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Teacher Education for Sustainability (EfS): Drivers and blockers to embedding EfS across a primary teacher education course.

Sue Wilson

Australian Catholic University

Email: sue.wilson@acu.edu.au

Abstract

During a 2008 study tour to Ontario, Education for Sustainability (EfS) in teacher education was discussed with UNESCO Professor Charles Hopkins. This grounded the following research in an international context (Australian Government Department of the Environment and Heritage, 2007; United Nations Educational, Scientific and Cultural Organization, 2009).

This research, at an ACT university, identified drivers and barriers to embedding EfS across primary teacher education courses. A mixed-methods approach was used. Data were gathered through document audits, a self-efficacy student survey, and student and lecturer focus groups. The results were informed by student responses to EfS in a science and technology education unit.

The research investigated the current teaching of EfS, informed by curriculum documents. Unit outlines were analysed to identify principles of sustainability (Australian Government Department of the Environment and Heritage, 2005) and relevant content. Lecturer focus groups discussed understandings of sustainability and EfS, current practices and factors that impacted on embedding EfS across the four-year Bachelor of Education (B.Ed.) course.

The unit outline audit identified a foundation of existing EfS principles and content across units. Students described successful learning outcomes, but differed in levels of confidence towards teaching sustainability. Some lecturers were unaware of the extent to which they already addressed EfS. Lecturers identified a range of societal and personal drivers and blockers to embedding EfS, however, lack of time was considered most significant. The analysis demonstrated the complexity of the situation.

The project demonstrated the key role education plays in sustainable living. Embedding EFs across teacher education courses can be facilitated by a commitment to sustainable values, identification of sustainability concerns and appropriate knowledge and skills. Hence, recommendations focus on developing professional learning strategies to enhance understandings of teacher educators, and reinforcing student connections to the community.

Introduction

The context of this project occurs within increasing societal awareness of sustainable issues. The end of 2009 marked the midpoint of the UNESCO Decade of Sustainable Development. The Bonn Declaration (2009) stressed the need to involve local communities and the scientific community in education for sustainable development.

This paper summarises an action research project conducted at an Australian Capital Territory (ACT) university, informed by discussions with Professor Charles Hopkins, about the UNESCO guidelines for embedding Education for Sustainability (EfS) into teacher education. The research comprised investigations of the factors impacting on embedding EfS in a four-year pre-service primary teacher education course, comprising 32 semester units and professional experience. The Australian Government Department of the Environment, Water, Heritage and the Arts' (DEWHA) documents (2005, 2009) provided a framework for the audits in the project. Contributors included teacher educators and fourth year pre-service teachers. Collaborators from the ACT community support and contribute to pre-service teacher education courses, and the project attempted to identify students' perceptions of the value of these associations.

Literature review

The background to this project included societal expectations of universities to educate students about sustainability. The Australian Vice-Chancellors' Committee in 2006 declared a commitment to education for sustainable development, in particular embedding a study of sustainability in their academic programs, (Wals, 2009). According to Scott and Gough, addressing sustainable development issues involves institutional change relating to:

- how the university presents its vision and mission statements;
- how resources are managed;
- what (and how) it teaches its students;
- how teaching is managed (2007, p. 108).

Schools are also introducing strategies to teach EfS. This has a strong effect on teacher education courses, as they are expected to align with developments in schools. As Wals (2009, p. 51) states:

The whole school approach is on the rise in primary and secondary education, it is hardly mentioned in the context of teacher education and professional development. The emergence of these new forms of learning is likely to have implications the teacher education and educated professional development in the years to come.

This is a particularly relevant comment, as the new draft consultation version 1.0.1 of the Australian curriculum, Science learning area, identifies sustainability as a cross-curriculum dimension which is explicitly addressed in the content sections and incorporated in the Science as a Human Endeavour strand (ACARA, 2010).

