Going on a turtle egg hunt and other adventures: Education for sustainability in early childhood

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Abstract

This paper reports outcomes for Early Childhood (EC) students after engagement in an Education for Sustainability (EfS) program. The research was conducted at an independent school located in the Perth metropolitan area of Western Australia. Three student-driven EfS projects, on issues of concern to young children, are examined. These projects are located at the school and in the nearby wetlands: biological survey, reed planting and turtle nest-watch. Findings indicated that participation in EfS projects was an effective, meaningful approach to achieving potent, enjoyable, hands-on action in real-life local contexts.

Introduction

Interest and commitment to Early Childhood (EC) Education for Sustainability (EfS) is growing rapidly in Australia (Environmental Education in Early Childhood, 2010; Hughes, 2007). EC is a critical time for establishing EfS understandings and behaviours (Environmental Education in Early Childhood, 2010; NSW Early Childhood Environmental Education Network 2010). This position informed the current study and justified need for the research.

Outcomes for EC students after engagement in an EfS program are presented. The research was conducted at an independent school located in the Perth metropolitan area of Western Australia (WA). Three student-driven EfS projects, located at the school and in the nearby wetlands, are examined: biological survey, reed planting and turtle nest-watch. The research investigated student outcomes in terms of attitudes, understandings and behaviours, after involvement in the EfS program.

Understandings about EfS and the importance of attachment to the local 'place' are discussed first, then background information about the study is outlined, followed by the research findings.

Education for sustainability

Over the past 40 years in Australia, Environmental Education (EE) has evolved into Education for Sustainability (EfS). EE has been discussed in the Australian education context since the 1970s (Evans & Boyden, 1970; Fien & Gough, 1996), with reference to education *in*, *about* and *for* the environment (Linke, 1980; Lucas, 1979). Simplistically, the evolution of EE to EfS may be presented as: *about* the environment in the 1970s, *in* the environment in the 1980s, *for* the environment in the 1990s, and *sustainability* in the 2000s (Tilbury, Coleman, & Garlick, 2005).

Since the 1990s there has been an emphasis in EE on the clarification of understandings related to the *for* approach. However, it wasn't until the 2000s that the *for* approach started to make an impact in practice (Heck, 2003). Education *for* 'promotes critical reflection … It seeks to build capacity for active participation' (Tilbury, Coleman et al., 2005, p. 17). Education *for* the environment empowers, providing learners with skills to take positive action so that current and future generations have a critical understanding of how complex systems work, such as ecosystems, economic and sociopolitical systems (Tilbury, Coleman et al., 2005). The *for* approach also stresses the cultivation of environmental values (Gralton, Sinclair, & Purnell, 2004).

The recent National Action Plan for EfS in Australia acknowledged for need for 'individuals and organisations [to] have the knowledge, skills, values, capacity and motivation to respond to the complex sustainability issues they encounter' (Department of the Environment Water Heritage and the Arts, 2009, p. 8). The Action Plan recognised that EfS had changed from the 1970s focus 'on awareness of natural ecosystems and their degradation to 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' (Department of the Environment Water Heritage and the Arts, 2009, p. 3).

The WA Sustainable Schools Initiative identified key elements for effective EfS. One was 'student voice and engagement' (Department of Education and Training, 2010). This element is important because talking with and listening to students enables them to be active participants and it facilitates more powerful learning and school processes (Cook-Sather, 2006; Thiessen & Cook-Sather, 2007). Enhanced student voice is critical for engagement and deep learning in EC (Grieshaber & Cannella, 2001). This element, associated with development in students' EfS understandings, may impact on EC education and student engagement in the present study.

Attachment to place

The 'Nature Deficit Disorder' refers to the observation that children have become so plugged into TV, video and computer games that they have lost/are losing their connection with the natural world (Louv, 2005). Various authors argue that it is vital to restore meaningful connections with nature, by fostering strong close relationships with the local environment (Miles, 2008; Miller, 2005). The present study therefore attempted to respond to issues raised by young children to enhance attachment to their local 'place'.

