Education for sustainability: a concern of pre-service and in-service teachers.

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Abstract

Climate change, an exploding global population and the industrialisation of developing countries, are issues which have important ramifications for the planet’s future ecological health, but which have been inconsistently attended to by governments internationally. Economic development to improve living standards has been pursued most ardently by Western industrial nations for the last two hundred years resulting in serious inequalities of access to the world’s resources and contribution to the world’s pollution and waste. Such global imbalance is gradually changing with the development of India and China, though these countries’ development will further burden the planet and add to the problems of future generations.

Education has been cited as humanity’s best hope and most effective means to achieve sustainable development. Education for sustainability (EfS) aims to develop future generations so that they have the ‘capacity to contribute to a more sustainable future in terms of environmental integrity, economic viability, and a just society for present and future generations’ (UNESCO Education Sector, 2005, p. 5). While education in alone is not sufficient to attend to the burgeoning social and ecological problems resulting from increasing industrialisation, it is an important prerequisite. The role of pre-service teacher education to develop teachers’ capacity to deliver EfS is thought to be fundamental for future sustainable development. It has led to this critical literature review which examined the body of peer reviewed literature addressing EfS, for teachers and teaching and pre-service teachers.

A systematic literature review resulted in 34 relevant studies centred on three supporting, interlocking strands pertaining to pre-service teachers, in-service teachers, and tertiary education approaches. Findings suggest:

I. Time needs to be devoted to improve the scientific knowledge of education graduates, with a focus on fighting misconceptions and addressing present controversies, teaching pedagogical content knowledge, and introducing pre-service teachers to practical examples to enable the integration of important topics into specific teaching areas;

II. Because professional experience is a fundamental pedagogical experience for pre-service teachers which influences their attitudes and capacities to teach about sustainability, in-service teachers’ understanding, knowledge and attitudes to EfS which are currently shown to be far from facilitative, need to be improved through professional development to remove barriers to the successful delivery of EfS by pre-service teachers and newly qualified teachers;

III. To support pre-service teachers’ attitudes and teaching, instruction must include hands-on field work, active investigations of local environmental problems and a perception of institution-wide vision for EfS.

Introduction

Urgent issues such as climate change, food scarcity, a burgeoning global population, and loss of biodiversity are highly complex sustainability challenges which societies are trying to address. Education is considered one of the ways to tackle these problems now and for future generations (Pandey & Vedak, 2010). Education for Sustainability (EfS) aims to develops the knowledge, skills, values and world views necessary for people to act in ways that contribute to more sustainable
patterns of living (Australian Curriculum, Assessment and Reporting Authority (ACARA), 2011). Indeed, recent years have seen increasing emphasis on sustainability in education with a series of government initiatives, policy statements and whole school programs (e.g., National Action Plan for Education for Sustainability (Department of Sustainability, Environment, Water, Population and Communities, 2009); Australian Sustainable Schools Initiative (AuSSI) (Department of Sustainability, Environment, Water, Population and Communities, 2010); Queensland Environmentally Sustainable Schools Initiative (QESSI) (Department of Education, Training and Employment, n.d.) and Earth Smart Science Schools (ESS) (Department of Education, Training and Employment, n.d.)). Although many Australian schools have committed to incorporating sustainability education into the curriculum, initial data indicate it has had a slow start and could take years to be fully and successfully implemented (Maiolo, 2013). A key barrier to embedding EfS within all schools appears to be a lack of support and comprehension among teachers and principals as to the nature of EfS and what it entails. It also appears that there has also not been enough professional development for teachers to gain the knowledge and skills needed to integrate EfS into their classrooms. However, the precise extent and scope of the research that has been conducted to answer the above concerns and propositions is not clear. The purpose of this literature review therefore was to examine research that has been published the English language between 2000-2013 located within, and in support of, the implementation of education for sustainability.

**Literature Search Methods**

In order to gain a better understanding of the issues that have emerged and been examined in relation to EfS in tertiary institutions and its facilitation and implementation in schools it was thought that a systematic literature review was necessary.

