________________________________________
12. Is there anything else you would like to add regarding EfS at the school? Any improvements? Any concerns? Any other comments?

________________________

________________________

________________________

________________________

________________________

________________________

________________________

________________________

Conclusion
Thank you for participating. I really appreciate your willingness to share your ideas and make time available to answer these questions. I am surveying other teachers and students in this longitudinal study because I’m hoping to develop a clear picture of education for sustainability at the school since it started. This is going to be featured in my doctoral thesis, which will strictly maintain the confidentiality of all individuals as well as the school. So, once again thank you for your thoughtful support.
QUESTIONS FOR FORMER TEACHERS’ SURVEY (2007 & 2008)

Introduction
Thank you for agreeing to take part in this survey. Please be assured that your contribution will be kept strictly confidential. As you are aware I’m undertaking my doctoral study on Education for Sustainability (EfS) and this survey aims to find out your thoughts on this topic.

1. What years did you work at XXX?______________________________________

2. What positions did you hold at the school during this period?
   _________________________________________________________________

3. What do you think were your understandings of EfS at the school during this period? Use the SWOT analysis chart below:

<table>
<thead>
<tr>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Opportunities</th>
<th>Threats</th>
</tr>
</thead>
</table>

4. What do you think is the impact of the Montessori philosophy on EfS at the school?
   __________________________________________________________________________
   __________________________________________________________________________
5. Did any EfS programs operate at the school during this period? _______________
   If yes, name some of the programs:

   ______________________________________________________

6. Describe, in as much detail as you can, one program in your former class that was a good example of your approach to EfS. Include the philosophy behind the program, its implementation and outcomes.

   ______________________________________________________
   ______________________________________________________
   ______________________________________________________
   ______________________________________________________
   ______________________________________________________

7. Was there a Sustainability model or policy operating at the school during this period? If yes, please explain.

   ______________________________________________________
   ______________________________________________________

8. What are your current understandings of EfS?

   ______________________________________________________

9. Do you think the school’s approach to EfS, when you were there, ignored the interests of anyone? “Anyone” could refer to an individual, a group or class at the school, and/or a group in the wider community. If yes, please explain.

   ______________________________________________________
   ______________________________________________________
   ______________________________________________________
10. Do you think the school’s approach to EfS, when you were there, ignored the interests of anything? “Anything” could refer to any aspect or understanding about sustainability. If yes, please explain.

______________________________________________________________________

______________________________________________________________________

______________________________________________________________________

11. Is there anything else you would like to add regarding EfS at the school, either when you were there or at present? Any other comments?

______________________________________________________________________

______________________________________________________________________

Conclusion

Thank you for participating. I really appreciate your willingness to share your ideas and make time available to answer these questions. I am surveying other teachers, parents and students in this longitudinal study because I’m hoping to develop a clear picture of education for sustainability at the school, over a twenty year period. This is going to be featured in my doctoral thesis, which will strictly maintain the confidentiality of all individuals as well as the school. So, once again thank you for your thoughtful support.
Appendix 3: Observations: Environmental Learning
Outcomes Survey and Field Notes
Interview Schedule:

Schedule removed because copyright permission was not obtained from copyright owner.

Observation Schedule:

Schedule removed
because copyright permission
was not obtained from copyright owner.

From:
Extracts from Field Notes:

In text identification of field notes state the year first, then the note number. For example, the first field note listed below would be referenced as: 07/9.

<table>
<thead>
<tr>
<th>Date</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>13/11/07</td>
<td>Staff Meeting staff reviewed CAPE for 2007 and set priorities for 2008 – led by champion … It was observed that participants’ understandings of phases in the AuSSI-WA tool varied greatly. One participant placed the school in the ‘starting’ category for a particular element, while another located the school in the ‘establishing’ category for the same element. Staff varied greatly re depth of understanding of terms employed in tool.</td>
</tr>
<tr>
<td>4/12/07</td>
<td>Sustainability committee: The structure was designed to promote capacity building and the ‘sustainability’ of the committee itself. Leadership was shared, and strong networking and delegation behaviours were evident. Tasks of the committee were divided into a number of key working areas, each with separate team leaders. Members chose to work on tasks in which they expressed particular interest. For example, some of the working groups were: visioning, garden development, the solar power project, waterwise works, carbon trading and the community co-op. Each working group reported on progress, discussed needs and made decisions in an inclusive manner. Members supported and encouraged each other, with interactions characterised by caring and constructive behaviours. In addition, the main sustainability committee roles (chair and secretary) were rotated amongst members to build confidence and capacity. Throughout 2007 the convenor role was shared between the school’s AuSSI-WA coordinator and an interested parent on the management board. When the school’s AuSSI-WA coordinator left the school at the end of 2007, detailed hand-over documentation was prepared and extensive discussions with the various stakeholders conducted. However, not all stakeholders chose to participate in this aspect of the hand-over process.</td>
</tr>
<tr>
<td>25/3/08</td>
<td>First sustainability item in school newsletter for 2008 – in Wk 9 – only about the garden. This is not whole systems thinking, rather a silo project; appears a few passionate parents concerned about the community garden.</td>
</tr>
<tr>
<td>30/6/08</td>
<td>Article in school newsletter - last week T2 - Management board member withdrew as sustainability convenor ... as at 1/8/08 the convenor position remains uncertain.</td>
</tr>
<tr>
<td>28/7/0</td>
<td>Article in school newsletter re sustainability co-op. Another silo project – no whole systems thinking/whole school approach/coherence indicated.</td>
</tr>
<tr>
<td>11/11/08</td>
<td>Sustainability article in newsletter … request for members (3 participants now). Another convenor resigned.</td>
</tr>
<tr>
<td>11/8/09</td>
<td>Sch newsletter: Garden progressing; Sustainability teacher appointed; focus on waste this term; stable convenor position.</td>
</tr>
<tr>
<td>5/12/09</td>
<td>No sustainability committee acknowledgment on website; only reference to sustainability related to a solar power education PPT by a student in 2005.</td>
</tr>
<tr>
<td>12/12/09</td>
<td>No school newsletter articles about solar power project/education since 2007.</td>
</tr>
</tbody>
</table>
Appendix 4: Interjudge Coding Assessments
**Education for Sustainability in a Montessori School: Inter-judge Coding Assessment**

**Children’s House (2007 & 2008)**

**Key:**
- S01 – S27 Children’s House students (3-6 years old): 9 of total 27 assessed by external judge = 33%
- W Waste
- Wa Water
- B Biodiversity
- We Wellbeing
- C Cleaning
- O Other

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Survey Item: Draw a picture of you outside, doing something good for the environment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>S06</td>
<td>Blue sky, yellow sun, girl in playground “sweeping leaves”.</td>
</tr>
<tr>
<td>S09</td>
<td>Birds in sky, gold sun, plants in garden; “seed growing and planting a flower”</td>
</tr>
<tr>
<td>S10</td>
<td>Colourful; 2 people by a lake “sweeping and don’t throw a can in the lake”</td>
</tr>
<tr>
<td>S11</td>
<td>Yellow sun with love hearts in sky &amp; on flower; person in garden “looking after the worms”.</td>
</tr>
<tr>
<td>S12</td>
<td>Boy “doing a science experiment with a bottle”.</td>
</tr>
<tr>
<td>S15</td>
<td>Lots of people doing different jobs – “sweeping, being helpful, chasing somebody’s cat” away from the birds.</td>
</tr>
<tr>
<td>S17</td>
<td>Picture of girl standing next to a tree, with snow and snails; “I am checking to see if the tree is going to fall down.”</td>
</tr>
<tr>
<td>S18</td>
<td>Picture of boy and four guitars; “This is me playing my guitars.”</td>
</tr>
<tr>
<td>S24</td>
<td>Boy outside placing fish bones in a bin and boy under an apple tree; “Picking up the dead fish to help the environment and ‘clean up Australia day’. Cleaning up the apples and sell to make money to buy a playstation.”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>W</td>
<td>W</td>
<td>3</td>
</tr>
<tr>
<td>W</td>
<td>W</td>
<td>3</td>
</tr>
<tr>
<td>We</td>
<td>We</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>1</td>
</tr>
<tr>
<td>We</td>
<td>W</td>
<td>2</td>
</tr>
<tr>
<td>W</td>
<td>W</td>
<td>4</td>
</tr>
<tr>
<td>Wa</td>
<td>W</td>
<td>3</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>C</td>
<td>3</td>
</tr>
<tr>
<td>We</td>
<td>W</td>
<td>3</td>
</tr>
<tr>
<td>O</td>
<td>O</td>
<td>1</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>1</td>
</tr>
<tr>
<td>C</td>
<td>C</td>
<td>1</td>
</tr>
<tr>
<td>O</td>
<td>We</td>
<td>1</td>
</tr>
<tr>
<td>O</td>
<td>We</td>
<td>2</td>
</tr>
<tr>
<td>W</td>
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<td>C</td>
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<tr>
<td>O</td>
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</tbody>
</table>

Total 91% 21 23
### Education for Sustainability in a Montessori School: Inter-judge Coding Assessment

**Lower Primary (2007 & 2008)**

**Key:**
- S28 – S67 Lower Primary students: 20% of total 40 = 8, with 4 2007 surveys and 4 2008 surveys
- W Waste
- Wa Water
- B Biodiversity
- E Energy
- We Wellbeing
- N None
- O Other

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Survey Item: Q3 Mind map of sustainability.</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
<th>Agree Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>S 30</td>
<td>“support worm farm; give people food; no boiling; caring”</td>
<td>W1 W2</td>
<td>B1 We3</td>
<td>W1 Wa2</td>
<td>7 7</td>
</tr>
<tr>
<td>S33</td>
<td>“resikling, gardening, worms, vailos” (3 values- “caring, rspekt, pashens”</td>
<td>W2 B1 We4</td>
<td>W3 B2 E2</td>
<td>W2 B1 W3 B2</td>
<td>7 7</td>
</tr>
<tr>
<td>S35</td>
<td>“recicle batteries paper”</td>
<td>W2 B1 We1</td>
<td>W1 Wa1 B3 E1</td>
<td>W1 Wa1</td>
<td>4 6</td>
</tr>
<tr>
<td>S36</td>
<td>“recycle, gene peg (guinea pig), worm frem, cereng (caring)</td>
<td>W2 B1 We1</td>
<td>W1 Wa1 B3 E1</td>
<td>W1 Wa1</td>
<td>8 10</td>
</tr>
<tr>
<td>S60</td>
<td>Pit traps, water tanks, solar panels, garden – no chemicals</td>
<td>W1 Wa1</td>
<td>B1 We6</td>
<td>B1 Wa2</td>
<td>7 9</td>
</tr>
<tr>
<td>S61</td>
<td>Healthy body – exercise, lots of water, brain, heart, good food; Worm farm; pit traps; lake testing; reed planting.</td>
<td>W1 Wa2</td>
<td>B1 We6</td>
<td>B1 Wa2</td>
<td>10 10</td>
</tr>
<tr>
<td>S62</td>
<td>Healthy body – exercise, lot’s of water, heart, good food; Worm farming; pit traps; lake; planting reads</td>
<td>W1 Wa1</td>
<td>B1 We5</td>
<td>B1 Wa2</td>
<td>9 9</td>
</tr>
<tr>
<td>S64</td>
<td>Healthy body – exercise, plenty of water, heart, good food; Worm farm; lake; reclying – paper, fruit.</td>
<td>W3 Wa1</td>
<td>B1 We5</td>
<td>B1 Wa2</td>
<td>11 11</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>90%</strong></td>
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</table>

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Survey Item: Q4 Favourite sustainability lesson last year.</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
<th>Agree Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>S 30</td>
<td>“Water testing – you got to see all the animals you won’t see”</td>
<td>Wa</td>
<td>Wa</td>
<td>Wa</td>
<td>1 1</td>
</tr>
<tr>
<td>S33</td>
<td>“all bcos I like sustainability”</td>
<td>W</td>
<td>Wa</td>
<td>B E</td>
<td>1 1</td>
</tr>
<tr>
<td>S35</td>
<td>“bird watching Beacos it was fan”</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>1 1</td>
</tr>
<tr>
<td>S36</td>
<td>“Pet trap; it was fun”</td>
<td>B</td>
<td>B</td>
<td>B</td>
<td>1 1</td>
</tr>
<tr>
<td>S60</td>
<td>All of them because they were fun and I learnt a lot</td>
<td>W</td>
<td>Wa</td>
<td>B E</td>
<td>1 1</td>
</tr>
<tr>
<td>S61</td>
<td>Lake testing. I like using the equipment.</td>
<td>Wa</td>
<td>Wa</td>
<td>Wa</td>
<td>1 1</td>
</tr>
<tr>
<td>S62</td>
<td>Lake because it was fun lerning about the lake.</td>
<td>Wa</td>
<td>Wa</td>
<td>Wa</td>
<td>1 1</td>
</tr>
<tr>
<td>S64</td>
<td>Lake becus it was fun.</td>
<td>Wa</td>
<td>Wa</td>
<td>Wa</td>
<td>1 1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Student** | **Survey Item: Q5 Least favourite** | **Researcher** | **External Judge** | **Agreement** | **Agree Total** |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Student Number</td>
<td>Survey Item: Q6 Changes you would like to see so that you can do more sustainability lessons that you would enjoy.</td>
<td>Researcher</td>
<td>External Judge</td>
<td>Agreement</td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------------------------------------------------------------------------------------------</td>
<td>------------</td>
<td>----------------</td>
<td>-----------</td>
<td></td>
</tr>
<tr>
<td>S 30</td>
<td>“being kind to animals like insects in jars”</td>
<td>B</td>
<td>B</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>S33</td>
<td>“Let you do it.”</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>S35</td>
<td>“kawting trees”</td>
<td>B</td>
<td>B</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>S36</td>
<td>-</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>S60</td>
<td>More gardening; after a long time be allowed to fix the solar panels.</td>
<td>B</td>
<td>E</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>S61</td>
<td>Do more gardening and rock and water</td>
<td>Wa</td>
<td>Wa</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>S62</td>
<td>Stoping [child’s name] putting rubbish in the bin</td>
<td>B</td>
<td>We</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>S64</td>
<td></td>
<td>O</td>
<td>W</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
<td></td>
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<tr>
<td>TOTAL</td>
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<table>
<thead>
<tr>
<th>Number</th>
<th>sustainability lesson last year.</th>
<th>Judge</th>
<th>Agree Total</th>
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</thead>
<tbody>
<tr>
<td>S 30</td>
<td>-</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>S33</td>
<td>no</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>S35</td>
<td>-</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>S36</td>
<td>no</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>S60</td>
<td>None of them, They were all really good.</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>S61</td>
<td>None</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>S62</td>
<td>Worm farming – it melt way to bad</td>
<td>W</td>
<td>1</td>
</tr>
<tr>
<td>S64</td>
<td>Fruit reling becus it was boring</td>
<td>W</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>

Total 88%
Education for Sustainability in a Montessori School: Inter-judge Coding Assessment
Upper Primary (2007 & 2008)

Key:
S68 – S107 Upper Primary students: 20% of total 40 = 8, with 4 2007 surveys and 4 2008 surveys
W  Waste
Wa  Water
B  Biodiversity
E  Energy
We  Wellbeing
N  None
O  Other

Student Number  Survey Item: Q3 Mind map of sustainability.  Researcher  External Judge  Agreement  Total
S75  Having LOTE, sharing, trying stuff, collecting honey, helping the gardain, doing the worm farm, helping the world and the things on it, stopping pollution, caring for others, recycling paper  W2  B4  W2  B3  8  10
S78  Recycling our rubbish (making things or putting them in the recycling bin), solar power instead of electricity, recycling our scrapes with the worm farm, recycling our batteries, caring for the environment  W4  B1  E1  W4  B1  6  6
S80  Biodiversity survey to help our lake wildlife, planting vegies, planting with Alicia, we're cleaning the lake planting natives getting rid of pollution, we recycle paper plastic pots batteries and we have a worm farm, pit traps, solar power, we're done living with tiger snakes, We work together teamwork, we care for our environment, we help contribute share & accomplish as a team.  W5  Wa3  W5  Wa3  17  17
S85  Recicel stuff a.k.a. paper batteries etc.  W3  W3  1  1
S90  Community, help us to help you, environment, don't cut down trees, solar power, timer taps, walk or ride do not drive, communication, communicate friendly, health have a healthy lunch.  Wa1  B3  Wa1  B2  9  11
S96  Environment – help the environment around you, don’t cut down trees; Spirit – Winter Solstice; Socialise – work together and socialise; health – don’t eat junk food; Sustainability – solar panels; Community – don’t fight our community will fall apart.  B3  E1  B2  E1  9  11
S105  Looked for turtle eggs, planted plants near the lake, water quality testing, pit traps, planted trees.  Wa2  B3  Wa2  B3  5  5
S106  Healing the Swan, groundwater festival, tree plants, worm farms, pit traps, frog pond, paper recycling, turtle nests, water testing.  W2  Wa3  W2  Wa4  7  9
Total  86%  62  70

Student Number  Survey Item: Q4 describe one program in your class that is a good example of sustainability in action.  Researcher  External Judge  Agreement  Total
S75  Gardning, mum and I wee intrested, picking vegdbals leaves and pulling out leaves, the garden is going well and the food dalishes!  B  B  1  1
S78  Putting our scrapes in a worm farm, so they ha enofe food and we are recicling, putting our scrapes in the worm farm, we're still doing it  W  W  1  1
S80  I think the lake surveys helped save herdsman & our lake, The school helped survey the lake to see how polluted it was; I (we) brainstormed ideas to help the lake; we came up with planting native because the exotic plants were polluting the lake.  Wa  Wa  1  1
To save the earth, because I like saving the earth, I learnt stuff, I gained knowledge.

Pit traps, to find different animals, looking at the pit traps, we found mostly frogs like motorbike frogs and ect.