This research is significant as it links current understandings in EfS, specifically the vital role of student voice and the importance of attachment to place, with an increasing focus on EC education. EC is the time to begin to have a critical impact on how future Australians view and respond to EfS issues. Furthermore, the research is timely because it is a sphere of investigation that has been highlighted in recent national and international literature (Environmental Education in Early Childhood, 2010; NSW Early Childhood Environmental Education Network 2010; Tilbury, Coleman et al., 2005).

Educational context

The school was situated adjacent to wetlands, which influenced the children's interests and consequently the EfS projects undertaken. The researcher was a staff member at the school and conducted the study as a component of doctoral research. The research was conducted between 2006 and 2008. The objective, methodology and findings of the study, followed by conclusions, are outlined below.

Objective

The research aimed to investigate the impact of the school's EfS program by addressing the question: What are the outcomes, in terms of EC student attitudes, understandings and behaviours, resulting from involvement in an EfS program?

Method

Participants in the program included the whole school population: students, teachers and other staff. Parents also participated by providing additional support during lessons. Evidence was obtained from 36 EC students who provided signed permission forms to participate in the research: 15 pre-primaries (PP) and 21 lower primaries (LP).

A qualitative approach to gathering information was adopted in order to address the research question. The approach was phenomenological, in that it set out to determine students' attitudes, understandings and behaviours about the EfS program and how the program influenced those characteristics.

Data gathering involved questionnaires, observation and collection of work samples. Students were surveyed in order to determine attitudinal, knowledge and behavioural outcomes. Randomly selected students were observed both in class and during outside EfS activities. Student work samples were analysed to provide additional evidence.

Data analysis involved the collection of data from different sources with a view to determining possible overarching themes. All sources of data were analysed by discourse analysis, using specialised computer software, QSR NUD*IST, Non-numeric, Unstructured Data - Indexing Searching Theorising (Bazeley, 2007; Richards, 2005). Word counts and semantic network analysis of student mind maps and drawings provided further depth of analysis.

Findings

Findings from three EfS projects are presented in the following sections: biological survey, reed planting and turtle nest-watch. These projects occurred in the local context: the school grounds and adjacent wetlands. They arose as a result of the children's interests and concerns.

Biological survey

Students at the school were interested in fauna and flora in their local area and some expressed concern about the lack of biodiversity. A research project was subsequently developed with the students. They wanted to investigate the extent of biodiversity around the school and wetlands.

A biological survey was conducted in 2006. LP students actively participated in all stages of the project, while PP children engaged in observations and discussions focusing on the pit trap specimens that the older children caught. Frogs and lizards were most commonly captured in the pit traps. Students graphed their findings. Figure 1 shows, for example, the number of frogs caught during the different seasons. Furthermore, only two species of frog were caught, seven Motorbike frogs and 75 Western Banjo frogs, whereas 12 frog species had previously been found in the locality (Greening Australia, 2010). In addition, more frogs were caught in the native garden area than any other area. As a result of these findings the students wanted to take action *for* the environment. They planted native flora to improve local habitat, with the goal of enhancing biodiversity of local native fauna and flora.

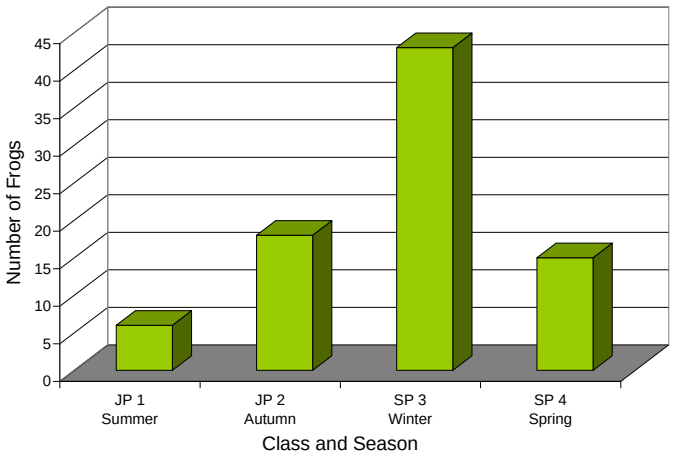

Figure 1. LP student work sample showing number of frogs caught in pit traps by season

