

PLACE AND SUSTAINABILITY LITERACY IN SCHOOLS AND TEACHER EDUCATION

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Abstract

The development of sustainability literate teachers has been identified as a key challenge for the implementation of education for sustainability in Australian schools (Skamp, 2010) and elsewhere (Nolet, 2009). This paper reports on the first year of a participatory action research project that investigates the learning of school teachers, teacher educators, school children and teacher education students, in relation to the integration of place-based sustainability education across the curriculum of a low SES primary school. The methods of data collection included digital visual and audio recorded observations and reflections by teacher educators; reflective observations, focus groups, and interviews with teachers and principals; and the collection of student artefacts from school and teacher education students. A number of different conceptual and theoretical lenses are brought to the analysis of this data including 'thinking through country'; sustainability literacies and new technologies; and contemporary theories of space, place and body. In this baseline paper, the overall findings are summarised under the categories of the participating groups: - teacher, teacher educator, school student, teacher education student, and the school/place/community nexus.

Keywords

Education for sustainability, place-based education, curriculum and pedagogy, low SES primary schools, participatory action research, theoretical frameworks

Background

The research undertaken for this study is part of a larger program of research about 'Place and sustainability education for the Anthropocene'. The concept of the Anthropocene, the new age of human induced planetary changes, is used as a provocation to emphasise the need for new curriculum and pedagogies of sustainability to educate the next generation of citizens and leaders for a post-climate change world (Kagawa & Selby, 2010). Environmental Education, with its disciplinary origins in science, has been substantially transformed within the new agenda of Education for Sustainability (Skamp, 2010). While 'education for sustainability' and 'education for sustainable development' are much criticized for their ubiquitous use and association with maintaining patterns of consumption (eg. Jickling and Wals, 2008), they are the terms that global, national, and local institutions and groups are using to initiate authentic action to address eco-social planetary problems. It is important, therefore, to take the term seriously and re-animate its meanings through educational research. The policy context of the current research project 'Linking teachers and teacher educators in developing place-based sustainability education' is the implementation of the cross curriculum priority area of sustainability through the Australian national curriculum in 2013. An issue of crucial concern, identified by both researchers and teachers alike, is the lack of preparation of sustainability literate teachers (Ferreira, Ryan, & Tilbury, 2007; Nolet, 2009; Tilbury, Coleman, & Garlick, 2005).

Australia is recognised as a leader in Education for Sustainability (Nolet, 2009), with multiple policy documents at national and state levels (DEWHA, 2008; ResourceSmart Australian Schools Initiative Victoria, 2011; Sustainability Curriculum Framework: A guide for curriculum developers and policy makers, 2010). However, while there are positive stories of schools implementing sustainability initiatives, 'the extent to which these are integrated into formal curricula remains unclear' and 'there is little evidence of new concepts of sustainability in Australian syllabuses' (Skamp, 2010, p. 10). In order that education systems do not continue 'sustaining unsustainability', it is important to ensure that 'sustainability is not just another issue to be added to an already overcrowded curriculum, but a gateway to a different view of curriculum, of pedagogy, of organizational change, of policy, and particularly, of ethos' (Sterling, 2005, p. 233).

Place-based education has been offered as a possible model for a new paradigm of sustainability education (Skamp, 2010). Defined as 'the pedagogy of community ... and the restoration of the essential links between a person and her place' (Lane-Zucker in Sobel, 2004, p. ii), place-based education is more properly understood as a global social movement that aims to address the sustainability of people and places (McInerney, Smyth, & Down, 2011). The field is characterized by advocacy rather than robust empirical research. Originating in an 'ecologised humanist tradition' in the United States 'to better serve the social and ecological well-being of particular places' (Ball & Lai, 2006, p. 262), place-based education has been criticized as apolitical and atheoretical (McInerney, et al., 2011; Nespor, 2008). Gruenewald builds on this humanist tradition to offer a critical place conscious education with the parallel objectives of 'decolonization' and 'reinhabitation' to deconstruct practices that damage places and ecosystems and retrieve or recreate new ways of living in places (Gruenewald, 2003a, 2003b). There have been every few empirical studies of critical place-based education, however, (McInerney, et al., 2011) and these are essential if we are to articulate new curriculum and pedagogies for sustainability education in a post-climate change world.

Our aim in this study was to explore teacher education and teacher professional development in relation to place-based sustainability education in Gippsland, Victoria. The first phase of this participatory action research study was conducted in partnership between teachers in a primary school in Latrobe Valley, Victoria and teacher educators at Monash University's Gippsland campus. The project involved Grades 3 and 4 teachers and their students, and teacher educators and teacher education students enrolled in a unit of study 'Understanding Space and Place' in the third year of a Bachelor of Primary Education. Ethics approval for the study was obtained from the Victorian Department of Education and Early Childhood Development and Monash University's Ethics Committee. The identity of the school, the children, and the teacher education students are protected by the use of pseudonyms for individual participants and the school. The location of the school is specified because the significance of place in this framework requires identification of the specific spatial and demographic location of Latrobe Valley.