**Search Strategy**

The literature search was designed to be as broad and as inclusive as possible using three literature databases. Using a process adopted from the public health domain, three independent search strategies were developed, one tailored for each database, (Scopus, A+Education and ERIC), in order to identify four subsets of articles addressing: (1) “sustainability”; (2) “pre-service” (3) “teach*” (where teach covered teaching and teacher); and (4) “education” (Figure 1). An additional OneSearch literature search using the search terms “climate change”, “teach*”, “education” and “pre-service” was also performed. As a result 34 papers emerged, were deemed relevant and were reviewed in full; 7 of these were more specifically targeted to climate change education rather than EfS in general.

**Search execution and article screening processes**

A literature search using the PRISMA framework for systematic literature reviews (Moher, Liberati, Tetzlaff, & Altman, 2009) was adopted. The citations for all of the articles identified by the intersection of the four search subsets (Exact Match) were distributed among the author and the research assistant who independently reviewed each title to determine the article's potential relevance to the research question. Reviewers were blinded to each other’s appraisal. Those titles for which both reviewers indicated a lack of relevance were excluded. For the remaining citations, the study abstracts were obtained, with the process of independent, blinded review repeated. Again, studies were only excluded if both reviewers indicated a lack of relevance. Finally, the full manuscripts for the retained
citations were reviewed using a data collection sheet to further screen and characterize the article, and to extract relevant information about each study.

Figure 1: The Exact Match Search Intersection

A similar process was undertaken to screen citations identified by the intersection of any three of the four search terms (Near Match). The titles of these articles were distributed to the two reviewers who independently reviewed each title to determine the article's relevance to the research question. If either reviewer identified a title for inclusion or further review, the abstract for that study was obtained with the process of independent blinded review by two reviewers repeated. Again, studies were only excluded if both reviewing study team members indicated a lack of relevance. The literature search was conducted in October 2013. The search result of primary interest was the intersection of the four search subsets (Figure 1), namely articles that included the terms pre-service, teacher or/and teaching, sustainability, and education.

Results

The identified articles could be classified into three sets of supporting, interlocking strands pertaining to pre-service teachers, in-service teachers, and tertiary education approaches. Overall, 13 studies were quantitative of a predominantly survey design, 11 studies were qualitative, 1 study was based on mixed methods and the remaining 9 articles were meta-reviews. Thirteen of the studies were carried out in Australia; the remaining studies were based overseas, more specifically in the US, Oman, Greece, Sweden, Germany, Latvia and New Zealand. The publication dates of the reviewed literature ranged from 2000 to 2013, but half of the studies were published in 2012 or 2013. Results are discussed by area of interest, or strand, below.

1. Pre-service teachers

1.1. Pre-service teachers’ attitude

Pre-service teachers’ general attitude towards sustainability and more specifically towards climate change seemed to be predominantly positive. Quantitative survey design studies of primary and secondary pre-service teachers in Australia and the Oman showed that a majority of pre-service teachers believed in anthropogenic global warming and they endorsed the view that it is important to
teach about climate change at school (Ambusaidi, Boyes, Stanisstreet, & Taylor, 2012; Boon, 2011; Effeney & Davis, 2013). Moreover, the cohort of secondary pre-service teachers in the Oman research strongly felt that educating future generations about issues of sustainability is potentially effective in combating climate change (Ambusaidi et al., 2012).

However, teachers’ acceptance of climate change in and of itself is recognised to be unlikely to change their behaviour. For example, even though pre-service teachers in the Oman study seemed to be well informed about actions that individuals can take to combat climate change, they were reluctant to personally take any action which would cause them inconvenience, e.g. using public transport (Ambusaidi et al., 2012). Nolet (2009) argued in his meta-review of teachers’ sustainability literacy that such an awareness which exists independently of enacted actions is common with environmental and health issues. When teachers are not seen to be acting as role models, however, the effectiveness of teaching about climate change is questionable.

Other studies examining pre-service teachers’ attitudes towards mitigation strategies showed greater variability in students’ opinions. Boon (2010) reported that a sizable proportion of an Australian final year pre-service teacher cohort felt sceptical or disempowered about climate change mitigation actions. Such attitudes about climate change and other sustainability topics are of great importance since they can impact upon teaching practices and views imparted to school students. Lombardi and Sinatra (2013) reported that pre- and in-service teachers’ negative feelings can predict their opinion of whether climate change is happening or not. Moreover, teachers who felt anger or an urgent desire to reach closure on the topic either did not teach about climate change at all or chose poor pedagogical methods to do so.