The 2007 PP questionnaire invited students to draw themselves doing something good for the environment. A representative drawing is shown in Figure 2. One of the questions in the 2007 LP questionnaire asked students about their favourite EfS lessons during the previous year. Table 1 presents the frequency of responses in terms of topics. Biodiversity topics were students' favourite EfS lessons, with nine of the 16 responses specifically referring to pit trapping in the biological survey (Lewis & Baudains, 2007).

Figure 2. PP student drawing 'caring for the worms'

Table 1. LP students' favourite EfS lessons

Topics	Waste	Water	Biodiversity	Energy	Wellbeing
Typical responses (some students identified more than one favourite lesson)	*Recycling. Worms.*	*Water testing – you got to see all the animals you won't see.*	*Pit traps - frogs wher in them. Garden - I lickt plating* (liked planting). *Pit traps becors you get to see nater* (because … see nature). *Bird watching beacos it was fan. Pet tra - it was fun* (pit trap). *Pt tras - cachc anmls* (pit traps - catch animals). *Pit traps because we cached bugs & insects.*	*Solar panels Sun fear - it was fun* (Sun fair).	*All* (referred to mind map that included caring & respect).
Total	4	5	16	5	4

The 2008 LP questionnaire invited students to create mind maps of everything they knew about sustainability. A typical mind map, identifying pit traps from the biological survey, is shown in Figure 3. Drawn by a Year 3 child, it identified four aspects of 'sustainability'. Two aspects are reported here: the biological survey and water testing/reed planting; while the remaining two referred to other projects (worm farming and health).

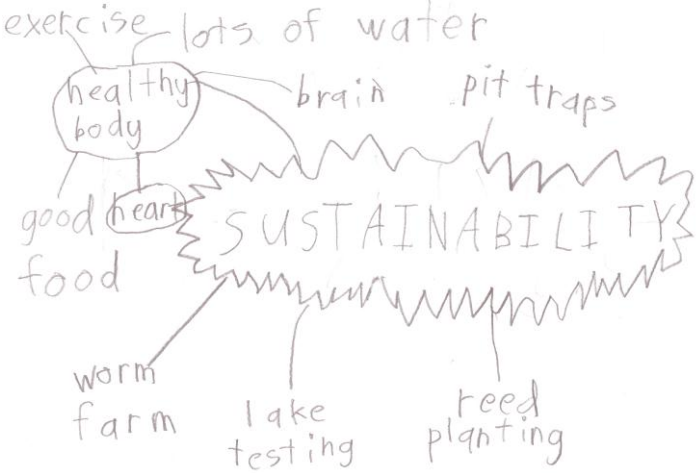

Figure 3. LP student mind map of 'sustainability'

In summary, students were extremely engaged in all aspects of the biological survey, from project design to the early-morning ritual of checking traps, weighing and identifying specimens, and later collating data and preparing posters to present findings. Clearly, the children's hands-on experience in this project

enhanced their interest in and commitment to local fauna, as they requested follow-up surveys in subsequent years.

Reed planting

In 2006 students conducted water quality testing of the local lake. Their results revealed concerns about pollution of the lake environs. For instance, students' found the macroinvertebrate count showed a predominance of species that were very tolerant or moderately tolerant to polluted water conditions. Figure 4 shows a PP student's work sample documenting the macroinvertebrate investigations. Students also learned that the presence of weed species at the lake edge contributed to poor water quality. These results led to student questions about what could be done to improve the situation. Students wanted to participate in action that was *for* the environment.

