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The Cattana Wetlands Project: A case study in environmental education for sustainability (EfS) with preservice teacher education.

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Abstract

The *Cattana Wetlands Environmental Education for Sustainability* project promotes community awareness of the Cattana Wetlands (3km from JCU Cairns) through the development and use of environmental educational materials by JCU preservice teachers, enrolled in a Graduate Diploma of Education. The project's website is innovative as educators can 'meet' virtual experts through video streaming, and select from learning activities, fact sheets and unit plans to support their own interests, or curriculum planning. Themes within the website are catchments (e.g., revegetation, hydrology), the richness and vulnerability of the catchment's flora and fauna (e.g., mammals, invertebrates) and the people who have created links to wetlands through their work, beliefs or values (e.g., scientists, Indigenous perspectives).

This paper reports on the adopted strategy of integrating field activities into preservice teachers' studies to develop a positive frame of mind (Bonnett, 2002) through a partnership between James Cook University's School of Education, the Cairns Regional Council, and Terrain Natural Resources Management. The project established that preservice teachers are keen to engage in action-competence (Jensen & Schnack, 1997) activities, such as Community Awareness Raising Events at schools, markets, interest-group meetings and residents' groups, because they recognise that community education work is highly regarded by the Queensland teacher registration body, and is a way they can make a personal contribution to environmental education for sustainability. Embedding workplace-integrated learning (WIL) with digital pedagogies also emerged as critical factors in the project's parameters. This project was made possible by funding from the Australian Government's *Caring for our Country: Community Coastcare* initiative (2008, Project 082237).

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Introduction

The *Cattana Wetlands Environmental Education for Sustainability* project (Hickey, 2009a) promotes community awareness of the Cattana Wetlands through the development and use of environmental educational materials by JCU preservice teachers. The project locale was an abandoned sand mining area, which the Cairns Regional Council re-developed into an 80 hectare recreational wetland. Because the Cattana Wetlands are 3 km from the university they are superbly placed for tertiary students to develop their capacity as educators of influence.

Preservice teachers formed partnerships with community-based environmental experts. As teams, they interviewed local experts in a range of topics, exploring the Cattana Wetlands as a context for EfS. They developed learning resources such as video, lesson plans, activity sheets and interview transcripts.

The innovative project is a partnership between staff and students of the School of Education Cairns, through Terrain Natural Resource Management (NRM) body and supported by the Cairns Regional Council. The project is a federally-funded *Caring for our Country: Community Coastcare* initiative (Australian Government, 2008).

A website (Terrain NRM, 2010) was built from preservice teachers' contributions. This public-access site is available for educators to invite 15 virtual (through video streaming) guest speakers into their classrooms, and select from learning activities, fact sheets and unit plans to support their curriculum planning, or own interests in education for sustainability.

Developing EFS through active engagement

How was the project organised? Project funding was secured by the subject lecturer/project manager who capitalised on local networks, sourced through Terrain NRM, to identify appropriate experts who could contribute. A web developer was contracted to build the site. A local artist liaised with preservice teachers to develop art work for their learning activities.

Preservice teachers visited the wetlands, met council officers to integrate field studies into their studies, orient them to the site's potential for education; and develop a positive frame of mind (Bonnett, 2002).

The project actively engaged preservice teachers in EfS in four ways. First, they visited a place which was itself an example of sustainable development, and learned about it from scientific aspects (e.g., hydrology, pH, species), social (e.g., recreational, cultural values) and economic (e.g., infrastructure costs of re-developing a mine-site) within the whole context of preserving natural resources. Secondly, they talked to, and learned from, experts who are role models of productive work in environmental sustainability. Thirdly, they produced web-based materials which promoted development of EfS concepts in students and teachers. Finally, and most importantly, they made a commitment to conduct their own Community Awareness Raising Event (as service learning, see Shephard, 2010). Each team organised educational events, workshops, presentations or information-distribution at locales including university open days, schools, interest-group meetings, and community markets.

The website was constructed around three themes which reflect the value of wetlands as a sustainable resource. For the catchments theme, for example, one team focused on the issue of water quality (hydrology and inflow pollutants) and distributed brochures at Sunday community market, telling interested passers-by about the opening of the wetland, and its value. Another team focused on the endangered plant species, interviewed the council's Land Management Officer (who has a personal interest in providing food sources for the Ulysses butterfly) who is in charge of planting 10,000 endemic species during the Cattana revegetation project. They conducted a session at a residents' meeting about the value of wetlands to preserve remnant feather palm forests, and the threats to wetlands from imported fauna such as tilapia.

A second theme for the website was the richness and vulnerability of catchment flora and fauna. One team borrowed from television's CSI and had children identifying indirect evidence (e.g., scat or food remains) of the presence of mammals, to understand nocturnal and diurnal fauna, guided by a wildlife ecologist. One team prepared material about the 150 species of birds that rely on the wetlands and are establishing themselves in urban areas, and gave a talk to a local bird observers club. Another used information from a JCU researcher to run a session for teachers at a nearby school on mosquitoes as disease vectors, particularly dengue fever.

