

Making the most of the multiplier effect: Teacher education as a key to sustainability

Dianne Chambers

Melbourne Graduate School of Education
The University of Melbourne
d.chambers@unimelb.edu.au

Abstract

Australia's journey to becoming a sustainable society will be achieved through raising awareness and understandings of sustainability issues, through building capacity for innovations, and implementing solutions. Education for sustainability is essential to achieve this. Working with individuals and community groups will be part of this process, but school education has a far greater reach. There are currently approximately 3.25 million school students in Australia and what happens at schools influences families and the wider community. Australian teachers, thus, have a major role to play in Australia's quest for sustainability, however, reaching the quarter of a million of teachers scattered across the country is a substantial challenge.

Teacher education institutions can play an effective role in rising to the challenge as, in addition to providing postgraduate learning and professional development opportunities for practising teachers, they are educating the teachers of tomorrow, who can begin their role as agents of change today.

This paper looks at a subject undertaken by primary and secondary teacher candidates in their final semester before graduation. The subject's content and the pedagogy has been designed to develop teachers who are ready to integrate sustainability into the curriculum, including across curriculum areas, to apply a pedagogical approach that supports critical thinking, independent learning and innovation, to gain an understanding of school dynamics, and dares teacher candidates to make changes in their lives and their communities. Teacher candidates are challenged to become agents of change in their professional and personal lives.

Introduction

In 2009 the Australian Federal Government released *Living Sustainably: The Australian Government's National Action Plan for Education for Sustainability* (2009a), which is Australia's second national action plan for sustainability, and 2009 also marks the half-way mark in the United Nations' Decade for Education for Sustainable Development (UNDESD 2005-2014, see <http://www.desd.org>). The importance of education for sustainability (EfS), or education for sustainable development (ESD), as it is termed in some parts of the world and by the UN, is thus well-established. Many school systems, universities and teacher education institutions are engaged in incorporating EfS into their curriculum and activities.

This paper will first explore the context of EfS in Australia and the importance of teacher education in achieving national sustainability goals. The paper will then outline a subject offered in a graduate Education course that endeavours to develop teacher candidates as agents of change for sustainability in their schools and communities.

Sustainability and Australian Education

From Environmental Education to Education for Sustainability

In Australia Education for Sustainability (EfS) has grown from Environmental Education, which has a long history in Australia. The fluidity of language around education and sustainability (for example, 'Education for Sustainable Development', 'Education for Sustainability', 'Environmental Education', 'Environmental Education for Sustainability', *etc.*) emerges from this history and from the desire to respect and value the major contribution that those in the field of Environmental Education have made. A common goal is that students will become citizens who have knowledge, values, and critical thinking skills and who will be able to make a difference.

A recent shift in language from 'Environmental Education' to 'Education for Sustainability' is evident in the recently released *Living Sustainably: The Australian Government's National Action Plan for Education for Sustainability* (DEWHA, 2009a) and in the renaming of government bodies, for example, the *National Environmental Education Council* has become the *National Council on Education for Sustainability* and the *National Environmental Education Network* is now the *National Education for Sustainability Network*.

In Australia, EfS has a broad scope, including challenging and changing both content and curriculum, pedagogy and assessment. Culture and values are also seen as important aspects of EfS. Goals of EfS in Australia include preparing citizens who understand sustainability issues, have values and capabilities to address the challenges, and who participate in decision making.

Principles of EfS espoused by the Australian Government include the ability to embrace change and adapt to new circumstances to secure Australia's future, and the role of EfS is seen as central in achieving this goal. The single goal stated in the document *Caring for our Future: The Australian Government Strategy for the UN Decade of ESD 2005-2014* (DEH, 2006) is:

To mainstream sustainability across the community through education and lifelong learning. (p4)

The educational framework around EfS in Australia is summed up in *Educating for a Sustainable Future: A National Environmental Education Statement for Australian Schools* (DEH, 2005) by the statement:

Effective environmental education for sustainability is not just a curriculum issue; it requires the involvement of the whole school. (p7)

In summary in Australia EfS includes:

- An holistic approach — environmental, economic, social & cultural sustainability are the key areas, though environmental sustainability is what most people outside the field tend to associate with the term
- A broad based approach
- Developing processes & skills, not just content knowledge
- Values
- Cultural influences
- Actions and outcomes, not just content knowledge
- Inclusive – everyone needs to play a part.

