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## Teacher perceptions and self-reported practices of Education for Sustainability in the early years of primary school: An Australian case study --Manuscript Draft--

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- Removed unnecessary headings
- Further refined research questions
- Removed author blinding of self-citations

## **Teacher perceptions and self-reported practices of Education for Sustainability in the early years of primary school: An Australian case study**

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## **Teacher perceptions and self-reported practices of Education for Sustainability in the early years of primary school: An Australian case study**

### **Abstract**

This Australian case study provides a snapshot of Education for Sustainability (EfS) practice of early years teachers in the school sector (Preparatory to Year 3), during the first phase of implementation of the Australian national curriculum. Interviews with teachers, located in government, Catholic and independent schools, were conducted by pre-service teachers as a part of their professional experience coursework requirements. Forty-three interview transcripts were collated in these qualitative analyses in order to explore: why teachers considered that EfS had been identified as a cross-curriculum priority in the national curriculum; how teachers implemented EfS in their classrooms; and the barriers that they experienced in implementation. The teachers perceived EfS to be highly relevant to their students, with a view to future participation in society, workplaces, leadership and lifelong learning. While the majority of teachers reported intentionally planning and implementing learning experiences that addressed aspects of EfS, the key barrier from their perspective was a crowded curriculum, with emphasis on literacy and numeracy performance. Findings reveal that ongoing professional learning is required for teachers to develop pedagogies that can promote students' critical and action-oriented engagement, with community partners, in local socioecological issues of relevance, whether in urban, rural or remote locales.

**Keywords:** Education for Sustainability (EfS), teacher classroom practice, teacher professional learning

### **Résumé**

Cette étude de cas australienne fournit un aperçu de la pratique de l'éducation au développement durable (EDD) des enseignants des premières années du secteur scolaire (Préparatoire à 3<sup>ème</sup> année du primaire) pendant la première phase de la mise en œuvre du cursus national australien. Des entretiens avec des enseignants provenant des écoles publiques, catholiques ou indépendantes, furent menés par des enseignants en formation comme composante des exigences d'expérience professionnelle de leur cursus. Quarante-trois transcriptions d'entretiens furent compilées dans le cadre de ces analyses qualitatives afin d'étudier pourquoi les enseignants considèrent que l'EDD a été identifiée comme une priorité

de tout le cursus national; comment les enseignants mettent l'EDD en œuvre dans leurs classes; et les obstacles qu'ils rencontrent dans cette mise en œuvre. Les enseignants perçoivent que l'EDD est particulièrement pertinente pour leurs élèves, dans l'optique de la participation future de ces derniers à la société, au travail, dans leur leadership et dans leur apprentissage tout au long de la vie. Alors que la majorité des enseignants rapportent délibérément planifier et mettre en œuvre des expériences d'apprentissage touchant différentes facettes de l'EDD, selon eux l'obstacle clé est un cursus surchargé, axé sur la performance en littératie et numératie. Les résultats indiquent qu'un apprentissage professionnel continu est nécessaire afin que les enseignants élaborent des pédagogies susceptibles de promouvoir l'engagement critique et orienté vers l'action de leurs étudiants, avec des partenaires communautaires, dans des problèmes socio écologiques locaux pertinents, que ce soit en milieu urbain, rural ou éloigné.

## **Resumen**

El presente estudio de caso australiano, provee la figura actual de la práctica de Educación para Sustentabilidad (ES) de profesores de enseñanza básica (preparatoria hasta el año 3), durante la primera fase de implementación del currículo nacional de Australia. Entrevistas a profesores de escuelas públicas, católicas y privadas fueron suministradas por profesores aprendices como requisito de su práctica profesional. Dentro de los análisis cualitativos realizados, se recolectaron 43 formularios de entrevistas con el propósito de explorar, primero, el motivo por el que los profesores hayan considerado que la ES haya sido identificada como una prioridad inter-curricular en el currículo nacional; segundo, la manera en que los profesores implementaron la ES en sus aulas; y tercero, las barreras que experimentaron durante dicha implementación. Los profesores percibieron la ES como muy relevante para sus estudiantes, con una visión a futuro de participación en sociedad, lugares de trabajo, liderazgo, y aprendizaje continuo. Mientras que la mayoría de los profesores reportó la implementación de experiencias de aprendizaje y planificación focalizada en aspectos de la ES, la principal barrera que debieron enfrentar fue un currículo sobrecargado, con énfasis en el desempeño en lectura, escritura y habilidad matemática. Los resultados evidencian que un aprendizaje profesional continuo es requerido por los profesores, con el objeto de desarrollar pedagogías que puedan promover un compromiso decisivo y orientado a la acción de los estudiantes para con miembros de la comunidad, en problemas socio-ecológicos de importancia, ya sea en áreas urbanas, rurales, o remotas.