The final theme highlights people with links to the wetlands through their work, beliefs or values. A Cairns author and elder of the Yirriganydji people explains bush tucker and traditional medicines and his connection to country; this is supported by an identification guide to plants found at Cattana. These people included an environmental engineer who shares ideas on pollution and water quality, and is active in introducing social conscience into engineering design. One group interviewed a CSIRO scientist and linked this to a learning activity on measuring acid-sulfates in water, and completing a home-audit "to highlight common activities in the home and garden which can have an impact on the water ways and hence the water quality in our wetland areas" (Terrain NRM, 2010).

Preservice teachers conducted 11 Community Awareness Raising Events (CARE for Cattana) reaching over 300 attendees. Events were held a wide range of locations with formal and informal audiences (number of attendees in parentheses): Smithfield Community Markets (30), Holloway's Beach Community Markets (30), Cairns Bird Observers Club monthly meeting (15), Yorkeys Knob Residents' Association monthly meeting (25), Cairns Regional Council wetlands revegetation day (15); JCU Open day (25), Trinity Anglican School Coconut Festival Day (35), Trinity Beach State School (25), Whitfield State School, Edgehill State School (100), Yorkeys Knob State School staff at a staff meeting. Additionally, one preservice teachers' media experience helped publicise the project through *The Cairns Post*, *Cairns Living Magazine*, and JCU's *Discover* magazine.

At each event, preservice teachers surveyed attendees, to experience first-hand how their work affected people's understanding of the value of wetlands, the role of preservice teachers in community education, the importance of sustainable development, and the actions of councils, state and federal policy in preservation of natural values. Feedback indicates that these events have positive impact on the community's awareness of recreational locations, interest in visiting these, and the importance of conservation of wetlands.

Participation in the project was embedded into a semester's work as an assessable task. Time during class (40 hours over 10 weeks) included team planning sessions (e.g., goal setting and progress review) and direct instruction (how to use a video camera, values of wetlands). In addition to independent work (preparation of learning activities) preservice teachers made the commitment for a site visit to

Cattana (2 hours), and a self-organised excursion to video their expert (2 hours), and a community education event (2 hours).

Project components were developed in consultation with the subject lecturer and included:

1. Teams develop a Project Plan as a contract, negotiated with the subject lecturer that selects a topic (familiarisation and foundation research), identifies roles and responsibilities, a time line, milestones, mandatory editing of drafts, mentoring, skills' audit, problem-solving strategies. (5%)

2. Teams identify a community expert, research the topic, devise questions, and arrange for a videoed interview. Complete the Media Release Form. (10%)

3. Make an edited transcript of the video. Develop a time-code of sections for the website. Write a brief expert biography. (5%)

4. Use the information from the expert and research, to develop a fact sheet. Develop a learning activity (e.g., science investigation, web quest, or game) to support the video. (10%)

5. Provide a written report on your team's community awareness raising events. Use the provided impact-assessment survey to assess the impact of your event on participants' knowledge, understanding, skills or values about environmental sustainability, conservation, wetlands, and policies. (15%)

6. At the JCU website launch, teams present 20 minute reports. They show selections from website material, describe community event/s, discuss the impact assessment, and link to education theory and policy to identify how place-based experiences can support student and community learning and action. (5%) (Hickey, 2009b).

Overall, a wide range of assessable elements were included in project assessment. For example, the project report reflected current education policies (e.g., sustainability education and positioning of ICTs as integral to all learning) from national, state and school levels. It demonstrated an understanding of learning theories, classroom management; and appreciation of quality teaching within school and student contexts. The report considered a pedagogical approach, used appropriate metalanguage, and highlighted how activities promoted engagement and intellectual quality (e.g., use productive pedagogies including digital pedagogies).

The lecturer/project manager had a range of responsibilities. Extensive scaffolding was provided to support preservice teachers to negotiate within their team: detailed guides, with examples, suggestions for topics and interviewees, possible sites and audiences for community sessions, templates for brochures, and planners for milestones. Administration included insurance coverage, approval of field trips, and management of documentation. There was liaison with the website developer, with Terrain and progress and financial reports to the federal government. Technical aspects included support to each project team (including, learning how to use a video camera, planning background research and drafting of interview questions, using local networks to source experts, conventions of using scientific names, editing and proofing drafts, and selection of the best footage for the website.

Value of EFS for preservice teachers

This project establishes the value for preservice teachers of active engagement in EfS, as measured against Australian research linked to federal and international polices; professional standards for graduating teachers; and within the context of work-integrated learning (WIL).