The study site

Latrobe Valley in Gippsland, Victoria supplies electricity for the state of Victoria from brown coal-fired power generation. The three main towns of Morwell, Moe and Traralgon are moving from an industrial to a post-industrial social formation in their transition to a low carbon economy. The processes of economic globalisation have previously had a marked affect on Latrobe Valley communities through the privatisation and automation of the power industry. In the early 1990's 8,000 direct, and 12,000 indirect jobs were lost resulting in long-term unemployment and poverty, for many residents (Tomaney & Somerville, 2010). Along with the loss of jobs came the loss of working class identities when the proud history of labour was replaced by intergenerational social alienation and disengagement. People's fears about the economic consequences of the introduction of carbon tax by the Australian Federal government in July 2012 are now overlaid on these earlier experiences and storylines of victimisation. The dominant storyline of climate change and identity in Latrobe Valley is one of 'exposure':

... regions, sectors, ecosystems and social groups will be confronted both by the impacts of climate change and by the consequences of globalization. ... there are “winners” and “losers” associated with both of these global processes. Climate change and economic globalization, occurring simultaneously, will result in new or modified sets of winners and losers (O’Brien et al, 2005: 222).

The public representations of post-industrial regions powerfully link place with identity. Dominant public storylines of the Latrobe Valley are of socio-economic disadvantage alongside environmental pollution represented in images of smoke stacks emitting greenhouse gases. They depict disaffected young people with behaviour problems, criminality and idleness. Life becomes inescapably linked with pollution, as increased attention to climate change and global warming has brought a new pathology to the region. These storylines operate as public pedagogies that not only describe, but also produce knowledge. Young people living in pathologised places are subject to both the real consequences of poverty and disadvantage and the discursive effects that tend to reinforce these dominant storylines of disadvantage. The issues of sustainability in this context necessarily include the ‘triple bottom line’, the intertwined socio-cultural, economic and environmental domains. There are many alternative stories of this region, however – of women, of its original Ginnai/Kurnai inhabitants, of its farmers, of its children and of active sustainability initiatives. The primary school program of integrated place-based education for sustainability that is the focus of this study is an important alternative storyline for children in this context.

The Morwell River Wetlands is part artificial, part natural wetlands constructed by International Power, the British Company who now own Hazelwood Power Station. The wetlands are in the original location of the overflow from the river, which was relocated to make way for the coalmine. Constructed by the company’s mining rehabilitation engineer, the wetlands has pools and banks, swathes of trees, logs and dead timber, islands and causeways, in the evolving landforms created for creatures to re-inhabit this place. The primary school has had a relationship with the wetlands since its construction and has monitored its evolution through the frogs, native trees, shrubs and grasses, and other creatures that have come to inhabit the place. Three hundred parents have been educated in community frog identification in partnership with the Amphibian Research Centre to prepare them and their children to be involved in community frog census. Three local schools received a Science in Schools grant of \$20,000 to integrate the wetlands into the school curriculum and one of these schools has continued this program since 2000 with a 12 years history of development and evolution.

Regular visits to the Morwell River wetlands were a key feature of the curriculum in this primary school, which partnered with us in this research. The Morwell River wetlands program was integrated across all grades in the school and across all subject areas. In the early grades the children studied the needs and life cycles of frogs, rearing tadpoles in the classroom and learning in a mini wetlands constructed in the school grounds. The middle grades were involved in monitoring the wetlands through the frogs and other animals that came to live there, and integrating their study across all curriculum areas. The upper grades conducted scientific analyses of the wetlands’ health by monitoring water quality and identifying the micro and macro organisms significant in its development as a living system. In common with the nature of such exemplary programs in other schools, however, this program relied on the work of a single teacher for its continuity. The visionary teacher who sustained this program began a transition to retirement, and the wetlands program began to diminish in the school.

Under the pressure of NAPLAN testing, an increasingly crowded curriculum, and the lack in new teachers’ understanding of how to integrate Education for Sustainability into the curriculum, the program threatened to become an excursion-based activity relegated to Term 4 as entertainment for children towards the end of the school year. The visionary lead teacher initiated the participatory action research project with the teacher educators to address the professional learning needs of teachers and teacher education students in order to ensure the program’s continuity and sustainability. The teacher educators have been working with the school for a number of years in different versions of engaging teacher education students in the program but the outcomes were marginal until this systematic participatory action research project was implemented.