## Introduction

In 2014, the Intergovernmental Panel on Climate Change warned that continued emissions of greenhouse gases will result in additional warming and long-lasting changes in the global climate system, enhancing the likelihood of “severe, pervasive and irreversible impacts for people and ecosystems” (p. 8). The Panel’s Fifth Assessment Report (Intergovernmental Panel on Climate Change 2014) indicated that in order to contain climate change impacts, “substantial and sustained reductions” in global emissions, coupled with adaptation measures, are required (p. 8). The Report highlighted the need for a shift to renewable energies, as well as investment in international, regional and national strategic initiatives, pertaining to urban and rural development, poverty alleviation, livelihood security, disaster risk management, ecosystem management and land use planning. In 2015, the Paris Agreement (United Nations Framework Convention on Climate Change) saw global consensus to reduce greenhouse gas emissions and build capacity to adapt to the adverse impacts of climate change within the context of sustainable development (Article 2, p. 21). It was three decades earlier that the Brundlandt Commission (United Nations World Commission on Environment and Development 1987) called for a reorienting of economic and social development goals in line with sustainable development and inherent concerns for intragenerational and intergenerational equity. The Commission’ report, *Our Common Future*, acknowledged that, “the world’s teachers ... have a crucial role to play” in the shift towards sustainability (United Nations World Commission on Environment and Development 1987, Chairman’s Foreword, p. 8).

The *Gothenburg Recommendations on Education for Sustainable Development* (Centre for Environment and Sustainability, 2009) identified early childhood as a natural starting point for EfS within a lifelong learning framework. Harnessing young children’s inherent curiosity, eagerness to learn and sensitivity to the natural environment, early childhood presents as the opportune time to introduce children to sustainability issues, principles and actions, as appropriate to their needs, age, context and culture (Mackey 2012; United Nations Educational, Scientific and Cultural Organization [UNESCO] 2015). Highlighting the importance of the formative years on future learning, behaviour and health and wellbeing, the German Commission for UNESCO (2010) stated that:

What humans acquire in early childhood in terms of basic skills, values and convictions plays a major role in how they will behave towards themselves, others and their environment in their further life. The principles of education for sustainable development, such as the adoption of a situation, action and participation focused

approach, must in this respect be seen as key elements of modern educational theory and action (p. 1).

A situation-, action- and participation-focused approach to EfS provides opportunity for young children to develop the knowledge, skills, values and dispositions to be problem solvers and change agents in their own environments (Davis 2010; 2015). Young children are capable of learning and educating others about sustainability issues, such as energy or water conservation, and participating in sustainability initiatives and transferring behaviours into the home environment (Davis et al. 2008; Hedefalk et al. 2015; Lewis et al. 2010; Mackey 2012).

### *Australian EfS policy context*

In the Australian education context, sustainability is recognised as a cross-curriculum priority in the national school curriculum, Preparatory Year to Year 10 (Australian Curriculum, Assessment, and Reporting Authority 2015a; 2015b). The last decade has seen the establishment of an enabling policy environment with respect to implementation of EfS across formal education, corporate and community sectors. Key strategic frameworks that have been published in Australia include:

- Environment and sustainability threshold learning outcomes for higher education Bachelor and graduate coursework programs (Phelan et al. 2015);
- A curriculum framework, articulated according to Preparatory Year to Year 2, Years 3 to 6, and Years 7 to 10 phases, to support implementation of sustainability as a cross-curriculum priority in the national school curriculum (Australian Government Department of the Environment, Water, Heritage, and the Arts 2010);
- A national action plan for sustainability targeting political leadership, education systems, business and industry, and the community (Australian Government Department of the Environment, Water, Heritage and the Arts 2009); and
- A national environmental education statement for sustainability, pertaining to the school sector (Australian Government Department of the Environment and Heritage 2005).

In addition, there has been the *Australian Sustainable Schools Initiative*, which fostered a whole-of-school approach to sustainability “with measurable environmental, education, social and financial benefits” (Australian Government Department of the Environment, Water, Heritage, and the Arts and Australian Sustainable Schools Initiative n.d., para. 1), and research projects that reviewed models of professional learning in pre-service teacher



education (Ferreira et al. 2006; Ferreira et al. 2015). It is important to note that subsequent to the 2013 election of a conservative government in Australia, a number of the aforementioned government documents are no longer 'operative' at the national level; they have been archived and used, if directed by the States and Territories. Similarly, the Australian Sustainable Schools Initiative is no longer funded.

### ***Research context***

At a regional Australian university, the School of Education adopted a whole-of-program approach to embedding sustainability into its Bachelor of Education, in recognition of sustainability as a growing education priority, as well as in response to the University's Curriculum Refresh Project, *Australia's University for the Tropics*. Curriculum investments took place over a number of years, involving the design and implementation of dedicated sustainability subjects; revision of a longstanding sustainability elective so as to enhance emphasis on climate change education; and the embedding of sustainability principles, concepts and issues across the Bachelor of Education for the majors in early childhood education (birth to eight years of age) and primary education (Preparatory to Year 6) (Lasen et al. 2015). With a focus on inquiry-based, technology-enabled and praxis-oriented learning and assessment experiences, it has been an ongoing intention to equip teacher graduates with the knowledge, skills, and dispositions to embed EfS in curricula and whole-of-school initiatives, as appropriate for the diverse school and community contexts of the tropical regions, and the global and local socio-ecological conditions that teachers and their students are likely to encounter over the coming decades (Lasen et al. 2015; Tomas et al. 2015).

