Embedding EfS in Teacher Education Through a Multi-Level Systems Approach: Lessons From Queensland

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Abstract

This article reports on the fourth stage of an evolving study to develop a systems model for embedding education for sustainability (EfS) into pre-service teacher education. The fourth stage trialled the extension of the model to a comprehensive state-wide systems approach involving representatives from all eight Queensland teacher education institutions and other key policy agencies and professional associations. Support for trialling the model included regular meetings among the participating representatives and an implementation guide. This article describes the first three stages of developing and trialling the model before presenting the case study and action research methods employed, four key lessons learned from the project, and the implications of the major outcomes for teacher education policies and practices. The Queensland-wide, multi-site case study revealed processes and strategies that can enable institutional change agents to engage productively in building capacity for embedding EfS at the individual, institutional, and state levels in preservice teacher education. Collectively, the project components provide a system-wide framework that offers strategies, examples, insights, and resources that can serve as a model for other states and/or territories wishing to implement EfS in a systematic and coherent fashion.

Unprecedented threats to the wellbeing of current and future generations brought about by disruptions to social and ecological systems highlight the urgent need for schools and teachers to deliberately engage with educational strategies aimed at addressing sustainability issues. Preservice teacher education provides a recognised strategy for ensuring that future teachers develop the knowledge, understanding, values and skills necessary to embed education for sustainability (EfS) into their

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teaching and learning practices. Yet, during the 20th century and into the 21st century, the embedding of EfS in teacher education has been an ad hoc or neglected area of practice and scholarship (Ferreira, Ryan, & Tilbury, 2014a, 2014b; McKeown-Ice, 2000; United Nations Educational, Scientific and Cultural Organisation [UNESCO], 2009). Initiatives have mostly consisted of a lone or, at most, two to three teacher educators working in isolation at the subject/course level. While fully recognising the importance and progress of such work to date, we propose that embedding EfS in preservice teacher education requires a more coordinated and coherent system-wide approach. This article details the fourth stage of an ongoing Australian project working to enact wide-scale change for sustainability in teacher education through developing a framework that reflects a coordinated and state system-wide approach for embedding EfS in preservice teacher education. Specifically, this article reports on the outcomes and lessons learnt from the fourth stage that utilised the Mainstreaming Change model (Ferreira & Ryan, 2012) to build on previous efforts and to embed EfS within all preservice teacher education institutions in Queensland.

Many Australian environmental and sustainability education researchers and teacher educators will be familiar with the first three stages of the research, undertaken by the former Australian Research Institute in Education for Sustainability (now the Australian Research Institute for Environment and Sustainability) and published in a number of reports (Ferreira, Ryan & Tilbury, 2006; Ferreira, Ryan, Davis, Cavanagh, & Thomas, 2009; Steele, 2010) and journal articles (Ferreira, Ryan, & Tilbury, 2007a, 2007b; Ferreira & Ryan, 2012). The fourth stage, funded by the Office for Learning and Teaching (OLT) during 2012 and reported on here, sought to deepen and extend the findings of the earlier studies. The project developed an implementation guide, a Queensland-wide multi-site case study on embedding EfS across the state teacher education institutions, and expanded teacher education networks (Stevenson, Ferreira, Davis, & Evans, 2014a). Outcomes included an expansion of the Mainstreaming Change model with the identification of strategies that contributed to enhancing the capacity for change required to embed EfS in teacher education. Collectively, these outcomes have shaped a state system-wide framework that can serve as a scaffold for other states and/or territories wishing to embed EfS in preservice teacher education.

Embedding or mainstreaming EfS in preservice teacher education refers to the inclusion of sustainability as part of the core focus and activity of teacher education policies and practices. EfS requires not simply an adaptation of content and courses to fit in with current educational structures, objectives and processes, but rather a disruption and reorientation of existing (curriculum, pedagogical, and managerial) systems (Scott, Tilbury, Sharp, & Deane, 2012; Sterling, 2012; Stevenson, 1987; 2007). We therefore contend that embedding EfS demands transformation, rather than adaptation, of philosophies, policies and practices that can be sustained in the long term.

