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Creating Web-based Environmental Education Resources through Community and University Partnerships

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Abstract: Community groups often seek to engage with schools in promoting environmental education goals. A collaborative initiative is described in which university pre-service teacher education students were encouraged to create Web-based teaching and learning resources, related to rainforests and world heritage areas, for use at primary and secondary levels. The partnership between Southern Cross University and the Advisory Committees of the Gondwana Rainforests of Australia World Heritage Area took the form of a voluntary competition, which was integrated with students' university assessment requirements. The factors that influenced students' decisions to get involved were identified through telephone interviews. Insight was also gained into pre-service teachers' understanding and willingness to engage in environmental education. The data was interpreted through the lens of participatory partnerships and incentives in environmental education. The study reveals implications for universities, professional associations and community organisations who may seek to similarly collaborate in educational resource development.

Introduction

A rich body of literature exists that emphasises the value and importance of environmental education and education for sustainability. Orr (1992 cited in Cutter-Mackenzie & Smith, 2003) argues that education is the single most important element needed to address world environmental challenges. This is also the position taken in 1992 by the United Nations Conference on Environment and Development (UNCED) in Agenda 21, Chapter 36 (see United Nations Department of Economic and Social Affairs, 2004). Most environmental educators emphasise that environmental education should be integrated into the everyday curriculum rather than being undertaken as a separate curriculum area (Department of Environment & Heritage, 2005). Providing resources that assist integration can be a valuable method of encouraging teachers to engage their students with environmental education initiatives (for examples, see NSW DET, 2001a; NSW DET Professional Support and

Curriculum Directorate, 2001), although the success of these initiatives has been questioned (Ferreira, Ryan & Tilbury, 2006). The importance of pre-service teacher education in preparing tomorrow's teachers to value and implement environmental education in their teaching programs is well established although its potential remains "largely untapped" (Ferreira, Ryan & Tilbury, 2006, pp.13, 20).

Teacher education programs in Australia are mainly based on a 'core and elective framework'. Within a context of increased regulation of teacher education programs, with complex requirements leading to an increasingly crowded curriculum, environmental education has not yet attained a prominence and priority to raise its status to mandatory. Environmental education is usually only included in the 'core' if lecturers responsible for such units refer to it; otherwise it is offered as an elective. In some awards, though, there are no elective units, for example in many end-on postgraduate diplomas. Many teacher education graduates, especially in secondary education, therefore complete their university education unaware of the existence of environmental education in the school curriculum. Therefore, initiatives that provide opportunities for environmental education to receive attention in preservice education need to be taken.

This paper discusses such an initiative. It involved university-based pre-service teacher education students in producing environmental education resources in partnership with an external government environmental organisation. Cross-sectorial coordination in the development of environmental education materials that support the development of specific environmental initiatives is a major strategy in the innovative NSW Environmental Education Plan 2007-2010, *Learning for Sustainability* (NSW Council on Environmental Education 2006). This paper documents the factors that influenced students' decisions to get involved in creating Web-based teaching and learning resources as part of this initiative.

The Potential of Web-based Environmental Education Resources

The integration of information and communication technology (ICT) into primary and secondary teaching and learning has become a major priority for schools and has been re-emphasised in several major recent reports. The MCEETYA ICT in Schools Taskforce's Pedagogy strategy (2005), for instance, notes that "pedagogies that integrate information and communication technologies can engage students in ways not previously possible, enhance achievement, create new learning possibilities and extend interaction with local and global communities" (p.2). This document particularly emphasises the important role of ICT in enabling new opportunities for collaboration with the community. This is also a key goal in education for sustainability initiatives (see, e.g., Skamp, Bergmann, Taplin & Cooke, 2007). Other writers emphasise the relevance of online learning experiences to young people's interests and experiences, and in making learning relevant to a generation of digital natives (Prensky, 2001). "The current generation of young people will reinvent the workplace, and the society they live in. They will do it along the progressive lines that are built into the technology they use everyday – of networks, collaboration, co-production and participation" (Green & Hannon 2007, p.17).