### **The current study**

As part of requirements for a professional experience subject in their Bachelor of Education course, pre-service teachers, who were enrolled in the early childhood major, interviewed their supervising teachers in school settings. The interview focussed on the implementation of sustainability as a national cross-curriculum priority for the early years of the primary school (Preparatory Year to Year 3). The reflections of the pre-service teacher on the processes of conducting the interview with their supervising teachers comprised the data source for a 2014 journal paper (Simoncini et al.), which focused on issues pertaining to professional dialogue and reflection, communities of practice and inquiry, and teachers as researchers. The transcripts of the teacher interviews are the data source for this paper. We investigate

perceptions and self-reported classroom practices of teachers relating to EfS through the following research questions:

1. Why do teachers consider that EfS was identified as a cross-curriculum priority in the Australian national curriculum?
2. How do teachers in the early years of primary school implement EfS in their classrooms?
3. What are the barriers that teachers perceive they face in the implementation of EfS in the curriculum?

This qualitative study makes an important contribution to an emergent literature of EfS in early childhood. It allows for a snapshot of EfS practice within the early phase of learning in the school sector, at a time of curriculum change (i.e., in 2012 during the first phase of Australian national curriculum implementation), and an insight into teacher perceptions of the rationale for sustainability as a cross-curriculum priority and constraints on their practice. Importantly, the teachers interviewed for this study were located in classrooms and learning environments in highly diverse school and geographical settings. The following section details the study's method.

### ***Method***

This research presents a single case study (Yin 2009) of teacher perceptions and self-reported practices relating to EfS, in the early phase of learning, in largely Queensland primary schools. The case study approach “offers a strong grounding in reality, utility to practitioners, and high resolution data that enables learnings to be transferred to other similar contexts” (Dyment and Hill 2015, p. 25). Fifty-seven pre-service teachers were enrolled in a third year professional practices core subject, wherein one week of professional experience was embedded; 34 were enrolled in the external/online mode and 23, in the internal/on-campus offering. Forty-seven pre-service teachers (83% of the total cohort) and their supervising teachers and schools participated in the research. Pre-service teachers were placed in all three school sectors: 30 in state schools, 12 in Catholic schools and five in independent schools. The schools were largely located in the state of Queensland, across city, regional and remote locations. Four pre-service teachers, enrolled in the online mode, were placed in schools in other states across Australia (New South Wales, South Australia and Western Australia). Supervising teachers are typically selected by school principals to mentor and evaluate pre-service teacher performance within their classrooms during designated practicums.

As part of their portfolio assessment, pre-service teachers were required to:

- Conduct and record an interview, or what was also referred to as ‘professional dialogue’, about EfS with their supervising teachers in the practicum setting;
- Transcribe the dialogue (the data for this paper);
- Reflect on the process of conducting the interview and its content (the data for Simoncini et al. 2014);
- Develop a learning sequence/unit of work that embedded EfS, and source high quality resources to support its implementation.

To assist in facilitating the professional dialogue, pre-service teachers were given five questions to ask their supervising teacher, as follows: (1) Why do you think EfS is a cross-curriculum priority in the national curriculum?; (2) What resources are available in the school/centre to support teachers’ efforts to address EfS?; (3) How do you bring EfS into your classroom practice?; (4) What are some of the challenges and obstacles you face in your efforts to integrate EfS?; (5) Is EfS a personal priority for you? Additionally, pre-service teachers were encouraged to ask other questions that they felt were relevant to their respective learning context and/or interests. The focus of the analyses in this paper is on questions 1, 3 and 4.

During their professional experience, pre-service teachers were required to gain consent from school principals and supervising teachers to conduct and audio record the professional conversations. Following professional experience, pre-service teachers were required to transcribe the audio-recordings and reflect on the facilitation and substantive focus of the professional dialogue. They then submitted transcriptions and reflections via the subject’s learning management system, as part of the portfolio assessment.

Five of the 47 pre-service teachers were unable to secure consent for an interview with their supervising teacher and instead were encouraged to interview another member of staff, including a teacher, teacher aide and principal, with recognised interest or expertise in sustainability. A total of 43 pre-service teachers submitted interview transcripts based on recorded interviews with *classroom teachers* in the Preparatory to Year 3 setting – the participants of interest to this paper. The 43 transcripts were collated for the purposes of these qualitative analyses.

## *Analyses*

Data analyses were undertaken applying Creswell's (2009) six generic strategies: (1) organise data for analysis (per interviewer question); (2) read through data; (3) begin coding; (4) generate categories and/or themes based on coding; (5) decide how themes will be presented; and (6) interpret the data. Two of the three authors engaged in extensive independent reading and several coding efforts before arriving at the approaches taken to data analyses and results presentation.

In terms of the first research question, we decided that Tilbury's (1995) framework, which outlined six defining attributes of EfS, provided a meaningful and an almost exhaustive lens by which to analyse teacher responses relating to the rationale for recognising sustainability as a cross-curriculum priority. According to Tilbury, EfS is: (1) relevant; (2) values oriented; (3) holistic; (4) issue based; (5) action oriented; and (6) a critical education. Teacher responses were aligned with one *or more* of Tilbury's EfS attributes – numeric counts as per frequency of response are presented in the results section. In terms of the second research question, pertaining to implementation of EfS in early childhood classrooms, results are presented according to what may be seen as a continuum of practice. Notions of a continuum of practice can be found in the work of Coburn (2004), who categorised Californian teacher practices involving reading reforms across a continuum from 'rejection' to 'accommodation'. In this study, on account of teacher responses to interview questions, we classified teachers as either: (1) non-implementers; (2) awareness raisers; *or* (3) intentional planners. In order to present the reader with a sense of the extent of EfS practice in early childhood classrooms, we again provide numeric counts, according to the aforementioned categories. Finally, in terms of the third research question, we present the predominant themes to emerge from teacher perceptions regarding the key barriers to EfS implementation in their particular contexts. Teacher responses were aligned with one *or more* of these broad themes.