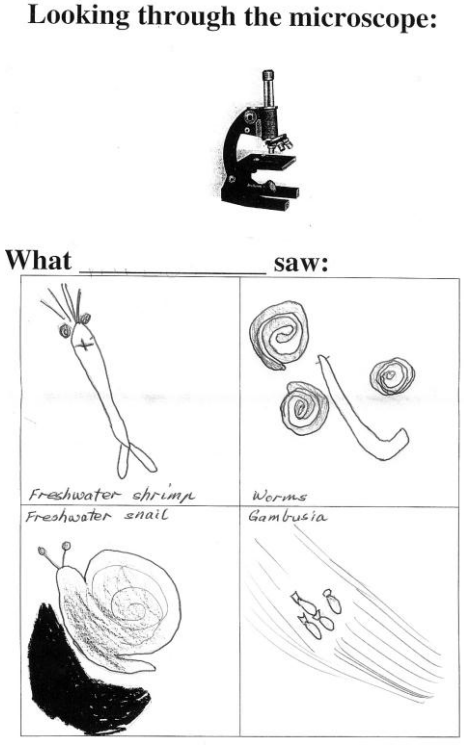

Figure 4. PP student's record of lake life

Based on the students' concerns and desire to improve the water quality, a school/community based project was developed. This involved the removal of weed species and re-planting with native reeds and sedges. Throughout the

project (2007), there was close collaboration between the school, the Department of Environment and Conservation (DEC), the local catchment council and other industry representatives. Students, staff and community members contributed hands-on support by making site observations, documenting developments and re-planting the site with native reeds and sedges.

Student actions showed commitment to the project. For example, after school on the re-planting day, one student reported that birds had pulled up some of the newly planted reeds. Students re-planted disturbed reeds in their own time. Students were also able to explain that planting native reeds and sedges could improve the water quality of the lake, which could positively impact on the diversity of lake species found. For instance, during an interview about attitudes to the environment, conducted in 2007 as part of an Environmental Learning Outcomes Survey (ELOS) Interview Schedule (Ballantyne, Packer, & Everett, 2005), students were asked what the particular part of their visit to the project site made them change how they felt. One LP student replied '… *remembering how dirty the water was last year and how clean it is this year … I found more creatures in the lake and saw the water was cleaner*'. The behavioural intentions of this student were '*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.'* Clearly, these students displayed behaviours indicating empowerment and commitment to the project.

The ELOS Student Observation Schedule (Ballantyne, Packer et al., 2005) was employed in 2007. PP and LP classes were observed participating in the project. Observations were undertaken during lessons incorporating whole class and small group discussions, walking to and from the lake site, observing surroundings and conducting water quality assessments. Overall, students displayed positive engagement in learning behaviours. Students shared their learning with their peers and experts, and were actively involved in learning all the time. See Table 2.

Table 2. PP and LP student engagement in learning behaviours during lake lessons

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

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

The 2008 PP questionnaire invited students to draw themselves doing something good for the environment. A representative drawing is shown in Figure 5. LP students were requested to create a mind map showing everything they knew about sustainability. The mind map in Figure 3 showed the student recalled the water quality testing/planting native reeds project from previous years.

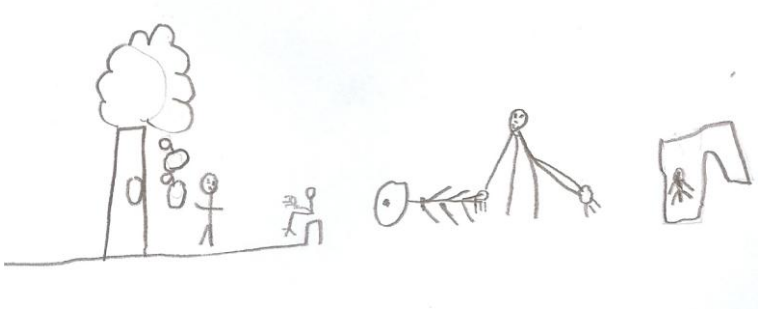

Figure 5. PP student at the lake 'placing fish bones in the bin'

In brief, the native reed planting project engaged children in practical, hands-on activities that could contribute to an improvement in the lake water. Evidence was provided indicating these young students felt empowered through participation in the project. Another wetlands investigation, the turtle nest-watch project, is discussed in the following section.