A range of strategies can be employed by teachers for engaging their students in online learning experiences, including use of WebQuests (Dodge, 1997; March,

2007), WebHunts or scavenger hunts, virtual excursions, online collaborative projects and exchanges (for definitions see, for example, <http://eduscapes.com/tap/topic1a.htm>) and learning objects (see for example Weller, Pegler & Mason 2003). Many such resources are freely available for teachers online, although finding locally relevant content can at times be difficult. Electronic dissemination in environmental education is identified by UNESCO as an inexpensive and effective way to enhance understanding of world heritage areas and *World Heritage in Young Hands*, a subgroup of UNESCO, recommended the promotion of the use of ICT to support world heritage education (UNESCO, 2003). Given the importance of children relating environmental issues to their own context and seeing the role and importance of regional community groups, the need for locally produced resources is all the more critical. The production of locally produced resources can help open up partnerships with local organisations and encourage increased interaction between sectors such as governmental agencies and school systems as called for by Smyth (2006) and Stevenson (2007). Of course, we acknowledge Payne's (2003) arguments that Web-based resources should in no way be seen as a substitute for experiential learning. Rather, they can provide an engaging introduction, adjunct or supplement to other classroom and community-based learning activities.

A methodical search through all issues of six key environmental education journals, *Australian Journal of Environmental Education*, *The Journal of Environmental Education*, *Environmental Education Research*, *Canadian Journal of Environmental Education*, *Ontario Journal of Environmental Education* and *Applied Environmental Education and Communication*, from 2000 to early 2006, indicates that very little, if anything has been written about the development of Web-based educational resources or about partnerships between community groups and universities in the production of such educational support materials. This paper describes and evaluates one partnership model and the resultant resources.

Gondwana Rainforests of Australia World Heritage Area

The Gondwana Rainforests of Australia World Heritage Area is a collection of eight distinct groupings of rainforest-dominated parks and reserves in NSW and south east QLD. They include the most extensive areas of subtropical rainforests in the world, large regions of warm temperate rainforest and almost all of the world's Antarctic beech cool temperate rainforest (Department of Environment and Heritage, 2002). The World Heritage property contains more than 50 national parks, flora reserves and nature reserves with a total area of 366 507 ha (Hill in DEH, 2006; World Heritage Information Network, 2005), including local areas such as Nightcap, Iluka, Border Ranges and Mt Warning. The region is relatively undisturbed and includes important geological features, notably the Shield Erosion Caldera and the Great Escarpment (World Conservation Monitoring Centre, 1996). Gondwana Rainforests has valuable examples of the evolution of the Australian landscape as the rainforests are rich in primitive and relict species (DEH, 2006; CERRA, 2003) and contain significant habitat for more than 200 rare or threatened animal and plant species, with 270 species of avifauna and thirty percent of Australia's terrestrial mammals recorded (WCMC, 1996). Additionally, the area has great cultural heritage significance with evidence of Aboriginal use of the area for more than 10,000 years, and many areas holding sacred importance (WCMC, 1996). The global significance

of these rainforests has been recognised through their inscription as World Heritage sites since 1986, with protection under the UNESCO *Convention Concerning the Protection of World Cultural and Natural Heritage* (1972).

The Federal Government's Department of Environment Heritage (DEH) has responsibility for World Heritage in Australia, however the Gondwana Rainforests' reserves are managed by the NSW National Parks and the Department of Natural Resources (QLD) (DEH, 2002; WHIN, 2005) through four joint NSW, QLD and Commonwealth committees. Previously known as Central Eastern Rainforest Reserves of Australia or CERRA (thus named in 1994), the name was changed to Gondwana Rainforests of Australia by UNESCO at the request of the Australian Government in 2006. A Community Advisory Committee is composed of prominent community members from different geographical areas of Gondwana Rainforests region.

Under the World Heritage Convention the Commonwealth Government has an international obligation to protect and conserve Gondwana Rainforests of Australia World Heritage Area for future generations and part of its management responsibilities is to convey World Heritage values to the community (CERRA, 2002). Gondwana Rainforests reserves lie along the most intensively used and settled region of the continent and provide great educational opportunity for schools to use the property to educate the young about environmental matters, relative to other World Heritage properties. One of Gondwana Rainforests' key management strategies is to keep the community informed about the region with the aim of strengthening appreciation, respect, responsibility and ownership by the broader public. Environmental education was, in the past, predominantly facilitated by Gondwana Rainforests in written word format (knowledge transmission) through a series of glossy pamphlets and booklets (Tilbury, 1995).