The Australian National Action Plan for Education for Sustainability

Australia's second national action plan for education for sustainability *Living Sustainably: The Australian Government's National Action Plan for Education for Sustainability* (DEWHA, 2009a) was released in April 2009 with the vision that:

All Australians have the awareness, knowledge, skills, values and motivation to live sustainably.

and the plan's mission is:

To engage the community in sustainability through education and lifelong learning.

The plan has four strategies:

- 1. Demonstrating Australian Government leadership*
- 2. Reorienting education systems to sustainability*
- 3. Fostering sustainability in business and industry*
- 4. Harnessing community spirit to act*

(p17, DEWHA, 2009a)

Strategy 2 'Reorienting education systems to sustainability' needs to be responded to by universities, and by Faculties of Education in particular.

Objectives of Strategy 2: Reorienting education systems to sustainability

2.1 The vocational education and training sector incorporates sustainability in all national training packages; and implements sustainable campus management.

2.2 Education for sustainability is integrated into all university courses/subject areas and campuses are managed in a sustainable way.

2.3 Whole-of-school and whole-of-system approaches to education for sustainability, including campus management, are adopted through widespread uptake of the National Environmental Education Statement for Australian Schools and implementation of the Australian Sustainable Schools Initiative.

(p21, DEWHA, 2009a)

The latter two objectives of this strategy need to be responded to by faculties or schools of Education, as this is where teacher education is situated. Faculties of Education will need to integrate education for sustainability into all courses and subject areas to meet Objective 2.2, and reconsider their offerings so that they are preparing and developing teachers and school leaders who are capable of and empowered to achieve Objective 2.3 in their school settings. Thus, a substantial response is required from teacher education institutions.

Sustainability in the School Curriculum

A whole-school approach is the basis of the Australian Sustainable Schools Initiative (AuSSI). AuSSI is a national initiative with over 2000 participating schools (with over 570,000 students). This is the chief Australian EfS initiative in schools and the new Australian National Action Plan (DEWHA, 2009a) continues support for AuSSI, which was established and funded under the previous government.

AuSSI is a systemic approach that seeks to support schools and their communities to become sustainable. The initiative ‘involves participants in a whole-of-school approach, to explore through real-life learning experiences, improvements in a school’s management of resources and facilities including energy, waste, water, biodiversity, landscape design, products and materials. It also addresses associated social and financial issues’ (DEWHA, 2009b). This holistic and systemic approach encompasses school curriculum and pedagogy and school operations, governance, design, management and grounds.

One of the challenges to incorporating sustainability into the school curriculum is particularly evident at secondary schools, where there is an increased focus of individual subjects and examinations. EfS should be multidisciplinary and holistic (Woods, 2005), but this is not always a reality in schools. In primary schools (K-6) an integrated curriculum approach is often implemented. Primary schools children spend most of the teaching week with the same teacher (with the exception of classes such as music and physical education) and schools tend to be reasonably small (<1000 students, often many less) and have a single staffroom, so all teachers are together. Teacher education and the culture of primary schools leads to teachers who work across discipline areas, so integration of sustainability across the curriculum is

generally not challenging to primary teachers.

In Australian secondary schools interdisciplinary studies are less frequent, though it is seen in years 7-9 in some schools. Secondary teachers generally have a degree in a discipline area followed by education studies, leading to an affiliation to their specific discipline, and staff rooms are often organised around discipline areas. Students in Australian secondary schools go from room to room and teacher to teacher as they move through their daily timetable. The strong discipline-base of secondary teachers, the timetabling issues in secondary schools, and the pressure applied from external examinations in Years 11 and 12 combine to impede interdisciplinary studies, and thus frequently blocking effective interdisciplinary studies around EfS in secondary schools.