The Higher Education Academy report on sustainable development in higher education identified “four major barriers to the successful of embedding ESD [education for sustainable development] into many of the subject disciplines. These were:

1. Overcrowded curriculum
2. Perceived irrelevance by academic staff
3. Limited staff awareness and expertise
4. Limited institutional drive and commitment”. (HEA, 2005, p. 5)

The timing of the project was therefore strategic and provided an opportunity for valuable research into embedding EfS into a coordinated teacher education course. As part of a preliminary investigation, the project aimed to identify if these barriers were pertinent.

Methodology

Ethics clearance was obtained for the project, which used a mixed-methods approach based within an action research framework. The project initially described eleven second semester units of the Bachelor of Education (B.Ed.) with respect to EfS. Principles of EfS were mapped across the outcomes and content identified from the university’s published unit outlines which specify the content of each unit, supported by interviews with key lecturers. In addition, data was gathered through surveys and focus groups to represent the views of students and lecturers.

Audit of units

The project aimed to identify existing practice, and principles of EfS that were already addressed. The audit of unit outlines was based on seven principles of EfS, (DEWHA, 2009, p. 9). The current extent of EfS addressed was mapped against the graduate attributes and outcomes of eleven units, to specify baseline data and the current situation. In addition, a more detailed survey was completed by Science & Technology, Studies of Society and Environment (SOSE), and Religious Education (R.E.) lecturers, to audit the EfS content, (Australian Government Department of the Environment and Heritage, 2005, p. 16-17) and teaching. This mapping exercise identified the current implementation of EfS in those units.

Lecturer Survey

A lecturer survey was developed, based on the principles and concepts from the DEWHA documents (2005, 2009). These were adopted to identify existing EfS in the audit of units and in the lecturer survey. Participants were also asked to nominate documents and specific pedagogical practices used in class.

Student Survey and Focus Groups

The student survey was developed, based on the Science Teacher Efficacy Belief Instrument, (Hoy, n.d.), to investigate pre-service teachers’ responses to EfS in a Science and Technology unit. Twenty five students responded to the student survey which investigated their perceptions of the extent to which the teaching of EfS: enhanced their

learning experience; gave them opportunities to develop knowledge and competence; enabled capacity-building in EfS; and better prepared them to understand EfS in schools.

Two focus groups (with a total of thirteen students), discussed understandings of EfS, and reflected on the unit, which involved community groups, such as Engineers without Borders. The project investigated students' assessment of the impact of presentations by community groups on their learning outcomes and experiences. Students described how they felt about their future role as teachers with respect to sustainability. The student voice provided an essential contribution to considering strategies for embedding EfS into teacher education courses.

Lecturer Focus Groups

All education lecturers were invited to focus group discussions to explore the attitudes of participants and collect their views about the issues and possibilities for the implementation of EfS in teacher education. Focus group interviews were carried out with six lecturers using a semi-structured interview protocol. Questions identified academic staff members' understandings of sustainability, focused on the present context, asked how EfS is presently addressed in units, and sought to identify the perceived barriers and enablers for embedding EfS across more units.

Results

The unit outline audit identified a foundation of existing EfS principles and content across units. The audit identified that all seven principles were already addressed in existing units. The more detailed lecturer survey showed that, in addition, lecturers reported that all the concepts of EfS, (Australian Government Department of the Environment and Heritage, 2005, p. 16-17), except for "cost-benefit analysis" were already mentioned in the existing units.

Students described successful learning outcomes, but differed in levels of confidence towards teaching sustainability. The results demonstrated the complexity of the situation.

Table 1:

EfS Student survey results

Question focus	% Agree and Strongly Agree
Will find better ways to teach EfS	94
Will teach EfS as well as teach other subjects	73
Will teach EfS effectively	76
Understand concepts to be effective in teaching EfS	74
Able to explain science experiments involving environmental topics	80
Able to answer students' EfS questions	67

Able to help students understand EfS concepts	73
Will welcome students' EfS questions	93
Know how to engage students in EfS	76

Pre-service teachers demonstrated positive attitudes (67% felt able to answer school students' questions, but 93% would still encourage these questions to be asked), but varied in their confidence to engage and teach their students in schools.