Context for the Partnership

The Community Advisory Committee established for Gondwana Rainforests WHA was particularly eager to develop a series of Web-based teaching resources for primary and secondary schools (across all stages) based around the values of the parks and reserves in Gondwana Rainforests. They approached the School of Education at one of the local universities (Southern Cross University) to see whether students might be given an option to be involved in producing Web-based teaching resources to promote World Heritage areas and issues relating to the Gondwana Rainforests WHA. The committees proposed offering two incentive prizes of \$600 (one for primary, the other for secondary level resources) in order to provide a competition context as incentive.

Southern Cross University offers a four year Bachelor of Education program qualifying students as primary teachers. A one year Diploma of Education, a range of combined degree programs, including a four year B.App.Sc/B.Ed and a Bachelor of Technology Education prepare students as secondary teachers. Environmental issues are integrated into various units in the primary education course, including science and technology curriculum units and a Human Society and Its Environment (HSIE) unit titled 'Think Global, Teach Local'. Primary teacher education students can also undertake an elective in Environmental Education. This pattern of integrated non-mandatory environmental education is typical of teacher education programs

throughout Australia (Tilbury, Coleman & Garlick, 2005) although notably the elective unit is run by staff in the School of Education and is directly tailored towards teachers' needs (in contrast to the norm suggested by Tilbury, Coleman & Garlick, 2005).

All students in both the primary and secondary courses are required to complete a unit titled *Educational Information Technology* (primary candidates typically complete this unit in first semester and secondary in second semester). As part of this unit they are required to produce a Web-based teaching and learning resource on a topic of their choosing. This task represents 40% of their assessment and is an example of future teachers' 'learning with computers' (Leuhrmann in Kumar, 2003). The resource is intended to represent an integrated unit of work for use by students and teachers in the classroom and with explicit connections to curriculum and specific learning outcomes (generally from the NSW syllabus documents) and productive pedagogies (NSW DET, 2003). The resources are intended to be constructivist in nature, and demonstrate integration of online learning resources into rich, authentic learning opportunities. By requiring students to make these outcome and pedagogical connections explicit for the web-based resource, Gondwana Rainforest's environmental goals (see above), in conjunction with the criteria for assessment in the university ICT unit, will start to move these future teachers' thinking towards education for sustainability, rather than only about sustainability (Tilbury, 1995). Even so a deep personal understanding of specific environmental issues and their human and environmental implications is a necessary, albeit not sufficient, stepping stone to empowerment to take action. This view acknowledges educational pathways to building capacity towards sustainable development are many (Scott & Gough, 2003).

The Competition in Practice

Students were given the option of being able to enter into the competition by choosing to focus their Web-based teaching resource (for the assessment) on issues related to Gondwana Rainforests WHA. A flyer was produced and distributed to all students electronically, together with e-mails and promotion of the competition at two lectures. The flyer emphasised that Gondwana Rainforests was keen to have sites suitable for all educational stages, and provided guidance for students regarding potential foci, for example what world heritage means (with a focus on local areas), what are rainforests and how are they formed, what types of rainforests exist (particularly in local areas), flora and/or fauna, ecology of the areas, preservation issues, tourism, economic value and geological issues such as volcanic landscapes, erosion etc. At the lectures it was emphasised that such themes could be integrated into all curriculum areas, including visual arts, music, English, maths/economics etc. Some content and technical parameters were also set including that sites entered in the competition should:

- focus on the natural values of Gondwana Rainforests;
- be designed for a clearly defined stage (i.e. Stage 1 through 6);
- clearly integrate with both NSW and QLD curriculum;
- be consistent with the NSW Department of Education & Training Environmental Education Policy for Schools (2001b);

- specify learning outcomes that are addressed in the teaching resource;
- acknowledge sources of information and avoid use of copyright materials;
- be created using a HTML editor (not a converter);
- not use frames or flash; and
- be simple, effective and professional.