## **Results**

In this section, the findings are presented in relation to the focus research questions on why teachers considered that EfS was identified as a cross-curriculum priority in the Australian national curriculum; how teachers in the early years of primary school implement EfS in their classrooms; and the barriers that teachers perceive they face in the implementation of EfS in the curriculum.

### *Teacher perceptions of the rationale for EfS as a cross-curriculum priority*

The predominant attribute to emerge from teacher perceptions was that EfS is relevant (Table 1). Indeed, Tilbury (1995) asserted that relevance is the central principle underlying an EfS approach. Twenty-four of the 43 teachers of this study addressed aspects of EfS in promoting the requisite knowledge, skills and dispositions for successful participation in society, future workplaces, leadership and/or lifelong learning, as reflected in the following responses:

Sustainability is a twenty-first century issue, isn't it? So quite obviously, if we've got twenty-first century learners, we don't know what their future careers are going to look like. Sustainability is a worldwide focus. It's a global education agenda (T39).

Obviously we're preparing our students for life, so it's a life skill and we've got to think of the future and we've got future leaders in our class (T17) (also see T29 in Table 1).

The second most predominant perception to emerge in response to this interview question was that EfS is recognised as a cross-curriculum priority because it promotes values that underpin environmental stewardship, responsible citizenship and sustainable thinking and living (i.e. EfS is values oriented). According to Tilbury (1995), EfS acknowledges that agency is not fostered in the "cognitive realm but is dependent on personal motivation and a sense of responsibility which results from the development of a personal environmental ethic" (p. 201). Nineteen teachers of this study saw development of such an ethic as particularly important in early childhood education given perceptions that: children may not have had exposure to sustainability within their own families (T16 in Table 1); children were increasingly less connected with the natural environment in today's society; and an early grounding in EfS may be efficacious in terms of shaping enduring values. Such sentiments are encapsulated in the following responses:

Children are becoming less aware of our natural environment and how to interact with it. By making it part of the curriculum we are ensuring that every student is exposed to ways to look after our environment (T15).

There's trying to be a whole social attitude change and one of the best ways to do that is start teaching it [EfS] early. I don't know if it becomes as much of a general social change unless it is actually targeted in formal education (T35).

Themes that were less typical but nonetheless somewhat evident in the data involved Tilbury's (1995) four other attributes: EfS is holistic; EfS is action oriented; EfS is issue based, and EfS is a critical education (Table 1). Eight teachers made reference to the holistic focus of EfS, with one perceiving that EfS covered "many facets of a day's learning", with

potential impacts across different aspects of life and locales (i.e. home, school and workplaces) (T19 in Table 1). One teacher made reference to sustaining the environment as a priority at varying scales (i.e. community, national and global). According to this teacher, EfS was positioned as a cross-curriculum priority as it “broadened the spectrum” through which to develop young children’s knowledge and understanding, positive attitudes and problem solving skills (T26). Another teacher saw that EfS could serve the purpose of “an integrating tool” for curriculum delivery (T37).

Six teachers made reference to EfS as an opportunity for student involvement in real environmental action and active learning (i.e. EfS is action oriented; T35 in Table 1). One educator identified “recycling, water conservation, gardening and land care” as appropriate environmental actions for the early childhood phase of learning (T12). Another teacher communicated that by engaging students in such practices at school, then there was the likelihood that, in turn, they would educate and encourage parents to adopt similar practices at home – spreading “like a ripple effect” (T25).

Five teachers of the study perceived it to be important that students were made aware of key sustainability issues, such as deforestation, species decline and pollution, and importantly, seek creative solutions to address these issues (i.e. EfS is issue based; T23 in Table 1). Finally, while there was no direct reference to EfS as a means by which to develop children’s critically reflective knowledge and thinking skills, there was limited sentiment pertaining to a deepening societal understanding that we were all responsible for shaping our global future and, hence, the need for students to challenge the status quo and engage in alternative ways of thinking and living (T43 in Table 1).

Only two of the 43 teacher responses were not able to be aligned with one or more of Tibury’s EfS attributes. In the first case, there was a misunderstanding of the question and, in the second, the teacher professed that they did not know why sustainability was a cross-curriculum priority.

<Insert Table 1 here>

### ***Teacher self-reports of implementation of EfS in classroom practice***

Eight out of the 43 early childhood teachers of the study (i.e. 18.5%) reported that they were not integrating sustainability into their classroom practice (Table 2). These non-implementers largely communicated that there were more pressing curriculum priorities identified by

school leadership, including: reading; student preparedness and performance on national literacy and numeracy tests; and implementation of *Curriculum to Classroom*, Queensland's suite of national curriculum planning materials. One teacher responded that, "We are so busy with the basics that they [school leadership] tend not to mention it" (T3). In spite of non-implementation in their own classroom, another teacher acknowledged that their school did "hold quite a strong policy in regards to sustainability" (T10); another, that EfS *may* be a future curriculum focus on account of its recognition as a cross-curriculum priority, however, it was not at the time (T26 in Table 2). Two non-implementers made passing references to teacher colleagues who had been or were proactive sustainability educators (e.g. T14 in Table 2).