Research literature in sustainability education

In our attempt to identify current practices of education for sustainability at the university level, and in teacher education programs and schools, we mapped several studies belonging to an expanding body of empirical literature that point towards the increasing inclusion of education for sustainability. We engaged with the literature through three particular contexts, namely: universities, schools and teacher education programs.

According to Sterling and Scott (2008) there is significant groundswell in favour of sustainable development and education for sustainable development (ESD) in universities. One Canadian study that examined the institutional barriers impeding the implementation of ESD at the University of British Columbia identified the need for ESD to be viewed as transdisciplinary rather than as a new or separate subject or discipline (Moore, 2005). In this study the role of the educator was distinguished as integral to a shift towards models of collaborative and transformative learning that underpin sustainability education. Similarly, Cotton, Warran, Maiboroda and Baily (2007) investigated university lecturers' views of sustainable development and its contribution to the higher education curriculum across three campuses in England. An online questionnaire and semi-structured interviews determined; the extent to which lecturers felt education for sustainable development (ESD) was a worthwhile and appropriate addition to the higher education curriculum, and sought lecturer's views on appropriate pedagogies for ESD. Responses revealed differing conceptions of the term ESD. Despite a high level of support for ESD from lecturers, many respondents showed a predisposition towards environmental issues compared with social or economic concerns.

Other studies have examined barriers faced by teachers when planning and teaching sustainable development in primary school classrooms. Summers, Corney and Childs (2003) worked with teachers from urban schools who participated in education for sustainability professional development (PD) to plan and deliver EfS lessons alongside colleagues and researchers. Findings suggest that PD planning sessions increased teachers' understanding (and limited knowledge) of EfS. Time pressures, limited guidance in the direction of citizenship, rights of future generations and absence of specific topics in the National curriculum were all cited as barriers to their understanding and practice. Teachers' conception of sustainable development and the task of Education for Sustainable Development (ESD) framed another study across England, Denmark and Germany (Nikel, 2007). One of the study's innovations was a card sorting activity that introduced 21 different approaches to how a teacher might possibly seek to enable young people in engaging with sustainable development themes and facing the challenges of the future. Interestingly, many teachers chose global ESD issues as their preferred option.

Closer to home we found important correlations between McInerney et al's (2011) investigation into the role of 'the local' in teacher's work and our own teacher education work. Using place-based education (PBE) as a framework, this study focused on a cluster of senior secondary schools in regional Australia to examine the school and community related conditions that promote school retention and student engagement in disadvantaged schools. Findings indicated the impact of imposed curriculum, standardized testing and performance managing regimes on pedagogical approaches to PBE. The study calls for a critical reading on the physical, social and cultural attributes of places that shape student identities. Another Australian study examined teachers' views on education for sustainability and how they coincided with the intent of the Sustainable Schools Program (SSP) (Kennelly, Taylor, & Jenkins, 2008). Remarks by most of the teachers in this research suggest that wider professional support is needed if the SSP, and indeed the NSW policy on environmental education more broadly are to be implemented as intended. Teacher comments revealed a preference for collaborative/shared pedagogical work (rather than individualist approaches) to enable meaningful student engagement in EfS.

Teacher education programs are also becoming recognised as critical and influential domains for the implementation of EfS. Of particular interest to our work is Corney and Reid's research that investigated how student teachers learnt about and perceived ESD in the context of a secondary school

curriculum (Corney & Reid, 2007). In determining the subject matter and pedagogies that student teachers develop during their initial teacher education course, alongside the sources of their knowledge and understanding of ESD, this study monitored the mentoring of students by a group of geography teachers who worked with students to advance their ESD knowledge and assisted with the development of topics. A number of important findings were identified: many of the geography teachers believed that ESD should be integrated rather than taught as a separate topic; teachers identified fieldwork and case studies in local places as helpful in assisting students' understanding of ESD; and the sharing and discussing of student teachers' school experiences provided opportunities for in-depth reflection of school ESD experiences and focusing on the student teachers' own teaching/pedagogies.

Collectively these empirical studies provide a valuable overview of current research, thinking and practice about the role and implementation of EFS in universities, teacher education programs and schools both in Australia and internationally. Mapping this research has allowed us to position our own pedagogical intentions and practice within and against broader EfS discourses. Our work, which is framed by place-based pedagogies and sustainability education seeks to bring teacher education students and practicing teachers towards a renewed understanding of the role of education for sustainability in everyday practice. In this research we ask: What is the process of developing pedagogies and curriculum for place-based sustainability education for professional learning and teacher education? In this paper we employ this overarching research question to examine the pedagogical role of 'place' as a way of working with and advancing EfS. We see this innovative place-based work as a significant contribution to the broader conversation about the implementation of EfS in universities and schools.