Planting trees, so we could grow more trees, I planted lots of trees with lots of other people. The trees will make the earth healthier.

Pit traps, because it was fun and a new learning experience, with my class I checked the pit traps to see if there were any frogs so we could tell which frog lived around our school and if the environment was good for them to live in, we found 2 of 10 species of frog around our area so then we planted more native plants to create a better environment for them so we then could find all 10 species.

Because of the sustainability projects from the school, I got to be on TV.

Survey Item: Q5 Do you think anyone is being missed out by the school’s current approach to sustainability.

Survey Item: Q6 Do you think anything is being missed out by the school’s current approach to sustainability.

Survey Item: Q7 Favourite sustainability lesson last year.

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Survey Item: Q5 Do you think anyone is being missed out by the school’s current approach to sustainability.</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement Agree Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>S75</td>
<td>No</td>
<td>N</td>
<td>N</td>
<td>1 1</td>
</tr>
<tr>
<td>S78</td>
<td>No</td>
<td>N</td>
<td>N</td>
<td>1 1</td>
</tr>
<tr>
<td>S80</td>
<td>[Yes] Maybe we could find another way to help the school environment - get the classes to do more work.</td>
<td>Y</td>
<td>Y</td>
<td>1 1</td>
</tr>
<tr>
<td>S85</td>
<td>NO</td>
<td>N</td>
<td>N</td>
<td>1 1</td>
</tr>
<tr>
<td>S90</td>
<td>? [no]</td>
<td>N</td>
<td>N</td>
<td>1 1</td>
</tr>
<tr>
<td>S96</td>
<td>No because everyone is involved in pit traps gardening ect</td>
<td>N</td>
<td>N</td>
<td>1 1</td>
</tr>
<tr>
<td>S105</td>
<td>No</td>
<td>N</td>
<td>N</td>
<td>1 1</td>
</tr>
<tr>
<td>S106</td>
<td>No</td>
<td>N</td>
<td>N</td>
<td>1 1</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
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<thead>
<tr>
<th>Student Number</th>
<th>Survey Item: Q6 Do you think anything is being missed out by the school’s current approach to sustainability.</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement Agree Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>S75</td>
<td>[Yes] I think we should go on a excursion [excursion]</td>
<td>Y</td>
<td>Y</td>
<td>1 1</td>
</tr>
<tr>
<td>S78</td>
<td>No</td>
<td>N</td>
<td>N</td>
<td>1 1</td>
</tr>
<tr>
<td>S80</td>
<td>[Yes] Maybe we could work on getting a positive attitude towards the environment from the whole school.</td>
<td>Y</td>
<td>Y</td>
<td>1 1</td>
</tr>
<tr>
<td>S85</td>
<td>No</td>
<td>N</td>
<td>N</td>
<td>1 1</td>
</tr>
<tr>
<td>S90</td>
<td>?</td>
<td>N</td>
<td>N</td>
<td>1 1</td>
</tr>
<tr>
<td>S96</td>
<td>No we have covered mostly everything in sustainability</td>
<td>N</td>
<td>N</td>
<td>1 1</td>
</tr>
<tr>
<td>S105</td>
<td>no</td>
<td>N</td>
<td>N</td>
<td>1 1</td>
</tr>
<tr>
<td>S106</td>
<td>no</td>
<td>N</td>
<td>N</td>
<td>1 1</td>
</tr>
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<td>Total</td>
<td>100%</td>
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<thead>
<tr>
<th>Student Number</th>
<th>Survey Item: Q7 Favourite sustainability lesson last year.</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement Agree Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>S75</td>
<td>? can't remember</td>
<td>O</td>
<td>O</td>
<td>1 1</td>
</tr>
<tr>
<td>S78</td>
<td>The pit traps, because we got to see the frogs and it was fun</td>
<td>B</td>
<td>B</td>
<td>1 1</td>
</tr>
<tr>
<td>S80</td>
<td>Lake activities; I'm more experienced with testing.</td>
<td>Wa</td>
<td>Wa</td>
<td>1 1</td>
</tr>
<tr>
<td>S85</td>
<td>Pit traps. There was bug and frogs and wildlife.</td>
<td>B</td>
<td>B</td>
<td>1 1</td>
</tr>
<tr>
<td>Student Number</td>
<td>Survey Item: Q8 Least favourite sustainability lesson last year.</td>
<td>Researcher</td>
<td>External Judge</td>
<td>Agreement</td>
</tr>
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<td>----------------</td>
<td>---------------------------------------------------------------</td>
<td>------------</td>
<td>----------------</td>
<td>-----------</td>
</tr>
<tr>
<td>S75</td>
<td>?</td>
<td>N</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>S78</td>
<td>none</td>
<td>N</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>S80</td>
<td>The pit traps (I didn’t hate it) because I didn’t see any animals.</td>
<td>B</td>
<td>B</td>
<td>1</td>
</tr>
<tr>
<td>S85</td>
<td>Did not have one. I did [enjoy it]</td>
<td>N</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>S90</td>
<td>nothin</td>
<td>N</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>S96</td>
<td>I liked every activity</td>
<td>N</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>S105</td>
<td>Planting plants near the lake, we got mud in our shoes and socks and all over us and we got wet.</td>
<td>Wa</td>
<td>Wa</td>
<td>1</td>
</tr>
<tr>
<td>S106</td>
<td>none</td>
<td>N</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Survey Item: Q9 What changes would you like to see so that you can do more sustainability lessons that you would enjoy.</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
<th>Agree Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>S75</td>
<td>?</td>
<td>N</td>
<td>N</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>S78</td>
<td>none</td>
<td>N</td>
<td>N</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>S80</td>
<td>Doing more planting or environmental activities</td>
<td>B</td>
<td>B</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>S85</td>
<td>More protesting</td>
<td>O</td>
<td>We</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>S90</td>
<td>More time</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>S96</td>
<td>No</td>
<td>N</td>
<td>N</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>S105</td>
<td>We should fill the frog pond up and put tadpoles in it and look after it.</td>
<td>B</td>
<td>B</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>S106</td>
<td>none</td>
<td>N</td>
<td>N</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>88%</td>
<td></td>
<td></td>
<td></td>
<td>7</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Survey Item: Q10 Changes you would like to see so that sustainability at school could be improved.</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
<th>Agree Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>S75</td>
<td>People remembering to put batteries in the battery box</td>
<td>W</td>
<td>W</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>S78</td>
<td>Make it really fun!</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>S80</td>
<td>Every single person contributing ideas and activities</td>
<td>O</td>
<td>O</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>S85</td>
<td>More protesting</td>
<td>O</td>
<td>We</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>S90</td>
<td>?</td>
<td>N</td>
<td>N</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>S96</td>
<td>More activities all</td>
<td>W</td>
<td>Wa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S105</td>
<td>Nothing</td>
<td>N</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S106</td>
<td>none</td>
<td>N</td>
<td>N</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>92%</td>
<td></td>
<td></td>
<td></td>
<td>11</td>
</tr>
</tbody>
</table>

**TOTAL 93%**
Examples of Interjudge Coding Disagreements for Current Student Responses

S18 Children’s House Student Drawing (4 y.o. boy; 2008):

Researcher coded: Other
External judge coded: Other & Wellbeing

S60 Lower Primary Student’s Mind Map (Year 3 girl; 2008):

Researcher coded: Waste 1, Water 1, Biodiversity 3 & Energy 1
External judge coded: Waste 1, Water 1, Biodiversity 2, Energy 1 & Wellbeing 1
Education for Sustainability in a Montessori School: Inter-judge Coding
Assessment
Former Students (2007)

Key:
S108 – S117 Former students: 20% of total 10 = 2

| B | Biodiversity | I | Increased focus |
| Br | Broad | N | No |
| C | Choice | Na | Narrow focus |
| Cu | Curriculum | S | Social |
| E | Energy | W | Waste |
| En | Environmental | Wa | Water |
| Enj | Enjoyment | Y | Yes |
| F | Future generations |

Student Number Survey Item: Q4 What are your current understandings of the term ‘sustainability’?

<table>
<thead>
<tr>
<th>Survey Item: Q4</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>S109 (Yr 11)</td>
<td>Br</td>
<td>Br</td>
<td>1 1</td>
</tr>
<tr>
<td>S111 (Uni)</td>
<td>En S</td>
<td>En E S</td>
<td>2 3</td>
</tr>
</tbody>
</table>

Student Number Survey Item: Q5 What do you think your understandings of ‘sustainability’ then?

<table>
<thead>
<tr>
<th>Survey Item: Q5</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>S109</td>
<td>En</td>
<td>En</td>
<td>1 1</td>
</tr>
<tr>
<td>S111</td>
<td>En</td>
<td>En</td>
<td>1 1</td>
</tr>
</tbody>
</table>

Student Number Survey Item: Q6 Do you remember any sustainability lessons during the time you were at the school?

<table>
<thead>
<tr>
<th>Survey Item: Q6</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>S109</td>
<td>B E</td>
<td>B E</td>
<td>2 2</td>
</tr>
<tr>
<td>S111</td>
<td>E</td>
<td>E</td>
<td>1 1</td>
</tr>
</tbody>
</table>

Student Number Survey Item: Q7 What do you think was the impact of the Montessori philosophy on sustainability at the school?

<table>
<thead>
<tr>
<th>Survey Item: Q7</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>S109</td>
<td>Enj</td>
<td>Enj</td>
<td>1 1</td>
</tr>
<tr>
<td>S111</td>
<td>C Cu</td>
<td>C Cu</td>
<td>2 2</td>
</tr>
</tbody>
</table>
participate in sustainability, people could choose to participate in it as much as they wanted to ... I believe that it incorporated more …

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Survey Item: Q8 What impact did the sustainability lessons you had at school have on you?</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>S109</td>
<td>I always dislike people using fossil fuels for power, and am still an avid supporter of more environmentally friendly solutions.</td>
<td>En</td>
<td>En</td>
<td>1</td>
</tr>
<tr>
<td>S111</td>
<td>They made me more aware of renewable resources and awakened an interest in our environment ... gave me a broader view …</td>
<td>En Br</td>
<td>En Br</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Survey Item: Q9 Do you think anyone is being missed out by the school’s current approach to sustainability?</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>S109</td>
<td>I doubt it … but I don’t really remember going into enough detail for other aspects of issues to be considered.</td>
<td>N</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>S111</td>
<td>No.-------------------------------------------------------------------------------------------------</td>
<td>N</td>
<td>N</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Survey Item: Q10 Do you think anything is being missed out by the school’s current approach to sustainability?</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>S109</td>
<td>There were a lot of things I don’t remember being taught but within what we were taught I don’t think so. The schools approach to sustainability was mainly focused on solar energy rather than wind or hydro power.</td>
<td>N</td>
<td>N</td>
<td>1</td>
</tr>
<tr>
<td>S111</td>
<td>Na-------------------------------------------------------------------------------------------------</td>
<td>Na</td>
<td>Na</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Survey Item: Q11 Do you think there is a difference between your current understanding of sustainability and the types of sustainability lessons you had at primary school?</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>S109</td>
<td>Yes; well the issue awareness has expanded through further study (particularly Geology, Biology and Environmental Science) and ways of solving unsustainable situations. Although I still don’t like cane toads or fossil fuels.</td>
<td>Y</td>
<td>Y</td>
<td>1</td>
</tr>
<tr>
<td>S111</td>
<td>Y-------------------------------------------------------------------------------------------------</td>
<td>Y</td>
<td>Y</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Student Number</th>
<th>Survey Item: Q12 Anything else you would like to add regarding sustainability?</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>S109</td>
<td>From what I hear from younger siblings and parents/friends the school has become much more focused on sustainability for the future than I recall but this is not a bad reflection on the school in any way. I love XXX. : )</td>
<td>I</td>
<td>I</td>
<td>1</td>
</tr>
<tr>
<td>S111</td>
<td>Sustainability was fun to get involved in at XXX and I thank you for giving me this opportunity to return some feedback.</td>
<td>Enj</td>
<td>Enj</td>
<td>1</td>
</tr>
</tbody>
</table>

TOTAL 96%  

| Enj | Enj | 1 | 1 |

| En | En | 1 | 1 |

| TOTAL | 96% | 22 | 23 |
Education for Sustainability in a Montessori School: Inter-judge Coding
Assessment Current Teachers (2007 & 2008)

Key:
S01 – S12 Teachers: 4 of total 12 = 33% (2 x 2007; 2 x 2008)

<table>
<thead>
<tr>
<th>Teacher Number</th>
<th>Survey Item: Q2 What do you think is the impact of the Montessori philosophy on EfS at the school?</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
<th>Agree Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T02</td>
<td>Teachers already have an understanding, “feeling for”, the importance for caring for our earth from Montessori. Therefore personal beliefs in benefit of sust. Educ are already established.</td>
<td>Ec M V</td>
<td>Ec M V</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>T03</td>
<td>The idea of ‘learning together and growing together’ really works with EfS. The chn go into each other’s classrooms (i.e. collecting paper, worm food scraps).</td>
<td>M Ec</td>
<td>M Ec</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>T07</td>
<td>Most staff believe and feel we have a responsibility today for tomorrow. Montessorians look to the future society.</td>
<td>M V</td>
<td>M V</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>T08</td>
<td>Child centred, Montessori’s belief in sustainability and spirituality, love of nature.</td>
<td>M V</td>
<td>M V</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher Number</th>
<th>Survey Item: Q3 What do you think is the impact of SSI on EfS at the school?</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
<th>Agree Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T02</td>
<td>Teachers are now putting into practice what they believe and teaching it in a practical way that is relevant to the school community and the curriculum.</td>
<td>I</td>
<td>I</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>T03</td>
<td>It has created a network with other schools – helps us feel connected and supported.</td>
<td>N</td>
<td>N</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>T07</td>
<td>Not much since you have left – need volunteers and an organiser. Only active in the garden at present.</td>
<td>P</td>
<td>P</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>T08</td>
<td>Regular contact with other schools, able to get ideas from them, collaboration.</td>
<td>N</td>
<td>N</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher Number</th>
<th>Survey Item: Q4 What do you think is the impact of the Strategic Plan in relation to the sustainability vision on EfS at the school?</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
<th>Agree Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T02</td>
<td>Don’t know. Don’t know the Plan well enough.</td>
<td>DK</td>
<td>Dk</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>T03</td>
<td>I think it is an excellent and progressive idea to have sustainability linked to all the K.R.A.s in the Strategic Plan.</td>
<td>Pr</td>
<td>Pr</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>T07</td>
<td>Not aware. Have heard talk, but not seen any action or direct link.</td>
<td>DK</td>
<td>DK</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>T08</td>
<td>Means we review our progress regularly – sustainability is built into all areas of the plan – ensures our commitment.</td>
<td>Pr Ef</td>
<td>Pr Ef</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Teacher Number</td>
<td>Survey Item: Q5 What do you think is the impact of the sustainability model on EfS at the school?</td>
<td>Researcher</td>
<td>External Judge</td>
<td>Agreement</td>
<td>Agree Total</td>
</tr>
<tr>
<td>----------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
<td>------------</td>
<td>----------------</td>
<td>-----------</td>
<td>-------------</td>
</tr>
<tr>
<td>T02</td>
<td>Huge impact – easily understood, summarises underpinning ideas, visually attractive.</td>
<td>C</td>
<td>C</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>T03</td>
<td>It makes it very clear to everyone – is visual and clear and understandable.</td>
<td>C</td>
<td>C</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>T07</td>
<td>It demonstrates how all things link back or connect with sustainability – yet may be lost in the curriculum.</td>
<td>C</td>
<td>C</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>T08</td>
<td>Show how everything works together and helps everyone to see links.</td>
<td>C</td>
<td>C</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher Number</th>
<th>Survey Item: Q6 What do you think is the impact of the sustainability policy on EfS at the school?</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
<th>Agree Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>T02</td>
<td>From my point of view I don’t follow or read the policy. I am guided by Elaine’s interpretation.</td>
<td>H</td>
<td>H</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>T03</td>
<td>Gives us clarity and a reference point whenever needed.</td>
<td>C</td>
<td>C</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>T07</td>
<td>Impact – school and community share the focus – all have identified the need and desire for sustainability education.</td>
<td>C</td>
<td>C</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>T08</td>
<td>Clear about each area which helps the school to focus their direction.</td>
<td>C</td>
<td>C</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher Number</th>
<th>Survey Item: Q7 What do you think is the impact on your class of having a sustainability focus every term?</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
<th>Agree Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>T02</td>
<td>Makes chn aware of a variety of sustainable practices. Important in building a repertoire of sustainable practices.</td>
<td>Cu</td>
<td>Cu</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>T03</td>
<td>Keeps everything alive and moving forward.</td>
<td>Cu</td>
<td>Cu</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>T07</td>
<td>Hasn’t happened – though we have just started feeding the worms again.</td>
<td>H</td>
<td>H</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>T08</td>
<td>Keeps the focus alive, build on previous knowledge and deepens their awareness.</td>
<td>Cu OT</td>
<td>Cu OT</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teacher Number</th>
<th>Survey Item: Q8 What do you think is the impact on you of having a sustainability focus every term?</th>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement</th>
<th>Agree Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>T02</td>
<td>Great for me as it forces me to do something. If not so clear the idea of sustainability may get buried by other class/teaching requirements.</td>
<td>Cu</td>
<td>O</td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>T03</td>
<td>Keeps everything alive and moving forward.</td>
<td>Cu</td>
<td>Cu</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>T07</td>
<td>Time – focus for integrated themes i.e. next term is Ancient China – it would be looking at ‘sustainability’ from that angle.</td>
<td>Cu</td>
<td>Cu</td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
Helps with planning – means we know it will always be part of the program.