1.2. Pre-service teachers’ knowledge

Only one overseas study reported that pre-service teachers were relatively well informed about the science behind climate change topics, such as greenhouse gases (Ambusaidi et al., 2012). All other reviewed studies consistently showed a significant and alarming lack of knowledge. Ikonomidis, Papanastasiou, Melas, and Avgoloupis (2012) reported serious misconceptions in Greek pre-service primary teachers about the causes, consequences and possible mitigations and adaptation actions for climate change. Boon’s (2010) study highlighted a general confusion in relation to scientific concepts like the greenhouse effect or the ozone layer in an Australian final year pre-service teacher sample. Boon’s (2010) findings included pre-service teachers specialising in learning areas such as Science and Study of Society and Environment.

In short, the good intentions about sustainability education do not seem to match pre-service teachers’ knowledge. Indeed, Boon (2011) demonstrated that pre-service teachers’ positive attitudes towards or familiarity with topics like climate change does not correlate with pre-service teachers’ scientific knowledge. These findings suggest pre-service teachers have limited or no exposure to science content knowledge relating to topics of sustainability at tertiary level, or possibly insufficient understanding of these topics.

Little research has been conducted to clarify the sources of pre-service teachers’ knowledge about general sustainability topics or basic climate change science. Two studies utilising a survey design reported public media and school education as common knowledge sources (Boon, 2010; Ikonomidis et al., 2012). It has not yet been established however, how various knowledge sources relate to the
quality of pre-service teachers’ scientific knowledge. Further, it is not known for example, which particular aspects of sustainability or climate change pre-service teachers perceive they need more support with at tertiary level in order to teach them effectively.

1.3. Pre-service teachers’ teaching efficacy

UNESCO (2005) has called governments to include Education for Sustainability into all primary and secondary school curricula and the Australian Curriculum Assessment and Reporting Authority (2013) has made sustainability a cross-curriculum priority. Therefore, teachers across all learning areas and year levels need to embed sustainability into their lessons. Two studies examining how confident Australian pre-service teachers were to teach about sustainability topics, such as climate change, reported that pre-service teachers were positive about their ability to include sustainability in their teaching (Boon, 2011; Effeney & Davis, 2013). However, in both cases, teachers’ self-reported efficacy did not correlate with their actual knowledge about climate change. This could mean that pre-service teachers overestimate their understanding and knowledge base, e.g. they are not aware of their lack of knowledge, or that a strong knowledge base by itself does not improve teaching confidence. Other skills, such as pedagogical content knowledge or practical experience, may be necessary as well to improve their teaching capacity for these topics.

A second problem surrounding future teachers’ efficacy in implementing sustainability as a cross-curriculum priority arises when examining their understanding of what sustainability means. Group interviews with Australian pre-service teachers at various stages of their degree showed that pre-service teachers’ understanding of the concept of sustainability was often limited, e.g. one-dimensional and unproblematic (Evans, Whitehouse, & Gooch, 2012). Similarly, in the US the majority of pre-service teachers studied in a qualitative research project were not able to correctly define the term and thought that sustainability could not be taught within their subject area (Muthersbaugh & Kern, 2012). Although, when participants were challenged to develop examples of how to potentially integrate sustainability into their subject areas, some were appeared to change their beliefs and attitudes.

1.4. Recommendations

Overall, most studies on pre-service teachers’ readiness to teach about sustainability agreed that more time needs to be spent at university level to enhance the scientific knowledge base of education graduates (e.g. Boon, 2010; Boon, 2011; Effeney & Davis, 2013). Empirical evidence suggested that there should be a focus on fighting misconceptions (Ikonomidis et al., 2012), teaching pedagogical content knowledge (Effeney & Davis, 2013) and on introducing pre-service teachers to practical examples of how to integrate the sustainability into specific teaching areas (Muthersbaugh & Kern, 2012). Furthermore, it has been argued that tertiary education about sustainability needs to be persistent, critical and to address present controversies to develop a sophisticated understanding of what sustainability entails (Evans, Whitehouse, & Hickey, 2012) and to increase the chances of teachers implementing education about climate change, a particularly important sustainability matter (Lombardi & Sinatra, 2013).