Research questions

- What is the process of developing curriculum and pedagogies for place-based sustainability education for professional learning and teacher education?
- How can we do this through participatory action research?
- What are the elements of curriculum and pedagogies in these emergent programs?
- What do teachers, teacher educators, and teacher education students learn through this process?
- What theoretical resources can we bring to the analysis and interpretation of the data produced through this study?

Methodology and methods

Conceptual framework: place-based education

The significance of place as a conceptual framework in research about sustainability, and the importance of place-based education in relation to sustainability, have particularly emerged in this project. 'Place' as a conceptual framework, the specific place of the Morwell River wetlands, offers a specific material site for the development of a shared language and pedagogical experiences for connecting teacher educators, teachers, school and teacher education students. Place connects us through its materiality, a materiality which is dynamic, constantly changing, shaped by daily cycles of seasons and weather, and the activities of all of the living creatures, including humans. All of us who participate in this place learn something from that engagement and place attachment is the most fundamental aspect of sustainability education. Place links the local and global, for example, through observing the local effects of climate change in the unstable patterns of extreme drought followed by

flood. It links nature and culture through our understanding that in a very obvious way the site was artificially constructed, but then becomes part of ecological systems as fish, birds, frogs small mammals, insects and so on inhabit the place. It links society, culture, economy and environment through the analysis of the social conditions of these children's lives. It is also a site of difference where individuals have different responses and experiences which can be represented in multiple ways such as writing, storytelling, drawing, dance, scientific measurement and so on, and especially through the use of new digital technologies.

Participatory action research methodology

Participatory action research (PAR) is the methodology chosen to best fit the range of elements and imperatives for this research. This research methodology is located within the critical paradigm and is concerned with enabling the collaborative development of a research project for transformative change. Transformative change is underpinned by a shared sense of purpose and the equalisation of power relationships within the research. The collaboration in this project is based on the long-term relationship between (author 1) with the lead teacher, and the school. While we believe that while the nature of the participation across the collaboration is equal, the outcomes desired by the school, the teacher participants, and the university educators are different. An example of this is that the lead teacher, in initiating the collaboration and the design of the research, was intent on producing high quality teacher education graduates who could carry on his work. Part of his requirements was that the teacher education students would be actively involved in designing and conducting pedagogical activities for school students in the wetlands. The purpose of the teacher educators was to research the process of implementing a unit of place and sustainability education within primary teacher education that would transform their future approach and endure as a pedagogical practice. Each of the groups – classroom teachers, lead teacher, deputy principal, principal and teacher educators who formed the research team had similarly different agendas in relation to this research in which they were all powerful participants. Participatory action research is compatible with the fundamental ontological and epistemological underpinnings of decolonising place-based education as the origin of the pedagogical bases of this study.

Methods

The study

The study involved two Grade 3/4 classroom teachers, a lead teacher, the Deputy Principal, the Principal, and the Environmental Officer of the power company, in collaboration with teacher educators and teacher education curriculum. This was undertaken in the context of a theme in the Grade 3/4 curriculum 'Adaptation and Change', and a compulsory unit offered to fifty students in the undergraduate Bachelor of Primary Education degree course, 'Understanding Space and Place'. The nature of the intersection of the Grade 3/4 curriculum and the teacher education curriculum was negotiated within the team. Teacher education students were scaffolded within an emergent¹ thirteen-week program of lectures and workshops developed by the teacher educators. This included one lecture by the environmental officer and lead teacher, and one by grade 3/4 teachers. Grade 3/4 teachers assisted in a workshop with teacher education students to design the learning activities for their school students in the wetlands. The teacher education students, in turn, designed pedagogical activities for the Grade 3/4 children in the wetlands and then carried out those activities.

The wetlands activity formed the core of the study around which both the school curriculum and the university curriculum were structured, generating for both groups a series of lessons prior to and after the wetlands day. In the Week 5 of the Unit fifty teacher education students and about eighty school

¹ The unit drew on the outline for its first iteration designed by Dr Kerith Power and Dr Monica Green that was re-designed in the emergent processes of this research.

children participated in the core day at the wetlands. The teacher education students had been randomly allocated to eight groups of 7 – 8 students each, and each group was scaffolded to develop an activity for about one hour for a group of the school children. These activities were conducted on a rotational basis with eighty school children, also divided into groups. Each activity was conducted through two rotations giving time in between for focussed reflection and re-development. The lead teacher, school teachers, and teacher educators were available to support the teacher education students during the day.