Table 2:

EfS Student Focus Group Questions –Summary

- 1. What understandings of sustainability have you gained from this unit?**
 Students reported the importance of the issues regarding sustainability (88%), that they had improved their understanding (80%), emphasised that education is essential (56%) and they had developed ideas that would support their teaching (72%).
- 2. How has the involvement of community groups (CREST, AuSSI, EwB) in the teaching of this unit assisted you with your understanding of Education for Sustainability?**
 Most (88%) students were enthusiastic about the contribution the involvement of groups from the community made to their learning.
- 3. What do you consider are the key issues in Education for Sustainability?**
 Students ranged in their perceptions of the key issues, some (44%) thinking more globally and others starting from a local perspective (56%).
- 4. In the primary classroom, where does teaching sustainability fit? – In science? SOSE? RE or values education? Integrated unit? Please give your reason.**
 All students said that sustainability applied to more than one discipline area. Most (88%) students said they would teach it as an integrated unit.
- 5. Which curriculum documents and other resources have informed your answer to question 4 and how have they done so?**
 Most (80%) students referred to the state and territory curriculum documents. Several students had used the AuSSI resources to inform their learning.
- 6. How do you see yourself as a teacher of sustainability? How confident do you feel about teaching it?**
 Students expressed a wide range of feelings about their confidence to teach sustainability, from “very” (16%) to “not confident” (24%), but all students intended to teach it.

7. What sustainable practices do you engage in? How has this unit assisted you with these?

The majority of students (72%) listed recycling as part of their current practice. A small number of students (16%) did not engage in any sustainable practices.

Students confirmed the importance of sustainability, reported that they had improved their understanding, and had developed ideas that would support their teaching. Students emphasised that education is essential and were involved in sustainable practices:

- “Made us active learners in looking at ways to improve/design concepts to further help the education of sustainability.”
- “The Unit has reminded me to keep these sort [sic] of things up as one day I’ll be teaching, therefore setting the example.”

Students said that the involvement of community groups had enhanced their learning:

- “It has made me more willing to teach EfS. Promoted my learning. They’re great organisations.”
- “It was very helpful and interesting because these are people dealing directly with the issues and with schools.”

Lecturer focus groups reviewed individual understandings of sustainability and current practices. Some lecturers were unaware of the extent to which they already addressed EfS in their units. They identified issues involved in implementing systems approaches to change in pre-service teacher education. Lecturers identified a range of societal and personal drivers and blockers to embedding EfS. However, lack of time was identified by all lecturers as the factor which impacted most on them.

Table 3:

Summary of Lecturer Focus Group Discussion

Drivers

Societal

Social values	Emphasis on sustainability in society and the media
Melbourne Declaration	Melbourne Declaration on Educational Goals for Young Australians (2008) “sense of global citizenship” (p.4)

Education policies and documents

National	DEWHA documents with established models available National curriculum emphasises sustainability
State and territory	Current ACT curriculum has Essential Learning Achievement (ELA) 20 specifically on sustainability

Lecturers

Commitment	Commitment of lecturers and passion for sustainability
Collegiality	Staff welcomed the opportunity to discuss issues

Curriculum	
Existing curriculum	Existing links to sustainability on which to build
Crowded curriculum	Crowded curriculum means no more units so integration across units is necessary
Students	
Engagement	Students respond to hands-on activities and projects
Schools	
Schools	Pre-service teachers need to connect to community because so many schools in the ACT are registered as AuSSI schools.
Blockers	
Societal	
Attitudes and complexity of subject matter	Idea that individuals can't make a difference, and increasing amount and complexity of information available – and common misconceptions
Universities	
Constraints and priorities of the current system	Complexity of universities, multiple priorities, scattered efforts. Conservative thinking of what is possible in a curriculum
Curriculum	
Complexity and crowded, discipline-based curriculum	Complexity of subject matter – so much information to cover. Disciplines in silos, separate units. Need for mapping across units
University staff	
Sessionalisation	Impact of increasing sessionalisation of staff in universities - not knowing what others are doing makes it hard to embed across units
Lecturer knowledge, skills and attitudes	Necessary lecturer knowledge, understanding and skills to teach sustainability and help students make connections. Resistance to change
Students	
Student attitudes, understanding and prior knowledge	Student attitudes include resistance to change. Prior knowledge and understanding of the scientific principles which underpin sustainability of students coming into primary teaching may be limited.
Time	
Communication	Lack of time for discussions with colleagues
Overcrowded curriculum	Impacts on time for innovations
Schools	Time needed to make connections to schools
Money and resources	
Funding and evaluation of resources	Limited budgets and responsibility and evaluation of resources