2. In-service teachers

2.1. In-service teachers’ attitude
Several large survey-based studies suggest that in-service teachers’ attitude towards sustainability is positive (Borg, Gericke, Höglund, & Bergman, 2012; Burmeister, Schmidt-Jacob, & Eilks, 2013) and that they strongly support the idea to teach about climate change (Wise, 2010). Some teachers, however, report a struggle to integrate sustainability into their teaching along with all the other curriculum demands. More than half of a large Swedish secondary teacher sample reported that they had difficulty integrating topics of sustainability into their teaching (Borg et al., 2012).

Interesting results emerge when examining the importance teachers place on specific sustainability topics. For example, teachers rated global warming or climate change as one of the least important topics in two independent teacher samples (Elshof, 2005; Spiropoulou, Antonakaki, Kontaxaki, & Bouras, 2007). Teachers seemed to emphasise local environmental issues over global ones in their teaching (Spiropoulou et al., 2007). Furthermore, over 70% of teachers’ in a small Canadian sample believed that the seriousness of global environmental problems was exaggerated by the media (Elshof, 2005). Interestingly, teachers in the Canadian sample consistently estimated their colleagues’ level of interest in sustainability issues lower than their own level of interest (Elshof, 2005). This could suggest that even though most teachers report a positive attitude towards sustainability, they generally believe that it is an unpopular topic and that support from colleagues to teach about issues of sustainability is unlikely.

It should be noted that all reviewed studies about in-service teachers’ attitudes towards sustainability, and more specifically climate change, have been carried out overseas, e.g. Europe and North America. There seems to be little empirical data on practicing Australian teachers’ attitudes about education for sustainability.

2.2. In-service teachers’ knowledge

Studies investigating in-service teachers’ knowledge base of sustainability topics consistently reported significant knowledge gaps, even if sampled teachers are specialists in science teaching. For example, a German sample of chemistry teachers was only vaguely informed of theoretical concepts behind sustainability education (Burmeister et al., 2013); secondary science teachers in Colorado held widespread misconceptions about climate change (Wise, 2010), and Greek primary school teachers seemed to have an incorrect understanding of the term sustainability and renewable sources of energy (Spiropoulou et al., 2007).

A study with a small secondary science teacher sample from Western Australia reported that, overall, teachers had a sound understanding of climate change (Dawson, 2012). A closer look at the questionnaire data, however, revealed that teachers showed very wide variation in their understanding of specific climate change issues, e.g. the greenhouse effect or the ozone layer. Thus, while the overall results gave reason for optimism, the misconceptions of some teachers in the sample were considered alarming.

Teachers’ self-reported sources of knowledge about climate change seemed to be predominantly independent private study, e.g. research of internet sources, rather than professional development or tertiary education (Wise, 2010). In a study of teachers from a rural school in North Queensland, Australia, teachers cited that they had undergone professional development for sustainability education, but these sessions did not check for the teachers’ theoretical scientific knowledge or
understanding (Evans et al., 2012). Surprisingly, a proportion of teachers in a large sample from Colorado, reported they had no learning experiences of climate change topics at all, even though these teachers’ main teaching area was science (Wise, 2010).

2.3. Implementation

As was found with the pre-service teacher samples, the positive attitude of in-service teachers towards sustainability education did not mean it was easily implemented. Spiropoulou et al. (2007) reported low implementation levels of environmental programs in Greek primary schools. One third of secondary science teachers from a Western Australian sample confirmed they did not teach about climate change at all (Dawson, 2012) and similarly science teachers from Colorado, did not teach about climate change, unless they specialised in earth science (Wise, 2010).

When implemented, the quality of education for sustainability seemed to be strongly influenced by individual teachers’ subject area. Borg et al. (2012) showed that teachers’ learning area may dictate the chosen pedagogy used to teach about sustainability. Tertiary teacher educators would benefit from research examining how specialisation of Australian secondary teachers influences their teaching practices and ability to implement sustainability as a cross-curriculum priority.

Few studies were able to suggest circumstances or factors leading to successful implementation of education for sustainability. A qualitative case study of one Australian primary school teacher suggested that personal life experience which leads to a sense of value of the environment may motivate teachers to engage with sustainability topics (Kennelly, Taylor, & Maxwell, 2008). Similarly, Liddy (2012) argued in her systematic review of 22 action research projects in Ireland that a focus on pre-service teachers’ identity was needed because increasing teachers’ content knowledge alone was not enough for behaviour change and as a result implementation of sustainability topics into the curriculum. Other reported motivators to integrate sustainability into teaching practices include direct encouragement to teach about sustainability from colleagues, a sound level of content knowledge and inclusion of sustainability in curriculum standards (Wise, 2010) as well as the principal’s support and professional development (Evans et al., 2012).