Observation and reflection (teacher educators)

As the teacher educators we undertook systematic processes of observation and reflection in response to the thirteen-week schedule of face-to-face teaching of the teacher education students. Our observations took the form of audio-recorded and transcribed conversations between us immediately after each three-hour combined lecture/workshop class. We also recorded our observations of the daylong wetlands program through digital photographs and written journal entries, and recorded our reflections on relevant informal and formal conversations with teachers and deputy principal. Our responses to student posts were documented in the online discussion forum.

Observation and reflection (teachers)

Originally the Grade 3/4 teachers were asked to record their observations in journals but this proved too difficult within the time pressure of their work. The Deputy Principal, who acted as mentor to these teachers, and to the project generally, undertook to meet with them after school and produced a dot point record of their reflections after the wetlands day.

Focus groups

Two two-hour focus groups were conducted at the end of the sequence in order to allow the whole team of teachers, Deputy Principal and teacher educators to critically reflect on the process. The first focus group used a semi-structured question format to allow for issues and ideas to emerge during the conversation. The following structure/questions were used to guide the discussion:

- What are the key issues that came up for us in implementing this program?
- Each person to identify 1-3 key issues
- Each person's key issues to be discussed in turn

The second two-hour focus group was conducted after the first in response to the transcription of the first focus group. Both focus groups were held in the staff room after school hours in the transition from the busyness of the school day to a space of considered reflection. The focus groups replaced the individual interviews as more appropriate to the collaborative methodology and more acceptable for the Grade 3/4 teachers.

Semi-structured interviews

The Principal was interviewed using semi-structured interview technique (Minichiello, Aroni, & Hays, 2008) because of his different perspective as providing overall support for the program within the school and the research rather than participating in its day to day activities. This interview with the Principal gives access to the organisational context of the wetlands program.

The lead teacher was also interviewed using semi structured interview techniques because of his expansive knowledge and passion for the program. He also provided ongoing email communication in relation to questions about the project and collected school student artefacts.

Collection of education student artefacts

Teacher education students were informed about the research project at the beginning of the unit of study and invited to provide consent for the use of the artefacts they had produced during the course after their final assessment. Artefacts collected included student posts from the weekly discussion forum, assessment task responses, and student presentations. Only those artefacts produced by consenting students have been used and their identity is made anonymous.

Analysis

The data for this project was analysed iteratively throughout the project in the weekly reflections between us as the teacher educators, in the focus groups with teachers, and in the reflective observations of teachers. This represents the first level of data analysis, which we present in the summary findings below. Meta-level analysis is also carried out using a range of theoretical lenses including: - 'thinking through country'; multiliteracy theory and digital technologies in relation to sustainability; interspecies learning and the more than human world; and contemporary theories of space, place and body. In the presentation in association with this paper the decolonising lens of 'thinking through country' will be used to focus on one example of the meta-level analyses used in response to this rich data set.

This paper aims to provide a baseline description of the project and its summary findings from the first level of analysis that may be useful for the different stakeholder groups in this project. This level of analysis therefore used the categories of teacher, teacher educator, school student, teacher education student, and 'place' as the key stakeholder participants in the study and a summary analysis within these categories is provided below.

Teacher

The Grade 3 and 4 teachers who participated in this study increased in their knowledge and understanding of the extent, complexity and breadth of the integrated wetlands program through participating in the research. Their professional learning in relation to sustainability was facilitated by the mentoring of the Deputy Principal; through guiding teacher education students in the activity planning; through the process of giving feedback to the students at the wetlands; and the collective discussion in the focus groups. Major learning for them also occurred through having to move outside their comfort zone to lecture to the teacher education students and to participate in a research project. 'The teacher visit to the University was great. It was wonderful to check out ideas and activities with the student teachers. Having the initial contact with the student teachers prior to the actual visit was great. We were able to see the ideas put into practice. Our presentation was not as stressful as first anticipated.' Like the teacher education students, their learning intensified exponentially during the activities at the wetlands where they were able to take a more observer stance as opposed to their usual embedded responsibilities as teachers: 'We felt this joint project enabled the student teachers to see how a teaching session/ activity may need to be modified and reassessed as it is taught. The student teachers got to first hand see the importance of instant change and flexibility'. In acting as outside observers they were able to provide critical feedback to the teacher education students and to learn about their own pedagogies of place in the process: 'Overall it was a fantastic way to organise the wetlands visit. As classroom teachers it was nice to roam around the groups and watch the children and student teachers'. All teacher participants (grade teachers, lead teacher and Deputy Principal)

found that the creative place-based activities developed by the teacher education students added to the pedagogical possibilities offered by the wetlands program. The teachers also emphasised how important it was to have a visionary teacher who was passionate about place-based work to inspire them.