Background to the Study

The United Nations Decade of Education for Sustainable Development (UN DESD) 2005–2015, together with a multitude of international declarations since the early 1990s (e.g., Talloires Declaration, Swansea Declaration, CRE Copernicus Charter) calling for universities to embrace the principles of sustainable development, has stimulated many higher education institutions around the world to commit to the integration of EfS into their core activities. Reported outcomes point to significant investments in campus management, operations and research, but somewhat less attention has been paid to the integration of EfS into teaching and learning (Cotton, Bailey, Warren, & Bissell, 2009). Although there is a variety of available discipline-specific and general

frameworks to guide the integration of EfS into higher education curricula (e.g., Benn & Dunphy, 2009; Lidgren, Rodhe, & Huisingh, 2006; Lozano, 2006; Roome, 2005; Rusinko, 2010; Sammalisto & Lindhqvist, 2008; Scott & Gough, 2006), we have known for some time that it is a difficult task (Gray-Donald & Selby, 2004). This is also reflected in the Australian context (Tilbury, Keogh, Leighton, & Kent, 2005).

Australia has many well-developed policies, curriculum frameworks and other initiatives aimed at encouraging the embedding of EfS across a number of educational sectors, including a National Action Plan (Australian Government Department of the Environment, 2009), sustainability as a cross-curriculum priority in the Australian Curriculum (Australian Curriculum, Assessment and Reporting Authority [ACARA], n.d.), whole school approaches such as AuSSI (Australian Sustainable Schools Initiative), QESSI (Queensland Environmental Sustainable Schools Initiative), and the National Vocational Education and Training Sector Sustainability Policy and Action Plan (2009). In the university sector, the literature outlines engagement with EfS within some disciplines, such as engineering (Brennan, 2013; O'Shea & Baillie, 2011; Sheehan, Schneider, & Desha, 2012) and business (Nowak, Rowe, & Thomas, 2008; Sanders & LeClus, 2011); however, in general, adoption of EfS is believed to be low level (Australian Learning and Teaching Council, 2010; Leihy & Salazar, 2011).

This low-level trend is also reflected within teacher education that has, overall, been slow to incorporate EfS (Steele, 2010). EfS is not a compulsory requirement in preservice teacher education in Australia. Indeed, the National Graduate Teacher Standards and National Program Standards for teacher education (Australian Institute for Teaching and School Leadership, 2011), for example, do not mention EfS. Many teacher education institutions, therefore, consider EfS an add-on and either ignore the area or include it in a tokenistic way, rather than in a thorough and systematic fashion (Ferreira et al., 2007b; McKeown, 2012). The result is that many new teachers graduate without the knowledge, understanding, skills, and commitment to implement EfS initiatives once they begin to teach in schools (Miles, Harrison, & Cutter-Mackenzie, 2006; Tilbury, Coleman, & Garlick, 2005). The study this article reports on utilised the Mainstreaming Change model (Ferreira & Ryan, 2012) to involve representatives from all teacher education institutions in Queensland and related agents of change such as the state Department of Education, Board of Teacher Registration and professional associations, to collaboratively facilitate policy and curriculum practices that reflect a coherent vision of EfS at the state, institutional, and course levels. The research and project approach, methods and processes, lessons learned, and the broader implications of the outcomes for preservice teacher education are examined below. To provide a context for the study, we begin with an overview of the first three stages.

The Mainstreaming Sustainability Model

The first stage of this study developed a Mainstreaming Sustainability model based on an extensive literature review of professional development models used in preservice teacher education initiatives (see Ferreira et al., 2006). This model combined the strongest features of a participatory action research process with a whole-of-system approach in an effort to concurrently initiate change across a whole system (rather than a section or subsection) through deep and meaningful but flexible engagement with key agents of change within the system. The premise was that broad engagement with key change agents across a system, combined with active and deep participation of stakeholders within a system, ensures that multiple levels and contexts within the system are aligned in their efforts to work towards embedding sustainability (Ferreira et al., 2009). In preservice teacher education, key agents of change (those who can influence

the system) include teacher education institutions, departments of education and the environment, boards of teacher registration, professional teacher associations, schools, and teacher education students. The Mainstreaming Sustainability model is unique in that it provides a method for trying to effect change by aligning all elements of the teacher education system with a shared vision of EfS (Ferreira et al., 2006).