2.4. Barriers to implementation

Several studies asked in-service teachers to name perceived barriers to implementation of education about sustainability topics like climate change. Many listed barriers referred to general problems of the school system, e.g. lack of time (Borg et al., 2012; Burmeister et al., 2013; Dawson, 2012; N. Evans et al., 2012; Wise, 2010), lack of support from school management or colleagues from other subject areas (Borg et al., 2012; Burmeister et al., 2013; N. Evans et al., 2012), limited freedom when choosing topics and content being determined by assessment (Burmeister et al., 2013) and lack of resources (Evans et al., 2012). Barriers more specific to sustainability education included a lack of expertise and training on the topic (Borg et al., 2012; Burmeister et al., 2013; N. Evans et al., 2012; Spiropoulou et al., 2007), a lack of pedagogical content knowledge and inspiring examples (Borg et al., 2012; Burmeister et al., 2013; Spiropoulou et al., 2007) and teachers not recognising the topic’s relevance to their subject area or prescribed curriculum (Borg et al., 2012; Dawson, 2012).

Finally, Bryce and Day (2013) argued in their meta-analysis of climate change education in schools that sustainability topics have become value laden, which makes teachers’ decisions about what
content to teach more difficult. A series of action research projects in Ireland confirmed that many teachers expressed a lack of confidence in addressing some controversial issues in the classroom (Liddy, 2012).

2.5. Recommendations

Research findings called for strategies to improve in-service teachers’ content knowledge about sustainability (Wise, 2010) and for the development of appropriate curriculum material to support teachers in their implementation of education for sustainability (Burmeister et al., 2013; Jonane & Salitis, 2009). Teachers in reviewed studies expressed little interest in self-directed learning about sustainability and had strong preferences for professional development and cooperation with out of school experts (Elshof, 2005; Jonane & Salitis, 2009).

Furthermore, it was argued that prescribed frameworks of education for sustainability imposed on teachers will not be successful (Borg et al., 2012; Elshof, 2005). Instead, schools were advised to let teachers participate in the development of teaching frameworks and encourage and find ways to make teachers incorporate issues of sustainability into their world views. Lastly, simply adding content to the curriculum is unlikely to increase the implementation of education for sustainability. Instead, several authors argued for a focus on the development of teachers’ pedagogical content knowledge, e.g. through the provision of specific examples of how to include topics like climate change into various teaching areas (Burmeister et al., 2013; Kennelly et al., 2008).

3. Tertiary education approaches

Past research suggests that pre-service teacher education for sustainability is most effective when teaching approaches used are (1) learner centred, (2) focus on critical curriculum and (3) include the explicit teaching of pedagogical content knowledge (Ferreira & Davis, 2005).

3.1. Learner centred teaching approaches

Liddy’s (2012) review of a series of action research projects concluded that participatory learning approaches, e.g. service learning, lead to greater engagement of pre-service teachers with environmental topics. Such engagement should ideally focus on the development of realistic solutions to sustainability issues like climate change, so teachers are able to link scientific content knowledge with real world problems (Nolet, 2009). Action-based or inquiry-based teaching approaches that ask pre-service teachers to actively participate in their learning of sustainability topics seemed to be met with enthusiasm from pre-service teachers and receive positive feedback in terms of their relevance for future application in schools (Ferreira, Ryan, & Tilbury, 2007; Flaws & Meredith, 2007). At the same time, however, some pre-service teachers from a university in New Zealand expressed concerns about their agency to implement similar student centred teaching approaches within their future workplace due to prevalent pedagogical frameworks (Flaws & Meredith, 2007).

Another review of literature on climate change education claimed that student centred educational interventions are most successful when they focus on local and tangible examples of environmental issues (Anderson, 2012). Frequent recommendations in the literature include hands-on field work (Nolet, 2009) and active investigations of local environmental problems (Kennelly, Taylor, & Serow, 2012; Spiropoulou et al., 2007). Pre-service teachers involved in such place-based learning at a
university in New South Wales, Australia stated they gained an improved understanding of a range of environmental issues and perceived these topics as more important than before the learning experience (Kennelly et al., 2012). Pre-service teachers at a university in the Australian Capital Territory reported that their learning experiences were especially enriched by the incorporation of community networks in their course (Wilson, 2012).