The flyer also indicated that all Websites entered in the competition, and which were considered to be of a suitable standard, would be hosted on the Department of Environment and Heritage Website, with links from the Gondwana Rainforests Webpage. Gondwana Rainforests and the DEH reserve the right to make amendments as required to sites but that student authors would be fully acknowledged. Some background materials, information and images with copyright clearance were collated and made available electronically to students.

In the interests of enhancing the quality of resulting resources, students were able to submit their Website for the unit assessment and then receive feedback on the site, which they could choose to incorporate before submission of the site for the competition.

Of the 448 students enrolled in that year (208 in first semester and 220 in second semester), ten students (four primary and six secondary) chose to create sites focused on Gondwana Rainforests. A significant number of other students (10) created sites that were related to various environmental issues, but not intended for the Gondwana Rainforests competition. The resources that were short-listed in the competition and considered suitable to be Web mounted are available to the public at http://www.scu.edu.au/schools/edu/student_pages/CERRA.

Research Design

The objective of this study was to determine why students did or did not choose to enter the competition, in order to understand how university students and staff can best work with community groups to produce such teaching and learning resources for authentic community purposes. Telephone interviews were conducted by one of the authors, not involved with the ICT unit. All students who produced resources for the competition were interviewed, as well as a random sample of students who did not enter the competition (both those who produced sites on environmental issues, and those who did not). Each group was identified through the coding C (competition entrant), E (environmental content) and O (not environmental content). The breakdown of students interviewed is outlined in Table 1.

Interviews ranged in length from five to ten minutes and only one student declined to participate due to illness. Following the interview all students were sent a summary of notes taken and two students contacted the interviewer to add further detail to initial responses. Common themes were isolated and are reported next.

	Competition Entrants (C)	Students who created Website related to environment (E)	Students who created Websites not related to the environment (O)	Total	Female	Male
Primary	4	10	10	24	20	4
Secondary	6	10	10	26	16	10

Table 1: Numbers of participants and non-participants interviewed

Findings

What Influenced Students' Decision to Get Involved?

All of the 51 students interviewed were aware of the Gondwana Rainforests competition although one primary and one secondary student who did not enter the competition indicated that they were not sure what the competition was about or what Gondwana Rainforests concerned.

All students choosing to enter the competition (4 primary [P] & 6 secondary [S]) were clearly passionate about environmental issues and most identified a prior interest in rainforests. When asked what motivated them to enter the competition the most commonly cited reason was the preparation of a resource, either for their own classroom use (6 students) or, alternatively, for a community organisation (4). Related to this factor were those who were motivated by their Website being able to be used as a teaching resource in the future (4) or specifically wanting to develop a resource for Gondwana Rainforests because he believed it was a significant organization (1): "Gondwana Rainforests is vital to the Australian ecosystem and the world" (C46). Other reasons given were: an environmental topic fitted well with their areas of specialisation (geography and science) (2S) and living close to a world heritage area made it easy to collect resources, such as photos (1). Associated with these reasons was the possibility of winning the \$600 prize: this thought was a bonus or motivator for seven of the entrants, with one who had been unsure of what topic to choose entering because of the competition, while another indicated that they would have focused on rainforests anyway 'but the competition was a definite incentive' (C27). However two secondary students said the prize was not really important to them, while two primary students noted that although the prize was great, they did not think they could possibly win because they did not feel confident in their ICT skills.

Of the forty interviewed students who did not enter (including the 20 who produced sites on environmental issues but not specifically Gondwana Rainforests), 22 cited 'time' as the main reason they did not enter the competition. Most talked about time limitations in relation to their other university assessments and that they did not wish to add anything to their university workload: 'It was above and beyond what the unit required. I would have loved to have done more but I had assessment with other units. The level of work needed for the entry was too high' (E7). Some students found the task of creating a Web-based teaching resource confronting due to their lack of confidence with ICT and said they chose to do a topic that was as easy as possible for them. 'ICT was also a big hurdle that I had to get over. I had not studied for ten years and it was all new to me' (O39). Others (6) cited personal problems, family commitments or work commitments as being the reason they did

not have enough time to enter the competition. Some students said they believed it would be quicker and easier to choose an area that they were already familiar with or combine two assignments together or use a topic they had already worked on. One student indicated that they 'didn't want any competition stress or to be exposed not being up to scratch with my work' (E30). Fifteen students believed the resource they produced for the assignment would not have been of a high enough standard to enter the Gondwana Rainforests competition with several indicating a belief that Gondwana Rainforests would have wanted something impressive that they could use as a commercial resource or as a benchmark; 'a grandiose sort of thing. Mine wasn't that' (E45).

