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Place, Sustainability and Literacy in Environmental Education: Frameworks for Teaching and Learning

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Abstract

The 'ecologisation' of Australian primary schools brings new opportunities for curriculum expansion and renewal for sustainability education. My contribution to the broader discussion of place, geography, sustainability and literacy stems from an interest in how children are brought into contact with sustainability discourses via sensory and embodied learning in local school ground landscapes. In this paper I am interested in identifying the emergent pedagogies and new literacies that inform and shape the implementation of sustainability curriculum. The paper draws on research that uses theories of place inhabitation, relationships to food, place ecologies, and place-based pedagogies to examine the educational value of food gardens and related environmental and health initiatives in primary (elementary) schooling in Australia. Using research data from two schools, the paper illustrates how school ground settings, curriculum and pedagogy generate spatial, temporal and geographical literacies that support children's meaning making. These multimodal literacies are vital curriculum ingredients that effectively educate for sustainability.

Keywords: Education, sustainability, school ground geographies, curriculum and pedagogy

Introduction

This paper emerges from a broader study that examined school ground geographies in three Australian primary (elementary) school contexts. The study, which proposed a framework for education for sustainability identified a number of pedagogical and socio-ecological practices that support the health and longevity of people-place relations (Green, 2011). At a time when education for sustainability has been identified as a key priority in the new Australian curriculum, school garden pedagogies are incorporating literacy and language practices that deepen children's understanding of sustainability. In

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this paper I am interested in examining how the constructs of place, sustainability and literacy bring children into contact with sustainability.

Education for sustainability is an emerging and dynamic concept that encompasses a new vision of education (UNESCO, 2002, 2012). As a concept sustainability represents an ideal that will be achieved when human-caused environmental degradation has been reversed and overconsumption and gross economic injustices that deprive future generations of the ability to meet their needs (Nolet, 2009; Orr, 2009; Shiva, 1992; Steele, 2010). Others (Capra, 2005; Orr, 2004) argue that children's intellectual understanding of ecology and their emotional bonds with the natural world need to be key features of sustainability.

More recently sustainability has been identified as the reorientation of society that equips citizens with critical thinking and problem solving, participatory decision-making, and systemic thinking skills to address today's complex sustainability issues (Onwueme & Borsari, 2007; Sterling, 2012; Tilbury & Wortman, 2008). Integral to this work are teaching and learning practices that emphasize environmental and social justice. Fawcett et al (2002) pick up this theme in their work on environmental praxis, suggesting that the real meaning of sustainability cannot be fully comprehended unless students engage in skills that assist them to investigate and solve issues that inform attitudes of care and concern, and in adopting practices that protect the places where they live and learn. Others advance sustainability as a new paradigm 'that makes learning towards sustainable living an explicit, central and integrating concept in education planning and practice' (Sterling, 2001, p. 83).

Despite these claims, sustainability has become a broad construct and open to wide interpretation (Fien & Tilbury, 2002). Such ambiguity has according to Walshe (2008) created significant implications for how it is interpreted, developed and implemented in schools. Up until very recently sustainability in Australian schools has been segregated, concealed and marginalised in both policy and practice. Often taught under the guise of environmental education by educators committed to teaching about, for and with 'the environment', or by those teachers who specialise in the disciplines of science, studies of society and environmental science, or environmental science, sustainability frameworks in schools have tended to be sporadic, and in some cases negligible (Sterling, 2012).

A number of schools however are beginning to develop integrated curriculum approaches that study sustainability from a variety of perspectives, and from integrated and academic disciplines (Feng, 2012). At the heart of this work are school ground geographies - including local everyday places such as food gardens, wetlands, other naturalized spaces and indoor classrooms that function as key enablers for children's deep engagement and long-term commitment to sustainable living practices (Edwards, 2006; Moore, 1995; Stone, 2004). Framed by rigorous sustainability curriculum that views education 'not just as another issue to be added to an already overcrowded curriculum, but as a gateway to a different view of curriculum, of pedagogy, of organizational change, of policy, and particularly, of ethos' (Sterling, 2005, p. 233), these alternative settings and their associated pedagogies are breaking new ground for the implementation of sustainability.