Turtle nest-watch

EC students expressed concern about turtles in the local wetland. Road deaths and a lack of suitable nesting sites were identified as key issues that impacted on turtles. In response to student concern, the school developed a turtle nest-watch project, which was implemented over a two-year period, 2006–2007. It aimed to provide a suitable, safe nesting site in the wetland for the oblong turtle, *Chelodina oblonga*.

The project involved close cooperation between the school, Department of Environment and Conservation (DEC) and other groups. The trial nesting site was located in a comparatively flat, open, rectangular area about 30 metres from the water, and a 10-minute walk from the school. Students, staff and community members contributed hands-on support for the project by making observations at the site, collecting litter and documenting developments.

Students displayed environmental responsibility by taking appropriate action when they observed the amount of rubbish at the site. They volunteered to collect litter each time they visited the site. During an ELOS (Ballantyne, Packer et al., 2005) interview in 2007, a LP student reported '*My attitude to this environment has changed seeing the impact of predation, of rubbish, and weeds, at the site ... It is sad to see how much rubbish is about; I'm more conscientious about walking to the bin.'*

Students recognised the importance of preserving native habitats and expressed ecosystem understandings. For instance, one LP student stated '*turtles are at the top of the under-water food chain and can show how good the environment is'*. Students conducted turtle nest-watch expeditions to determine if the site had been used for nesting. They found it had, but it was unsafe as all 31 nests were predated. This finding was reported to DEC for follow-up action.

In summary, the review of the outcomes of the turtle nest-watch project suggested participation provided an effective means of responding to student

concerns and engaging them in EfS action to make a difference in their local environment. As with the biological survey, LP questionnaire respondents in both 2007 and 2008 were so engaged in the project they requested further ‘turtle egg hunt’ experiences.

Conclusions

The three projects discussed in this paper illustrate how one school attempted to engage in EfS with EC students from a perspective that recognised the importance of responding to topics of interest and concern to the children. The issue about who created the suitable learning context was important. In each project it was students who initially raised the topic and drove the creation of the environmental contexts in the local setting. Student participation in the whole learning process, from conception of learning context to its fruition, was considered crucial for achieving powerful, meaningful, long-term EfS experiences. Clearly, EC children have the capacity and energy to make changes in the environment, but the support role played by the school and parents/community is critical.

The results support the proposition that this EfS program was an effective, meaningful approach to the engaging young children in sustainability learning experiences. Students were able to verbalise their developing environmental knowledge, express attitudes toward local environmental issues, and outline their behavioural intentions and actions to improve the environment. This evidence suggests young students can learn about sustainability in real life, local environmental contexts by actively participating in tasks that empower them. Student outcomes were illustrated in potent, enjoyable, hands-on, real-life contexts. Students demonstrated improved care of and action *for* the local environment, as well as enhanced understandings of the healthy functioning of natural ecosystems.

EfS in the present study moved beyond the familiar school kitchen garden experience for EC students. The three projects: biological survey, reed planting

and turtle nest-watch, allowed us to view EfS with a re-framed perspective, utilising the opportunity to provide students with a powerful voice by responding to their interests and concerns. Indeed, sound pedagogy called for making strong links between student voice and the real world in the local, long-term context (Miles, 2008; Thiessen & Cook-Sather, 2007). Evidence indicated enhanced attachment to students' local 'place'.

In conclusion, EC EfS can facilitate deeper futures thinking and engagement with 'real' local environment issues. The challenge to the participating school now, and to other schools, is to determine ways to respond to student interests and deeply embed EfS practices within other site plans and curricula. There are broader implications too. What is the nature of the staff professional development required to achieve these outcomes? What do teachers, students and the school community need in order to engage in similar learning experiences? What are the implications of the issues identified in this paper for pre-service and in-service teacher education? Finally, how can other projects be confidently translated into examples of quality teaching that facilitate the transformational change outlined in Australia's Action Plan for EfS? Clearly, there are many research questions about the relationship between EC education and EfS that warrant further study. Only some of these questions will be addressed in the current doctoral research; future researchers are therefore challenged to consider the questions raised here as a platform for further discovery.

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