A further eight teachers of this study (i.e. 18.5%) perceived that they were raising awareness about sustainability by way of engaging students in discussions about sustainability and sustainable practices, such as recycling and disposing of waste responsibly (Table 2). Rather than intentional curriculum programming, two teachers explicitly referred to this approach as "incidental" (e.g. T29 in Table 2) – that is, seizing teachable moments to raise awareness.

However, the majority of early childhood educators of this study were intentional planners. Just under two thirds or 63% of the interviewees (i.e. 27 out of 43) communicated that they were intentionally planning and implementing EfS activities, lessons and/or units. Fourteen of the 27 intentional planners (i.e. just over half) reported incorporating EfS in the learning area of Science; six of these teachers also made reference to one other learning area. Six teachers incorporated EfS in Studies of Society and the Environment, with one responding that: "The simple answer for me is Studies of Society and the Environment. I've taught about our environment through topics on the Great Barrier Reef. We looked at global warming and the impacts and coral bleaching" (T12).

There were limited references to the incorporation of EfS in History (n=2), Mathematics (n=2), Religion (n=2) and Technology (n=1) learning areas. While no teacher directly linked EfS and the English curriculum, three teachers referred to the use of specific children's literature as stimulus material for EfS learning experiences. One teacher spoke of students writing in a garden journal. This teacher reported drawing upon whole-of-school sustainability initiatives in order to realise a cross-curriculum approach to embedding EfS:

Well, the main initiative that got us started was developing a School Environmental Management Plan. From our Plan, the school has initiatives that support sustainability.

Probably the most significant is our permaculture garden. The students are all involved in planting vegetables, fruits and herbs, as well as maintaining the garden beds. The students also have a worm farm. They have been recycling their food scraps from lunches. The worm juice is used as fertiliser on the garden and is sold to finance new equipment and seeds. The students recycle their materials and use mulch on garden beds to reduce water use. The Science program has been useful in incorporating EfS into the classroom. It provides a good platform for learning about the environment and associated issues but we incorporate it across many areas of the curriculum. The kids all have a garden journal. Maths can be integrated as well, as students have been looking at how much money they are making from their produce stall at the markets and how they could re-use materials. They have been drying their own seeds to reduce our costs. The students are also keeping a tally of what birds they see during eating time. So it's a whole integration of areas and ways of learning (T21).

While School Environmental Management Plans were developed as part of the *Queensland Sustainable Schools* program (Queensland Government Department of Education and Training, 2015), whole-of-school initiatives – as reported by the teachers of this study – also emanated from the *Reef Guardian* (Great Barrier Reef Marine Park Authority 2016), *Earth Smart Science* (Queensland Government Department of Education, Training, and the Arts n.d.) and *Junior Landcare* (n.d.) programs, as well as parent and community led projects. Associated activities included:

- monitoring and conserving energy and water usage;
- composting, worm farming and gardening;
- caring for and rehabilitating animals;
- planting native trees and rehabilitating sites; and
- participating in excursions and events, such as *Clean Up Australia*, and sustainability competitions.

For instance, one teacher spoke of their students' involvement in a turtle rehabilitation programme:

We've actually got a brilliant Parent Environmental Group. When the lake got very saline and the level dropped, and no water came down the river, worm shells appeared on the turtles and made them sick. The Group had to rescue the turtles. They set up a rehab type programme. We were actually involved in helping them scraping the turtles all clean (T9).

<Insert Table 2 here>



### *Teacher perceptions of barriers to implementing EfS*

The predominant barrier to implementation of EfS, as perceived by participant teachers, was the lack of time/crowded national curriculum (n=23), including a prioritisation of English/literacy and Mathematics/numeracy and the associated challenge of integrating EfS into these learning areas (n=8 of the 23) (Table 3). It was recognised that, in terms of dedicated hours, English and Mathematics comprised a substantial part of the week's learning and, hence, integration of EfS in these learning areas was important. Teachers were encouraged by the cross-curriculum approach – that is, the potential of EfS as an “integrating tool” (T37) – however, challenges in realising an embedded approach were communicated, as per the following responses:

Maths and English take up a big chunk of our curriculum area. For us, our Science is only one hour a week and Studies of Society and the Environment has a few more hours (T16).

We are teaching each Key Learning Area so separately now. It makes that integration a little bit more difficult. It [EfS] is integrated well within Science and Studies of Society and the Environment but I think that's where it stops; maybe a little bit through the Arts. I don't think it's integrated very well in English or Maths (T23).

Literacy has been the large focus of our school over the past two years. If we can integrate EfS into this more readily, we can apply the learning area much more explicitly (T15).