Associated with this work are pedagogical practices that expand children's environmental communications and literacy repertoires (Comber, Nixon, & Reid, 2007; Reid, 2007). As such, school ground geographies are now considered as important gateways that assist students to engage in a range of multimodal literacies. No longer viewed as a separate discipline that privileges the written form, literacy is becoming universally understood as a tool with which to understand, critique, and engage with the world via a diversity of texts (Luke, 2003). The 'multiplicity of communication channels' (Kalantzis & Cope, 2008) that currently underpin literacy belong to a framework that defines and shapes children's learning via flexible text forms privileging engagement with real life agendas (The New London Group, 2000). These agendas are being taken up in outdoor learning environments where children make meaning through reading, writing, viewing, listening, designing and talking (Walsh, 2010).

Hardly a new phenomenon, meaningful learning agendas were central in a three year Australian River Literacies project, Special Forever that exemplify how clusters of teachers utilise a range of multimodal communications to assist students to build and communicate knowledge about, and take action in their local environments (Comber, et al., 2007). Transcending print-based communication, the project illustrates the importance of multiliteracies that expand children's semiotic repertoires and competencies through land conservation, arts-based activities and garden work. Research associated with this project examines the significance of productive pedagogies that link literacy and the environment through alternative and informal processes (Nixon, 2007; Reid, 2007). Given the limited research on place, sustainability and literacy, the River Literacies project created a critical benchmark for thinking about how teachers might work with multimodal literacies to emphasize the sustainability of local places.

In examining the multiliteracy practices that connect children to sustainability, I present two examples (from the broader study) of how sustainability is being organized via school ground geographies and multiple literacy modalities. The first represents a middle-class primary school located in the Dandenong ranges (one hour's drive from the city of Melbourne in the state of Victoria) regarded for its enduring commitment to environmental education. As part of their engagement with sustainability curriculum, children design, build and (re)inhabit a new garden site. The second comes from a P-10 school (one hour's drive from the city of Hobart in the state of Tasmania) which supports a low-socio economic demographic. This program is framed by place-based pedagogies that support children's knowledge and understanding of a coastal environment. Focusing on the two school settings, the paper illuminates the pedagogical, geographical and literacy practices that bring children into contact with sustainability.

I begin the article with a description of the conceptual framework of place that frames the broader study, which is followed by a review of garden-based literature. An explanation of the study, including the methodology and methods is then provided. Drawing on photos, field notes, student-produced artefacts and student/teacher interviews I describe two school ground geographies–a coastal environment and a horticultural/forest environment, and the respective literacies that bring children into

contact with sustainability. Framed by pedagogical renewal and new literacies I discuss the implications and contributions of the programs for curriculum, and for teaching and learning. Finally, I conclude that multi-literacy practices combined with school ground geographies and pedagogies are key enablers that educate for sustainability.

Place as a conceptual framework

In the broader study I drew on the conceptual framework of 'place' as a way of understanding the school ground geographies that informed teaching and learning interactions. As argued by Gruenewald, place 'foregrounds a narrative of local and regional politics that is attuned to the particularities of where people actually live, and that is connected to global development trends that impact local places' (Gruenewald, 2003b, p. 3). In viewing place as an 'organizing principle' I began to understand its capacity as 'an alternative lens through which to construct knowledge about the world' (Somerville, 2010). Made up of three key elements: place learning is necessarily embodied and local; our relationship to place is communicated in stories and other representations; and place learning involves a contact zone of contested place stories, Margaret Somerville's place pedagogy framework provides an important platform for understanding the way teaching and learning might occur in place (Somerville, 2010).