Lecturers identified a lack of time as impacting on factors such as communication, curriculum development, evaluation of resources and working with schools and

community groups. Lecturers perceived sustainability as important and relevant, but every lecturer commented on the lack of available time.

There was also a strong sense that lecturers from a diverse range of disciplines felt that they lacked information about EfS, and wanted professional learning which would equip them to address EfS in their units, in order to make connections to and build upon what was being taught in other units.

Discussion

When tertiary institutions improve the management, conservation, and recycling of natural resources, and adopt energy and environmental design measures, they model sustainable practices, and commitment to the fundamentals of EfS for students. This forms an important part of the context within which teaching about EfS occurs.

Of the four major barriers identified in the literature, overcrowded curriculum, perceived irrelevance by academic staff, limited staff awareness and expertise and limited institutional drive and commitment, (HEA, 2005, p. 5), this research identified two factors – the overcrowded curriculum and limited staff awareness and expertise - as significant. There was no evidence of a lack of drive and commitment from either the institution or the staff. This suggests that social and political changes that have occurred since previous research.

The barriers identified by lecturers in this research emphasised time as the most serious constraint. Lack of time is a function of the overcrowded curriculum and time is needed for staff to upgrade their expertise. In addition, lecturers expressed frustration that the time available did not allow for the development of an integrated and connected course which they could see would be of value to their students.

Embedding EfS across teacher education courses can be facilitated by a commitment to sustainable environmental values and identification of sustainability concerns, so it is important that staff have the time to develop the appropriate knowledge and skills. This enables them to make relevant connections to sustainability in the teaching of different disciplines, developing pre-service teachers skilled for sustainability to contribute to the teacher workforce. The lecturer focus group results showed that lecturers were not fully aware of the scope of EfS, but already addressed some of the principles and concepts in their units. Therefore, it is vital to ensure that teacher educators have time to develop deeper understanding of EfS.

Formal and informal learning, studying innovative technologies and practices with respect to energy, production and consumption, conservation, and waste management provide basic knowledge and skills for sustainability for pre-service teachers. It is important that units that engage with developing these understandings are mapped across the course so that lecturers can make connections to other units.

Conclusion and recommendations

The complexity of the role of education in participants taking action to identify “best practice” in EfS, and developing actions and practice towards sustainable living was underlined by this research. This project supports previous research findings that the overcrowded curriculum and limited staff awareness and expertise are factors which act as barriers to implementing change. However, the enthusiasm expressed by lecturers to incorporate EfS in diverse units suggests a different perspective to that reported in previous research. This report recommends the development of teacher-educator professional learning training and development packages to support lecturers who are seeking to change their existing practices. It is suggested that packages with an online component would allow lecturers more flexibility with regard to time.

Community partnerships showcase interdisciplinary approaches to sustainability education. As students reported that they found these connections valuable, it is recommended that they be developed and extended to allow students to access mentors who encourage sustainable values and principles, and promote social inclusion. Collaboration with partner organisations would enhance existing connections.

The outcomes of this study provide a foundation for further research. It is recommended that a community EfS network could undertake action research to extend the findings of this project. Involvement of the broader community can boost knowledge of sustainable practices by demonstrating practical examples connected to the workforce. Longitudinal studies could provide feedback on the impact on early career teaching practices.

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