Amongst the non-entrants (n=20), several students mentioned being pro-environment, 'Greenies' or members of Greenpeace and that the competition was a 'great' idea to make people more aware of environmental issues and global issues' (E7). Such students liked the concept but thought that the environmental issues were not related to their area of specialisation. Ten students did not enter the competition as they had chosen another topic that was of more interest to them; 'I wanted to focus on something that was really important to me personally, refugees' (O18). A smaller number of students indicated that they simply wanted to pass the assessment or that they were not competitive and one interviewee questioned what recognition would there had been for them if they entered. Only four students said they were not particularly interested in environmental issues.

Students who produced resources on environmental themes, but not specific to Gondwana Rainforests (n=20) tended to indicate that they wanted to be more diverse with their topic: 'It would have been a better resource for me if it was the whole of Australia. I might have done it if it was broader' (E8). Other reasons provided were: wanting to create a resource that was useful for their teaching, implying that they believed that the Gondwana Rainforests resources might not be that. (9); perceiving that their resource would not meet the criteria or outcomes of the Gondwana Rainforests competition (3); and indicating they would have entered the competition if they could have concentrated exclusively on the Big Scrub (a regional area surrounding the university) (1) - this view contrasted with the comments made by others about the limitations of a local focus.

Significantly, nineteen students who did not enter thought that more information about the competition would have been helpful and may have encouraged them to enter. They suggested that it would have been useful for a Gondwana Rainforests representative to speak to them. Nine students wanted to have examples of other Websites made for Gondwana Rainforests (note that while a wide range of example Websites produced by students are available at http://www.scu.edu.au/schools/edu/student_pages/, this was the first time the competition had been run and so examples specific to Gondwana Rainforests were not available). Eight students thought the information given was adequate and that more information would not have influenced them as they already had another topic chosen.

A summary of these responses is included in Figure 1.

Reasons/ motivation for entering (n=10)	Reasons/ motivation for not entering (n=40)	Reasons/ motivation for not entering, but still prepared an environmental website (n=20)
Competition prize seen as a bonus (7)	Time (22) [including reference to other university assignments, personal problems, perceived difficulties with ICT, lack of familiarity with the content area]	Wanted resource that would be useful for their teaching (9)
Will be able to use resource in own classroom (6)	Needed more information about the competition (19)	Perceived that prepared resource would not meet CERRA requirements (3)
Creating a resource for a community organisation (4)	Did not believe that the resource produced would be of sufficient standard (15)	Required resource needed to be more general (1)
That resource would be used by others in future (4)	Had selected topic of more personal interest (10)	
Aligned with secondary curriculum area (2)	Wanted examples as models (9)	
Gondwana Rainforests is a significant organization (1)	Not interested in environmental matters (4)	
Lived close to rainforest (1)	Could not be bothered (2)	
Access to Gondwana Rainforests photos (1)	Not competitive (2) Technical (ICT) difficulties (1) Questioned recognition for effort required (1)	

* As many students gave several reasons the responses are not additive.

Figure 1: Reasons for entering or not entering the Gondwana Rainforests competition (1)

What We Learnt About Pre-service Teachers' Knowledge and Beliefs About Environmental Education?

All students interviewed, whether they entered the competition or not, saw environmental education as very important in both primary and secondary schools. Primary candidates, in particular, emphasised the importance of primary students being exposed to environmental ideas at an early age. 'Primary education is where it all starts' (E8); 'Primary children need to know about possible choices they have...they need to be able to make informed choices' (O20).

It is very important to keep children close to local and national environmental issues. Good to get out of the classroom and

observe and to use all the senses. Kids are natural learners as they are fascinated. It's good to have non-academic stuff in schools (C4).

The secondary candidates also had very strong views. Many talked about the changing issues that impacted negatively on the environment and how education was fundamental to address these impacts. 'Things are perilous, we need to act now. Kids need to know the issues and how to prevent problems. We are teaching for the future and it's important so we don't make the same mistakes' (E38).