A second stage study piloted the Mainstreaming Sustainability model in Queensland and Northern Territory teacher education systems. In adopting a whole-of-system approach, this stage engaged stakeholder representatives from within and across a range of related education, government, business, and non-profit organisations. This included teacher educators and students from five Queensland universities and two Northern Territory universities and colleges, participants from the business sector, state government departments of education and environment, school and outdoor education centres, and environmental and educational non-governmental organisations (NGOs). The project was successful in establishing networks, partnerships and strategies for mainstreaming sustainability in teacher education. Findings from stage two highlight that the Mainstreaming Sustainability model is able to facilitate change over time (Ferreira et al., 2009), but also note the importance of building capacity for change. In the case of systemic change for sustainability this means building change agents' knowledge of EfS, conceptual skills in systemic thinking, organisational change skills, and leadership skills (Ferreira, Ryan, & Davis, 2015).

Stage three used the Mainstreaming Sustainability model in one Australian Capital Territory (ACT) and three New South Wales (NSW) universities and identified a number of enablers and constraints to mainstreaming EfS within these two teacher education systems (Steele, 2010). This stage involved teacher educators mapping their individual systems, identifying key agents of change within their systems, and establishing baseline conditions for systemic change. This third stage found that while individual teacher educators are motivated and able to incorporate EfS into their courses, there is often a lack of systemic support, and this acts as a constraint on achieving change (Steele, 2010).

In summary, stage one of the study conceived and developed the Mainstreaming Sustainability model. Insights from stages two and three informed further development of the model, including a renaming to the Mainstreaming Change model (Ferreira & Ryan, 2012) and the need for a systemic teacher education framework and approach. As outlined above, the fourth stage's purpose was to extend and deepen the lessons and recommendations from the first three stages and to expand the Mainstreaming Change model into a state-wide system framework for embedding sustainability into teacher education.

Research Approach, Methods and Processes

Based on stages one to three of the research, expanding the Mainstreaming Change model to a comprehensive inclusive state-wide system framework demanded involving key agents of change within and across the Queensland 'teacher education system', broadly defined. Therefore, stage four project participants, in addition to a project team comprising three project leaders and a project manager from James Cook University, Queensland University of Technology and Griffith University, consisted of: one participant from each Queensland university offering preservice teacher education (James Cook University, University of the Sunshine Coast, Queensland University of Technology, Griffith University, University of Southern Queensland, Central Queensland University, University of Queensland, Australian Catholic University), as well as one participant from the state's teacher registration authority — the Queensland College of

TABLE 1:   Activities to Facilitate Change for Sustainability at Multiple Levels

State level activities	Program level activities	Institutional level activities
• negotiated a vision for EfS; • created and expanded a state network; • developed a revised systemic model based on and supported by a Queensland-wide multi-site case study; • developed a repertoire of curriculum strategies and resources for embedding sustainability in teacher education.	• participants worked to incorporate EfS content, skills and processes into current subjects; • participants collaborated with peers to develop EfS initiatives across their institution; • participants worked to incorporate EfS skills into graduate attributes; • participants published and disseminated related research and case studies of their experiences.	• participants mapped teacher education systems; • participants worked to enhance participation and engagement of academic staff across schools of education and disciplinary specialisations; • participants convened sustainability networks within their own institutions and organisations; • participants aligned teaching units with graduate attributes consistent with sustainability principles.