A second theme to emerge with respect to what constrains implementation of EfS in early childhood classrooms was lack of teacher content and pedagogical knowledge, and associated with this barrier, lack of teacher professional learning opportunities (n=7) and supporting resources (n=8) (Table 3). One teacher stated that, “professional development would increase our own knowledge of sustainability, and also provide further ideas of how EfS can be integrated into the curriculum” (T21). Another teacher identified the challenge as “finding people who can link it all together ... those people who can say, ‘Well, in History, this would link in with this, and if you did this in the English lesson, that would link in with that’” (T36). Without opportunity for professional learning and sharing of practice, another teacher expressed that they felt that they “would be going off the top of my head”, given that it was “not a particular area of expertise” (T14). Teachers expressed that they needed resources to support implementation of EfS – in terms of a dedicated budget and age appropriate curriculum materials:

When you're on a limited budget, as a school, that is a big negative towards trying to introduce it [EfS] more. People might think that it's cheap to set up gardens, have some animals, and even some of the products but it does cost initially to set that up (T30).

... knowing the children are young and the information needs to be adapted to suit them. There aren't many resources for early childhood age groups (T27).

A third constraint related to teacher perceptions of learner capabilities, as well as learner, parental, community and societal expectations and values (n=14) (Table 3). Six of the 14 teachers of this sub-set questioned the appropriateness of EfS from the perspective of the students; three responses addressed the early childhood phase of learning and the other three, children's differing value systems on account of family socialisation. For instance, one teacher perceived that it was difficult in the Preparatory Year, "as they [the students] don't understand the importance of sustainability and don't understand the concept of it (T7; also see Table 3). Eight of the 14 teachers perceived that their particular school/community setting was not conducive to EfS implementation on account of pervasive attitudes, lack of parental support and/or logistical challenges. Interestingly, teachers in urban, rural and remote settings, as well as semi-affluent and Australian Indigenous community settings, all perceived their contexts to be barriers, as is evident in these selected responses:

Living in a semi-affluent area, there are a lot of middle class families. There does seem to be a fairly disposable mentality from people in terms of, "If that runs out, it is OK, as I'll just buy another one". So that is sort of an on-going obstacle (T19).

It hasn't been on our agenda! For a start, this school is in an urban environment. We used to have a rainforest. Many, many years ago – taking up all that area, where all those buildings are. It got cut back bit by bit but it was a really lovely learning environment (T26).

As the school is in a rural community there is not much community support and not many organisations to bring into the classrooms as guest speakers (T27).

In a place like (location), no one really cares. That global aspect of it is almost useless here. Every time we have *Clean up Australia Day*, it is just futile (T6).

In addition to the key barriers identified in Table 3, four teachers spoke of obstacles to enacting sustainable practices more generally. A further two teachers responded that there were no obstacles. Finally, one teacher perceived the additional administrative load, when taking students out on excursions or into the community, to be a barrier to implementing EfS.

<Insert Table 3 here>

## Discussion

The fact that the majority of the largely Queensland early childhood educators of this study were, to some extent at least, intentional planners of EfS (Table 2) is reflective of an enabling policy environment in Australia and a history of four decades of EfS practice in Australian schools, including implementation of large-scale, state-based projects. It is clear, though, from responses of participant teachers that further professional learning opportunities are needed to promote teacher content and pedagogical content knowledge and to provide targeted resources for EfS implementation in early childhood classrooms (Table 3). Lack of teacher knowledge and opportunities for professional learning, both pre-service and in-service, have been identified in Australian studies over time as barriers to EfS implementation (Cutter and Smith 2001; Cutter-Mackenzie and Smith 2003; Evans et al. 2012; Hill and Dymont 2016).

Teachers of this study found limited opportunity to incorporate EfS in English and Mathematics, highlighting the time afforded to these learning areas in the curriculum. Teachers clearly communicated the pressure of expectations around student performance in literacy and numeracy, especially as measured through high stakes national testing for which schools' results are published on the open access *My School* website (Australian Curriculum, Assessment, and Reporting Authority 2015c). A parallel can be seen in the United States. Stevenson (2007), citing the work of Gruenewald and Manteow, proposed that the implementation of high stakes testing, and the associated scrutiny on teachers and schools in terms of comparative performance, led to a narrowing of curriculum, emphasising "basic skills of literacy and numeracy in the lower educational levels" (p. 270).

However, the teachers of this study spoke in clear terms of the relevance of EfS to students and society and its importance in terms of promotion of values that underpin environmental stewardship, responsible citizenship and sustainable thinking and living (Table 1). So too, a Review of the Australian Curriculum (Australian Government Department of Education, 2014) highlighted strong teacher support for student learning in the cross-curriculum priorities of sustainability, Aboriginal and Torres Strait Islander histories and cultures, and Asia and Australia's engagement with Asia (p. 3). It may well be that many teachers are feeling "frustrated by narrowly defined accountability demands and standards-based reforms that are reducing their autonomy and the creativity of teaching" (Stevenson 2007, p. 274);

captured most potently by the teacher of the study who communicated, “at the moment, we are just doing what we are told to do” (T26 in Table 2).

As congruent with findings in the literature (Dyment and Hill 2015; Evans et al. 2012; Hill et al. 2014), it would appear that participant teacher notions of EfS were “largely limited to environmental sustainability, with notable lack of reference to economic, social, or political dimensions, which are considered key interrelated aspects of sustainability in the literature” (Dyment and Hill 2015, p. 28). In the study setting, it is likely that environmental notions of sustainability were perpetuated through Queensland schools’ involvement with state-based environmental and resource conservation programs. While these programs seemingly generated rich learning opportunities for young children, teachers also need to expose students to economic, social and political perspectives. Hedefalk and colleagues’ (2015) noted in their review of EfS in early childhood in the before-school sector that:

There are no articles about children focusing on larger social issues related to sustainability, such as people starving, getting sick from harvesting bananas sprayed with pesticides or lacking of possibilities to get an education. Maybe the absence of these issues is a conscious decision to protect children from harsh realities, or maybe the teachers do not see this dimension as related to education for sustainable development because the environmental dimension overshadows it (p. 986).