Teacher Number Survey Item: **Q9 Describe one program in your class that is a good example of EfS.**

<table>
<thead>
<tr>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>W Wastewise</td>
<td>Wa Waterwise</td>
<td>B Biodiversity</td>
</tr>
<tr>
<td>W</td>
<td>Wa</td>
<td>E</td>
</tr>
</tbody>
</table>

Currently have not incorporated sustainability in a focused way apart from incidental activities such as the battery recycling and encouraging sustainable use of power/water/paper in class. Approaches linked to sustainability as an integrated part of the curriculum have been driven by the Curriculum Co-ordinator. This has been much appreciated as it has enhanced my knowledge and understandings.

Leadership Program with Alicia Curtis – the students came up with things they wanted to change (i.e. rubbish free lunch, more natives in our area). They were able to take ownership and everything was followed through to completion … and feel positive about changes they were able to implement. Haven’t as yet.

Healing the Swan – involved working with other schools, collaborating in groups, using experts from the community including an Aboriginal elder. Involved visiting many sites along the swan River and taking water samples, assessing area and learning about the Aboriginal significance. The students put into practise some of what they had learned previously (ie water testing) and had a clear picture of the state of the river, how it had changed, what was likely to change and why, as well as what could be done.

Teacher Number Survey Item: **Q10 Do you think anyone is being missed out by the school’s current approach to sustainability?**

<table>
<thead>
<tr>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N None</td>
<td>Y Yes</td>
<td></td>
</tr>
<tr>
<td>T02 No</td>
<td>N None</td>
<td>N 1 1</td>
</tr>
<tr>
<td>T03 No</td>
<td>N None</td>
<td>N 1 1</td>
</tr>
<tr>
<td>T07 No – open forum allows and encourages anyone with a passion to come forward.</td>
<td>N None</td>
<td>N 1 1</td>
</tr>
<tr>
<td>T08 No</td>
<td>N None</td>
<td>N 1 1</td>
</tr>
</tbody>
</table>

Teacher Number Survey Item: **Q11 Do you think anything is being missed out by the school’s current approach to sustainability?**

<table>
<thead>
<tr>
<th>Researcher</th>
<th>External Judge</th>
<th>Agreement Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>N None</td>
<td>Y Yes</td>
<td></td>
</tr>
<tr>
<td>T02 No</td>
<td>N None</td>
<td>N 1 1</td>
</tr>
<tr>
<td>T03 Paper – although we recycle paper, I think we need to address its overuse and find ways to use paper i.e. in a photocopier use paper which is blank on one side.</td>
<td>Y Yes</td>
<td>Y 1 1</td>
</tr>
<tr>
<td>T07 No</td>
<td>N None</td>
<td>N 1 1</td>
</tr>
<tr>
<td>T08 No</td>
<td>N None</td>
<td>N 1 1</td>
</tr>
</tbody>
</table>
### Survey Item: Q12 Anything else you would like to add regarding sustainability?

<table>
<thead>
<tr>
<th>Teacher Number</th>
<th>Researcher</th>
<th>External</th>
<th>Agreement</th>
</tr>
</thead>
<tbody>
<tr>
<td>T02</td>
<td>K</td>
<td>K</td>
<td>1 1</td>
</tr>
<tr>
<td>T03</td>
<td>A</td>
<td>A</td>
<td>1 1</td>
</tr>
<tr>
<td>T07</td>
<td>H</td>
<td>H</td>
<td>1 1</td>
</tr>
<tr>
<td>T08</td>
<td>N</td>
<td>N</td>
<td>1 1</td>
</tr>
</tbody>
</table>

My knowledge, understanding and practice of sustainability issues has already been greatly enhanced by EfS as it is practised in the school. I'm very pleased to be part of it!

My concern is finding someone prepared to step into the empty space and commit 30-40 hrs a week to ensure these projects can take place.

### Survey Item: Q13 What action have you taken so far this year re the identified EfS priority for 2008?

<table>
<thead>
<tr>
<th>Teacher Number</th>
<th>Researcher</th>
<th>External</th>
<th>Agreement</th>
</tr>
</thead>
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<tr>
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<td>N/A</td>
<td></td>
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<tr>
<td>T03</td>
<td>Na</td>
<td>N/A</td>
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<td>Na</td>
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<tr>
<td>T08</td>
<td>Na</td>
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</tbody>
</table>

TOTAL 96%

| Agree Total | 54 56 |
Education for Sustainability in a Montessori School:
Inter-judge Coding Assessment Summary

<table>
<thead>
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<th>Surveys</th>
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<th>Percentage</th>
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<tr>
<td></td>
<td>27 (CH)</td>
<td></td>
</tr>
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<td></td>
<td>40 (LP)</td>
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<tr>
<td></td>
<td>297 of 319</td>
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</tr>
</tbody>
</table>
Appendix 5: Addendum to Literature Review
2.1.2 Attitudes and Values in EfS

Attitudes

Other attitudinal studies in the field of sustainability that have been investigated include, for example, attitudes towards fisheries, electronic waste, and renewable energy (Bergquist & Zwick, 1995; Odom et al., 2008; Ruff & Olson, 2007). The purpose of the fishery study was to investigate licensed Chatham fishermen beliefs about the sustainability of Striped Bass fish stock and attitudes toward regulations of fisheries (Bergquist & Zwick, 1995). Overall, fishermen were generally positive in their beliefs about sustainability of bass and attitudes toward regulations, but still believed that harvest allotments could be increased (Bergquist & Zwick, 1995). The electronic waste study involved a survey of 435 undergraduate students attending Indiana University (Odom et al., 2008). Students were found to prefer to purchase new rather than used technological equipment and were not worried about global warming (Odom et al., 2008). The renewable energy study measured attitudes toward related environmental issues. Tertiary level interior design students responded to a four-part survey: demographics, ecology, sustainability, and comments (Ruff & Olson, 2007). The ecology and sustainability survey results exhibited great variability. Responses to individual items were mostly pro-sustainability but quite a few students perceived the environment to be somewhat invincible (Ruff & Olson, 2007). The data also revealed a “discrepancy between what students think they know (sustainability section) and what the students actually reveal in their open-ended answers (comments section)” (Ruff & Olson, 2007, p. 67). These studies of attitudes toward specific aspects of sustainability are relevant to the present study because they provide evidence of ‘cognitive dissonance’.

Cognitive dissonance is viewed as a natural phenomenon, a natural process that is a biological survival tool; it is a means to deal with conflicting beliefs and justify our actions (Aronson, 2008; Aronson et al., 1997; Travis & Aronson, 2007). Linking this phenomenon to the fisheries study (Bergquist & Zwick, 1995), the finding that fishermen had generally positive beliefs about sustainability of bass while still believing that harvest allotments could be increased, is an instance of cognitive dissonance. The other two studies referred to above (Odom et al., 2008; Ruff & Olson, 2007) also illustrated examples of cognitive dissonance. Further examples of cognitive dissonance relating to attitudes toward aspects of sustainability are found in the literature. Research involving thirteen workplaces and
approximately 4,000 employees investigated transport behaviour in Western Australia (Baudains, 2003). Results showed female participants expressed more positive environmental attitudes than males but did not reduce single occupant vehicles trips over the study intervention period, while males did (Baudains, 2003, p. 287). Another Western Australian study of 327 students attending Murdoch University, found females generally scored higher, more positively, than males on sustainability perception and environmental attitudes scales (Malet, 2009, p. 19). This study also reported a large majority of students held very high positive attitudes to both the environment and sustainability, yet a high proportion of students believed humans had the right to modify their environment to suit their needs. These findings agree with international evidence. For instance, Kagawa’s (2007, p. 332) online questionnaire explored University of Plymouth students’ perceptions and understandings of, and attitudes towards, sustainable development and related issues. A positive attitude towards sustainability did not indicate, however, that respondents necessarily understood the multifaceted and contested nature of sustainability, or its holistic nature.

**Values**

An innovative Values Education Good Practice Schools (VEGPS) project (Stage 2) in which values were regarded as central to EfS, involved a tri-state school cluster (Sparvell, 2007). Six schools in diverse sites, state and independent, primary and secondary, rural and urban, in South Australia, the Northern Territory and Western Australia co-operated to explore an explicit values education agenda from an environmental EfS perspective. This project aimed to contribute to the growing focus on values education research in Australia. The specific question overarching the schools involved in this tri-state VEGPS cluster was: How can we pursue an explicit values education agenda with an environmental EfS perspective? This question was investigated by analysing the processes and products of both common and mini-projects in the cluster schools (Sparvell, 2008). Undertaken over a twenty month period, September 2006 – April 2008, the project incorporated a range of learning activities for students; those in which all project schools participated (common) and those relevant only to the individual schools (mini-projects).

One of the common activities involved students participating in on-line Centra link-ups with other schools across the three states (Sparvell, 2007, 2008). During these on-line sessions the students discussed various topics in values education, such as exploring the
values embedded in local environmental projects. Each of the schools involved in the project also conducted their own mini-projects that were relevant to their local needs and student interests. An example of one school’s mini-projects - the case study school of the present research - was described by Lewis, Mansfield, & Baudains (2008). This paper reported on learning outcomes from three mini-projects: oblong turtle research, a native reeds/sedges replanting program at a lake adjacent to the school, and the development of the school’s permaculture garden. Evidence suggested that conducting hands-on environmental EfS projects, in real-life local contexts, was an effective meaningful approach to the explicit teaching of values and enhancing awareness of whole systems thinking. The relationship between values education and EfS was potently illustrated.

Sustainability values and ‘sense of place’

Recent research evidence indicates that children are spending less time outdoors and have increased their consumption of electronic media (television, video games, computer activities, etc) (Louv, 2005). This trend has been called the ‘nature-deficit disorder’ and refers to the situation where children have become so plugged into computers and television they have lost their connection to the natural world (Louv, 2005). This finding was drawn from an analysis of ten years of data collected from parents and children, living in both rural and urban areas of the U.S.A., about their experiences in nature. Other authors have also argued that the present generation of children is growing up disconnected from nature and mostly unaware of its importance (Alvarez, 2004; P. H. Kahn, 2002). This has been referred to as ‘generational amnesia’ (P. H. Kahn, 2002). According to this author, the present generation does not appear to have the same knowledge and understandings about the environment as former generations, which is important because human wellbeing is profoundly linked with the environmental system.

Some researchers have addressed aspects of the nature-deficit disorder in different ways, focusing instead on the importance of ‘attachment to place’. These authors argued that attachment to place was vital since it facilitated the development of strong close relationships with the local environment which in turn increased connectivity to the natural world (R. Evans et al., 2007; Miles, 2008a). Indeed, Gruenewald (2006, p. 4) claimed “to know anything about the world is to know its places”.
Researchers investigating ‘place’ concluded that people needed opportunities for meaningful interactions with nature. One reason provided for focusing on ‘place’ in education was to make learning more meaningful to all stakeholders. As Gruenewald (2003, p. 620) stated, this approach made learning more relevant to “the lived experiences of students and teachers... so that places matter to educators, students and citizens in tangible ways”. Furthermore, Cameron (2008, p. 303) maintained that the educational experience needed to be deeply grounded in place: “education, environmental sustainability and intercultural dialogue should not just take place into account, but they should be deeply grounded in place”. Similarly, Powers (2004, p. 17) argued that place-based education was “grounded in the resources, issues, and values of the local community and focuses on using the local community as an integrating context for learning at all levels”. Habitat connectivity was also found to be important as it enhanced scientific literacy about biodiversity and related conservation issues (J. R. Miller, 2005). Another author, Mawson (2008a), wrote about the importance of building a sense of ‘place’ in Bromley-by-Bow to empower the local community. An area once covered by tarmac was converted into a meadow … “it became a real joy of a place to sit in. It attracted all kinds of people ... [and] butterflies ... to this rundown part of town” (Mawson, 2008a, p. 114). Clearly, having a sense of place in nature is important for human wellbeing and for environmental conservation.

Numerous case studies have been conducted examining the significance of ‘sense of place’ in education. For example, Miles’ (2008) research was based in a small country public school in New South Wales. This author concluded “Places define who we are and what we do ... Education that focuses on and uses places ... is one effective way of strengthening community and giving the community a sense of pride, care and concern for its places (Miles, 2008b, p. 10). Another study, a VEGPS (stage 1) project, involved three independent schools in the metropolitan area of Perth and two rural Western Australia schools (Netherwood et al., 2006). This study reported:

*We have carried out our projects in practical and significant ways, in the context of place and community, in order to explore sustainability values in the schools. We bring the concepts and practices of sustainability explicitly into the curriculum at our schools and into our daily practice of caring for place. Importantly, sustainability education is not seen as an ‘add-on’ to complete, then put aside while we get on with the rest of the ‘real curriculum’. Rather sustainability education is becoming fully integrated into our schools and fully*
connected with the rest of the learning process ... Sustainability education should at least in part be undertaken in a practical outdoors context. Children learn and grow best while doing and being in place (Netherwood et al., 2006, p. 10). One Year 6 student involved in this project summarised his learning experiences in terms of understanding “what is what and where all of these important places are and how to respect them” (Netherwood et al., 2006, p. 10). Clearly, place-based education was found to be a powerful, effective approach in these studies.

In brief, a review of the literature on values in EfS and the importance of ‘sense of place’ revealed considerable overlap. VEGPS projects - stage 1 (Netherwood et al., 2006) and stage 2 (Sparvell, 2008), and other studies (Cameron, 2008; Miles, 2008a) provided evidence that supported engagement with EfS in local, meaningful contexts that are empowering for all stakeholders.

Sustainability values and environmental values
The United Nations Millennium Declaration identified six fundamental values for sustainability on this planet in the twenty-first century (Leiserowitz et al., 2004; UNGA, 2000). These included freedom, equality, solidarity, tolerance, respect for nature and shared responsibility (UNGA, 2000) (see Table A5.1).
Table A5.1
Fundamental Values for Sustainability (UNGA, 2000)

<table>
<thead>
<tr>
<th>Fundamental Value</th>
<th>Value Elaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freedom</td>
<td>Men and women have the right to live their lives and raise their children in dignity, free from hunger and from the fear of violence, oppression or injustice. Democratic and participatory governance based on the will of the people best assures these rights.</td>
</tr>
<tr>
<td>Equality</td>
<td>No individual and no nation must be denied the opportunity to benefit from development. The equal rights and opportunities of women and men must be assured.</td>
</tr>
<tr>
<td>Solidarity</td>
<td>Global challenges must be managed in a way that distributes the costs and burdens fairly in accordance with basic principles of equity and social justice. Those who suffer or who benefit least deserve help from those who benefit most.</td>
</tr>
<tr>
<td>Tolerance</td>
<td>Human beings must respect one another, in all their diversity of belief, culture and language. Differences within and between societies should be neither feared nor repressed, but cherished as a precious asset of humanity. A culture of peace and dialogue among all civilizations should be actively promoted.</td>
</tr>
<tr>
<td>Respect for nature</td>
<td>Prudence must be shown in the management of all living species and natural resources, in accordance with the precepts of sustainable development. Only in this way can the immeasurable riches provided to us by nature be preserved and passed on to our descendants.</td>
</tr>
<tr>
<td>Shared responsibility</td>
<td>Responsibility for managing worldwide economic and social development, as well as threats to international peace and security, must be shared among the nations of the world and should be exercised multilaterally.</td>
</tr>
</tbody>
</table>

Clearly these sustainability values are broadly based and not narrowly focused on the environment only. ‘Respect for nature’ is only one of the six values.

There are many formulations of the essential components of 'environmental values' (Gralton et al., 2004; Martin, 2007; Smyth, 1996). Such formulations include, for example, living harmoniously within ecological systems, developing a caring, responsible attitude toward nature, and promoting a sense of continuity and community with other people and all living things. However, the present study adopts the values outlined in the Western Australian curriculum document.

The Curriculum Framework (Curriculum Council, 1998), the document guiding education in Western Australia, explicitly outlined values to be addressed. Five ‘Core Shared Values’ were identified: a pursuit of knowledge and a commitment to the achievement of potential, self acceptance and respect of self, respect and concern for
others and their rights, social and civic responsibility, and finally, environmental responsibility. I am arguing that all these values contribute to sustainability - personal, community and environmental sustainability, and furthermore, that there is considerable overlap between these values and the values in the Millennium Declaration. For example, ‘a pursuit of knowledge and a commitment to the achievement of potential’ may be linked with the statement on ‘freedom’ and ‘equality’ in terms of provision of fair and just opportunities for education. Furthermore, the value ‘respect and concern for others and their rights’ includes a statement about ‘equality’: “Each person has equal worth and basic rights, regardless of differences in race, gender, age, ability, religious belief, political affiliation, national origin, citizenship, regional affiliation, or economic or household status (Curriculum Council, 1998, p. 325). This statement is in basic agreement with the underlying meaning of the Millennium Declaration value of ‘equality’.

The Curriculum Framework value of ‘a pursuit of knowledge and a commitment to achievement of potential’ may also be linked with the huge body of literature on student motivation. Student motivation and achievement is influenced by many factors, including for instance, the whole school learning environment, classroom structure and learning context, degree of student centredness of the teaching and learning process, student goal setting behaviours, and the quality of bi-directional relationships between students and teachers, students and peers and students and parents (Ames, 1992; Mansfield, 1997, 2002; Meece & Holt, 1993; Skinner & Belmont, 1993). Although it is recognized that student motivation and engagement are different constructs, student motivation is relevant to the present study in the context of students’ emotional engagement in EfS programs. An instrument to measure student engagement in environmental learning processes, behavioural intentions and learning outcomes, was recently developed in Australia (Ballantyne et al., 2005). This instrument measured the level of emotional engagement from low (bored), to moderate (happy, calm) and high (excited, amazed, challenged). Due to the bounds of the present study, student motivation is mainly addressed in the context of the Ballantyne et al. (2005) tool. The Curriculum Framework values of 'social and civic responsibility' and 'environmental responsibility' are given more focus here because of their explicit relationship with EfS.