Many students said that environmental education needed to be taught across KLAs and in innovative ways to gain student interest and that environmental education was not given enough attention particularly in secondary schools. Other noted that teachers often struggled to fit environmental education in: 'Unfortunately because of the numeracy and literacy emphasis, HSIE is being cut down. HSIE will become a patriotic feel good subject, instead of nitty gritty issues of the environment and society' (E18). Another student commented that 'parents want kids to know about reading and writing before learning about the environment' (O22). Those entering the competition, however, tended to indicate that environmental education should be mandatory for all students, that it should be a priority, or a mainstream subject. 'We are teaching future policy makers' (C27); 'It gives students understanding of themselves, and the environment. It teaches them respect, that's the bottom line' (C46).

We also took the opportunity to survey to what extent students had the opportunity to learn about environmental education throughout their degree. Twelve non-entrants said that they had not had any environmental education content thus far in their tertiary studies. Of the others several sources of environmental education were mentioned. Particular units were identified by some, namely a segment on environmental education in *Think Globally, Teach Locally* (6P) and mention was also made of the primary Science and HSIE curriculum units having a small amount of environmental education; for some secondary students environmental content was also part of the double degree in science and education or in the HSIE specialisation area in the postgraduate diploma (6S), while others (2) said they had touched on a few environmental issues but nothing in depth. Assessment was also an avenue for encountering environmental education for some in that they selected an environment topic as the focus of an assessment in a unit (hence coverage had been voluntary and dependent on personal interest, as in the Gondwana Rainforests competition); this was also the case for three of the entrants in the competition- making the Gondwana Rainforests Website was the first time they had the opportunity to learn more about environmental education. These sources and their impact are similar to those reported by Miles, Harrison and Cutter-Mackenzie (2006). Three students did refer to the specific environmental education elective but none had undertaken that unit.

The majority of entrants in the competition indicated that they were already familiar with environmental issues. One of the primary entrants and four of the secondary entrants had an Applied Science degree including environmental studies. Four others cited personal interest in environmental issues while two students said they had limited knowledge about environmental education and indicated that they were keen to increase their knowledge. Seven of the fifty students interviewed overall had prior knowledge of Gondwana Rainforests and six of these were secondary students. Only two of the nine students who entered the competition knew about Gondwana Rainforests prior to the competition.

Did the Competition Enhance Understandings of Environmental Issues?

Students were asked if involvement in the competition increased their understanding of environmental issues, environmental education and/or local world heritage areas. Nine students entering the competition believed their knowledge of local areas had been increased, especially for one student who was new to the area. 'I now realise how unique the habitats are and how unique the geological aspects are as well. It was good going in the competition' (C29). Another mentioned going into a Stage 3 classroom for professional experience and the class was studying rainforests. 'It was good to have this new knowledge. It really helped' (C11), while one entrant indicated 'I was quite familiar with the areas and had visited most of them. But I had not looked at some of the Gondwana Rainforests details, like where certain birds live. I increased my knowledge, it is more in-depth now' (C27).

The majority of primary non-entrants said that the competition *had* brought environmental education to their attention; it "made me think about where environmental education fits in" (E3). Eight non-entrants said that their knowledge of local areas was increased. "I did not know much before about local areas, which ones were heritage listed, so it was valuable" (O10)." At least some non-entrants looked at the competition flyer or the online resources; 'It was valuable to read the Gondwana Rainforests information. Now I know what is local, what's world heritage and how it's classified' (O12). Another indicated that they had gone to the Gondwana Rainforests Website; 'I thought it was an informative Website. Put it in focus. Added to favourites and will use as a possible resource' (O20). In contrast to the primary candidates only three secondary students said the competition brought environmental issues to their closer attention and there was little evidence that secondary non-entrants accessed the Gondwana Rainforests Website or related materials as a result of the competition. Two secondary non-entrants had previously accessed the Gondwana Rainforests site but said their environmental knowledge was substantial and had not been further increased.

Practical issues in the Implementation of the Competition

As previously mentioned, students were provided with the opportunity to incorporate feedback from university staff on their Website before resubmitting the site by the competition due date. While two entrants did resubmit their site, the majority did not take up this opportunity. Most cited time as the main reason and while some indicated that the feedback was excellent they basically didn't have the opportunity to continue working on the site. One student cited the requirement to include connections to both NSW and Queensland outcomes as problematic due to extra work involved in becoming familiar with another state's syllabus.