In addition, Doreen Massey's conceptions of space and place provide further impetus for thinking about school ground geographies as educational entities that generate dynamic relations. As Massey argues, place is not a stationary reality but an active, generative and reactive process that can modify and transform (Massey, 1993, 1994). She maintains:

> *What gives a place its specificity is not some long internalized history but the fact that it is constructed out of a particular constellations of relations, articulated together at a particular locus…The uniqueness of a place, or a locality in other words is constructed out of particular interactions and mutual articulations of social relations, social processes, experience and understanding in a situation of co-presence (Massey, 1993, p. 66).*

The relational interactions Massey refers to could best be described as dynamic components of a pedagogical framework that constitutes daily routines, exchanges and actions in place (Sutton & Kemp, 2011). These pedagogical connections between the human and more than human world are known throughout the literature as 'place-making' initiatives (Birkeland, 2005; Comber, 2011; Derr, 2006; Green, 2009; Gruenewald, 2003a; Somerville & Green, 2012b) that 'teach us about how the world works, and how our lives fit into the spaces we occupy': they assume a relationship between education and the well-being of place' (Gruenewald, 2003b, p. 647).

Within educational settings these approaches are known as place-based education and are offered as a possible model for a new paradigm of sustainability education ... that aims to address the sustainability of people, places and communities (McInerney, Smyth, & Down, 2011; Skamp, 2010; Somerville, 2010). As Eppley (2011) sees it, place-conscious pedagogies can be understood as a means of resisting inequitable literacy practices [and promoting] democratic participation that spirals from the local to the global, a notion that is taken up later in the paper.

School ground geographies: food garden pedagogies

Central to the study is the importance of school ground geographies that link children to learning. Traditionally viewed as spaces that provide a break from 'real learning' (Skamp, 2007), school ground geographies include indoor and outdoor 'living classrooms' (Nuttall, 1996) that support children's social, emotional, ecological, cultural and physical relationships (Blair, 2009; Mannion, 2003). The 'ecologisation' of school grounds over the past decade (Rauch, 2000) has seen the replacement of hard playing surfaces with more naturalised and softer elements of trees, grasses, flowers and rocks. This school ground 'greening' has given way to the proliferation of food gardens and food production opportunities, including new openings for sustainability curriculum. More than just places in which to grow food, school garden settings are becoming the catalyst for transformative change in school communities, prompting schools to re-design, remake and re-think school values and cultures that revitalize and reorient curriculum priorities and practices (Green, 2008, 2011).

School ground geographies tend to incorporate learning settings both within school grounds and into nearby places within the broader community (Flowers & Chodkiewicz, 2009; Skamp, Boyes, & Stannistreet, 2009). Despite the limited opportunities for modelling and developing understanding of sustainability in schools (Tilbury, 2006), many Australian schools are working with local geographies to promote sustainability as a curriculum priority (Somerville & Green, 2012a). Increasingly schools are developing curriculum that views sustainability 'not just as another issue to be added to an already overcrowded curriculum, but as a gateway to a different view of curriculum, of pedagogy, of organizational change, of policy, and particularly, of ethos' (Sterling, 2005, p. 233). At the heart of these initiatives are 'sustainability literacies' (Orr, 1994, cited in Nolet, 2009) that enable children's engagement with everyday practices in places where school communities exist (Comber, 2011).

Historically dominated by anecdotal claims, empirical studies of school ground/garden settings are becoming well represented (Blair, 2009). Within gardening discourses we now understand the health benefits of gardens (Bell & Dyment, 2008; Ozer, 2007; Simovska, 2007), the nutritional outcomes (Parmer, Salisbury-Glennon, Shannon, & Struempler, 2009), the mental health effects of garden interactions (Maller, 2009; Maller & Townsend, 2005) and the part gardens play in connecting children to the more than human world (Heft & Chawla, 2006; Moore & Wong, 1997; Pivnick, 2001). Other garden-based studies explore children's desire to learn in gardens (Wistoft, 2012) and speak to the ways naturalised spaces stimulate educational and play opportunities that cultivate important child-environment relationships (Barratt Hacking, Scott, & Barratt, 2007; Bowker & Tearle, 2007; Dyment, Bell, & Lucas, 2009; Skelly & Zajicek, 1998; Waite & Pratt, 2011). Additionally, a growing body of work clarifies the importance of local geographies as frameworks that link students to sustainability, history and culture (see Faddegon, 2005; Green, 2011; Harrison, 2011; Thorp, 2006). These and other studies (Mayer-Smith, Bartosh, & Peterat, 2007; Mayer-Smith, Peterat, & Bartosh, 2006; Murphy, 2003a, 2003b) capture the significance of everyday places