The Curriculum Framework value of 'social and civic responsibility' includes nine aspects. These aspects are: participation and citizenship, community, diversity,
contribution, authority, reconciliation, social justice, responsibility and freedom, and benefits of research. For example, the value of 'community' states "Interpersonal co-operation and social responsibility are encouraged" (Curriculum Council, 1998, p. 325). Social and civic responsibility also acknowledges the 'benefits of research', that is, "Society should support the advancement of knowledge in all its domains, promote scholarship and research that promise to improve the quality of life and share the benefits as widely as possible" (Curriculum Council, 1998, p. 325). The co-operation and involvement aspects of ‘social and civic responsibility’ clearly link with active participation embedded in EfS.

Four aspects of ‘environmental responsibility’ are identified in the Curriculum Framework: cultural heritage, conservation of the environment, sustainable development and diversity of species (Curriculum Council, 1998, p. 325). ‘Cultural heritage’ refers to respect and maintenance of the cultural heritage of Australia, including Indigenous sacred and archaeological heritage. The value promoting the 'conservation of the environment' states "The management of the environment should take into account the need to preserve its diversity and balance for the future" (Curriculum Council, 1998, p. 325). ‘Sustainable development’ recognizes the need to develop natural resources in a manner that is “consistent with long-term ecological sustainability and rehabilitation practices” (Curriculum Council, 1998, p. 325). 'Diversity of species' refers to "Each person should recognise a need to preserve native habitats and arrest the extinction of presently-surviving native species" (Curriculum Council, 1998, p. 325). All these environmental values underpin the work promoted by AuSSI-WA and are relevant to the research context of the present study.

2.1.3 Knowledge and Understandings

Attitudes

Types of knowledge needed to participate effectively in EfS are wide ranging and not confined to any particular discipline. Some of the key understandings that need to be developed and areas of knowledge which are important (Woods et al., 1999) are represented in Table A5.2 within a systems thinking perspective.
Table A5.2
Key Understandings for Effective EoS (adapted from Woods, Young et al., 1999)

<table>
<thead>
<tr>
<th>Systems Perspective</th>
<th>Key Understandings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental</td>
<td>Resources of the earth, particularly air, soil, water, minerals, their distribution and their role in supporting living organisms; nature of ecosystems, their health and interdependence within the biosphere; sustainable relationships within the environment.</td>
</tr>
<tr>
<td>Social</td>
<td>Processes of planning, policy-making and acting to solve problems; role and values of science and technology in the development of societies and the impact of technologies on the environment; dependence of humans on the environmental resources for life and sustenance.</td>
</tr>
<tr>
<td>Economic</td>
<td>Implications of resource distribution in determining the nature of societies and the rate and character of economic development.</td>
</tr>
<tr>
<td>Whole Systems</td>
<td>Planet earth as a finite system; interconnectedness of present political, economic, environmental and social issues.</td>
</tr>
</tbody>
</table>

Another approach to understanding types of knowledge recognises declarative, procedural and conditional knowledge (McInerney & McInerney, 2006; Paris & Paris, 2001). Declarative knowledge is knowledge about things, procedural knowledge is knowing how to perform various cognitive activities, while conditional knowledge brings skill and motivation together for the knowledge to be employed (McInerney & McInerney, 2006; Paris & Paris, 2001). This perspective on types of knowledge has links with self-regulated learning (Paris & Paris, 2001) and the model proposed by Baudains (2003) (see Figure 2.2). However, the scope of the present study does not permit examination of these issues here.

2.1.4 Skills and Behaviours

In 1999 Woods and associates identified seven skills which should be acquired for EE to be effective (Woods et al., 1999). This list of skills has been adapted and represented in Table A5.3.
Table A5.3
Skills for Effective EfS (adapted from Woods, Young et al., 1999)

<table>
<thead>
<tr>
<th>Key Skill</th>
<th>Skill Elaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditional</td>
<td>Define and explain fundamental concepts such as environment, ecological systems, community, development and technology and being able to apply them to specific situations using a range of relevant resources and technologies.</td>
</tr>
<tr>
<td>Critical Thinking</td>
<td>Analyse problems, and frame and investigate relevant questions; assess and evaluate differing points of view; develop hypotheses based on balanced and accurate information, engage in critical analysis and careful synthesis, and test new information and personal beliefs, explorations and experiences against these hypotheses.</td>
</tr>
<tr>
<td>Communication</td>
<td>Communicate information and points of view effectively.</td>
</tr>
<tr>
<td>Partnerships</td>
<td>Develop partnerships and the foundation for cooperative and consensual action.</td>
</tr>
<tr>
<td>Action</td>
<td>Develop strategies for action, including locating appropriate resources, and means for their implementation.</td>
</tr>
</tbody>
</table>

One key skill identified in Table A5.3 relates to critical thinking and other authors have highlighted the importance of this skill too. Critical thinking skills are considered vital for effective EfS (Henderson & Tilbury, 2004). These skills involve the ability to draw upon a range of thinking strategies, uncover root causes of problems, examine society’s values and assumptions, solve problems, make decisions and evaluate different positions on issues. It is argued that these skills are fundamental for empowered and informed decision-making and the development of social responsibility (CES, 1993; Henderson & Tilbury, 2004). Social responsibility has been considered to incorporate aspects of community service, political and social involvement, conflict resolution and EE. Various initiatives to enhance social responsibility have sought to develop students’ basic social skills, strengthen their sense of connection with surroundings, and increase their confidence to make a difference in the world (CES). Other researchers have recognized the importance of social responsibility too. For instance, Hungerford and Volk (1990) found the development of a sense of ownership and empowerment were crucial for the development of responsible citizenship behaviour. Furthermore, some of the EE/EfS skills reported by Tilbury, Coleman and Associates (2005) also moved beyond ecological knowledge based skills to more broadly based skills, such as, observation, gross and fine motor physical skills, cooperation and conflict resolution skills, independence and resilience, persistence, creativity, and skills in expressive and receptive language. These skills clearly make links between a wide range of learning areas.
Skill in developing partnerships is another skill category important for EfS. As Henderson and Tilbury (2004, p. 8) stated, EfS “requires a new pedagogy which sees learners develop skills and competencies for partnerships, participation and action”. ‘Learners’ here refers not only to students but to all school staff. Developing partnerships in the school context has implications for school governance and leadership, staff professional learning, resource management and pedagogical approaches.

It has been established that education programs facilitating broad based skill development are vital for effective EfS (Tilbury et al., 2005). Furthermore, it has been recommended that assessment of student needs should be undertaken initially, so that a skills-based curricula derived from that assessment can be developed, rather than the implementation of a generic skills program (IIEP, 2006). Assessment would identify modifications that may be required in existing programs so that specific student needs could be met (IIEP, 2006). To enable implementation of such targeted teaching, the provision of resources and teacher training are essential (IIEP, 2006). Research evidence for behavioural change and action would be anticipated upon the completion of such programs.

One study reporting changed behaviour involved first-year students from Warren Wilson College in North Carolina, USA (McDuff et al., 2006). These students developed, implemented, and evaluated environmental communications campaigns to target behaviours such as increasing local foods in the school cafeteria, decreasing exposure to second-hand smoke, and promoting composting in the dorms. The researchers documented students’ stories, outlining the positive impact campaigns had on student EE leadership skills and college campus behaviours.

A New Zealand paper reported evidence on behavioural change in two Bay of Plenty community education programs (Blair, 2008). The Coast Care Bay of Plenty program found skilled presenters, effective communication strategies and providing Coast Care groups with skills, technical advice and resources for planting days contributed to successful environmental outcomes. In contrast, the Welcome Bay Catchment Care Group experienced set-backs due to a poor communication campaign and limited support and resources, including retaliation from some stakeholders. This cross-case
analysis illustrated differences in program effectiveness as a result of the amount and quality of support received.

### 2.2 Whole School Approaches to Sustainability

#### 2.2.1 International perspectives

During the 1960s and 70s books in the public arena, like Carson’s (1962) work, raised awareness about environmental concerns. International forums were conducted, resulting in international documents and commitments that advocated educational reform to reflect the sustainability agenda. For example, the United Nations (UN) *Conference on the Human Environment* in Stockholm focused on environmental concerns (UNEP, 1972), the *Habitat* conference in Vancouver examined the growing complexity of human settlement problems (IISH, 1976), and the *Tbilisi Declaration* promoted EE for environmental protection and people’s participation in solving environmental issues (UNESCO-UNEP, 1978).

The World Commission on Environment and Development’s report *Our Common Future*, also known as the *Bruntland Report*, defined and popularised the term ‘sustainable development’, “…development that meets the needs of the present without compromising the ability of future generations to meet their own needs” (WCED, 1987). However, the World Conservation Union, UN Environment Programme, International Union for Conservation of Nature and Natural Resources and World Wide Fund for Nature (1991) report, *Caring for the Earth: A strategy for sustainable living*, focused on “…improving the quality of human life while living within the carrying capacity of supporting ecosystems”. The first definition emphasized meeting human needs taking into account intergenerational responsibility, while the second addressed the need to enhance the quality of human life while protecting the earth’s ability for regeneration.

The UN *Conference on Environment and Development*, held in Rio de Janeiro in 1992, was known as the *Earth Summit* and resulted in a report called *Agenda 21* which established guidelines for global sustainable development in all spheres of human activity (UNDSD, 1992). The next major international event was the *World Summit on Sustainable Development* in Johannesburg, which drew attention to “…the integration of the three components of sustainable development – economic development, social development and environmental protection – as interdependent and mutually
It was also agreed at the Summit that poverty eradication, changing unsustainable patterns of production and consumption, and protecting and managing the natural resource base of economic and social development were overarching objectives of, and essential requirements for sustainable development, because these factors were seen to be inherently linked to further environmental degradation.

Related to the foregoing Summit understandings was the UN Millennium Development Goals which identified eight goals to achieve by 2015 (UN, 2005). The seventh goal was: ensure environmental sustainability (UN, 2005). When elaborated, this goal included the imperatives to: integrate the principles of sustainable development into country policies and programs; reverse loss of environmental resources; reduce by half the proportion of people without sustainable access to safe drinking water; and achieve significant improvement in the lives of at least 100 million slum dwellers by 2020. These initiatives indicated that the vision for sustainable development had broadened to include social justice and the fight against poverty. Furthermore it is now internationally recognised that education and learning are crucial to achieving sustainable development.

In 2006 UNESCO released a model of sustainability that integrated four systems: natural, social/cultural, economic and political systems (Department of Environment and Heritage, 2005; United Nations Educational, Scientific and Cultural Organisation, 2006a, 2006b) (see Figure 2.1.) To explain the model: first, natural systems provided resources that support all life, such as water, soil and food. Next, social and cultural systems provided family, community and wider support to people. Third, economic systems provided money and jobs for people. Finally, the political system provided the means through which decisions were made about the other three systems. Such a model viewed the world as “inter-related through patterns of interdependent systems” (United Nations Educational, Scientific and Cultural Organisation, 2006b).

The outer circle of the UNESCO model included values that contribute sustainability: conservation, peace and equity, appropriate development, and democracy. Conservation is necessary to ensure natural systems continue. Peace and equity enables people to live co-operatively and in harmony. Appropriate sustainable development is needed so people can support themselves long-term. Lastly, democracy allows people...
to have a fair say in how systems should be managed (Department of Environment and Heritage, 2005; United Nations Educational, Scientific and Cultural Organisation, 2006b). This linking of different aspects of sustainability with associated values at the international level, will later be shown to influence conceptions of sustainability at national and state levels.

Education was seen as an essential element to spreading the international sustainability agenda. The United Nations position on EfS, outlined in their Decade (2005-2014) of Education for Sustainable Development Statement, is “Education for sustainable development is a life-wide and lifelong endeavour which challenges individuals, institutions and societies to view tomorrow as a day that belongs to all of us, or it will not belong to anyone” (UNESCO, 2008). Furthermore, “Educating to deal with complex issues that threaten planetary sustainability is the challenge of Education for Sustainable Development” (UNESCO, 2005b). Clearly, EfS was considered vital at the global level and started influencing education departments in different countries across the world.

2.2.2 National perspective

Historical developments

Across the globe, national governments became aware of the need for sustainable development and implemented education programs to support this. Some of these programs have been mentioned above. In line with these international developments, the State, Territory and Commonwealth Ministers of Education in Australia met in 1989 and developed the Hobart Declaration on Schooling. Part of the sixth ‘Common and Agreed National Goals for Schooling in Australia’ aimed “To develop in students ... an understanding of, and concern for, balanced development and the global environment (MCEETYA, 1989). So nationally, Australia was reflecting its values and concerns about sustainable development through education goals.

The next key development in this arena in Australia was in 1990, with the release of the National Strategy for Ecologically Sustainable Development (NSES). The following definition of ecologically sustainable development was given in that document: “... using, conserving and enhancing the community’s resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and
in the future, can be increased (Commonwealth of Australia, 1992). NSESD was adopted by all levels of Australian government in 1992 (Department of Environment and Heritage, 2006). It addressed many areas for action identified in Agenda 21, which was the report resulting from the Rio Conference (United Nations Division for Sustainable Development, 2006). The National Strategy identified eight key sectors: manufacturing, mining, agriculture, forests, fisheries, energy production and use, transport and tourism. In addition, twenty two intersectoral issues were assigned, including for example, education, biological diversity, environmental protection and Aboriginal and Torres Strait Islander peoples.

The aforementioned definition of ecologically sustainable development involved development that aimed to meet the needs of current Australians, while conserving ecosystems for future generations. This conception was emphasized in the education sphere in 1999, with a joint statement by Australian Ministers of Education in the Adelaide Declaration: “When students leave school, they should have an understanding of, and concern for, stewardship of the natural environment, and the knowledge to contribute to ecologically sustainable development (MCEETYA, 1999b). Student awareness of, knowledge about, and action for, the natural environment was therefore seen to be an important education goal for all Australians at school.

In 2001 the National Environmental Education Network (NEEN) met to discuss a NSW Department of Education and Training and Victorian submission to trial a Sustainable Schools Initiative (DEWHA, 2009c). Through NEEN all States and Territories expressed their support for this joint Commonwealth/State project. Pilot Sustainable Schools programs commenced in New South Wales and Victoria in 2003 for an 18 month period. It placed increased emphasis on a whole-system, whole school approach to EfS (DSEWPC, 2011) and supported a deeper understanding and heightened curriculum focus on the active, for the environment, component of sustainability (Tilbury & Cooke, 2005a). By the end of 2003 NEEN endorsed a document outlining the 'Common Elements of the National Sustainable Schools Initiative' as a guide to the development of the Initiative around the country. The following year the Australian Government launched the national Initiative. Other Australian States and Territories joined in 2004, with the AuSSI-WA pilot beginning in 2005 (DET, 2008c).
The national model for environmental EfS was published in 2005 (see Figure 2.2). It was one example of the implementation of the NSESD (Department of Environment and Heritage, 2006). This model identified six aspects of environmental EfS: curriculum organisation; teaching and learning; physical surrounds; relationships with the local community; resource management; and governance. The model required a whole school approach, with the development of a shared vision and goals (Department of Environment and Heritage, 2005).

Summarising to this point, over the last twenty years there has been growing awareness in Australia of the need to look beyond economic progress and work towards a sustainable way of life, as reflected in the foregoing national statements, declarations and initiatives relating to sustainability. Furthermore, as outlined in section 2.1, since the 1970s there has been a gradual evolution of EE understandings (about, in and for the environment) to EfS, involving a more holistic, systems thinking approach. By 2005 it was recognised at the national level that “economic and social progress depends on base ecosystem services” and that this also involved education, justice and community participation (DEH, 2005a). We can see this emphasis reflected in the National Environmental Education Statement for Australian Schools which acknowledged “economic, social and political pressures that can inhibit or support the capacities of individuals, communities, or the nation to properly care for the environment … [and promotes] stewardship of the environment” (DEH, 2005a). Education had a vital role to play in developing students’ ‘scientific literacy’ to assess the credibility of different arguments related to the environment (Rennie, Goodrum, & Hackling, 2001) and to provide the knowledge, skills and values that enabled active caring for the environment (DEH, 2005a).

In 2008, the for component of EE, plus the action component from the Adelaide Declaration in terms of stewardship of the natural environment, was reinforced at the gathering of Education Ministers for the Melbourne Declaration on Educational Goals for Young Australians. Australian students were to be “active and informed citizens” that “work for the common good, in particular sustaining and improving natural and social environments” (MCEETYA, 2008). Again, there was an emphasis on being active, on doing, on working; not just ‘desk’ learning about the environment.
Four issues of concern

Although there have been important developments in national education goals over the years, there appear to be some concerns that are impacting on successful outcomes for EfS in Australia. Four of these issues will be examined in the following sections: triple bottom line conception of sustainability, varied understandings of the term ‘sustainability’; outcomes from political declarations; and the need for a shift in thinking about sustainability.

Triple bottom line

The “triple bottom line” (TBL) model of sustainability refers to overlapping environmental, social and economic components of sustainability (see Figure A5.1). The phrase “triple bottom line” was first used by Elkington (1999) to expand traditional business thinking and reporting to include environmental and social performance as well as economic outcomes (DPCD, 2009). The TBL conception has been widely adopted across the international community and used in Australia (DEH, 2005; Unerman, Bebbington, & O'Dwyer, 2007). There are numerous arguments for and against this approach. These arguments are relevant to EfS because they highlight different understandings about sustainability and issues for emphasis. This is then reflected in different conceptions about sustainability at state and local levels, which will be examined later. Arguments for and against the use of TBL will be briefly reviewed first.