Teachers (QCT), the key State Government agency — Education Queensland (EQ), and two national professional organisations — the Australian Teacher Education Association (AATEA) and the Australian Association of Environmental Education (AAEE). Participants comprised a combination of early, mid-career and one experienced researcher, selected by the institutions. Out of eight, two teacher educators had no understanding or prior experience in EfS, three others had limited experience, and three had undertaken previous research in EfS and embedded EfS knowledge and practices within their own teaching. All participants from the professional associations had a personal interest in sustainability, with those from EQ and AAEE also having extensive professional experience in EfS.

A case study approach was adopted, with each participating institutional representative asked to develop a case study outlining efforts to embed EfS in teacher education at their institution.

Case studies are a common approach to studying innovations in sustainability at all levels of education and can be useful for enhancing understanding of existing educational practices and offering new possibilities for understanding and improving practice (Stevenson, 2004). Seven of the participating teacher education institutions in this project produced individual case studies capturing critical context-based experiences of working to integrate EfS within their respective institutions (Stevenson, Ferreira, Davis, & Evans, 2014c).

The project team employed a variety of strategies to support participants in collaboratively developing and enacting a set of flexible multi-level policy and curriculum-based project activities throughout 2012, as outlined in Table 1. Activities were supported through three 2-day workshops spread throughout 2012, monthly teleconference meetings, and phone and email conversations as required, all designed to enhance capacity to embed EfS within their teacher education faculties.

To guide project activities, we drew on conceptions of, and frameworks for, sustainability and EfS (DEWHA, 2009; Tilbury & Cooke, 2005; Fien, 2001), systems theory and thinking (Capra, 1997; Sterling, 2004), and leadership and change theory (Hargreaves & Fink, 2006; Sterling, 2001), along with a participatory action research (PAR) approach to change. Although there are multiple definitions, PAR can be understood as a collaborative and critically reflective approach where participants negotiate research activities and combine systematic inquiry with learning and action to enact change (ARIES, as cited in Ferreira et al., 2009; Kemmis & McTaggart, 2000; Greenwood et al., 1993). In this study, project leaders and participants used PAR to negotiate, inform, guide, enact, and revise project activities (as outlined in Table 1) and as a way of researching the impacts of actions in working towards embedding EfS. We also engaged participants in reflective discussions throughout the workshops, teleconference meetings, and email and phone conversations. An external evaluator was a critical friend for the action research, and a formative and summative project evaluator.

The three workshops, strategically held at the beginning, midway and at the end of the project, focused on developing a shared conceptual understanding of systems, organisational change, EfS, and the Queensland teacher education system as it pertains to EfS. This was undertaken through specific activities and exercises, many of which were trialled in previous iterations of the research (Ferreira et al., 2009; Steele, 2010) and included: mapping teacher education systems and participant institutional systems, discussions on conceptions of EfS, visioning change exercises, and generally opening communication spaces for participants to share experiences and understandings. An implementation guide, *Embedding EfS In Teacher Education: An Introductory Guide to Using the Systems Model* (Stevenson, Ferreira, Davis, & Evans, 2014b), was developed to help participants begin or expand the embedding of EfS within their own institutions. The guide includes many of the workshop activities and exercises described above, as well as background on key concepts and themes related to sustainability and education; the theory and application of the Mainstreaming Change model, including implementation processes, strategies, and tools; potential barriers, opportunities, and desirable outcomes related to embedding EfS; and a repertoire of supporting resources. This includes guides for creating institutional teams, mapping organisational systems, undertaking curriculum reviews and renewal processes, key websites, help guides, policy papers, reports, books, journals, and conferences.

The monthly teleconference meetings focused on discussing and reflecting on developing conceptual understandings as well as actions taken by participants within their particular institutions. Participants reported that these monthly meetings helped them to stay focused on the project and provided the opportunity to discuss and clarify issues, concerns and/or understandings as they emerged.