Given that time was evidently a significant concern; students were asked whether, if they were given an extended timeframe they would have been prepared to do further work on their resource. Of the primary candidates, one said they would definitely take the opportunity if offered over a semester break. Another who, for some reason was unaware they had the opportunity, said they would have done so. One student indicated that there would need to be greater incentive, such as further accreditation. All of the secondary students were eager to incorporate feedback and do more work on their Website, although the opportunity for them to do so was limited

by them having completed the unit in the second half of the year with the majority completing their course at that time.

Although it had already been part of the competition requirements, students were asked if they would be prepared for someone else, such as the lecturer or another student, to do further work on their site to prepare it for Gondwana Rainforests' needs, with the idea that they would be acknowledged as the primary author. They were also asked if they would like to collaborate in a team in doing further work on their site. All primary and secondary students were happy to have someone else develop their resource further, although most wanted to be involved with the process; "A learning experience for me, not just to make it better for the competition" (C46). Several indicated that they felt it would be positive to work collaboratively as part of a team to do so.

Non-entrants were also asked whether a team-approach to constructing the site would have been of interest to them. Nine students thought team work would have been positive and they noted that different students could have brought different strengths to the activity.

It would be more complex with everyone doing a bit. Could do 4 to 5 pages each with 2 to 3 units of work. It would be unreal. It was a bit overwhelming for me. I did not have a lot of ICT knowledge, so it would be good to be in a team with others and get their support. I might have had a chance (E8).

Sixteen students, however, were not in favour of collaboration, with the majority of these being secondary students. Issues cited concerned being at different levels and wanting to work at their own pace, time availability for meetings (especially for those with families and employment), wanting to retain control over the process and negative group dynamics. Six students said team collaboration was too difficult for external students.

Collaboration between Gondwana Rainforests and the University was in some senses hampered throughout the year-long project with changes of staff within Gondwana Rainforests and subsequent delays in making the sites accessible and promoted due to foreshadowed name changes of the organisation. Despite these difficulties, both groups were quite pleased with the outcomes. Lessons learnt included the importance of clear paths of responsibility, as well as timelines and a realistic understanding (conveyed to students) of the time delay in final mounting of the sites. Other organisations would also be wise to discuss issues surrounding whose server the resultant resources will be mounted on. Some issues did arise with the technical functioning and content accuracy of the sites. Small technical issues were able to be fixed by SCU staff, however, content issues did require input from Gondwana Rainforests staff.

Discussion

Although only a small proportion of the overall student group entered the competition there was an overall sense that the project was successful in both producing practical resources for use in schools, and also in terms of promoting the agenda of environmental education and its integration in all curriculum areas in both primary and secondary preservice teacher education. Exposure to environmental education in preservice education through assignment choice in core degree/

postgraduate diploma subjects, without an environmental focus, is limited (Miles, Harrison & Cutter-Mackenzie, 2006). The initiative reported here has used this avenue,

While the competition did tend to attract those already passionate about environmental education consistent with findings from prior research Jenkins (1999/2000). This was not necessarily viewed as problematic as entrants were passionate and knowledgeable about the area, hence enhancing the quality of the resulting resources. That said, it could be argued that many of the future teachers who did not enter, particularly those in the secondary program, were those who probably most needed to be involved in order to expose them to environmental education ideas and principles. However, by promoting the relevance of the competition to all primary and secondary teachers, and emphasising the ability of all secondary curriculum areas to produce resources around the environmental theme the competition was a positive means of encouraging pre-service teachers to understand the interconnectedness of issues related to the environment and the view that they are responsible and can play their part in developing environmentally literate students (as advocated by Jenkins, 1999/2000; Tilbury, Coleman & Garlick, 2005).