Figure A5.1 Triple bottom line conception of sustainability (Newman, 2005b, p. 274)

Some of the arguments in favour of using the TBL include monetary reform (the measurement of social and environmental deficits facilitates the re-direction of money
to these issues); climate change and environmental degradation (focus on the environment is essential to avoid a further deterioration); and Nature’s services (draws focus on the value of ecological services to humans, such as the provision of clean drinking water) (C. Adams, Frost, & Webber, 2004; Brown, Dillard, & Marshall, 2006; Henriques & Richardson, 2004). The TBL approach also recognises the ‘value of life’ (Kyoto Protocol uses explicit measures, such as the ratio of the price of a human life between developed and developing nations, 15 to 1) to obtain political pressure on developed nations to cleanup ecosystems (UNFCCC, 1997). Other arguments for TBL relate to benchmarked performance (measurement of economic, social and environmental outcomes) and improved operations and management (comprehensive planning facilitates better outcomes), improved risk management (planning to prevent environmental deficits and thereby reduce economic deficits) and improved communication (all stakeholders recognised in reporting) (Henriques & Richardson, 2004). Clearly the TBL approach provides numerous benefits.

Arguments against TBL reporting include such issues as effectiveness (starving people need food and are not worried about social and environmental matters so TBL analysis is only effective for wealthy societies); division of labour concerns (requiring organisations/ businesses to address environmental and social issues, outside core purpose); and Nationalism (looking after a nation’s own citizens first) (Henriques & Richardson, 2004). There is also the libertarian argument, that it is arrogant to force people to accept TBL analysis when there is debate about whether it is the best approach available. Next, there is concern that the weighting of the three pillars of sustainable development – economic, environmental and social - are not clear (Henriques & Richardson, 2004). For example, the outcome of the World Trade Organisation meetings in December 2005 showed that political decision-making based on economics still appeared to dominate (Wright, 2005, December 19). Finally, there is the question of inertia, the difficulty of achieving global or regional agreement, reflecting the lack of willingness to undergo economic recession to, say, remediate damaged ecosystems (CISA, 2009; Henriques & Richardson, 2004).

All these issues about TBL are relevant to EfS because national and state governments, and ultimately schools, determine their own understandings, models and visions of EfS. The national conception will impact on state conceptions, and then on local school visions of sustainability. So if there isn’t a clear understanding of the implications of
the different models of sustainability, then weaknesses and gaps in the national approach may influence the thinking of members of a local school community and impact on their model of sustainability.

**Uses of the term ‘sustainability’**

Another concern in the field of sustainability relates to use of different terms, as though they are interchangeable: sustainability, environmental education, education for sustainable development, ecologically sustainable development, sustainable development, education for sustainability (C M Baudains, 2006a; Jacobs, 1999). It cannot be assumed that these various terms have similar meanings and that our individual understandings of these terms are uniform. Use of these different terms matters, as they indicate different emphases. A particular term may, for example, emphasize an active environmental focus that excludes or minimizes the importance of other aspects of sustainability (such as political, social or cultural sustainability). This is where educators need to be very clear in their understandings and use of terms. It is vital that they are explicit about what is meant when using different terminology because different understandings have different implications for our education programs - what is taught, what is assessed, program outcomes, and so on (Baudains & Styles, 2006).

It has also been argued that lack of clarity regarding terminology “allows anything to be claimed as sustainable” (Jacobs, 1999, p. 24). For example, business and government interests may claim they are engaging in sustainable behaviours when actually they are the “perpetrators of unsustainability” (Jacobs, 1999, p. 24). Furthermore, it has been argued, for a definition of ‘sustainability’ to be operationally useful it needs to specify measurable criteria (Jacobs, 1999). Different people have different understandings about stated values, politics, and so on. It is therefore vital commonly agreed explicit criteria are established to ensure specific development programs achieve desired goals.

These definitional issues about ‘sustainability’ are relevant to EfS because international, national and state understandings may influence understandings of EfS at the school level. Confusion at national or state levels may impact on a local school community. Thus clear explicit statements regarding EfS and what this entails are essential.
Outcomes from political declarations

Another issue of concern related to Australia’s national education goals for EfS, specifically the difference between momentous political declarations and actual implementation. National goals set a grand vision, however the responsibility for the practical implementation EfS often devolves to state and local levels. These levels do not necessarily have the same funding and political commitment as the national level (Grace, 2006).

Need for a shift in thinking and action

It has been proposed that a paradigm shift in thinking and action is required at all levels, particularly at the national level (Grace, 2006; Tilbury & Cooke, 2005a). New ways of thinking and acting are needed “to equip and involve individuals and institutions ... [to] help them make informed decisions about how to work towards a more sustainable world” (Herbert, 2006, p. 1). Furthermore, the 2005 National Review of Environmental Education stated that “... major problems cannot be solved from our current way of living but will require a shift from traditional ways of thinking and acting upon environmental problems”, in other words, new mental models are needed to help us re-think and re-design our activities (ARIES, 2005, p. 2). Following the 2005 Review, the proposed focus was to be on “learning for sustainability” (ARIES, 2005, p. 2). The Review recognised that “sustainability is essentially an on-going learning process that actively involves stakeholders in creating their vision, acting and reviewing changes” (Australian Research Institute in Education for Sustainability, 2005). Current literature in this field presents some new models for discussion, for instance, the incorporation of ‘critical’ skills to respond to challenges of sustainability (Tilbury, 2004) and the need for new paradigms (Grace, 2006; Hesselink, Van Kempen & Wals, 2000).

The pyramid model (Grace, 2006) is an example of the paradigm shift recommended. Grace’s (2006) model involved a move from a two-dimensional environment/economic/social (TBL) Venn diagram-type model of sustainability to a three-dimensional pyramid model in which eco-system services linked the environment with people (Grace, 2006). Grace (2006) argued that despite disturbing news about climate change, biodiversity loss and so on, this situation “... doesn’t seem to translate to action at the scale commensurate with the magnitude of the problems”. This author argued there were sustainability committees and environmental action plans, but little substantive change
occurring in our day-to-day behaviour. The reason for this, Grace (2006) maintained, was that our current paradigm about the relationship between people and planet Earth, was deficient and outdated. The two dimensional Venn diagram model with the social, economic and environmental aspects overlapping, and sustainability in the middle, was considered inadequate.

Grace’s (2006) model linked ecosystems services to the needs of the community and needs of people, all in the context of linkages between all communities, local, regional and global (see Figure A5.2). Key points associated with this paradigm were ecosystem services, people as citizens, people as part of the biosphere and interdependence. To elaborate, the base of the pyramid was ecosystem services. Human well-being was seen to depend on the health of ecosystems – for example, healthy catchments provided us with good quality drinking water. Therefore we conserve our catchments not because it is a good ‘green thing’ to do, but because it directly impacts on our health and quality of life. Next, people are seen as citizens, not consumers. In this model it was considered important to align economic development with what people really need, not what can be sold. Grace’s (2006) model also viewed people as part of the biosphere, not separate. Finally, human well-being was understood to depend on the strength of our communities and the interdependence of communities around the world. Indeed, this model argued that people needed to sustain all elements of the pyramid to survive.

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Figure A5.2 Pyramid model of sustainability (Grace, 2006)

Reflection on this model suggested links with whole systems thinking. The model emphasised the interdependence of all systems, with ecosystem services as the foundation. It is interesting to note that other authors have alluded to the concept of ecosystem services too. For instance, Mc Ewen (2004, p. 2) stated that the “... concept of sustainability places the wellbeing of natural ecosystems at the centre of our personal
and business decision making"). Furthermore, Suzuki (2004, March 8) maintained the importance of ecosystem services with “...ecology as the bottom line”. Clearly, Grace (2006) is not the only author arguing for ecosystem services as the foundation of our understandings of sustainability.

In summary, literature on EfS highlighted four issues for reflection - the triple bottom line conception of sustainability, varied understandings of the term ‘sustainability’; outcomes from political declarations; and the need for a shift in thinking about sustainability. These issues are important because they impact on EfS at all levels. For example, in WA the TBL conception of sustainability influenced the implementation of EfS in schools (DET, 2008) but Grace’s (2006) pyramid model has received little attention. This lack of exposure limits possible debate and the important increase in understandings that can arise from intense examination of such models.

2.2.3 State perspective
One of the key developments from the state perspective was the state government’s 2003 Hope for the Future initiative, a state sustainability strategy (Government of WA, 2003) (refer to Figure A5.3.).

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Figure A5.3 Western Australia’s Sustainability Strategy
(Government of WA, 2003)
Appendix 6: Extract from School’s Sustainability Policy:
Model of Sustainability and Strategic Plan
Initial Sustainability Policy 2006

Extract: School Sustainability Policy including the Model of Sustainability

Montessori Philosophy

Maria Montessori stated that up to the age of twelve years nature ought to constitute the child’s primary interest. Furthermore, the Montessori approach has an ecological basis and views all living and non-living things on this planet as strictly interrelated. This understanding is reflected in the Cosmic Education curriculum and the five Great Lessons.

Environmental awareness is closely tied to peace studies, “… especially as it relates to our responsibility for ecological imbalances in the world” (North American Montessori Centre, Cosmic Education and Peace, 2001, p. 93). The Montessori Peace Flower has four petals: self-awareness, community awareness, cultural awareness and environmental awareness.

Community Consultation

Drawing on the Findhorn Foundation’s model of sustainability, these four Montessori petals/aspects were elaborated as follows:

- Self-awareness: education and spirit;
- Community awareness: governance and communication;
- Cultural awareness: culture and economics; and
- Environmental awareness: health and environment.

This expanded model of sustainability was developed after an extensive community consultation process (August 2005 - March 2006) with all stakeholders. The consultation phase of the school’s updated Strategic Plan (2006) also endorsed the incorporation of sustainability principles into the new plan.

Community input resulted in the creation of our sustainability logo, which is in the form of a living atom. The whole living Earth is the nucleus of the ‘atom of sustainability’. The circle surrounding it represents unity and oneness. This is surrounded by eight different overlapping circles, or fields, of sustainability. These interconnected and interrelated fields, radiating from the nucleus, represent growth and change. The fields overlap to form petals of a living flower (Peace Flower), symbolic of the interdependence and splendour of Nature. The eight fields of sustainability identified in the logo are:

- Education (yellow petal);
- Governance (orange);
- Environment (red);
- Culture (brown);
- Spirit (purple);
- Economics (dark blue);
- Communication (aqua); and
- Health (green).
Model of Sustainability
Revised Sustainability Policy 2007:

Sustainability Policy: Overarching Statement

Introduction
The policy is explained through three sections:
Policy
Guidelines
History

Policy
School Decision-Making
[The school] has adopted a whole school approach to sustainability, as reflected in the 2006 Strategic Plan:
KRA 1 Governance: Maintain a transparent and consistent governance framework that enables the Association to meet its legal obligations and remain viable, effective and sustainable.
KRA 3.6 Education: Integrate sustainability principles to all aspects of our school and wider community.
KRA 4.3 Community: Maintain a sustainable community size and classroom structure.
KRA 5 Finance: Maintain a sustainable financial position that delivers our KRAs.

Sustainability Sub-Committee
The Management Committee of the school is supported by the Sustainability Sub-Committee. In 2006 the Management Committee approved the formation and Terms of Reference of this sub-committee.

Guidelines
Decision-Making
All school decision-making will consider the sustainability outcomes resulting from those decisions. Concern for a sustainable future will be mirrored in the practical decisions made on a daily basis, such as, school purchases, renovations, energy use, the healthy eating policy, lighting and heating arrangements, recycling and transportation decisions. Modifications recognising these sustainability issues will be made where possible.

Sustainable Community
[The school] will work toward being a sustainable community. The Sustainability Sub-Committee, along with other sustainability task forces, will consult with all relevant stakeholders, plan, implement and evaluate sustainability projects that involve the whole school community, in accordance with the requirements of all other policies and guidelines. We also strive to ensure that we strike a balance between encouraging all community members to pursue their passions and actively contribute while managing expectations to allow a sustainable work-life balance to be maintained by all.

History
1. 2006 – First Sustainability Policy approved by Management Committee and due for review in August 2007.
2. 2007 – At the 13th September 2007 Management Committee meeting, when discussing the reviewed Sustainability Policy, it was recommended that an overarching Sustainability Policy be prepared for consideration by the
Management Committee. The Sustainability Policy now consists of four documents:

- Sustainability Policy (Overarching Statement)
- Education for Sustainability Policy
- WasteWise Policy (Addendum to Education for Sustainability Policy)
- WaterWise Policy (Addendum to Education for Sustainability Policy)

**Education for Sustainability Policy**

**Policy**

**School Decision-Making:**
XXX has adopted a whole school approach to sustainability, as reflected in the 2006 Strategic Plan, the operations of the Sustainability Sub-Committee and educational programs.

**Integration of Sustainability into the Curriculum:**
Education for sustainability (EfS) will be an ongoing component of the curriculum in all classes. Each term class teachers will identify the sustainability focus for that term, and where possible it will be integrated into the class program. The focus may range from long term commitments, lasting for a year or more, or may be short term projects. Finally and most importantly, the EfS program focus will integrate all fields of sustainability in a ‘whole systems thinking’ approach.

**Guidelines**

**The school as a Sustainable School**
[The school] demonstrates a whole school approach to EfS and the community has developed its own vision, or model, of sustainability.
Ten elements have been identified as the essential keys to success as a sustainable school:

- Whole school commitment
- Sustainability Sub-committee
- Policy and procedures
- Goals and targets
- Baseline data
- Staff professional development and parent education
- Community partnership links
- Develop and implement action plans
- Develop and implement integrated curriculum plans
- Monitoring and evaluation

**Sustainability Goals:**
[The school] will maximise the educational opportunities in its total life to create a learning community committed to contributing to a more sustainable future.
EfS is a life long learning process that leads to informed and involved citizens having:

- Creative problem-solving skills that can be applied in all fields;
- Scientific and technological literacy;
- Scientific and technological numeracy;
- Social literacy and justice; and
- Commitment to engage in responsible individual and cooperative actions.
EFS at [the school] will incorporate best practice environmental education. Within the environment field there are four main resource theme goals:

1. **Biodiversity** improved local biodiversity;
2. **Energy** reduced energy consumption;
3. **Waste** reduced waste (see WasteWise Policy); and
4. **Water** reduced water consumption (see WaterWise Policy).

**SAC:**

Information about ‘Sustainability at [The school]’, known as SAC, will be regularly communicated to the whole community through the School Newsletter and the SAC files and displays.

**History**

The development of the [school’s] Model of Sustainability:

1. **Montessori Philosophy**
   
   Maria Montessori stated that up to the age of twelve years nature ought to constitute the child’s primary interest. Furthermore, the Montessori approach has an ecological basis and views all living and non-living things on this planet as strictly interrelated. This understanding is reflected in the Cosmic Education curriculum and the five Great Lessons.

   Environmental awareness is closely tied to peace studies, “… especially as it relates to our responsibility for ecological imbalances in the world” (North American Montessori Centre, Cosmic Education and Peace, 2001, p. 93). The Montessori Peace Flower has four petals: self-awareness, community awareness, cultural awareness and environmental awareness.

2. **Community Consultation**
   
   Drawing on the Findhorn Foundation’s model of sustainability, these four Montessori petals/aspects were elaborated as follows:
   - Self-awareness: education and spirit;
   - Community awareness: governance and communication;
   - Cultural awareness: culture and economics; and
   - Environmental awareness: health and environment.

   This expanded model of sustainability was developed after an extensive community consultation process (August 2005 - March 2006) with all stakeholders. The consultation phase of the school’s updated Strategic Plan (2006) also endorsed the incorporation of sustainability principles into the new plan.

   Community input resulted in the creation of our sustainability logo, which is in the form of a living atom. The whole living Earth is the nucleus of the ‘atom of sustainability’. The circle surrounding it represents unity and oneness. This is surrounded by eight different overlapping circles, or fields, of sustainability. These interconnected and interrelated fields, radiating from the nucleus, represent growth and change. The fields overlap to form petals of a living flower (Peace Flower), symbolic of the interdependence and splendour of Nature. The eight fields of sustainability identified in the logo are:
   - Education (yellow petal);
   - Governance (orange);
   - Environment (red);
   - Culture (brown);
• Spirit (purple);
• Economics (dark blue);
• Communication (aqua); and
• Health (green).

3. **AuSSI and SSI-WA**
XXX became a member of the Sustainable Schools Initiative (SSI) pilot scheme in WA in 2005. Ongoing participation in the SSI has provided additional resources and information to support XXX’ commitment to sustainability.

**WasteWise Policy**

**Policy Addendum**
This WasteWise Policy is an addendum to the Sustainability Policy and links directly with the sustainability goals listed in that policy.

**The 4 Rs**
At [the] Montessori School we believe in striving towards a world where people value the natural environment and care for their communities. One way we can do this is by becoming WasteWise, and promoting a policy of:
- Rethink
- Reduce
- Reuse
- Recycle

**Goals**
In implementing our WasteWise policy we hope to achieve the following goals
- Develop environmentally sound attitudes, habits and values.
- Teach, demonstrate and reinforce the health and safety procedures when participating in WasteWise programs.
- Educate the school and wider community about the WasteWise message.
- Encourage participation of the whole school community.
- Minimise the amount of waste going to landfill.
- Examine and audit the waste collected to reduce and re-educate where necessary.
- Encourage smarter, eco-friendly thinking about purchasing of products at school and at home.
- Enhance the beauty of the school.
Guidelines
A Waste Minimisation Plan has been developed and is attached to this policy. In brief this plan involves:

1. Continue placement of paper recycling boxes in every room.
2. Continue daily collection of recycling bins from rooms and place into SITA bins.
3. Continue other recycling schemes (batteries, plastic pot plant containers, milk cartons, electrical equipment, furniture, etc).
4. Commence classroom responsibility for area clean up every week.
5. Encourage the reduction in the amount of paper photocopied.
6. Collect and reuse materials for art, craft, science, technology and math activities.
7. Enhance the beauty and cleanliness of the school grounds.
8. Develop a community permaculture kitchen garden.
9. Reuse the food scraps collected during the day from lunches through worm farming and composting.
10. Minimum waste lunches linked with our Healthy Eating Policy.
11. Compost garden waste and shredded paper.
12. Reduce the amount of energy used by the school (for heating/cooling by encouraging the wearing of appropriate clothing for weather conditions, selective garden planting and other coverage on windows and walls, use of energy saving light bulbs, etc).
13. Reduce the amount of water used by the school by encouraging water-saving behaviours and structural changes (rainwater tanks, waterless urinals, underground drip reticulation, etc).