Data collected included: field notes and minutes from workshops and monthly meetings; text-based exercises that participants undertook, such as the systems-mapping exercises; notes derived from the action research process at each institution; formative and summative comments and reports by the external project evaluator; and a focus group interview with the Queensland-based participants. An inductive approach was used to analyse and interpret the data. The inductive approach provides a systematic procedure when the primary aim of analysis is to derive concepts, themes and/or models from raw data (Thomas, 2006). This entailed undertaking detailed readings of raw data to allow findings to emerge from dominant and significant themes that were intrinsic to the raw data collected. Diagrams and mindmaps were also created to focus on different emergent themes and connections between other aspects of the project. This exercise facilitated understanding of the processes and thinking involved in developing the type

of change process required for the embedding of EfS at multiple levels, as outlined in Table 1.

Lessons Learned From the Project

Four key lessons emerged from this study, namely that building capacity and foundations for change in embedding EfS in teacher education: (1) is an evolving process influenced by the institutional context; (2) is enhanced by mapping the agents of change at the state and institutional levels of the teacher education system and creating expanded networks that engage these agents; (3) demands robust dialogues about the meaning and significance of EfS without necessarily being dependent on a shared understanding and conceptualisation of EfS; and (4) is assisted by making connections to current structures, policies and programs that support EfS and/or being opportunistic in taking advantage of changing circumstances. We expand on these below.

The first lesson is that embedding EfS in teacher education is an evolving change process influenced by the prior institutional history and current state of cultural and structural engagement with sustainability at both the teacher education and whole university levels. Some institutions had established structures (such as discrete offices and/or committees), policies and mission statements concerned with sustainability practices, programs and/or research. Others were in the process of developing sustainability initiatives, such as graduate attribute statements of sustainability competencies. The evaluator noted that the EfS teacher education activities in these institutions 'either engendered or cohered with existing sustainability programs elsewhere in the institutions' (Robottom, as cited in Stevenson et al., 2014a, p. 48). Differences in institutional activities were also a function of the experience, status and networks of the participating institutional representatives. These differences were manifested in different levels of engagement with EfS, from a focus on working within a teacher education program or subject subgroup (e.g., science teacher educators) to working towards institutional-wide approaches.

The second lesson is that the process of change is facilitated by mapping the key agents of change at the state and institutional levels of the Queensland teacher education system and creating or expanding networks to engage these agents. Participants reported that the mapping exercises helped familiarise them with both the state-wide teacher education system and their university's institutional system, as well as assisted them to identify the influential system players — which was seen as important in planning and taking strategic action. All participants indicated that involving more people, especially those who may not see EfS as their primary concern, was found to be crucial for progressing change. Some participants reported that system mapping enabled them to enact change through collaboration across program/course and/or institutional levels within their own universities by connecting with already established structures and networks. For example, through joining teaching and learning or other institutional committees (e.g., on sustainability). Some built or expanded a network by engaging other colleagues within their universities, sometimes from different departments not usually associated with sustainability.

The third lesson, that embedding EfS in teacher education does not depend on a shared understanding and conceptualisation of EfS, is not surprising if we consider contemporary understandings of EfS as a fluid (Kates, Parris, & Leiserowitz, 2005; Vercoe & Brinkman, 2012) and contested concept that is open to interpretation (Fien & Tilbury, 2002; Stevenson, 2006). Although project participants initially searched to find a common definitional and conceptual understanding of EfS, it soon became apparent that settling on one agreed conception across a whole teacher education system was

problematic. The project evaluator argued that this situation 'is not to be viewed negatively' (Robottom, as cited in Stevenson et al., 2014a, p. 50) since a similar lack of clarity has been reported at major international conferences focusing on conceptualising EfS (e.g., see Bjorneloo & Nyberg 2007). Multiple conceptions of EfS are to be expected owing, in part, to the vagueness and broad scope of the foundational concept of sustainability, which is open to multiple interpretations (Stevenson, 2006). Instead of seeking a common understanding of EfS as initially planned, robust dialogues about the meaning and significance of sustainability and EfS enabled participants to develop understandings of the different concepts of and debates about EfS and to draw on conceptions most relevant to their particular contexts. These conversations took place not only in meetings among the project leadership team and institutional representatives but, in many cases, in meetings arranged by the latter group, often supported by materials shared in the workshops and included in the implementation guide. In addition, several participants included this issue within their own internal research of staff efficacy related to knowledge of sustainability and teaching of EfS. Some participants also acknowledged shifts in their conceptual understandings of EfS. For example, one individual recounted that at the beginning of the project she strongly identified EfS with the science curriculum area. However, the conversations during the life of the project exposed her to the interdisciplinary nature of EfS and therefore its relevance to all curriculum areas.