that frame intergenerational interactions between children, gardens, farms and the broader community.

Building on this overview of place/school ground geographies/gardens, the paper sheds further light on the enabling pedagogies that afford children's engagement with everyday places via diverse literacies that educate for sustainability.

Research methodology and data collection

The 4-year qualitative research project - Place Matters: Pedagogies of Food, Ecology and Design (Green, 2011) examined the eco-pedagogical practices employed in sustainability programs in three Australian primary schools. The study was informed by an arts-based (Cole & Knowles, 2008; Weber, 2008) and auto-ethnographic (Ellis, 1997; Pink, 2007) methodology. Overall fifty-three children aged 8-12 years, three gardening/environmental education teachers and three principals from their respective primary schools worked ethnographically with the researcher. Data were primarily derived from semi-structured, face-to-face interviews from the participants. The data collection phase for each school worked as such: interviews with respective principals and then the gardening/environmental teachers. In order to build familiarity and rapport with students, I initially undertook classroom/garden observations before interviewing children. Other sources included children's mapping work, field notes, photos (with parents' consent) and research journal. Key features of the data collection were 'walking interviews' (Clark & Emmel, 2010) that encouraged student stories at learning sites of their choice. A total of fifteen days participant observation of garden and classroom-based lessons (including recorded accounts of events/observations) provided further contextualization.

Analysis of interviews and lessons involved an inductive approach that recognized emergent knowledges and distinguishable categories or storylines within the data source (Somerville, 2003).

The collation of emergent categories, for example, ecological competence, children as designers, democratic processes, food knowledge, autonomy etc. were developed from each of the interviews, and provided a framework for understanding the shared and unique patterns across all interviews. Field notes/photos from lesson observations were analysed using the following questions: What are students being asked to do in this lesson? What is the teacher doing to support student learning? How are students moving in/through the learning site? How are students responding to the learning tasks? To analyse children's mapping work I set out each of the different maps - one-dimensional drawings and two-dimensional maps to examine the emergent themes and storylines within each. How did concepts such as keys/symbols, direction, and orientation etc. work to represent students' spatial understanding of the school grounds/gardens?

In the following section emphasis is given to two of the participating schools – Forest school and Coastal school (pseudonyms) who work with innovative multi-literacies and eco-pedagogies within a sustainability curriculum framework. The focus on these schools is deliberate and sets out to critique the literacy and pedagogical practices that effectively strengthen and expand students' comprehension of sustainability.

Findings

Sustainability in the making: A tale of two schools

Forest primary school

Forest primary school is a middle-class school located in the Dandenong ranges (one hour's drive from the city of Melbourne, Victoria) and is well regarded for its commitment to environmental education via classroom and school ground settings such as garden site, wetland and creek and nearby deciduous forests. These school ground geographies are important features that frame children's ecological knowledge and skills through experiential and problem-based tasks. Far from hypothetical scenarios determined by the environmental science/gardening teacher, real-life issues require students to work in small teams. They are expected to share their learning with peers and understand the tangible nature of their investigations. As the teacher tells them:

> *You've acted as an engineer would in this situation because they're always trying to come up with ways of constructing things that are safe … you've just put your science lab coat on doing that little test there… that's what scientists do, they find out with hard data, they make a hypothesis, they have an observation, they test it and then they find out whether they're right or wrong, and you've done that (Environmental teacher).*

These same processes inform the're-engineering' of an unused playground site for the 'garden project' intended to expand the school's existing sustainability curriculum. In response to the overarching question: What will our new garden look and feel like, students across the school work in small research groups of 3-4 to analyse gardening magazines, books and websites, interview gardeners, visit gardens and record their research through mind maps, stories, lists and poetry as a way of thinking about the new garden. As ideas develop, children are afforded opportunities to present findings and newly formed ideas that are debated, negotiated, and justified in dialogical and respectful ways.