History
Across Australia we are running out of landfill space. We are now seeing the devastating impact on the environment and our communities of wasteful practices.

It is the aim of [the school is] to send as little waste as possible to landfill. This will lead to financial savings for the school, considerable benefits for the environment and many opportunities for students to learn environmentally-sound attitudes and habits.

It is also the aim of our school to have the least amount of litter in the school buildings and grounds. This will make our school more attractive and save money and time in collecting carelessly discarded litter. It is also important from a health viewpoint.

The school is committed to a whole-school approach to environmental education, of which waste minimisation and litter reduction plays a vital role.

This elaboration of the school’s WasteWise policy was required as part of the application process for a WasteWise grant.

Attachment: Waste Minimisation Plan
<table>
<thead>
<tr>
<th>TIMELINE</th>
<th>STRATEGIES</th>
<th>PERSONNEL</th>
<th>FUNDING</th>
<th>EVALUATION/TARGET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commence-ment 2005</td>
<td>Waste Audit – conduct audit and students determine priorities.</td>
<td>Sustainability studies student group.</td>
<td>Part of educ program.</td>
<td>Students present findings at school meeting and take action on recommendations.</td>
</tr>
<tr>
<td></td>
<td>Worm Farms – establish a worm farm.</td>
<td>Sustainability studies group.</td>
<td>Seek donations of un-used worm farms.</td>
<td>Worm farm to be functioning by term 3 2005.</td>
</tr>
<tr>
<td></td>
<td>Paper Recycling – recycling boxes placed in classrooms (SITA bin); double sided photo copying policy.</td>
<td>All staff / students. SITA collection.</td>
<td></td>
<td>All paper to be used double sided.</td>
</tr>
<tr>
<td></td>
<td>Battery Recycling – box placed outside [classroom].</td>
<td>Whole school community. City of Stirling bin.</td>
<td>School batteries and batteries brought from home.</td>
<td>Batteries to be recycled; assess degree of recycling.</td>
</tr>
<tr>
<td></td>
<td>Pre-loved Items Recycling – toys, books, tools, etc; list on atrium noticeboard.</td>
<td>Whole school community.</td>
<td>Items donated.</td>
<td>Items to be recycled.</td>
</tr>
<tr>
<td></td>
<td>Collect and Reuse Materials – for art, craft, science maths, technology.</td>
<td>Whole school community.</td>
<td>Items donated or collected from ReMida.</td>
<td>Items collected and re-used.</td>
</tr>
<tr>
<td></td>
<td>Reduce Energy Use – implementation of solar power system project and energy saving strategies on daily basis.</td>
<td>Principal and Sustainability Committee. Whole school community.</td>
<td>Fundraising.</td>
<td>Reduced energy use/costs.</td>
</tr>
<tr>
<td>2006-2007</td>
<td>Worm Farms – Junior primary</td>
<td>Apply for</td>
<td>Additional worm</td>
<td></td>
</tr>
</tbody>
</table>
Obtain funding and purchase more worm farms.

Paper Recycling – as above plus shredded paper for compost.

Plastic Pot Plant Recycling – SITA bin.

Battery Recycling – box placed outside Spitfires.

Electrical Equipment Recycling – computers, toaster, fridge, etc no longer needed.

Creation of a Community Permaculture Kitchen Garden – with underground drip watering system.

Garden Waste – obtaining funding for compost bins.

Waste Recycling – new bins purchased and installed; children taught appropriate litter disposal.

Class grant. farms to be functioning by term 1 2007.

All staff / students Used paper to be shredded for mulch.

Convenor Sustainability Committee. Whole school community. SITA collection.

Organise through Sustainable Schools Initiative. Pots recycled.

Whole school community. Battery World bin.

Batteries from and brought to school Batteries to be recycled; assess types of batteries and need for further action.

School funds to purchase replacement electrical equipment. Second-hand equipment available for use by others.

Principal and Convenor Sustainability Committee. Murdoch Uni collection.

Apply for grants. Contact local businesses for support. End of term 1 2007 students will be cooking with school garden produce.

Whole school community. Apply for grant.

Convenor Sustainability Committee. Staff and students. All garden waste to be composted and returned to garden.

Litter minimised and
| Installation of Water Tanks and Waterless Urinals | Whole school community. | placed in correct bins. |
| Sub-committee of the Sustainability Committee. | Apply for Community Water Grant. |

2007-2008

| Worm Farms – sale of worm juice; collection of water bottles for storage of worm juice. | Responsibility rotates through primary classes (multi-age). | Donation of greenhouse for seedlings. |
| Plant Propagation and Sales – use of recycled pots & other objects for sales of school grown herbs & vegies at community events. | Sustainability Committee. All students. | Apply for grant. |

| Continue Waste Minimisation and Litter Reduction Programs - from previous years after their re-evaluation. | Principal, Sustainability Committee and students. | Apply for grants. | Determine if modifications, additions, etc. are needed. |

**WaterWise Policy**

**Addendum**

This WaterWise Policy is an addendum to the Sustainability Policy and links directly with the sustainability goals listed in that policy.

**Goals**

In implementing our WaterWise policy we hope to achieve the following goals:

- Develop environmentally sound attitudes, habits and values toward water resources.
- Teach, demonstrate and reinforce the health and safety procedures when participating in WaterWise programs.
• Educate the school and wider community about the WaterWise message.
• Encourage participation of the whole school community.
• Examine and audit the water used at school and reduce and re-educate where necessary.
• Encourage the school community to reduce the amount of water being consumed through water-saving behaviours.
• Encourage smarter, eco-friendly WaterWise thinking about the purchasing of products at school and at home.
• Enhance the beauty of the school.
• Enhance the biodiversity around the school.

Guidelines
Our WaterWise plan:
1. Utilise the principles relating to water that are already embedded within the Montessori Cosmic Education curriculum in geography, history and biology.
2. Integrate the WaterWise philosophy across all learning areas by delivering an education program that gives students the skills, knowledge and values to empower them to make responsible choices regarding water management.
3. Involve children in a wide range of WaterWise activities.
4. Access specialist knowledge in the community in the form of excursions and incursions.
5. Actively participate in community projects e.g. tree and reed planting, fundraising for a well overseas.
6. Raise awareness of WaterWise practices within the school and wider community through a range of avenues e.g. the school newsletter, parent evenings, fundraising events.
7. Role model WaterWise practices through the ongoing improvement of infrastructure (e.g. rainwater tanks, dual flush toilets, flow control valves) and ongoing quantitative monitoring of water use i.e. school wide water usage audits.
8. Develop a community permaculture kitchen garden with under-ground drip reticulation.

History
The [school] community recognizes the need for our water resources to be carefully managed to sustain an environmental balance. Thus we acknowledge that it is essential for staff, students and the school community to develop an awareness of water as a precious yet limited global resource.

This elaboration of the school’s WaterWise policy was required as part of the application process for a WaterWise grant and certification as a WaterWise school.
### Education and Curriculum:

Provide an educational environment based on Montessori principles and other ‘best practice’ educational methods, where children develop love of learning, become independent thinkers, and develop life skills and respect for others.

#### KRA 3

<table>
<thead>
<tr>
<th>Strategy</th>
<th>Performance Indicator</th>
<th>Who</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1 Pursue education and curriculum directions that help children develop a love of learning, become independent thinkers and develop life skills and respect for others</td>
<td>* Graduates exhibit a love of learning, are independent thinkers, and demonstrate life skills and respect for others</td>
<td>Principal</td>
</tr>
<tr>
<td>3.2 Support and extend all children according to their needs, talents and aspirations</td>
<td>* Every child progresses according to their needs talents and interest.</td>
<td>Principal</td>
</tr>
<tr>
<td>3.3 Foster the relationship between parents, children and teachers to enhance learning outcomes</td>
<td>* Parents, children and teachers are partners in the learning process</td>
<td>Principal</td>
</tr>
<tr>
<td>3.4 Develop and maintain a common understanding of the educational philosophy</td>
<td>* Parents and teachers are able to articulate the approach to learning</td>
<td>Educational Philosophy convenor</td>
</tr>
<tr>
<td>3.5 Provide and maintain appropriate educational resources</td>
<td>* Staff have the appropriate resource for individual student needs</td>
<td>Principal</td>
</tr>
<tr>
<td>3.6 Integrate sustainability principles to all aspects of our school and wider community</td>
<td>* Sustainability principles are evident in the curriculum and the behaviours of the community</td>
<td>Sustainability convenor</td>
</tr>
<tr>
<td>3.7 Comply with funding and regulatory requirements whilst maintaining our educational approach</td>
<td>* The school continues to deliver quality outcomes and complies with the required regulations</td>
<td>Principal</td>
</tr>
</tbody>
</table>
Appendix 7: Work Samples from Observation Lessons
What caused the **various evolutions of man** to sustain or not sustain life on earth?

Definition of sustain: **to keep up or maintain, to endure or withstand**

<table>
<thead>
<tr>
<th>Causes for sustainability</th>
<th>Causes for un-sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Southern ape standing up to cope with less trees</em></td>
<td><em>Boisei couldn't make shelters</em></td>
</tr>
<tr>
<td><em>Handy man-made tools</em></td>
<td><em>Homo erectus didn't advance in tool making</em></td>
</tr>
<tr>
<td><em>Bonobo were lice but they are protected by fur</em></td>
<td><em>Heidelbergensis still couldn't imagine the future (or a way beyond death) and the eastern neandervs couldn't imagine ether</em></td>
</tr>
<tr>
<td><em>Homo habilis are bone marrow town</em></td>
<td></td>
</tr>
<tr>
<td><em>Wanna create better and did things similar to today but better</em></td>
<td></td>
</tr>
<tr>
<td><em>had advanced cooling system to travel long distances</em></td>
<td></td>
</tr>
<tr>
<td><em>Homo erectus, sloped into knee, when got to china there was no stone to make tools with, there was only bone</em></td>
<td></td>
</tr>
<tr>
<td><em>had larger brains, could communicate, understand and body language, read each others minds</em></td>
<td></td>
</tr>
<tr>
<td><em>ability to breathe easier so could talk</em></td>
<td></td>
</tr>
<tr>
<td><em>Heidelbergensis had bigger brains</em></td>
<td></td>
</tr>
<tr>
<td><em>African vs (Europe) short, long noses (cope in cold)</em></td>
<td></td>
</tr>
<tr>
<td><em>more robust (Africa) tall, slim</em></td>
<td></td>
</tr>
<tr>
<td><em>dark skin</em></td>
<td></td>
</tr>
<tr>
<td><em>the survivors were called Homo sapien sapiens</em></td>
<td></td>
</tr>
<tr>
<td><em>they had imagination we descended from them</em></td>
<td><strong>but NATURAL SELECTION only some lived</strong></td>
</tr>
</tbody>
</table>
They entertained each other in winter with myths and stories.

They cooked meat to kill bacteria.

Enemies collapsed when they encountered their food by fire (cooking).

They killed mammoths for animal bones and ivory.

Mammoth teeth and claws were used for making tools.

Diseases killed them.

Cave paintings were done stories, pass down messages, and images with the bull.

They killed elephants and mammoths.
Appendix 8: Other Work Samples
Children’s House: ‘Community’ Value Drawings

Lots of people doing different jobs…being helpful (15).

Purple sky, big red sun with two people, one is…helping someone (2).
Looking through the microscope:

<table>
<thead>
<tr>
<th>What</th>
<th>saw:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freshwater shrimp</td>
<td>Worms</td>
</tr>
<tr>
<td>Freshwater snail</td>
<td>Gambusia</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What</th>
<th>saw:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gambusia</td>
<td>Freshwater Snail</td>
</tr>
<tr>
<td>Damselfly larvae</td>
<td>Freshwater shrimp</td>
</tr>
</tbody>
</table>
Upper Primary (9-10 years old): Biological Survey – Before and After Brainstorms

Before program commenced:

Focus: Plants + Animals Around the Lake
Brainstorming Everything I Know...

Plants
- grass

Animals
- frogs
- bats
- fish
- snakes

At the end of the program:

Focus: Plants + Animals Around the Lake
Brainstorming Everything I Know...

Plants
- flowers
  - colours attract more bees and insects.
  - colours more like red, oranges, yellows.

Animals
- there were lots more amphibians with lots of frogs and toads in the pond in the springtime, and lots of dragonflies and damselflies.
- most cool though
Upper Primary (9-10 years old): Biological Survey – Before and After Brainstorms

Before program commenced:

Focus: Plants + Animals Around the Lake
Brainstorming Everything I Know...

Plants

There are trees around the lake that grow tomatoes and nuts. They also grow nuts sort of like prunes that make you go to the toilet.

Animals

There are snakes (light snake) that live on the lake. They feel of toads & mice.

(Swans) (ducks)
Their are also birds all over the lake. Not sure of what they are.

At the end of the program:

Focus: Plants + Animals Around the Lake
Brainstorming Everything I Know...

Plants

- Bracket tree
- Daisy
- Sunflower
- Spider

Facts

- Insects like warm, colored flowers. We have because it keeps them warm and it's where they eat.

- I loved getting involved in daily life like fishing, putting the lake and the biscuits.

Animals

- Birds
- Geese
- Black duck
- Swan
- Sparrows
- Baby way rail
- Otters

Other animals

- Water bugs
- Spiders

- Motorbike frogs
- Long frogs
- Two toe skink

- Swans are very protective of their young.

- Birds like warm weather.

- The large frog has two legs, each special for the water.

- The way they swim their nostril is not in their mouth.
Upper Primary (11-12 years old): Biological Survey – Before and After Brainstorms

Before program commenced:

Focus: Plants + Animals Around the Lake
Brainstorming Everything I Know...

Plants
- Teak
- Oan tree
- Willow
- Peepal tree
- Grass

Animals
- Spoonbill
- Stork
- Snail
- Snake
- Shark
- Skink
- Spider
- Hawk

At the end of the program:

Focus: Plants + Animals Around the Lake
Brainstorming Everything I Know...

Plants
- School
- Bottle brush
- Lobster
- Paper bark

Lake
- Lake water
- Yum fish
- Willow

Animals
- Goafs
- Turtle
- Fish
- Snake
- Bird

School
- Birds
- Fish
- Computer

Pause
- Bottle
- Bucket
- Telephone
- Radio
- Telephone wire
Upper Primary (11-12 years old): Biological Survey – Before and After Brainstorms

Before program commenced:

Focus: Plants + Animals Around the Lake

Brainstorming Everything I Know...

Plants
- Algae
- Weeds
- Some animals eat or live in the plants
- Reeds in the lake
- Most ducks are herbivores
- Spoon bills
- Snakes
- Fish
- Plants

Animals
- Coots
- Swamp hens
- Lots of ducks
- Most of them
- Most of them are mostly tree frogs
- Turtles

At the end of the program:

Focus: Plants + Animals Around the Lake

Brainstorming Everything I Know...

Plants
- I learned that most plants are pollinated by insects or wind
- I also learned that the petals of most plants look like the petals of a flower
- I also learned that the green plants are some of the species of flowers
- And I also learned how the seeds of flowers are produced
- I also learned that the seeds of flowers are white, blue, yellow, white, and red

Animals
- I learned all about the frogs around the school
- Western Swamp Frogs.
- They have a white line down their back
- They have red under their back legs
- They have black dots that look like eyes on their back
- And I learned that when you find a lot of water bugs it can mean that we're finding it interesting learning about all these animals.
Upper Primary (9-10 years old): Understandings of the term ‘sustainability’

I think the word SUSTAINABILITY means:
[Further text likely handwritten]

I think the word SUSTAINABILITY means:
being safe with the environment and looking after it.

I think the word SUSTAINABILITY means:
I think it means to be doing stuff to help the environment like solar panels.

I think the word SUSTAINABILITY means:
when you are looking after the environment.

I think the word SUSTAINABILITY means:
Something that doesn’t hurt the environment. Environmentally friendly.

I think the word SUSTAINABILITY means:
looking after the environment, caring for the animals.
Upper Primary: Values for the Environment

VALUES for the environment

- Flowers
- The hills
- The animals
- Natural walks
- Trees give us oxygen
- It gives us water, food, shelter,

VALUES for the environment

- I like how some people help and many clothes from other
- I like help people come about it.
- I like how much it is not anything you can't help.

VALUES for the environment

- Without it, we wouldn't live alive.
Upper Primary: Actions for the Environment

**ACTIONS for the environment**

- Don’t use plastic bags.
- Don’t use chemicals.
- Recycling
- Using all natural products.
- Don’t let your helium balloons go into the sky.

**I would help people who are trying to help the environment.**

**ACTIONS for the environment**

- If I see rubbish, I pick it up.
- I would help people who are poor.
Upper Primary: Science Leaders Course

Leadership Action Plan

Finding Strengths

Determination

Listening

In the leadership program, we participated in a team, learnt about role models and then we developed a personal leadership plan. This is a plan to make you a better leader. We brainstormed different leadership actions we could practice every day. 3 that we came up with were:

- Finding strengths - because you need to believe you can do something before you do it.
- Determination, because you have to keep going even if it gets hard and
- Listening - because you have to listen to others ideas so you can make your ideas better.
Upper Primary: Science Leaders Course

What It Means to be a Leader

- Goals
- Determination
- Leadership
- Communication
- Empathy
- Confidence
- Empowerment

Montessori School

- Leadership Program
- Past Community
- Present Community
- Future Community
- Parents
- Teachers
- Students
- Computer Helpers
- Cleaners
- Community

People who help the school

- Allies
- Friends
- Others

School leaders

Other schools
Generate ideas to improve our school biodiversity!