The last lesson is that the process of embedding EfS in teacher education can be assisted by identifying current structures, policies, and programs capable of supporting EfS and/or by being opportunistic and taking advantage of changing circumstances in the form of curriculum, or organisational reviews, or restructuring. Support for embedding sustainability in teacher education was provided by institutions where there were current or emerging developments of mission statements, policies and structures (e.g., dedicated offices/organisational units and committees) related to sustainability. As the project evaluator stated, the EfS teacher education activities in these cases 'cohered with existing sustainability programs elsewhere in the institutions' (Robottom, as cited in Stevenson et al., 2014a, p. 48). This project took place within a context of change for Australian universities, including institutional restructures and reorientations, course reaccreditations, curriculum refresh exercises, and emergent national education agendas and policies such as the Australian Professional Standards for Teachers. These changing circumstances were reported by a couple of the participants as providing a set of opportunities (as well as challenges) for change that they were able to take advantage of to leverage for EfS — an important lesson for other universities. For example, a 'curriculum refresh' exercise at one university offered the opportunity to advocate for embedding of EfS within that institution's teacher education courses.

Implications of Project Outcomes for Teacher Education Policies and Practices

Taken together, the four related lessons learned suggest major project outcomes that have important implications for teacher education. Specifically, the outcomes point to strategies for building capacity for embedding EfS at the individual and the institutional levels of the teacher education system. This fourth stage of the research was concerned with building on the previous systems model by trialling the revised framework for engaging with stakeholders, both within and outside teacher education institutions in the Queensland system. However, owing to the 1-year time limitation on our project we focused on working with the preservice teacher education institutional representatives and did not pursue in depth how the other agencies could contribute to building state-wide capacity for embedding EfS.

A major outcome of this project, as revealed in the multi-site case study, was that the collective efforts of the institutional representatives enabled an expansion of the institutional teacher education component of the state-wide systems framework, now renamed the Embedding EfS Change Model. The model focuses on identifying the agents of change and the institutions and structures that comprise the teacher education system (e.g., heads of schools/faculties, lecturers, curriculum committees in teacher education institutions). The value of identifying the people to involve was confirmed in this OLT-funded project in that all institutional representatives reported being assisted by mapping of both the state-wide teacher education system and their own institutional teacher education and sustainability subsystems. What this project contributed to the model was that, beyond this mapping, the multi-site case study revealed processes and strategies that enable change agents to engage productively in building capacity for embedding EfS in preservice teacher education. While the project team worked collectively and individually with the institutional representatives to identify and develop EfS initiatives, the case studies describe how the diverse history, specific context, and individual staff experiences of engaging with EfS across these institutions resulted in different approaches and processes used to integrate EfS. These ranged from individually initiated activities and actions to working through existing university committees, networks and systems. This diversity suggests there are distinctive ways that teacher educators in Queensland experience efforts to embed EfS within their respective institutions, including opportunities and barriers that shape the way sustainability is taught and learnt.

Generally, those participants with more experience in the fields of both EfS and teacher education were more likely to undertake activities to leverage change widely across their institution, rather than at the individual subject or lecturer level. Examples of these broader activities include: liaising with heads of school/faculty/teaching and learning deans, engaging with key university documents and policies, understanding and seeking opportunities to work across disciplines, developing resources to assist academics, and developing or using a community of practice. In contrast, new or novice teacher educators tended to focus on: (1) mapping the EfS policies and practices currently in place (or missing) in their teacher education program(s) by auditing curriculum or surveying staff and/or students on their views on sustainability and EfS, and (2) developing their own and their colleagues' understanding of EfS

A cross-site analysis of the institutional case studies suggests that the following five main strategies need to be employed by teacher educators as agents of change for embedding EfS:

- mapping the key agents of change — within both the state system and their institutional teacher education and sustainability subsystems;
- establishing and strengthening networks of engaged colleagues — within their school/faculty and across the university;
- building more complex understandings of sustainability and EfS — through robust dialogues that are likely to result in multiple conceptualisations of EfS;
- mapping the EfS policies and practices currently in place (or not) — in teacher education and the whole institution;
- working towards an institutional systems-based approach to embedding EfS — for example, incorporating sustainability competencies into expected student graduate attributes.