No teachers of this study made direct reference to the potential of EfS to develop students’ critical thinking skills and critically reflective knowledge (one of Tilbury’s attributes in Table 1). In a UK study of classroom practice, McNaughton (2012) found that both primary and secondary teachers perceived EfS to positively impact students’ thinking skills, as well as their own understanding of how to work more collaboratively with students to meet the challenges of issues-based learning. In this way, “EfS provided hitherto unrecognised opportunities to collaborate to research, consider alternatives and set out and justify their ideas and positions” (McNaughton 2012, p. 775). Indeed, EfS is fundamentally about challenging existing teaching and learning approaches (Tilbury et al. 2005).

With the exception perhaps of some of the richer examples of teacher practice, presented in the results section (e.g. T21), discussion of pedagogy was largely absent in teacher responses to the question, “How do you bring EfS into your classroom practice?”. One teacher spoke of a broadly child-centred pedagogical approach (T27); another teacher stated that, “we have done explicit inquiries on sustainability” (T35 in Table 2). However, no respondent spoke of employing a pedagogical process, such as that outlined in Tilbury’s (1995) framework, involving students in: identifying issues, investigating issues, seeking solutions to issues,

carrying actions to address issues, and evaluating the impact of environmental actions; or similarly, as comprising the sustainability action processes of the Australian Government's *Sustainability Curriculum Framework* (Department of the Environment, Water, Heritage, and the Arts 2010). This finding may be reflective of the general line of pre-service teacher/interviewer questioning (i.e. there were no specific questions in the standard interview schedule pertaining to teaching and learning approaches or strategies). However, in professional learning opportunities, it would seem important to expose teachers to pedagogies that can promote students' critical and action-oriented engagement, with community partners, in local socioecological issues of relevance, whether in urban, rural or remote locales.

## Conclusions

This study presents a 'snapshot' of EfS practice in the early years of the primary school during what was the first phase of national curriculum implementation across highly diverse school and geographical settings. It is important to acknowledge that this snapshot is based on classroom teacher 'self-reports', and that the interviewers were their assigned pre-service teachers. As such, the interview had the potential "to temporarily disrupt the novice–expert relationship, characteristic of the practicum" (Simoncini et al. 2014, p. 30.). A number of pre-service teachers reflected on their supervising teachers' unease in participating in the dialogue on account of lack of knowledge and expertise in EfS (Simoncini et al 2014). There *may* have been a tendency on the part of some supervising teachers to overstate the level of engagement with EfS in classroom practice, so as to appear to be doing the right thing. Nonetheless, this study has found that the majority of participant early years teachers perceived EfS to be highly relevant to students and society, and were intentionally planning EfS experiences within curriculum, albeit at a busy phase of new curriculum implementation and identified obstacles. It is clear that a focus on ongoing teacher professional learning and support need to be at the heart of the EfS enterprise.

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Table 1. Teacher responses organised according to Tilbury's (1995) EfS attributes

EfS attribute	Number of responses	Selected response
<p><i>EfS is relevant to:</i></p> <ul style="list-style-type: none"> <li>• the needs of society</li> <li>• learners' present and future needs</li> </ul>	24	Education is a lifelong process that does not begin and end with schooling. In order for education to be relevant and useful, it needs to prepare children not only for life in the present day but also sustain them in the years that follow (T29).
<p><i>EfS is values orientated, promoting:</i></p> <ul style="list-style-type: none"> <li>• values of social responsibility, concern for all life forms, harmony with nature, and commitment to work with and for others</li> <li>• values clarification and integration</li> <li>• awareness of the existence of different values which influence environmental quality and, of the influence of culture, religion, socio-economic class and gender on values</li> </ul>	19	They [students] spend a lot of time at school and some of them come from families where sustainability isn't a word that is even spoken. So the only time they are going to hear it is at school and, if we encourage them to be thoughtful and good citizens, then that's going to contribute to the health of the entire world (T16).
<p><i>EfS is holistic in its:</i></p> <ul style="list-style-type: none"> <li>• outlook of the environment, with reference to environmental scales, dimensions and perspectives</li> <li>• outlook of environment and development problems</li> <li>• approach to learning, considering all areas of experience</li> <li>• approach to developing the whole person</li> </ul>	8	It [EfS] actually covers many facets of a day's learning and many different ideas and has impacts in many different areas of life...at home, school, within our different working environments (T19).
<p><i>EfS is action orientated, promoting:</i></p> <ul style="list-style-type: none"> <li>• involvement in real and simulated environmental action</li> <li>• knowledge and experience in a variety of environmental actions</li> <li>• involvement in active learning</li> </ul>	6	A lot of sustainability is about changing practices and that's something that you actually need to actively learn. It's not something that just happens (T35).
<p><i>EfS is issue based, involving learners in:</i></p> <ul style="list-style-type: none"> <li>• identifying issues</li> <li>• investigating issues</li> <li>• seeking solutions to issues</li> <li>• carrying actions to address issues</li> <li>• evaluating the impact of environmental actions</li> </ul>	5	It [sustainability] will be one of the major issues that's presented to them [students] in their lives. With the current research we know that the way we are living on the planet at the moment isn't sustainable. So, they are going to have to be really creative and work out ways to be able to solve