Email from lead teacher 7/7/11

http://water.epa.gov/type/wetlands/outreach/wetlandsvideo_index.cfm

This little clip is a must watch:

Extinction of Experience leading to the loss of the desire for experience/disengagement from nature/being satisfied with the virtual experiences provided by technology.

What if they have never really touched nature?

Hey everyone! Our Wetlands unit next term is bigger than adaption and change. Please find time to watch.

Regards,
Max.

One of the most significant insights of the teachers was that, despite this innovative and embedded program, it would not be their generation of teachers who carry forward the pedagogies of sustainability, but the new generation of teacher education students who are undertaking this learning prior to entering the school education system. None of the teachers or Principals understood this work as education for sustainability prior to, during, or after this cycle of research. And yet in many small and large ways they provided unique insights into the implementation of education for sustainability in the school and in teacher education by focussing on the place of the wetlands and its integration into their teaching curriculum.

Teacher educator

As teacher educators we brought substantial previous experience and frameworks in place-based and sustainability education through our work in Indigenous education and outdoor education respectively. However, neither of us had previously researched or theorised our pedagogical practice in relation to the concept of sustainability. We have both recently been involved in leading the establishment of a United Nations Regional Centre of Expertise in Education for Sustainable Development and become aware of the potential of local-regional-global connections in sustainability education to build momentum for transformative change to address planetary problems.

Despite our previous experience, the negotiation of the activities associated with emergent place-based curriculum and pedagogies within a university system and between a university and a school system moved us outside our comfort zones. We consciously adopted a position of unknowing (Somerville, 2008) and communicated that to our students. This is neither an easy or accepted stance for a teacher/lecturer but one that is an important starting point for place-based work. Stepping out of the conventional classroom context into an outdoor environment opened up another dimension of pedagogical possibility and uncertainty, a place both of risk and of learning (Somerville & Green, 2011). Sharing that sense of unknowing and of risk with our teacher education students enabled them to see us as more like them in their learning, and supported them to take risks that they might otherwise have been unwilling to take. It was also crucial in our ability to collaborate on a deep level with the school teachers and they commented on their relief when we talked about taking risks and learning as we go, an ease that was reiterated many times.

Our in-depth observation of teacher education students' learning in response to our emerging pedagogical practice was a site of deep and continued learning for us as educators. The practice of team teaching was critical in this process of observation in allowing us something of the same distance

as the school teachers experienced during the wetlands day. Practice, especially one's own practice, is one of the most difficult things to observe and theorise because it is embedded in the minute-by-minute actions that constitute that practice. In sharing the teaching we could move in and out of the space of practice and observation. Our ability to share our reflections immediately after each teaching session deepened this learning, especially because of our different positions and perspectives. The weekly reflection sessions led us to consciously refine our pedagogical practice from week to week and thus constituted a cycle of action, observation and reflection within the study. A core activity recorded in individual journal reflections was the introductory exercise.

I introduced the collective memory work by reading from the beginning of the critical power of place chapter because it begins with a collective biography place story. I ad libbed a bit and didn't read it all but I think was enough to get into the exercise which I reiterated before they began.

The instructions were that they were to recall an embodied place memory, to tell it to the others, each taking a turn and the others listening, and then to assist each other to make the memories more sensory – smell, sound, touch, movement etc. They asked some good questions:

Does it have to be as a child? I told them about the literature that says that young children have strong embodied place attachments and that we teach this out of them in school. That therefore they are learning to both work with these early place memories in children but to recapture these memories now as adults. This seemed to work well and was probably the most significant aspect of the discussion.

Can we collapse many place memories into one? I suggested that their memory needs to focus on a single specific place and this would be hard to do if trying to combine memories.

Can we include events, other characters etc. I cautioned them away from a narrative structure – telling a story – which is different from a place memory.

We believe this introductory activity was fundamental to what followed which built on this learning in iterative stages.

Teacher education student

The teacher education students were a mixture of Gippsland based students (approx. two thirds) and city based students (approx. one third) who travelled from Melbourne to the Gippsland campus to undertake their study. We traced the trajectory of their learning as evidenced in their online posts, their participation in class discussion, their assessment tasks, and our observation of their pedagogical activities in the wetlands. There were two outstanding peaks in the trajectory of their learning related to particular pedagogical practices we introduced. The first was the introductory session structured around the collective memory work exercise described above. After telling their memory, students were asked to write, revise and edit their story as the first part of a five-part assessment task and invited to post it on the Blackboard Discussion site prior to submission. A number of students did this and the exercise generated extraordinary memory stories, which the students themselves recognised as a powerful beginning point.