Taken together, the above strategies led to expanded and enhanced participation and engagement of staff in EfS which, in turn, can be expected to increase individual and institutional capacity for embedding EfS in teacher education. At the individual teacher educator level, participants developed capacity for change through

activities that enabled them to: (a) develop or enhance their understanding of EfS; (b) become familiar with the EfS and teacher education system within their respective schools/departments, institutions, and across Queensland; and (c) identify the central content and process characteristics of their particular subject/courses as a way to explicate their conceptualisation of and orientation to EfS. At the institutional level, participants took advantage of either institutional structures or emergent opportunities within their particular context to introduce EfS (Stevenson et al., 2014c). At the state level, capacity for embedding EfS across the whole teacher education system was more limited, but enhanced to some extent through the development of cross-institutional networks that transcended traditional discipline silos (Stevenson et al., 2014a).

The power of networks, which are a recognised strategy for achieving change (Chapman & Aspin, 2008), was evident throughout the project. Efforts were made to build networks of teacher educators and other relevant stakeholders within and across the institutional, state, and national levels to enable participants to share and expand on ideas and strategies for embedding sustainability into preservice teacher education. To be effective, networks need to be nurtured, supported and incentivised (Parker & Gallagher, 2007). Thus, the teacher education participants at the institutional level and the project team at the state level worked collaboratively to do so through collegial meetings (with food often provided) that emphasised robust conversations, as well as curriculum development and research activities, throughout the life of the project.

In an effort to begin to build a national network of teacher educators for sustainability, one participant from a teacher education institution in each state and territory was invited to participate in the final workshop. Collectively, we considered how best to maintain and nurture networks beyond the life of the project but, once the project and the funding finished, demanding workloads and competing commitments undermined our capacity to continue developing the networks. As a result we have no evidence of lasting change or further developments and/or influences of the collaboration. However, in 2015 we secured further funding from the OLT to extend this project by disseminating the processes and findings to all other states and territories in Australia. This gave us the opportunity to reconnect with and expand network members, identify ongoing or further issues and impacts resulting from the fourth stage of the project, and to survey teacher educators' needs for and suggestions for utilising and expanding an existing national network or creating a new one around the participants in this project. The overwhelming desire was to focus on solidifying and expanding one of the existing networks rather than try to sustain multiple networks. The major criterion for the identification of a suitable network was the availability of a coordinator who could maintain regular communication and support network activities.

Conclusion

The contribution of this project (in conjunction with the three previous stages) lies in the development of a holistic, coherent and context responsive system-wide approach to change. This fourth stage has tested and expanded a model to mainstream sustainability into teacher education and developed resources to enhance and support the model. Collectively, the developments arising from this project may serve as a holistic framework for other states interested in developing EfS in higher education.

Results of the fourth stage of the project suggest that the Embedding EfS Change model can contribute to building capacity for change at multiple levels. At the individual level, the project has developed innovative teacher education approaches and strategies to assist lecturers to embed EfS into teaching and learning, regardless of their experience or specialisations. At the institutional and state levels, the model has

encouraged inclusive and systemic approaches to building capacity for embedding sustainability, thereby encouraging a shift away from fragmented approaches. The project offers important examples, insights, and resources for other teacher education institutions wishing to embed EfS, as well as to a range of agents seeking to bring about similar change within other complex educational systems and contexts.

Keywords: education for sustainability, environmental education, teacher education, systems change, pre-service teacher education, embedding sustainability

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