As part of the process students build two-dimensional maps with crushed rock, glass, sand and other natural materials to represent their thinking. Developed through 'a bird's eye view', the maps provide a rich overview of what this new place will look like. Lists of ideas are generated, and pictures and diagrams drawn up as working documents. These processes are well remembered by an older student who told me:

> *At the start all we did was make designs…where all of the things were going to go in the garden…we made models… you got to use your imagination and you just put all your thoughts down…blue glass was used for representing water…plasticine to make sculptures. It feels really good because you don't usually get asked every day to make something (Grade 5 student).*

Students' final impressions are collated and interpreted by the teacher on a blueprint garden plan that becomes 'the working plan'. As the principal explains, this final plan serves as an important representation of student ideas that provides a critical 'bird's eye view' of the school's collective vision:

One of the crucial things is that plan. [The teacher] has placed a lot of emphasis on what we're heading towards… having it all clear. She wants every kid to know 'now over there, that circle is representing the pond, that's representing the building…(Principal).

During their weekly classes children transfer democratic design ideas into grounded reality: garden beds and paths are measured, built and mulched; fruit, native and ornamental trees are planted, and a frog pond built. With the assistance of the broader school community, a (passive/solar designed) ecology centre made with recycled materials is built. Brightly painted second-hand tables and chairs, couches and rugs adorn the classroom, and reflect the intent of the teacher who tells me:

I wanted it [the ecology centre] to be a bit like a house…because at home kids are very comfortable and school seems such an alien kind of place to be in sometimes for a whole day. And yet I've always felt that why can't your classroom look like your lounge room? Why does it have to look so regimented? And this inside I want to be relaxed and interesting and I want them [students] to feel creative and inspired and connected … there will be times when we will have the whole lesson in here if it's bad weather, and I want them to sit on the couch and read and I want them to sit at a microscope and explore things (Environmental teacher).

Figure 1.
Place-making in the pizza garden: tasteful learning

As the garden project advances students work with the art teacher to design, build and install colored tipi's throughout the greater garden space; later on painted prayer flags, totem poles and garden signs are fixed into place. In other lessons a group of children draw on mathematical literacies and concepts to build and plant a new pizza garden with (fractional) beds that symbolize a (real) pizza. Future ingredients of herbs and tomatoes are harvested for homemade pizzas to be cooked in the nearby outdoor oven. In their gardening lesson senior students work with principles of 'area' and 'perimeter' to estimate and measure rainfall (water harvesting) from school building rooftops; their findings determine size and capacity of water tanks for future water storage.

Figure 2.
Mapping literacies: a local landscape

In their two dimensional mapping activities senior students work the concepts of 'bird's eye' and 'helicopter' view in order to develop a more complex spatial perspective of what the new site will look like. In this image (Figure 2) the materiality of the map is brought to life through children's sophisticated representational use of colour and texture. Close to the ecology centre younger grades plant out an alphabet garden with boxed hedge. In the nearby wetland, volunteer students have cleared weeds and excess foliage during lunchtime; younger children dangle from a newly built platform and scoop out active pond life with finely woven hand nets. This site becomes part of the nature trail designed by the older students with interpretive signage describing its ecological and historical significance.

Coastal school

Coastal school is a P-10 school (one hour's drive from the city of Hobart, the capital city of Tasmania) that supports a low-socio economic demographic, and a fluctuating student population that see themselves as 'less achieving than other students' (Principal). The environmental education teacher works with place-based pedagogies to support children's knowledge and understanding of a coastal environment, and has been responsible for developing the sustainability program on the school's 12-acre farming property.