The cicadas drum my ears as wander around the caravan park, and I can feel the heat on my skin as I enter Grandma's van. As I jump up the steps they creak a little, and my chance to take Grandma by surprise is lost. I'm in my spotty purple bathers because of the thick heat, and even though the afternoon is drawing to a close, it seems to want to hang over this little alpine town forever.. There is an orange hue throughout the van, and the bright patterns of the fabrics pop out at me. It only gets hotter as a move further through it, and after confirming that Grandma is definitely not there I ponder my next moves. Whilst contemplating where my family is (most likely at Mum and Dad's caravan), my eyes slowly fix on the plastic salad bowl sitting atop the counter. I'm sure its for tonight's barbeque, and I'm sure I should leave it alone but for some reason that I cannot explain, I was immediately lured to it and couldn't resist exploring its contents. Long thin slices of carrot, cabbage and beetroot, but more importantly, the delicate little cylinders of fresh spring onion sprinkled throughout were just begging to be tried. One, two, three pieces of onion spiraled into polishing off the entire contents; a rather hefty feat for my tiny 4 year old stomach. And whilst being completely enchanted by my first encounter with my new favorite vegetable, I've neglected to notice my Grandma standing in the doorway watching me. Instead of scolding me for ruining her salad or spoiling my appetite, she simply stands and smiles, seeming to be just taking in the moment. The clothes she's wearing don't matter, all I can see is her gentle round face smiling down at me, laughing at what I had just achieved. The subtle murmur of the river running by the van reminds me of my love for this place, and the auburn haze of the filtered light, along with the gentle breeze, ultimately

creates the perfect final memory of my Grandma and her presence in this place (Teacher education student individual posting).

The second learning peak occurred during the day at the wetlands. Students experienced a degree of anxiety about their ability to perform this task in real life, real time, and real place. The fact that they were working within groups and the high level scaffolding they had received made possible the development and implementation of their activities. Due to their dispersed geographical locations and infrequent visits to campus much of their planning was conducted visibly on the online Discussion site. Only one group of students visited the physical place of the wetlands before the activity although all agreed afterwards that this would have been desirable. Their unfamiliarity with the nature of wetlands was evident in some of the girls sinking into the mud in high heels, with their designer handbags flung over shoulders, and flimsy clothes not appropriate to outdoor activities in a cool southern winter. The internal collective functioning of the groups influenced how well their activities were prepared. The pressure to deliver meaningful activities for the children on the day increased the level of their learning.

We took a walk down to the lake [on campus] to see what might interest children. On the way we discovered poo, yabby holes and listened to birds. So our focus changed. We took pictures of different types of poo, recorded the birds, took pictures of the birds, and took pictures of the yabby holes. Armed with our newfound information we came inside to discuss how we could use this to teach. When then went through a series of questions about the learners.

- Prior learning
- Expectations that they had
- What the learners liked
- What the learners disliked
- What are their interests
- How do they think the classroom could be brought outside
- Real life situations – how is it relevant to them

From this we thought of many activities that could be of interest to the learners.

- Senses, mind map; close your eyes what do you feel, think, smell, hear; then draw from their thought patterns
- Water, man made structure; what lives in the water; uses of water; classroom research what lives in static water.
- Yabby hole, what type of animal make this hole; from the size of the hole can we tell how big the animal is; other animals that live in holes; what role does the size of the hole mean in relation to the size of the animal; what other habitats are there and who uses them; create, build, draw, make habitats and the relevant animals.
- Poo, what animal did this poo; can we tell how big an animal is from the size of the poo; can we dissect the poo and then know what the animal ate; what is the water concentration to rough matter.

It was very clear when observing the pedagogical coming together of children and the teacher education students in the wetlands that all of the elements of the place including trees, grass, water, rocks, weather, came to the fore. One group for example, with a tightly organised plan, had a group of active boys run off into the bushes to be retrieved by one of their members before they could begin. Others explored the territory of the world underneath a rock and became productively focused on experiencing and naming that world. Another group designed an activity called 'The Treasure Hunt' in which children had to choose a colour card (from a paint shop) and find an example of a 'living', a 'non-living' and a 'once living' element of the wetlands that matched their chosen colour. The level of engagement of the group was high and the vision of one child holding up his square of blue colour to the sky prompted a subsequent journal entry on the power of this activity. All stakeholder groups including the school students found the teacher education students' pedagogical activities, and the learning they generated, as extraordinary as their original place memory stories.