- Plant some plants that should be planted in your suburb's
- Look after our animals and macroinvertebrates etc.
- Don't leave rubbish on the beach or lakes cause then you leave pollution, and all the animals could die.
- Try not to use too much pollution in your world or than it causes the world to have a climate change, and try to change the global warming.
- Take care of your plants and grass
- If you leave pollution you can cause big trouble to the world.
Upper Primary: Science Leaders Course

School biodiversity

Brainstorm

- Plan more native plant to attract frogs
- Build underpasses for frogs
- Leave animals alone when you see them
- Don't step on small plants
- Use solar powered cars or walk to not pollute as much
- Use the train
- Don't snap branches on trees
- Put native plants in separate spots
- Always put away/throw away rubbish in bins
- Put more bins around places
- Respect the animals
- Instead of throwing away candy wrappers why not just collect them
- Do not cut down a owl tree for paper

Generate ideas to improve our school biodiversity

Put native plants around the school so the animals will come to the pond and our gardens.

Treat the animals as you would like to be treated.
Keep your dogs on a leash when your walking around the lake.
Put a bypass under the car park so the frogs can go to the garden without being squashed.
School biodiversity

1. Plant more plants
2. Clean up around what wildlife is.
3. Make an special garden for animals
4. Try to make the air cleaner
5. Plant plants that frogs like so they can come and have a nice pond.
6. Make safer gardens.
7. Make food gardens.
8. More bins around the place.

Ideas

1) Signs/Posters around the lakes (stop harming animals)
2) Stop using cars to go to school if you live close
3) Plant native plants
4) Clean up the pond algae
5) Don't put sand & leaves in the pond

Actions

Plant native plants
Create a rubbish-free lunch
Appendix 9: Teacher Workshop Handouts
# PDs and Staff Meetings 2007

## Term 1 2007

<table>
<thead>
<tr>
<th>2007</th>
<th>TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>29 Jan</td>
<td>First Steps Writing PD</td>
</tr>
<tr>
<td>30 Jan</td>
<td>Whole School Planning PD</td>
</tr>
<tr>
<td>6 Feb</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>13 Feb</td>
<td>Active Sport PD</td>
</tr>
<tr>
<td>20 Feb</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>26 Feb</td>
<td>Astronomy PD &amp; EfS</td>
</tr>
<tr>
<td>27 Feb</td>
<td>Scitech PD</td>
</tr>
<tr>
<td>6 Mar</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>13 Mar</td>
<td>Virtues PD</td>
</tr>
<tr>
<td>20 Mar</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>27 Mar</td>
<td>Mental Maths and NuLit PD</td>
</tr>
<tr>
<td>3 Apr</td>
<td>Staff Meeting</td>
</tr>
</tbody>
</table>

## Term 2 2007

<table>
<thead>
<tr>
<th>2007</th>
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</thead>
<tbody>
<tr>
<td>1 May</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>8 May</td>
<td>Water PD: Science, D &amp; T and EfS</td>
</tr>
<tr>
<td>15 May</td>
<td>Reggio Emilia PD</td>
</tr>
<tr>
<td>22 May</td>
<td>Water Drama PD</td>
</tr>
<tr>
<td>29 May</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>5 June</td>
<td>Art: textiles PD</td>
</tr>
<tr>
<td>12 June</td>
<td>Staff Meeting: Review of Strategic Planning and Writing</td>
</tr>
<tr>
<td>19 June</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>26 June</td>
<td>Ed Philosophy &amp; Staff Meeting</td>
</tr>
<tr>
<td>3 July</td>
<td>Reggio Emilia PD</td>
</tr>
</tbody>
</table>

## Term 3 2007

<table>
<thead>
<tr>
<th>2007</th>
<th>TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>23 Jul</td>
<td>First Steps Writing PD with Jenny Dougan</td>
</tr>
<tr>
<td>24 Jul</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>31 Jul</td>
<td>Water, Timeline of Life and EfS</td>
</tr>
<tr>
<td>7 Aug</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>14 Aug</td>
<td>Values PD</td>
</tr>
<tr>
<td>21 Aug</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>28 Aug</td>
<td>Sustainability (S&amp;E and Sc) PD</td>
</tr>
<tr>
<td>4 Sept</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>11 Sept</td>
<td>Caring for Places, DEC EfS (S&amp;E) PD</td>
</tr>
<tr>
<td>18 Sept</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>25 Sept</td>
<td>Writing &amp; Maths PD</td>
</tr>
</tbody>
</table>

467
<table>
<thead>
<tr>
<th>2007</th>
<th>TOPIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 Oct</td>
<td>Whole School Planning for 2008</td>
</tr>
<tr>
<td>16 Oct</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>23 Oct</td>
<td>ICT PD</td>
</tr>
<tr>
<td>30 Oct</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>6 Nov</td>
<td>All projects: Evaluation - including Writing, ASISTM, Values and EfS</td>
</tr>
<tr>
<td>13 Nov</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>20 Nov</td>
<td>Montessori Equipment – making &amp; ordering</td>
</tr>
<tr>
<td>27 Nov</td>
<td>Staff Meeting</td>
</tr>
<tr>
<td>4 Dec</td>
<td>The Arts: Music/Dance PD</td>
</tr>
<tr>
<td>11 Dec</td>
<td>Staff Meeting</td>
</tr>
</tbody>
</table>
PD Power Point Slides

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because copyright permission
was not obtained from copyright owner.
4. What is the WA Sustainable Schools Initiative (SSI)?

- SSI provides a practical guide and support for schools to develop good practice through Education for Sustainability – Making the Connection program & OECD tool.
- 2007 Pilot program started with 20 schools.
- 2008/09 rollout; each pilot program school mentors a school new to the program.

4. What does a "Sustainable School" look like?

- Whole-school planning process linked to existing programs and resources, including WaterWise, WasteWise and Solar Schools, etc.
- Use of sustainability as a key context for teaching and action based learning (not an add-on)
- Embedding sustainability within the culture of all school communities

Benefits of being a Sustainable School in WA?

- Support from SSI toolkit and website: [http://www.sustainableschools.wa.edu.au/](http://www.sustainableschools.wa.edu.au/)
- Designed to meet local needs
- Inclusive involvement of all stakeholders
- Engages head, heart and hands of participants

What are we doing well?

- Sustainability embedded into Strategic Plan
- Active Sustainability Committee
- Policies & Terms of Reference
- Cosmic Education
- Projects
- Research
- Grants
- Whole systems thinking

What are the achievements of AuSSI?

- 24 participating schools in 10 programs, some outstanding achievements:
  - School attendance increased by 75%.
  - Increase in the amount of fruits and vegetables eaten by students.
  - A 50% increase in recycling by students.
  - Environmental education integrated across the curriculum.
  - Community engagement.
  - Successful implementation of the project.

Worm farming

Students at various skills levels maintain 3 worm farms to fund further projects.
Installation of solar panels

Installation of owl nest boxes in local park

Vision for the Future
- Past/current achievements (CARE tool)
- Visioning activity
- Improvements
- Montessori Planning

What can we improve on?
- Implementing Montessori understanding on limited ecological educator, interdependence
- Inclusion of all aspects of sustainability not just environmental
- Integration of the various aspects i.e. move from 'self thinking' to 'whole systems' thinking

Montessori Context
- What Dr. Montessori called 'superstructure' was the suggestion that we humans can not survive on our own -- we are interdependent. Our 'superstructure' is the heart of cosmic education.

Montessori Context
- All is strictly interconnected on this planet.
- Up to the age of twelve years... nature ought to constitute the child's primary interest.

Montessori Context
- The ultimate goal of Montessori biology is an ecological view of life and a feeling of responsibility for the [the] environment.
- The child will see that each individual life on earth is seemingly selfish; fighting for its own survival. In reality each serves the good of the whole. Montessori calls this the Cosmic Plan.

Montessori Context
- Ecology looks at the interaction of living things and... non-living forms. Without an understanding of ecology there is no meaning to cosmic education.
- We must create a concern for what we are doing and how we are doing it - changing value systems where children must live with them to absorb theirs...

Questions please?

Thank you
Appendix 10: Extracts from School Newsletters
Sustainability at

The Sustainability Sub-Committee met again last Thursday. We welcomed two new parents to the committee meeting. Please feel very welcome to come along to these meetings whenever you are available - it is a free-flowing involvement so that participation is sustainable for us all!

At the meeting we reviewed our progress in sustainability that has been achieved this year, from whole school endeavours (such as ; and Peace Week) to class programs each term (like recycling and the MAKEPOVERTYHISTORY event discussed below).

Furthermore, we are planning some joyful, wonderful, inspiring events and activities next year. So ... we are being the change we wish to see!

(Learning Opportunities Co-ordinator)

Make Poverty History Event

We have an opportunity to extend our sensational MAKEPOVERTYHISTORY school meeting performance to a wider audience ... in Perth city.

In the lead up to the World Trade Organisation Conference in Hong Kong, Oxfam and other aid agencies are challenging richer countries to make decisions which will allow developing countries to trade their way out of poverty. This is part of a global campaign known as MAKEPOVERTYHISTORY.

As part of this campaign Oxfam will stage a small peaceful media event in front of the Perth Concert Hall, across the road from the US consulate, involving 20 children in T-shirts which spell out in letters MAKEPOVERTYHISTORY and who will present the consulate with a small bag of grain and some Chinese fortune cookies. The grain represents subsidised grain that richer countries trade in
SAC: SUSTAINABILITY AT

Sustainability Sub-Committee
Last Friday’s meeting of the Sustainability Sub-committee achieved further progress on planning our community permaculture garden. We will be meeting again on Friday 25\textsuperscript{th} August, 3.15pm, in the playground as usual.

Biological Survey
Spitfires will be involved in the biological survey this term. Their participation in the project begins this week with a ‘walk and talk’ bird watching session with (bird expert and library volunteer at ). Thank you for your continued support for by sharing your ornithological skills.
Next week Spitfires will be involved in the Ribbons of Blue water testing activities in our lake. This lake session includes bird observations in the wetlands environment. After this the students will participate in the fauna (pit traps and birds) and flora survey activities. Please be aware of the usual safety issues during the pit traps week – signs will be on display.
Spitfires’s students are keen to be involved in the biological survey project, frequently asking when it will be their turn, so enthusiastic participation is anticipated!

Curriculum Co-ordinator
School Newsletter 5/2/2007

**SAC: SUSTAINABILITY AT**

Welcome to another year of making a difference to our environment through your support for Sustainability at SAC. This year we have many ongoing projects, such as, improving the water quality of the lake at the back of our school, constructing a turtle breeding bank on the eastern shore of Herdsman Lake and addressing issues related to the sustainability of our water resources.

**Permaculture Garden**

Take a wander through our new community permaculture kitchen garden. You will behold a rich variety of greens, yellows and reds. Over the summer holidays corn, tomatoes, pumpkin, sweet potato, passion vines, herbs and flowers have blossomed. This term every class will be involved in the garden and will experience the joy of growing, harvesting, preparing and eating their own produce.

**Sustainability Sub-Committee Meeting**

The next meeting of the Sustainability Sub-Committee will be held on Friday 9th February at 3.15pm in the permaculture garden. We will be developing our plans for this year ... for the garden, the water grant and other issues. Please feel very welcome to join us in this vital endeavour.

**Curriculum Co-ordinator**

School Newsletter 12/2/2007

**SAC: SUSTAINABILITY AT**

**Sun Fair**

The Perth Sun Fair is on again, Sunday 1st April, UWA Oak Lawn, 9am - 5pm. The Sun Fair is aimed at introducing the people of Perth to sustainable living concepts, technology and lifestyles. Major themes of the fair include renewable energy, energy efficiency, environmental conservation and natural living.
Children and parents will be able to serve on our. Please register your interest in participating in the Sun Fair with Elaine Lewis. A roster will be prepared. Participants will explain aspects of the commitment toward sustainability (solar power system, permaculture garden, biological survey, etc.) and sell eco-friendly products (soap, honey, artworks, etc).

**Sustainability Sub-Committee Meeting**

The Sustainability Sub-Committee met last Friday in the permaculture garden. We developed our plans for this term...for the garden, the water grant and other issues. A huge welcome to who has joined the committee. It you are interested in participating in any aspects of SAC but are unable to attend the meetings please let me know.

The next meeting of this committee will be on Wednesday 28 Feb at 3.15 pm in the garden. All welcome.

Finally, a note of clarification: the Curriculum Coordinator’s involvement in the Sustainability Sub-Committee, as the committee’s Convenor, is on a voluntary basis and is undertaken in non-paid hours.

**Community Permaculture Garden**

Spitfires made pizzas last Friday using produce from the garden. Absolutely delicious...full of organic garden goodness and the children’s enthusiasm. Thank you, Spitfires.

Apart from the bountiful tomatoes and herbs, have you seen the size of our pumpkins and corn? Many congratulations to all the garden workers last term...particularly...Your hard labour has been richly rewarded...we commend you for your outstanding effort!

This term we need to complete the garden and need some helpers:

- **Friday 16 Feb 3.15pm:** a gentle get-to-know the garden and weeding day. Please feel very welcome to join us. Everyone is very welcome.
- **Saturday 10 Mar 10am - 3pm:** complete the garden ready for class planting e.g. brick borders, spread mulch, etc. Please tell Elaine if you can join us for all or part of the day.
- **Parent volunteers:** for the garden beds of Skippers, Swordtails and Mariposa.
- **Parent volunteers:** for building benches and a hut, making signs and letterboxes.

Your help in one of these roles will ensure your children continue to be immersed in the beauty and bounty of nature. Please let...I know if you can assist in any way. Thank you.

**Cork Recycling**

Cork is made from cleaned corkwood stripped from the cork oak tree. It takes 40-50 years to grow wine cork and just seconds for it to become environmental junk. Cork recycling saves approximately 400 cubics of landfill each year.

Used cork is granulated and compressed for use in the manufacture of industrial safety mats, the inside of cricket balls and horse float mats.

Please recycle your corks by placing them in the labelled basket on the atrium bookcase. Thank you. The students will graph the weight of the corks collected and investigate associated mathematical scenarios.

**Sustainability Convenor**

**COMMUNITY NEWS**

**Coffee Morning**

In the staff room on Thursday morning after drop off. Enjoy a tea or coffee in good company. The morning will be hosted by Skippers.

**BBQ on Friday**
School Newsletter 9/9/2008

SAC: Sustainability At

Would anyone like to be involved in creative art work within the garden? We would like to decorate the herb spiral before planting it. There are many other opportunities to decorate garden beds, the worm farm and compost bays. Any ideas and suggestions welcome. If you would like to contribute, please see

School Newsletter 9/6/2009

THE GARDEN COMES TO LIFE AGAIN

We would like to extend a BIG thank you to Bunnings Innaloo for their generous donation of seedlings, seeds, pots, shovels, gloves and craft paint. With their help, money raised from the Mothers Day Plant stall and the arrival of the rain!

We have been able to get started in the Permaculture Garden for winter planting. All classes have been busy planting winter vegetables, mulching, decorating and planting the herb spiral (Spitfire), and revitalising the worm farm. Each class now has a parent garden rep to help their teacher and students in the garden. Classes will soon be planting seeds for next season's crop.

Thanks also to who has been very generous with her time and help whilst the new garden committee learn the ropes.

We would like to ask for your HELP by donating seeds, soil, pots, chicken wire, stakes to the garden. We need it all! Please have a look in your garden shed this weekend.

Our reticulation system is also in desperate need of an upgrade so if you have any spare pipe or spray
heads would like to hear from you.

We are looking forward to our produce appearing in the kitchen. Watch out for sweet potato leaf recipe coming soon!
Appendix 11: Other Evidence
Extracts from Yearbooks 1997 and 2002:

1997

2002

For us, harmony means an understanding of the need for balance, and for centering. This balance involves duality, the awareness of opposing forces and the acceptance of change.

We acknowledge the ... night and day ... black and white ... female and male ... peace and pestilence ... unity and diversity ... sorrow and joy of life within our community. 

Thus we embrace harmony.
XXX, the school’s principal in 2005, provided strong support and leadership for XXX sustainability vision. This commitment was reflected in, for instance, his active participation on the Sustainability Sub-Committee and the involvement of all staff in a wide range of ‘sustainability’ professional development days.

XXX convened the first Sustainability Sub-Committee, which was formed in August 2005. The Sub-Committee included parents and teachers, as well as the Principal. Students were also invited to be involved in meetings. The Sub-Committee varied their meeting times and days (every 2-3 weeks) so that all interested school community members could participate.

Due to the overlap of several members on both the XXX Management Committee and the Sustainability Sub-Committee, most minor decisions were made by the Sub-Committee, with only bigger decisions considered by the Management Committee. Minutes from the Sub-Committee meetings and bi-annual progress reports were forwarded to the Management Committee.

There were six working groups in the Sustainability Sub-Committee. Members worked on the:

- Solar Power System
- Community Water Grant
- Community Permaculture Garden
- Peace and MakePovertyHistory
- Carbon Trading Project (renamed the Maia Maia Project in 2008)
- School Sustainability Vision Plan

These working groups focused on achieving the desired outcomes for their group, which ranged from enabling the installation of a working solar power system, installing water tanks and creating a community permaculture garden at the school, to taking action to make this planet a better place by promoting peace, healthy living and addressing climate change issues.