Each class at Coastal school is allocated a specific patch of land to work with during their sustainability lessons. Some grades have responsibility for looking after the wetland, others care for the little fernery, boxed food garden beds and an indigenous garden; the infant grades are custodians of a little food garden close to their classroom. Informed by the significance of school ground geographies, the teacher describes her pedagogical intent to work with local landscapes for learning:

> *I think it's really important for kids to know where they live and there's such a rich resource in outside the classroom, outside the school…[it] is often neglected…it's important to really foster that sense of wonder about their place…to get to know it, identify with it, be the expert and caretaker of that patch, and develop an awareness of the changes that occur in that place (Environmental teacher).*

The wetland project kick-starts the implementation of the sustainability program. As part of their lessons senior students immerse themselves in neck-high cumbungi weed - some slash the plants with small hand machetes - others clear it and build pyramid-like piles for it to decompose. Later the cleared area is replaced with indigenous tree and grass species that will aid water filtration processes in the wetland and creek system, which feeds into the coast some 100 metres away. In time the restoration work converts a dysfunctional and 'smelly' wetland into a flourishing habitat that supports species of frogs, water hens, cormorants, sea eagles and a platypus, all of which now make this place home. Children understand their part in the wetland's transformation and this is represent in the photo below (Figure 1) where children are busy redirecting water flow after planting native grasses. As one student explains:

> *I reckon the wetland has changed a lot. It used to have weeds growing up twice as high as it is now. When we came here it was covered in cumbungi [weed]… it was everywhere. Over there we found it was leaking water into the dam making it worse. There was a giant puddle so we ended up digging a big trench all the way to the dam to fill it up (Grade 6 student).*

Figure 3.
The 're-inhabitation' of a wetland: caring for country

Children are able to create their own stories of place through collected materials (see Figure 4). In these installations children embrace coastal/marine themes through the use of shells, driftwood and an old lantern that represents a bottle with a message inside. Students write about and photograph their work, which is re-produced in the school newsletter. Their environmental work is communicated to the broader community via the local radio station, newsletter and at a statewide conservation conference where children are keynote speakers. As the program gains momentum, students lead school ground tours to educate visiting teachers and general public about their sustainability work. During these 30- minute excursions students communicate the participative learning processes that occur at each of the various sites – wetland, food garden, composting station etc.

Figure 4.
Sculpture trail: Message in a bottle

Children's engagement with this coastal place are brought to life in My Patch - a picture storybook developed by the teacher featuring children's detailed drawings of underground ant tunnels, local flora and fauna, rocks, trees and vegetable gardens: written stories describe student's special relations with the more than human world. A Flotsam and Jetsam exhibition along the 1km foreshore-walking trail linking school ground to neighbouring properties brings students, local artists and other nearby schools together to celebrate intergenerational relations with this coastal place. For their part children collect miscellaneous objects and materials from the nearby foreshore in small groups (including rubbish, pollutants and fishing miscellanies) to create installations that represent the (his) story and're-inhabitation' (Gruenewald, 2003a) of a coastal place.

Since the commencement of the program students have taken on leadership roles in managing environmental and economical initiatives such as marine research, foreshore rehabilitation, monitoring and adjusting the use of energy and resources within the school (e.g. water, electricity, compost, and paper), the collection and propagation of native seed, planning and designing endemic gardens, and maintaining organic gardens for food production. Building on these responsibilities the teacher arranges for a group of older boys to work with a visiting chicken farmer who teaches them how to care for the school's chickens. A student tells me of his newfound responsibilities:

> *We've got our own chooks…we've got a lot of responsibility here. When I first took over the chickens you would walk outside your class and you'd see a chicken run past, they were everywhere around the school…me and my team ended up rounding them up putting them back in their pen and fixing up all the*

> *holes in there … and my work has finally come through and we have two, three new baby chickens…they [expert visitor] talked about how to get rid of mites and black mites which is in their feathers. He said we should have some railing up for roosting that we built in the afternoon. He said we had to paint their legs with used cooking oil and ash to stop mites…now they can walk easier, because the leg mites stop them from walking. My chickens at home have never looked better (Grade 6 student).*

The student's commitment to leadership and animal responsibilities is significant given that up until the opportunity to learn through a local landscape, he had had limited experiences of successful, autonomous and empowering learning. As he tells me, he can now confidently transfer his school-based learning to home.