		some of the issues that that are becoming present (T23)
<p><i>EfS is critical education promoting:</i></p> <ul style="list-style-type: none"> <li>• critical reflective knowledge regarding power and decision-making, resources, social organisation, media, and links between lifestyles, everyday events and environment/development issues</li> <li>• critical thinking skills</li> </ul>	4	If children are not taught about sustainability they will not know that there could be another way of doing things (T43).

Table 2. Teacher categories relating to implementation of EfS in classroom practice

Practice category	Number of teachers (n=43)	Selected Responses
Non-implementers	8	<p>I didn't know that it was a particular priority. Perhaps I haven't read my ACARA [Australian Curriculum, Assessment and Reporting Authority] documents properly. NAPLAN [National Assessment Program – Literacy and Numeracy] is a priority in my classroom. I know there used to be a garden over between those buildings, over there, that was run by a particular teacher. I think she moved on. That was her initiative (T14).</p> <p>With me in the classroom, in Prep, I don't really think I have dealt with it at all. At the moment we are just doing what we are told. We have been told that reading is our priority and getting through the C2C [Curriculum to Classroom]. I could see that it might be in the future but it's not at the moment. So because it's not a priority for the school, it can't be a priority for me (T26).</p>
Awareness raisers	8	<p>... rather than necessarily setting out and having sustainability as a major focus, it is something that incidentally you do without even realising it. For instance, when we do our 'Under the Sea' unit, we educate the children about when they go to the beach, they are not to throw rubbish. I feel my role is more to make them aware that they are responsible for the decisions they make and how it effects the global scheme of things (T29).</p> <p>I am trying to teach my children about making sure the lights are turned off and the fans and the aircons and the computers at the end of the day.... teaching them to put their rubbish in the bin. And we talk generally about going to the beach and if not leaving our litter out there to preserve the wildlife (T28).</p>
Intentional planners	27	<p>We have done explicit inquiries on sustainability. Last term we built a sustainable village and the parents came in and we set up the tables with roads and their home project was a house and they had to show all the ways that they made their model house sustainable. There's actually some photos up near the hall. We had a boy in our class whose family had renovated their house on green principles and she [his Mum] actually took our whole class through the house to have a look at the features (T35).</p>

		<p>We are a Reef Guardian School, and they [Great Barrier Reef Marine Park Authority] are quite heavily involved here, obviously because we're [on] an island. They actually provide a whole box of resources like little nets for catching bugs and little dishes so we can test the water quality. They give us rope and measuring sticks to map out the sea grass beds for the dugongs around the island and they actually come out and facilitate that with us as well (T6).</p>
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Table 3. Teacher responses organised according to key barriers

Barrier to EfS	Number of responses	Selected responses
<ul style="list-style-type: none"> <li>Lack of time/ crowded national curriculum (including, prioritisation of English/literacy and Mathematics/numeracy and the challenge of integrating EfS into these learning areas)</li> </ul>	23	<p>All year levels are so curriculum heavy. There is so much to do in literacy or numeracy. That always comes first (T38).</p> <p>Finding the time available to you in order to teach sustainable practices really does involve quite a strong commitment. One of the challenges is trying to think about how we can integrate that into our everyday learning (T19).</p>
<ul style="list-style-type: none"> <li>Lack of teacher content and pedagogical knowledge and professional learning opportunities</li> <li>Lack of resources (budget and curriculum materials)</li> </ul>	15	<p>Not having sufficient knowledge is a personal obstacle. In order to be effective in my teaching practice, I need to be sufficiently informed about the topic. We are always in-serviced on Math and English and RE [Religion] but it was only in our in-service last year that we actually had a lady come in from <i>Earthcare</i> (T29).</p> <p>Physical resources can be difficult to access, especially when the kit is provided and the whole school wants to use it at once (T6).</p>
<ul style="list-style-type: none"> <li>Learner capabilities and learner, parental, community and societal expectations and values</li> </ul>	14	<p>Obviously for a Year One classroom, their life is just at (location), so their understanding of the future and the possibility that we might not have water and we might not have all the resources, is not something that they can comprehend at this age (T17).</p> <p>Students do not always see the value in learning about sustainability, especially if their parents do not see this as a priority. It's hard in a world of consumerism to change public perception about what needs to happen in the future, and this relates to school in terms of parents and changing their thinking about why this is important (T43).</p>

## **Response to revision**

Undertook all revisions recommended by Editor and beyond

- Substantially reduced manuscript length: 6975 words (for main text and references) by refining introduction, discussion and conclusion
- Sharpened discussion in response to feedback from Reviewer 2
- Substantially reduced number of references
- Checked alignment between citation in main text and reference list
- Reworked abstract
- Reformatted: 12 point font; left alignment
- Removed almost all acronyms
- Removed unnecessary headings
- Further refined research questions
- Removed author blinding of self-citations