3.2. Focus on critical curriculum

After reviewing two sustainability teacher education projects in the Asia-Pacific region, Fien and Maclean (2000) argued that next to active participation, critical reflection is essential in increasing pre-service teachers’ confidence to teach about sustainability. They also urged tertiary educators to engage pre-service teachers in action research in order to enrich students’ understanding of the purpose of environmental education and to teach them how to choose appropriate teaching strategies. Anderson (2012) suggested that such cultivation of critical thinking and problem solving may help counteract some pre-service teachers’ sense of helplessness in regards to climate change or even encourage sustainable behaviour.

3.3. Explicit teaching of pedagogical content knowledge

Content knowledge or the active inquiry into the facts of an issue is arguably only one necessary part of preparing pre-service teachers to teach about sustainability and climate change. Pre-service teachers also need to be taught how to best implement education for sustainability (Kennelly et al., 2012). Several meta-analyses suggested that education for sustainability is best implemented via an integrated curriculum approach (Anderson, 2012; Liddy, 2012). Thus, pre-service teachers would need to be taught how to work collaboratively between their subject disciplines.

Some universities approached this challenge by introducing pre-service teachers to exemplar units that have been implemented successfully (Nolet, 2009) or by asking students to develop their own examples of how to integrate various sustainability topics into their teaching (Taylor, Kennelly, Jenkins, & Callingham, 2006). Pre-service teachers appreciated the opportunity to evaluate different teaching strategies and reported an increase in teaching efficacy after being provided with the opportunity to practically implement their planned lessons (Kennelly et al., 2012).

3.4. Recommendations

All in all, pre-service teachers’ confidence and desire to teach about sustainability seemed to increase when they learned how to improve their content knowledge independently, when they experienced pedagogical strategies that lead to positive student outcomes and when they got the opportunity to use relevant teaching resources (Kennelly et al., 2012). Anderson (2012) reviewed the literature with a specific goal to improve pre-service teachers’ ability to educate about climate change and recommended that the following content knowledge should be taught in order to influence pre-service teachers’ attitude and teaching behaviour: the history and causes of climate change, mitigation and adaptation practices, understanding of different interest groups that shape responses to climate change and the ability to critically evaluate these responses.
Conclusion and research gaps

In relation to pre-service teachers, most studies examining their readiness to teach about sustainability showed that more time needs to be spent at university to enhance their scientific knowledge base and fight misconceptions. Moreover, teaching pedagogical content knowledge and providing practical examples of how to integrate sustainability topics into specific teaching areas are likely to be critical enablers of pre-teacher confidence to teach EfS. A critical gap in the research literature appears to be the source of pre-service teachers’ knowledge for important sustainability topics such as climate change.

In-service teachers are both important in the provision of EfS to their students but also critical enablers of pre-service teacher attempts to teach EfS. They are their practicum supervisors and strongly influence initial pre-service teaching practice, both in the affective domain through influences upon attitudes but also in via the curriculum through the expectations they have of pre-service teachers to teach particular content areas. Research findings showed an urgent need for strategies to improve in-service teachers’ content knowledge about sustainability and appropriate curriculum material to support their classroom practice using professional development delivered by out of school experts. Schools must give space to teachers to find ways to incorporate issues of sustainability into their world views without adding to the already burdened curriculum requirements. Longitudinal studies tracing the development of attitudinal change in in-service teachers and case studies exploring the ways that an increase in their teaching capacity is developed are important research gaps that need to be addressed.

Finally, but not least important, tertiary institutions need to heed the desire of pre-service teachers for action-based or inquiry-based teaching approaches that help them to actively participate in their learning of EfS. Time to develop scientific understanding for the topics embraced by EfS must also be devoted to the pre-service training curricula teamed with assessment strategies that ensure quality control for emerging teachers. And in support of these endeavours, researchers have recently noted that vision, leadership and funding at university level also enable teacher educators to implement EfS through their content areas (Mills & Tomas, 2013). Mills and Tomas (2013) research highlights the importance of perceived social norms for individual participation in advocated (for sustainability) behaviours (Ajzen & Fishbein, 2005). Research in this area needs to confirm the best ways to prepare pre-service teachers to teach EfS and the effects of institution-wide policies upon teacher educators.

References