Results and discussion

Pedagogical renewal

The dynamic teaching and learning geographies highlighted in this paper encompass pedagogies that motivate a community of learners - schools, students, their teachers and the broader school community to embody new ways of being in the world. Orchestrated by the guidance of well-prepared and committed teachers (Flowers & Chodkiewicz, 2009; Skamp, et al., 2009) the pedagogical processes involve a 'slow' and unhurried arrival to new knowledge, predominantly through democratic processes. In these contexts children are positioned as active agents who experience deep levels of embodied learning, interaction with phenomena, ideas, messages and objects through place-making activities (Healy, 2008).

Largely informed by chaos, risk, chance and open-endedness (Somerville & Green, 2011) the predominant action-based tasks require students to develop (public) perspective, opinion and action. Subsequently, the teaching and learning geographies at play here generate emergence and uncertainty and are without exception, chaotic. The ensuing notion of chaos in these learning sites are as Barbara Comber (2011) suggests, 'risky', and demand pedagogies that support students to think and rethink strategies/tactics that bring them to new ways of seeing and being in the world. The absence of mundane worksheets that tend to promote generic and rote answers means that teaching and learning in these places often warrants messy, unfinished and ongoing investigation. In a climate of heightened teacher accountability and testing regimes designed to steer children towards correct and immediate answers, such approaches could be perceived as inherently destabilising as Derrida suggests:

> *This chaos and instability, which is fundamental, founding and irreducible, is at once naturally the worst against which we struggle with laws, rules, conventions politics and provisional hegemony, but at the same time it is a chance, a chance to change, to destabilize…Chaos is at once a risk and a chance (Derrida, 1996 cited in Massey, 2005, p.151).*

In this study we see teachers who are prepared to take a risk and a chance in order to re-think pedagogy and curriculum. These programs are not only an opportunity to implement innovative (sustainability) curriculum ideas, but are 'a chance to change' the

ways children learn and teachers teach. Pedagogically this work disrupts the traditional discourses that elevate teacher domination and student passivity. In stark contrast teachers are positioned as facilitators rather than knowledge holders, who frame learning through autonomous and independent processes. Similarly, children are re-positioned as authentic learners who are empowered to think and act critically throughout their learning encounters.

New literacies for sustainability

The 'multiplicity of communication channels' (Kalantzis & Cope, 2008) that inform teaching and learning in these programs open up new ways to interpret and implement 'literacy' in sustainability curriculum. In their own distinctive ways the two programs encompass a diversity of texts (Luke, 2003) that invite children to engage with the local worlds where teaching and learning occurs. Fundamentally literacy is not viewed as a specific (isolated) discipline taught through conventional text-based practices, but rather viewed as a 'multimodal and multispatial' practice (Vasudevan, 2009) that is integrated across a broad curriculum. Predominantly but not exclusively framed by sustainability and environmental education, students are encouraged to draw on knowledge from other subject disciplines such as history, geography, mathematics and science as part of their engagement with mapping, diagrams, sketches, lists and other digital literacies.