The School Sustainability Vision Planning group identified eight possible fields of sustainability relevant to the school community: Health, Communication, Education, Governance, Environment, Culture, Spirit and Economics. In developing a shared vision for the school, a large poster with “petals” representing the different fields of sustainability was displayed in the school’s atrium, with pens attached to encourage input. In each petal, students, parents, staff and other members of the school community wrote ideas for their vision of sustainability.
Community input chart for developing the school’s sustainability vision

The outcome of the community consultation process resulted in the creation of the school’s beautiful sustainability model: SAC: Sustainability at XXX. The petals were incorporated into a colourful image of the school’s sustainability vision. A series of sustainability files were developed to complement the model, reflecting each of the eight coloured fields of sustainability. These files kept ongoing records of the school’s activities, sustainability policies and plans for the past, present and future. This documentation was placed in the atrium to ensure accessibility to all members of the school community.

In 2006, each class displayed one coloured petal on their classroom door to represent the field of sustainability they were focusing on that term. The various sustainability activities and practises also rotated through all the classes so that students could learn and experience a balanced variety of sustainable practises over their years at the school.

A whole school plan was developed showing how every class worked on several sustainability projects each term, with some overlap on whole school projects, for example Peace Week in September each year.
A number of sustainability policies were progressively developed to clarify understandings in the school: the Overarching Statement, the Education for Sustainability policy, the Water Wise policy and the Waste Wise policy. The Terms of Reference documentation for the operation of the Sustainability Sub-Committee was also developed. All these documents were approved by the school’s Management Committee.

The Sustainability Sub-Committee was mindful of communicating their ideas and activities in many ways, for example, through newsletters, posters, newspaper articles, displays around the school and in shopping centres, and items at school meetings (assemblies). This strategic approach to the dissemination of information was monitored using a Communication Checklist.

Teachers attended professional development sessions, for example, on the Waste Wise and Water Wise programs, and also attended the Forest Hills Discovery Centre, to enhance their skills and knowledge in the field of sustainable studies.

Sustainability was also reinforced by special events such as the Winter Solstice concert, where key values and understandings were presented in plays and musical items. For example, the focus of Whole School Education Plan in Semester 1 2007 was the Physical Sciences, with particular reference to ‘water’, so the Winter Solstice that year explored the sustainability of the Earth’s water resources. Everyone present at this event was invited to “participate in this River Dance and feel compassion, love and hope for the future of our Water”.

Another significant sustainability event in 2007 was the XXX Festival. The festival was held on the XXX Lake grounds at the back of the school. Funds were raised to support local and international sustainability projects.
Excursions and incursions were additional ways that the school sought to embed sustainability into the curriculum. Excursions to the Subiaco Sustainable Home and to REMIDA for example, along with whole school incursions like the Nestboxes for Native Birds workshops and the Doing My Best values education dramatic performance, added to the children’s understandings of sustainability.
Turtle Watch Poster:

Turtle Watch: Community Contribution to Environmental Impact Assessment

Elaine Lewis, Catherine Baudains, Caroline Mansfield

In 2005, community members of an independent primary school in the North metropolitan area of Western Australia expressed concern about evident threats to the local turtles living in nearby wetlands. Early investigation suggested that road deaths and pollution were the major threats to the turtle population. To examine the issue further, with the aim to improve the turtles’ local habitat, the school successfully applied for a Community Conservation Grant. The subsequent project involved close collaborations between the school, the Department of Environment and Conservation (DEC), the local council and other organisations.

Project Purpose

To trial the provision of a suitable safe nesting area for the Kemps’ ridley turtle, Lepidochelys kempii and the green turtle, Chelonia mydas, in the area.

Project Program

The project was undertaken over a two-year period, March 2006 – March 2008. The trial was conducted on the north-eastern side of Myall Lake in a protected area approximately 300 metres from the beach (Figure 1). It was 20 metres wide and 200 metres long. The trial was conducted by 50 volunteers from the school on a twice-weekly basis.

Project Results

The turtles used the trial site regularly, but not as much as all the disturbed nests were predicted.

Turtle Watch Data - During the study period 21 isolated turtles were found in the trial site, with another 6 predicted nests located in the wetland area. No live hatchlings were observed in the site, however 3 were seen in the surrounding area (Figure 1). 86.4% of turtles included in the trial were found in the wetland area, 4.2% were found in the trial site, and 0.6% were found in the buffer zone. The trial is ongoing and will continue to monitor turtle population monitoring.

Conclusions

Connectivity to Nature - Improved student and community connection to the Myall Creek wetlands, as shown by improved knowledge, skills, behaviours and values related to the natural environment.

Recreational benefits - Improved understanding about the interconnectedness between all species and how one species affects another, including the influence of environmental issues on turtle populations.

Community Benefits - Community involvement between stakeholders was varied and effective throughout the project. An efficient, sustainable, class and staff partnership between DEC, staff and the school was a key factor. Students, staff and other stakeholders were able to develop effective strategies to improve the trial site’s success.

Lessons Learnt

1. Greater emphasis on education and awareness raising is needed to support the project.

2. Improved communication and coordination with other organisations is recommended.

For Further Information Contact:

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Making Waves Poster:

A collaborative project, called SOS: Science of Sustainability, explored student engagement and learning in the science, technology and mathematics of water management. This Australian Schools Innovation in Science, Technology and Mathematics (AUSiSTM) project involved 12 schools (nine independent, primary and secondary, and three geographically dispersed subsets in the metropolitan area of Perth, Western Australia, tertiary institutions, and government and non-government organisations.

Project Purpose
To implement engagement and learning activities in science, technology, and mathematics through a range of practical, experiential, interactive, education for sustainable development initiatives with a focus on water resources management. The project aimed to provide opportunities for deep meaningful real-life contexts, partnerships, cross-curricular integration, and curriculum integration.

Project Program
The project was undertaken across nine representative schools in 2007-08. It incorporated a range of teaching activities for students from Years 9 to 12 of the partner schools located in metropolitan and rural remote areas in the Hills, Swan, and Peel

- Perth Groundwater Festival: SOS project displays,
- Whole-of-project website: SOS project下班;
- Perth community implementing sustainability programs through partnerships,

Outcomes
- Improved student engagement and learning – hands-on learning including real-life, fully resourced learning opportunities were created.
- Common activities
  - Whole-of-project website: SOS project display;
  - Perth community implementing sustainability programs through partnerships,

Key Outcomes Achieved
- Common activities and whole projects:
  - Improved student engagement
    - Students investigating the project and its impact on the community;
  - Improved student understanding of water resources management;
  - Improved communication
    - Improved communication skills among students and between students and teachers.

Conclusion
The SOS project was effective in raising awareness in students, learning outcomes, through enhanced student engagement and improved understanding about water resources management. This was achieved by innovative programming including action-based environmental activities in the community and partnerships with government and other local agencies.

Partnership Model
- Whole-of-project website: SOS project display;
- Perth community implementing sustainability programs through partnerships,

Square learning with a wide audience
- Whole-of-project website: SOS project display;
- Perth community implementing sustainability programs through partnerships,

Project Challenge – huge coordination and communication with the school project leader.

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Appendix 12: Application of Eagle Eye Model at the Case Study School
Applying the Eagle Eye Model and Whole Systems Thinking at the Case Study School:

Flying over to view the big picture … swoop in to focus on a narrow aspect of ‘water’ … then swoop out and over to understand interrelationships and interdependence between other systems.

Environment:
- School modelling of values, skills & actions re conservation of water
- ‘Interdependence’ theme of cosmic education curriculum
- Conservation grants & water-efficient installations
- Gardening, worm farming & composting

Communication:
- School newsletters
- School meetings
- Parent Education sessions
- SAC members & files
- Festivals & displays
- Management Committee Minutes
- Sustainability Sub-Committee Minutes

Health:
- Health curriculum & school promotion of drinking water for healthy body & brain function
- Use of reverse osmosis water filtering system

Education:
- Cosmic education curriculum
- ‘WaterWise School’ accreditation
- Grants provide outcomes re water understandings in all learning areas
- Educational monitoring of water usage
- Math, Science & Technology outcomes re properties of water, use, needs

Economics:
- Water-cost savings re flow control valves, taps, dual flush toilets, flow-controlled urinal, rainwater tanks for toilet flushing
- Water-efficient irrigation
- Water efficient native garden

Spirit:
- Actions resulting from Values Education grants support for school, state and national values
- Implementation of actions re ‘environmental responsibility’
- Festivals & special events
- Virtues program links re responsibility, service, caring, justice, helpfulness, purposefulness, etc.

Culture:
- Local, state, national & international perspectives of water
- ‘Healing the Swan’ walk re Indigenous, historical & current understandings

Governance:
- Sustainability embedded in Strategic Plan
- Sustainability Sub-Committee actions
- Community modelling of responsible values & actions

Applying the Eagle Eye Model and Whole Systems Thinking at the Case Study School:

Flying over to view the big picture … swoop in to focus on a narrow aspect of ‘waste’ … then swoop out and over to understand interrelationships and interdependence between other systems.

Communication:
- School newsletters
- School meetings
- Parent Education sessions
- SAC members & files
- Festivals & displays
- Management Committee Minutes
- Sustainability Sub-Committee Minutes

Health:
- WasteWise approach to all resources - water, food, fabric, equipment, etc.
- Use of environmentally safe chemicals in the school
- Use of natural medicine

Education:
- Cosmic education curriculum
- ‘WasteWise School’ accreditation
- Grants provide outcomes re waste understandings in all learning areas
- Educational monitoring of waste
- WasteWise student outcomes in all learning areas
- Gardening, worm farming & composting
- Promotion of ‘no waste lunches’
- Use of ReMida resources e.g. recycled fashion
- Recycle wide range of products – food, clothes, shoes, stamps, corks, plastic pots, paper, etc.

Economics:
- WasteWise savings from recycling
- Waste efficient worm farming
- Waste efficient composting
- Membership of ReMida

Spirit:
- Actions resulting from Values Education grants support for school, state and national values
- Implementation of actions re ‘environmental responsibility’
- Virtues program links re responsibility, service, caring, justice, helpfulness, purposefulness, etc.

Culture:
- Local, state, national & international perspectives of waste

Environment:
- School modelling of values, skills & actions re conservation of water
- ‘Interdependence’ theme of cosmic education curriculum
- Conservation grants & WasteWise installations, behaviours, etc.
- Gardening, worm farming & composting

Governance:
- Sustainability embedded in Strategic Plan
- Sustainability Sub-Committee actions
- Community modelling of responsible values & actions
Applying the Eagle Eye Model and Whole Systems Thinking at the Case Study School:

**Flying over** to view the big picture … **swoop in** to focus on a narrow aspect of ‘biodiversity’ … then **swoop out and over** to understand interrelationships/interdependence between other systems.

**Communication:**
- School newsletters
- School meetings
- Parent Education sessions
- SAC members & files
- Festivals & displays
- Management Committee Minutes
- Sustainability Sub-Committee Minutes

**Health:**
- Health curriculum & active body
- Wearing appropriate clothing for the weather
- TravelSmart behaviours – walking, riding & public transport to school

**Education:**
- Cosmic education curriculum
- 'EnergySmart School' recognition
- Grants provide outcomes re energy understandings in all learning areas
- Educational monitoring of energy usage & solar power system
- EnergySmart student outcomes in all learning areas
- Alternative energy education – solar, wind, bio fuel, etc.

**Culture:**
- Local, state, national & international perspectives on biodiversity
- 'Healing the Swan' walk re Indigenous, historical & current understandings

**Health:**
- Health curriculum & active life
- Clean lake water
- Reduced exposure to toxic chemicals
- Connectivity to local environment

**Environment:**
- School modelling of values, skills & actions re solar power & EnergySmart
- 'Interdependence' theme of cosmic education curriculum
- Conservation grants & energy-efficient installations

**Education:**
- Longitudinal Biological Survey
- Grants provide outcomes re biodiversity understandings in all learning areas
- Educational monitoring of biodiversity
- Promoting biodiversity outcomes in all learning areas
- Replanting natives at local lakes
- Turtle research at local lakes
- Partnerships & collaboration with wider community
- Permaculture garden activities
- 'Ribbons of Blue' water quality testing
- 'Healing the Swan' walk & water testing

**Governance:**
- Sustainability embedded in Strategic Plan
- Sustainability Sub-Committee actions
- Community modelling of responsible values & actions

**Economics:**
- Electricity cost savings re solar power system
- Energy efficient equipment
- Energy efficient behaviours – turn off lights, fridges off in holidays, etc.

**Environment:**
- School modelling of values, skills & actions re conservation of biodiversity
- 'Interdependence' theme of cosmic education curriculum
- Conservation grants & energy-efficient installations

**Governance:**
- Sustainability embedded in Strategic Plan
- Sustainability Sub-Committee actions
- Community modelling of responsible values & actions

**Spirit:**
- Actions resulting from Values Education grants support for school, state and national values
- Implementation of actions re ‘environmental responsibility’
- Festivals & special events
- Virtues program links re responsibility, service, caring, justice, helpfulness, purposefulness, etc.

**Applying the Eagle Eye Model and Whole Systems Thinking at the Case Study School:**

**Flying over** to view the big picture … **swoop in** to focus on a narrow aspect of ‘energy’ … then **swoop out and over** to understand interrelationships and interdependence between other systems.
Appendix 13: Application of Whole Systems Thinking in a Generic Context: Eagle Eye Model and 10 Tonne Plan
Notes for teacher professional learning in generic context:

Whole Systems Thinking:
Eagle Eye Model and 10 Tonne Plan

What is Whole Systems Thinking?
Systemic thinking is a new way of perceiving our world. Whole systems thinking is a framework for seeing the whole picture, for putting things into a context to establish interrelationships and understand phenomena as an integrated whole. Systems thinking may be contrasted with fragmentary, silo thinking, which is viewing phenomena in their separate parts and focusing only on narrow specialisations. In an Education for Sustainability context this means emphasizing relationships, relationships between all the systems on our planet, and at different systems levels, as they relate to the environment, economics, government, health, and so on. Values are also important to the development and maintenance of these relationships. In brief, systemic thinking requires people to examine the interrelationships between processes, between disciplines and between systems.

How to Apply Whole Systems Thinking in the Classroom
Eagle Eye Model
The Eagle Eye Model will support teachers to be explicit about whole systems thinking with their students. This model was developed from an understanding of the structure and function of the Wedge-Tailed Eagle’s eye and the zoom-in zoom-out approach in grammar education. While flying, Wedge-Tailed Eagles can see in two ways: they can see the whole countryside beneath and, at the same time, see a small part of it, as if looking through a telescope.

The Eagle Eye Model is utilised at the start of an Education for Sustainability program to assist students understand the big picture perspective, the interdependence of different systems. An eagle will circle and glide, reaching heights up to 2000 metres. From this height the eagle can see a vast perspective, a whole systems view. However, while in flight it can also see a moving rabbit from say 1.5 km away. Thus the eagle can keep it’s ‘prey’ (my jelly ‘bean’ of knowledge) in sharp focus as it swoops down. In the same way a teacher can shift - swoop or zoom in - from the systems perspective
to a detailed focus on some particular aspect of the curriculum. Once this aspect is grasped by the students, the teacher facilitates flight back out, or zooms out, to the systems view again to examine how this detailed new understanding impacts on the whole system.

The Eagle Eye Model enables teachers to start a theme/program by presenting the big picture, engaging children in activities that reveal where the topic may be located from a whole systems thinking point of view. Students discuss initial understandings that involve exploration into interrelationships and interdependence between systems. For instance, at the start of a unit on ‘water’, students could discuss how the water cycle is related to water in dams and climate change. Teachers then facilitate their students’ learning journey in a manner that involves them swooping in on the detailed components of the water cycle. Finally, students swoop out and over again to review how new in-depth understandings of the water cycle relate to water conservation from a local, state, national, global perspective. Through this process students are explicitly challenged to think from a whole systems thinking perspective, while also investigating detailed aspects of a topic. See illustration below.

The Eagle Eye Model complements and enhances Western Australian Curriculum Framework (Curriculum Council, 1998) requirements. This model facilitates broad learning area outcomes (such as, Society & Environment: Natural & Social Systems),
while enabling detailed focus on the narrow outcome aspects (for instance, Science: Life & Living: The student understands that living things have features that form systems which determine their interaction with the environment). The model is also aligned with the thinking skills work and assessment tools of Pirozzo (2009) and Pohl (2009), in that it addresses big picture understandings as well as detailed specific learning outcomes. Likewise the model is a valuable tool in the implementation of the new Australian Curriculum (ACARA, 2011b), particularly in terms of Sustainability (cross curriculum priority) and Critical and Creative Thinking (general capability) in the context of all curriculum learning areas (English, mathematics, science, history, geography, languages, the arts, health and physical education, technologies, economics and business, and civics and citizenship). Summarising, the Eagle Eye Model provides a tool for teachers to address concerns about students’ fragmentary knowledge and silo thinking, enabling a practical process that supports whole systems thinking.

**10 Tonne Plan**

The ‘10 Tonne Plan’ is another proposal that may support teachers implement whole systems thinking. The Plan was trialled at an independent public school (not the case study school) during 2011. The main aim of the 10 Tonne Plan was for the school to reduce greenhouse gas emissions to the atmosphere by ten tonnes in one year. This
reduction was achieved by planting trees, being waste wise, water wise, energy smart and travel smart. Environmental accounting associated with the Plan was conducted by one of the school’s community partners, the Maia Maia Project (MMP) team, while the following illustration shows how students recorded progress toward achieving their ten tonne goal (Maia Maia Project, 2011):

10 Tonne Plan: Upside Down Thermometer for Measuring Progress (MMP, 2011)

The Plan enabled numerous silo projects being undertaken at the school to be linked together into a whole systems thinking approach based on the AuSSI-WA eco footprint and social handprint (CPS, 2011; Maia Maia Project, 2011). Research is currently in progress to assess the outcomes of the 10 Tonne Plan, and these findings will inform the school’s 2012 ‘50 Tonne Plan’, as well as similar programs being proposed in other Western Australian urban and rural schools (C. Baudains, personal communication, May 4, 2012). In brief, the ‘10 Tonne Plan’ strategy is another tool teachers may utilise to support student understanding of whole systems thinking.