Teacher Education, EfS, and the multiplier effect

The Multiplier Effect of Teacher Education

The multiplier effect is defined by the Oxford English Dictionary as a term mainly used in economics as “an effect whereby under certain conditions a relatively small change in input of some kind (esp. levels of investment or expenditure) may produce a relatively large change in output”, that is, an increase in some activity starts a chain reaction that generates more activity than the original increase.

Teacher education is a good, non-economic, example of a multiplier effect in action: if a teacher learns something then, potentially, all of the students in their care over the duration of their career can be influenced by the learning of that teacher. Thus, by incorporating EfS into teacher education there is the opportunity to influence many students, and their families, over a long period of time. Although community education will also play an important role in Australia’s journey toward sustainability, the multiplier effect makes investment in EfS in teacher education programs that prepare teachers who are effective EfS educators a particularly effective investment.

Teacher Education and EfS

Teacher education is acknowledged as a strategy for embedding education for sustainability in schools (Ferreira, Ryan & Tilbury, 2007) and teacher education is a target area for the UN’s Decade of Education for Sustainable Development. The impact that teachers can have on the children that they teach is seen as an important element in addressing the urgent need for people to live more sustainably, and the UNESCO project *Reorienting Teacher Education to Address Sustainability* (UNESCO, 2005; Gough & Scott, 2007) has as its goal major changes in teacher education worldwide so that teachers are prepared to teach about sustainability and influence the children that they teach to live in a more sustainable way. The importance of

teacher education institutions to influence future generations through the work of their students is acknowledged and education is described as a ‘great hope for creating a more sustainable future’ (UNESCO, 2005). Teacher education includes initial teacher education and the professional development of practising teachers and teacher educators are frequently involved in the design of school curriculum in their local context and often provide advice for local education authorities.

Teacher Education at the Melbourne Graduate School of Education

Commencing in 2008, and following the substantial restructuring of the Faculty of Education into the Melbourne Graduate School of Education (MGSE), teacher education at MGSE shifted to a graduate model. Teacher candidates wishing to become teachers now enter the MGSE as university graduates and enrol in the primary or secondary Master of Teaching course, and thus the courses are designed on the premise that teacher candidates will have a foundation of disciplinary knowledge, analytical and communication skills, and will bring with them a range of life and work experiences. The course emphasises research evidence as the foundation for educational practises, while at the same time building on extensive classroom experience and guidance from exemplary teachers. Teacher candidates in the M.Teach. courses are graduates from a wide range of fields, with those in the Primary stream having an undergraduate degree in any field, while teacher candidates in the Secondary stream are required to have appropriate studies (generally a major or sub-major) in school learning areas within their undergraduate degree. Thus the teacher candidates have very diverse educational backgrounds.

A key aspect of the Master of Teaching programs is that teacher candidates are at university for three days and in school two days each week of the university semester. In addition, teacher candidates spend a two-week block in schools each semester and are at the same school over a semester. This time in a school enables teacher candidates to observe expert teachers, to apply university learning, to reflect on their classroom experiences, and discuss this with their supervising classroom teacher. The extended time in school allows teacher candidates to begin to understand the culture of the school, understand processes that underpin the running of the school, and see the range of responsibilities that classroom teachers undertake inside and outside the classroom.

As well as the supervising classroom teacher, who teacher candidates traditionally have when in schools, teacher candidates in the Master of Teaching course also have two additional experts to guide them in their development as teachers. For each 20-25 students at schools in a local area (termed the ‘Neighbourhood Group’) the university employs half-time an exemplary teacher from, and based at one, of the schools as a ‘Teaching Fellow’. The

Teaching Fellow's role is to mentor, advise, and extend the teacher candidates. This is in addition to the guidance and mentoring of each teacher candidate's supervising classroom teacher. Also allocated to each Neighbourhood Cluster is an academic staff member (one day a week) who works with the teacher candidates and the Teaching Fellow. This role is termed the Clinical Specialist. Together the Teaching Fellow and the Clinical Specialist mentor and guide the teacher candidates of their Neighbourhood Group.