School student

The school students had been prepared for this activity within an inquiry based learning approach and a theme about *Adaptation and Change*. Because of this approach they were already open to what might happen when they met with the wetlands as a place and entity in its own right. They had generated lists of questions with the lateral and creative thinking that children are so capable of when

they are invited to learn in this way. Repositioning children as knowledge holders and designers of their own learning through the processes of inquiry was newly introduced across the school and fitted perfectly with the place-based pedagogies. Such questions as ‘Do fish get bored?’, the title of the presentation related to this paper, reveal children’s capacity to think in lateral, creative ways, open to the wondering and generating required of emergent curriculum for sustainability learning (Somerville et al, 2011).

Do fish get bored?
Why do miskidos[sic] like blood?
Why can’t fish walk?
How does sap grow?
What do frogs eat?

The place offered an obvious physical freedom for the children, evident in their movements through the space, and their engagements with the elements of grass, stones, rocks, and water. The place itself was a powerful leveller with some children who typically performed well in school struggling while others who usually did less well coming to the fore.

The place

The place influenced the nature of the pedagogical activities and how the wetlands day occurred. Continual flooding rains, which replaced a long period of drought, meant that the usual part of the Morwell River wetlands was neither accessible to cars and buses nor appropriate for an influx of human visitors. A last minute decision was made to relocate the visit to the Brodribb Rd wetlands, a part of the same Morwell River system. The Brodribb Rd wetlands had open areas of drier grassland kept mown because of the massive power lines that passed through on their way to deliver electricity to Melbourne. The power lines formed an intrusive and unwelcome sight for us as educators, incongruent against adjacent farm paddocks with their rounds of sleeping hay. Margaret coped with this by erasing them from her vision, but her first conversation with a child walking along the path to his activity revealed that he included them fully in his perception of the place. Looking up towards the massive structures that march enormous powerlines across this landscape he asked ‘Would you be dead if you touched those powerlines?’ Margaret looked up and responded, ‘Yes, you would be very dead’. While Margaret chose to erase the powerlines from her vision, for this child, the powerlines are an intrinsic part of this place, something that he contemplates in an imaginary negotiation between his body and the nature of the electricity that flows through them.

In an important sense the place itself is an important stakeholder in this program, the research project, and the activities of the day. Even on a small local level the place and its myriad living and non-living elements is fragile and vulnerable to the decisions and actions of the power company and its ongoing collaboration with the school is crucial in its wellbeing. Actions are made monthly in regard to monitoring the health of the wetlands through the presence and activities of the frogs, however, it is the longer term and larger consequences of developing citizens and leaders of the future who value their local places that will have an enduring and more widespread effects.

Conclusion

Our innovation in this project is to bring place as a framework for research and educational practice into relation with education for sustainability. We explored how place-based education can facilitate a new paradigm for the transformative learning required for planetary sustainability because ‘Sustainability education involves deep transformations in values, new ways of thinking about problems, and fundamentally different approaches and a more central role for all educational sectors’ (Nolet, 2009, p. 12). It is in this sense that Nolet refers to the development of sustainability literacy. This project involved collaboration with a low SES primary school in Latrobe Valley Victoria, a

community faced with significant social, environmental and economic sustainability challenges for its future in a climate-changed world. We asked: How are we to educate these children to be citizens and leaders in this new world, and how can we apply this knowledge in other schools, communities and places. This baseline paper aims to provide a beginning point for the different stakeholders who are engaged in education for sustainability including teachers and their students, teacher educators, teacher education students, and the communities and places in which they live.

In this first phase of analysis, conducted according to the categories of the stakeholder groups, we found that through the participatory action research process we have developed different understandings and insights about curriculum and pedagogy. 'Curriculum' and 'pedagogy' can no longer be seen as stable categories within this nexus of place and sustainability but need to be interrogated and reframed in terms of their potential in a new paradigm. All participants in this project were importantly positioned as learners within emergent curriculum and place-responsive pedagogies. The methodologies for both the research and the teaching/learning were as powerful and significant as the content. Repositioning children as knowledge holders through an inquiry based approach in a place-based program generated powerful learning beyond the scope of what could have been imagined and taught through other approaches.

The teachers learned through being able to teach and observe the teacher education students, as if a mirror was made available to them to reflect their own practice. Despite their participation they believed that it was the current generation of teacher education students who would lead this work into the future. The teacher education students learned the critical power of place in the powerful learning evident in the school students they designed activities for. Working in groups was an essential and challenging aspect of their learning. The school children responded with wonderful lateral curiosity and creativity when they were open to the place through inquiry learning. They discovered things that even the long term experience of the lead teacher had not seen or could not answer. Teacher educators discovered the 'pedagogy of organised chaos' through their own immersion in the exciting and risky business of moving outside their comfort zones into the territory of place and the other. We believe that participatory action research in place-based sustainability education offers a potential model for curriculum renewal in teacher education and professional learning for teachers.

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