The data did provide evidence of broader outcomes for the wider student body, although this may have been increased had Gondwana Rainforests representatives spoken directly to the student group: as Ferreira, Ryan & Tilbury (2006, p.53) argue the “more equal and participatory the partnership (between organizations involved with environmental education), the better the shared process and the outcomes”. This may also have occurred if the resulting resources had been promoted more widely and promptly after the competition was judged. While it was unfortunate that more secondary students from diverse curriculum backgrounds such as Languages Other Than English (LOTE), Visual arts, Music, Personal Development, Health and Physical Education (PDHPE) or English didn't choose to enter, data did indicate that the majority of students did generally see the potential for such integration. As this is the case, if this approach is used again (see postscript) the university unit will make students in these curriculum areas more aware of the possibilities (see earlier, NSW Department of Education and Training Professional Support and Curriculum Directorate, 2001).

It was reassuring that all students interviewed saw environmental education as important, indicating broad support for integration of environmental education into the curriculum at both primary and secondary levels. Commitments by some of the group E, particularly those from secondary, indicate that a greater emphasis on the importance of ‘thinking local’ and including locality relevant issues in teaching may have been important: many environmental educators would support this position (e.g., Smyth, 2007; Sobel, 1996).

Much was learnt from the project in terms of the model of partnership between universities and community groups such as Gondwana Rainforests, and these findings are relevant to other institutions that might consider or seek to extend the approach to other contexts. In this instance the relationship between Gondwana Rainforests and the university was between being ‘outcome-based and contract driven’ and a degree of collaboration as indicated by the sharing of Gondwana Rainforests resources with preservice teachers, the development of resources for use by Gondwana Rainforests and student teachers, and mutual assessment by both groups of the end-products. As stated elsewhere, if the ‘partnership intensity’ were to increase then there may possibly be greater pre-service teacher involvement (Tilbury, Coleman & Garlick, 2005, p.21).

Dovetailing the competition into existing assessment requirements was essential and feedback from those who did enter indicates that this was a strong motivator for involvement. Incentives have been used to attract teachers to undertake professional development in environmental education, but they have not usually been financial. Rather, if the initiative has been thought to be “valuable and worthwhile” by various bodies, for example, an NGO or helped in developing networks for those involved, then this has usually been more important. Interestingly several of the reasons for involvement (see Figure 1) embraced these types of incentives. Other teacher education initiatives have noted that “high level recognition and support was critical to levels of engagement by... student teachers” (Ferreira, Ryan & Tilbury, 2006, p. 60). This is a facet that could be strengthened in future.

Clearly, for any such partnership in resource development to be effective the requirements for entry need to be not considerably different to standard assessment requirements. As has been documented in broader studies (Long & Hayden, 2001), university students are time and resource poor, have multiple commitments including work and family, and tend to be seeking time-efficient ways of approaching their studies. Some of the competition entrants recognised the competition (with a pre-determined theme and set resources) as providing an efficient and worthwhile path while other non-entrants saw the competition as requiring considerable additional effort and were thus discouraged from entry. Ideas of encouraging team-based resource development (which would have been possible to negotiate within assessment requirements) would clearly not have appealed to all students (particularly secondary students) but may have encouraged some. If a team approach to assessment is taken in future, Meehan and Thomas’ (2006) advice that even tertiary students need to be prepared for projects involving team work will be heeded.

A clear part of encouraging students to participate was to further support them to believe that they were capable of creating Web-based resources which would be professional and appropriate for use by other teachers and community groups. While this lack of technical confidence was certainly a factor impacting on initial decisions to get involved the existence of examples from competitions would help provide a benchmark for standards, as well as illustrating that other students, just like themselves, had managed the process successfully.

Conclusion

The initiative described in this paper provides enhanced understanding of how universities can involve students in working with local community groups through the production of Web-based teaching resources on specific issues of relevance to community groups. By working with community groups in this way, universities are supporting and engaging with the regional community, and enhancing the range of locally produced educational resources which are available to regional teachers and schools.

Postscript: The process Continues with Water Conservation Issues

The project will run again in 2008. Resources produced for the Gondwana Rainforests competition can be found at

http://www.scu.edu.au/schools/edu/ICT/student_pages/CERRA

Since implementing and evaluating the Gondwana Rainforests project described in this paper the local water provider Rous Water also approached Southern Cross University to be involved in a similar initiative following the process example described in this paper. The resultant Web-based resources relate to water conservation issues and are available to the general public at

http://www.scu.edu.au/schools/edu/ICT/student_pages/RousWater

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