Teaching for a Sustainable World

In the final semester of the Master of Teaching course teacher candidates select an elective subject to undertake and this is where teacher candidates can undertake the subject *Teaching for a Sustainable World*. In an ideal world *all* teacher education subjects would be underpinned by an ethos of sustainability, and work towards this is underway, but having a subject that is explicitly focussed on sustainability is also seen as valuable.

Pedagogical Approach: Problem Based Learning

The subject uses a problem based learning approach where teacher candidates, in teams, tackle two substantial problems over the semester. The subject is thus designed around the two problems —incorporating sustainability in the operations of the school by developing a three year school sustainability plan and integrating sustainability across the curriculum. Finkle and Torp (1995) described problem based learning (PBL) as “a curriculum development and instructional system that simultaneously develops both problem solving strategies and disciplinary knowledge bases and skills by placing teacher candidates in the active role of problem solvers confronted with an ill-structured problem that mirrors real-world problems”. Problem based learning is seen as an appropriate teaching and learning strategy in the context of sustainability as so much more than content knowledge needs to be developed, and PBL facilitates teacher candidates learning not only about content, but also skills, teaching and organisational strategies, facing novel situations, in addition to developing the teamwork and leadership skills that will be required of them when in schools if they are to be effective agents of change for sustainability.

In addition to the PBL approach, there is also a series of lectures that address a wide range of topics, such as the science of climate change, sustainability and school design, sustainability in the curriculum, and the Australian Sustainable Schools Initiative (AuSSI). The lecture series complements the PBL approach, and it addresses the challenge of the range of backgrounds of the teacher candidates, as well as extending teacher candidates into thinking about aspects of sustainability that they may not have initially considered.

Selection of the Problems

The topics of the two problems enable the teacher candidates to engage with the major issues around sustainability at schools—school operations, where teams develop a three year school sustainability plan, and integrating sustainability into the curriculum, by developing a unit of work that includes a number of curriculum areas. Both of these topics are challenging for teacher candidates, but for different reasons. Few teacher candidates have been involved in developing a strategic plan, so teacher candidates have much to learn about strategic planning, management and organisational issues, engaging and motivating members of the school community, and so forth. Thinking on a whole-school scale and over three years demands that teacher candidates expand their thinking about how a school runs, in addition to the knowledge about sustainability initiatives that the teacher candidates engage with. The school sustainability plan that teams develop is situated in a real school, selected by the team, that is a school that at least one team member is undertaking their teaching practice at. This requires as the starting point for developing the strategic plan that the team investigates what the school has already done towards sustainability, evaluate the progress achieved, talk with school members (staff and students) who have leadership roles in this area, and generally come to an understanding of where on the journey toward sustainability the school is. Once the current situation is determined, the team develops a vision for where the school should be in three years and creates a strategic plan to achieve this vision.

Working collaboratively to develop a unit plan that integrates sustainability across all curriculum areas is also challenging for many teacher candidates. This is particularly true for teacher candidates who will be secondary teachers, as secondary teachers tend to be focused on their discipline area and working with those who will teach in other curriculum areas is something that many have not done before. Future mathematics teachers developing a shared unit plan with (future) teachers of, for example, visual arts, music, science or Japanese requires that teacher candidates think beyond their specific discipline area and its required learning outcomes, work with teachers from other discipline areas who may have different approaches to teaching, and, importantly, think about the students' learning experiences across the various subjects that they are engaged with, rather than just the child's time in their own class.