Aesthetic and arts-based literacies

The arts-based literacies cited in this paper reflect how a creative arts platform might support students to 'use the arts to communicate their developing understanding of the concept of sustainability' (ACARA, 2011, p. 22). The literacies are integral to children's engagement with sustainability and deliberately combine the intellectual understanding of ecology and children's cultural and emotional attachment to the natural world (Capra, 2005; Orr, 2004). The tipi's, prayer flags, mosaics, murals and interpretive signs for example, are responsive and intrinsic exemplars of creativity and the arts that expand communication and representation of knowledge through 'multiple expressive modalities' (Vasudevan, 2009, p. 357). Similarly, the children's foreshores installations become meaning-making projects or ways of knowing that not only immerse children into a coastal place/community through expressive and arts-based frameworks, but which encourage them to 'explore experiment, create, analyse and critique, and ultimately discover multiple meanings' (ACARA, 2011).

The imaginative genres represented within the two programs complement cognitive learning, and foster what Ewing (2010, p. 34) describes as 'connections between children's culture, language and experience and lead to transformative changes in their understanding, so that they can interact with the social and physical environments, making new connections and seeing new possibilities'.

Spatial literacies

The school ground geographies foregrounded in this study open up new ways for understanding how children might embody local landscapes as part of their learning. In these settings teachers pay specific attention to the socio-spatial opportunities those privilege children's mobility and spatial freedom. Compared to traditional 'risk-free' classroom choreographies (Jones, 2003) that physically, emotionally and spatially

confine students, children are free to move around the learning sites in autonomous and flexible ways (Karsten & van Vliet, 2006). Children come to know and love these opportunities and are grateful for the chance to genuinely participate in processes where their opinions matter. Described as 'liberating place-making practices' (Sutton & Kemp, 2002) the collective action generated in these lived spaces becomes a launching pad for children's active engagement with current and future worlds. This engagement is expressed through reflective processes that pay attention to children's deep learning (Warbuton, 2003):

> *Our garden is a really cool place. It has taught me loads of stuff and the reason is that it is really cool is because it is outside and you can talk heaps while you are working and you can work with whoever you want to (Grade 4 student).*
>
> *The sun on your face, the bird sounds in your ears, these are just some of the reasons I love the garden. My favorite part of the garden project so far was going bug catching in grade 2. I remember Leroy finding a dead tadpole with legs. I also like making fairy gardens while most of the boys made fern huts. I like drawing diagrams of animals and holding animals. When you are in the garden, your mind just drifts off somewhere else (Grade 5 student).*

As places of everyday life (Holloway & Valentine, 2000) the geographies at play here frame children's identities and learning in ways that mean something to them. Their reflections of how they read and act their everyday worlds highlight the importance of pedagogies and literacies that enable them to make and re-make their own worlds of meaning through sustainability curriculum frameworks.

Conclusion

This paper has explored a number of geographical, pedagogical and literacy practices that advance children's understanding of sustainability though the 're-inhabitation' of school ground places. Recognised as enabling learning spaces the school ground geographies effectively link children to sustainability knowledge and understanding and have great capacity for transformational teaching and learning. Largely informed by place-, geography- and garden-based pedagogies, these programs take up spatial, temporal and geographical literacies to inform sustainability curriculum, and are tangible exemplars for how beginning and practising teachers might develop curricular vision for their own delivery of sustainability.

Framed by everyday places, the lived, sensory, embodied and action-based experiences are the foundations on which children's genuine engagement with sustainability can be understood and built. The enabling pedagogies and literacy practices are transformational in that they offer new and different ways to reconceptualise and inform sustainability curriculum. In this work, children read and act the world through local geographies and diverse literacies, and in the process become invested in the places where learning occurs. These reflections of embodied outdoor experiences push for a more contemporary landscape of communication that include multimodal textual forms.

Pedagogies of design, land conservation, food production and local histories/stories are vital ingredients of integrated curriculum frameworks that successfully educate for sustainability. Internationally further research is required to understand how teachers can work with integrated sustainability frameworks that draw on children's life experiences and their already developed knowledge. If the premise of education for sustainability is to support school communities in equipping students with necessary knowledge and skills that allow them to understand the significance and implications of human-environment relations in the 21st century, then the multiplicity of literacies highlighted in this paper offer a way forward for how we might educate for sustainability.

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