Education for Sustainability

Teacher education has been identified as a "key profession" for sustainability in a national action plan (Australian Government's Dept. of the Environment, Water, Heritage and the Arts, 2009. p. 23). A national study *Mainstreaming Sustainability into Pre-Service Teacher Education in Australia*, confirms EfS as a high priority for preservice teacher education (Ferreira, Ryan, Davis, Cavanagh & Thomas, 2009) to build preservice teachers "capacity for change" particularly in terms of developing "knowledge of education for sustainability, conceptual skills in systemic thinking … and organizational change and leadership skills" (p.1). Similarly, there is recognition of the well informed "eco-citizen" as part of a values framework (Queensland Government, Dept. of Education and Training, 2010a).

These documents respond to ideas within the Decade of Education for Sustainable Development (United Nations, 2005); which continue to be expressed, for example, the Australian Curriculum's (ACARA, 2009) selection of "sustainability" as a "unifying idea" (p. 9) with "ecological sustainability" as part of "contemporary science" (p. 5).

Projects such as the Cattana Wetlands project, deserve consideration by course planners to include environmental education for sustainability in preservice teacher education as "a concept encompassing a vision of education that seeks to empower people of all ages to assume responsibility for creating a sustainable future" (The Australian Government's Dept. of the Environment and Heritage (2005, p.3).

The project gave preservice teachers the opportunity to develop a deep understanding of EfS policy enacted in a tropical north Queensland context. It provided them with an intensive experience, and with skills to contribute to EFS upon graduation, through programs such as Schools Environmental Management Program (Government of NSW, 2010), Reef Guardians (ReefEd, 2010), wetlands-based activities (Queensland Government Dept. of Environment and Resource Management, 2010a), WaterWise (Queensland Government Dept. of Environment and Resource Management, 2010b) and *Queensland Sustainable Schools* (Queensland Government Dept. of Education and Training, 2010b).

Providing evidence towards professional standards

Preservice teachers were directed to the possibility of using these experiences as outstanding evidence for employer-rating interviews within a highly competitive employment environment, and to see them as an opportunity for assessment against Professional Standards towards registration.

Explicit links between Professional Standards (Queensland College of Teachers, 2009) and project activities were made in subject documentation (Hickey, 2009b). For example, for *Standard 1 Design and implement engaging and flexible learning experiences for individuals and groups,* preservice teachers were directed to develop teaching/ learning strategies within appropriate modes of inquiry, pedagogical frameworks, models of literacy pedagogy and policy priorities appropriate for diverse learners. For *Standard 9 Contribute effectively to professional teams,* preservice teachers demonstrated understanding of how teams function, meeting deadlines, making progress explicit, engaging in critical review, how they met challenges, and how these skills related to the context of today's schools.

Work-Integrated Learning (WIL)

The project concept was informed by ideas of a work-integrated learning (WIL) curriculum to "provide students with a combination of workplace experience and formal learning which are integrated as part of a course of study in higher education" and which includes career development and management within the curriculum subjects and opportunities for engagement with the community. (James Cook University, 2008). Billett (2009, p. v.) explains WIL as a process through which "students come to learn from experiences in educational and practice settings" and integrate these learnings in "developing the understandings, procedures and dispositions required for effective professional practice".

Embedding WIL emerged as successful factors in the project's parameters. It became a "purposefully designed curriculum" (Patrick et al, 2008, p. v) which positioned literacy, ICTs and sustainability education competency as purposeful and essential.

Preservice teachers discovered WIL-related partnerhips (IRUA, 2008) in using external funding, and how to communicate with the community (i.e., produce a community resource, learn video skills, conduct a local education event, make links with non-school based experts). They developed conceptions about wetlands, sustainability, biodiversity, systems, within a meaningful context of a local wetland. They experienced the world of teachers' work, before graduation, by working in teams, with a long-term complex task, linked to government policies and current educational research. They experienced success by public acclamation at the launch of their website, to an audience of school personnel, peers, university staff, and elected government officers.

Conclusion

The project established that preservice teachers are keen to engage in action-competence (Jensen & Schnack, 1997) activities, and community engagement, because they recognise that community education work is highly regarded by the teacher registration bodies, and is a way they can make a personal contribution to environmental sustainability.

For many, the thrill of seeing their work on the web was a crowning achievement of the year. The outstanding quality of one team's work was recognised by the Queensland Resources Council (2010). One preservice teacher said that the group work for this project was "the absolute best group work I have ever experienced" and it had had a profound effect on her valuing of collaborative projects. Another, now employed as a fulltime teacher explained that she is providing her own students with opportunity for inquiry and involvement in the wetlands:

> I was able to gain full time employment teaching Math and Science at a local high school. I am able to continue my work with the Cattana Wetlands project. Specifically, this semester we are teaching students about the value of wetlands in our local community and how they can get involved. The experiences and resources I developed at JCU have been extremely valuable in developing my career as a teacher. (Graduate teacher, personal email, 2010)

The Cattana Wetlands project demonstrates how EfS policies can be successfully welded into an innovative, community-based teacher education project. The website will provide an on-going knowledge access network, and will promote local learning, involvement, stewardship initiatives and applicable science learning outside the classroom.

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