Teacher candidates work in their teams over a number of weeks as they explore the problem and determine what is required of them, negotiate tasks with others, come to a shared understanding, develop shared goals, allocate tasks, and undertake those tasks, while being accountable to their team mates and synthesising their recommendations into a cohesive report and verbal presentation, as if to a school leadership meeting. All the while teacher

candidates are engaging with content about many aspects of sustainability and how this relates to schools and how other schools or systems have addressed similar situations.

Goals of Assessment Tasks

To complete the subject teacher candidates need to complete a number of team and individual tasks. Team tasks are the reports on the two team problems, and other tasks are a briefing paper on a selected aspect of sustainability, a brief report on attendance at a school sustainability meeting, and a brief report on a self-initiated sustainability activity in a school that the teacher candidate has undertaken. The goals for these tasks are described below.

Three year school sustainability plan: This team report requires teacher candidates to work together to determine the target school's current position with respect to sustainability and to develop their vision for where the school will be in three years' time. They then need to outline how their strategic plan would be operationalised, with a timeline for what would need to be achieved each term for their overall vision to be realised. The report is presented as a professional document (rather than looking like a university assignment!) that could be used by the school. Teams make a 10 minute presentation to a mock School Council meeting where they outline their plan and make recommendations to the school's leadership team.

Sustainability in the Curriculum: Teacher candidates work in a cross-curriculum team to develop a cohesive unit plan, including sample lessons, that students in a selected year level could work on over a term that incorporates aspects of sustainability across a range of subjects. This requires teacher candidates to work together to achieve shared goals and to consider the curriculum more holistically, rather than atomised into discipline areas. Working with teachers from other discipline areas develops an understanding of cross-curriculum cooperation and breaks down barriers between discipline areas.

Briefing paper: Teacher candidates select topic about an aspect of sustainability that they are particularly interested in. They then prepare a briefing paper for school leaders based on research findings, concluding with recommendations about their topic for the school. The format of this document is deliberately concise and teacher candidates are required to succinctly summarise the topic and issues involved and come to recommendations for the school to implement. The purpose of this task is for teacher candidates to develop expertise in the topic of their paper and in the skills of finding, distilling and communicating findings to school leaders as a step in initiating informed change at the school. Briefing papers prepared by class members are shared with the class, so that the knowledge is shared.

Report on school sustainability meeting: Teacher candidates need to investigate the processes at their school for initiating a sustainability project and attend a meeting of a school's sustainability or environment committee (or similar) to learn about issues that a school is

grappling with and, more importantly, to gain insights into the decision-making processes of a school and to observe how leadership is enacted in different ways. Teacher candidates learn that by asking questions they are beginning to be agents for change.

Make a Difference project: Class members are challenged to implement a small change in their school to help the school work towards sustainability, this can be undertaken individually or as a team. This could be establishing an end-of-day routine for the classroom where all computers are switched off or creating a poster for display at the school to encourage, for example, reduced water or energy use.

Through these assessment tasks teacher candidates engage in many aspects of sustainability and in becoming more skilled teachers and school members so that they are empowered to lead change. In addition to assessed tasks, teacher candidates are challenged to make at least one change in their own life to reduce their ecological footprint, as their students will judge them by their behaviours.

Conclusions

The paper describes one example of an education for sustainability subject in a teacher education course that endeavours to develop not only knowledge about sustainability issues, but to also an understanding of decision-making processes in schools, analytical and planning skills, teamwork and leadership skills, experience in working in cross-discipline teams, and giving teacher candidates a sense of empowerment and knowledge that they can make a difference to their school, the children they teach, and to their community and be an agent for change.

This paper has explored education for sustainability in Australian schools and the importance of EfS in teacher education, because of the multiplier effect that flows from teacher education. By including EfS in teacher education programs much can be done towards educating children, their families and the wider community about sustainability. Although teacher education has a substantial multiplier effect, it should be noted that the multiplier effect of educating teacher educators about EfS is even greater than that for teacher education students, and further efforts should be focussed in this area.

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