



## Research paper

# Approaches to embedding sustainability in teacher education: A synthesis of the literature



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## HIGHLIGHTS

- Academics apply a range of approaches and strategies to embed sustainability.
- Academics provide four rationales for embedding sustainability in teacher education.
- Academics draw on a range of established theoretical frames to embed sustainability.
- Academics face a number of challenges to embedding sustainability.

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## ABSTRACT

This study investigated how teacher education academics embed sustainability education in learning and teaching, using a systematic literature review of peer-reviewed journal articles. A taxonomy of four distinctive approaches was developed: (1) embedding sustainability education widely across curriculum areas, courses, and institution; (2) through a dedicated core/compulsory subject; (3) through a component of a core/compulsory subject; and (4) through a dedicated elective subject. This paper investigates the differing rationales, theoretical frames and pedagogical approaches used and identifies the perceived challenges underpinning each of these approaches. The final section offers an analysis and discussion of the implications of our review findings for teacher education academics and researchers, and others in the broader academic community who are interested in change towards sustainability through education.

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## 1. Introduction

Issues such as climate change, accelerating biodiversity loss, and food scarcity and security are receiving increasing global attention as urgent concerns facing humanity. These issues are often framed within a sustainability discourse and education is often viewed as having a central role in building society's capacity to address them (Barth, Michelsen, Rieckmann, & Thomas, 2016). The central

principles that inform this sustainability discourse first emerged from the 1989 report of the World Commission on Environment and Development, entitled *Our Common Future* (also known as the Brundtland Report), which emphasised intergenerational equity and the interconnectedness of environmental, economic and social systems as key sustainability concepts. Scholars such as David Orr (2004, p. 27) argue that the “problem of sustainability” is also “the problem of education” because education requires rethinking - from individual and nation-building emphases - to focusing on the critical issues of human survival. Such a shift presents major challenges for teaching and teacher education.

Sustainability education (SE), also referred to as Education for Sustainability (EFS), Education for Sustainable Development (ESD) and, previously, Environmental Education (EE), aims to help

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learners develop the necessary knowledge, understanding, skills, values, capabilities and dispositions to respond to the complex socio-ecological issues of the 21st century (Australian Research Institute for Environment and Sustainability [ARIES], 2009). The recently concluded United Nations Decade of Education for Sustainable Development (2004–2015) and its follow-up, UNESCO's Global Action Programme on Education for Sustainable Development, highlight the international significance attached to integrating sustainability into the education of young people and, therefore, into the education of student teachers (Australian Government Department of the Environment, Water, Heritage and the Arts [DEWHA], 2009). This imperative is further emphasised by UNESCO's Education Strategy (2014–2021), which outlines three strategic objectives: (1) to develop education systems and support educators to foster quality and inclusive lifelong learning for all, by improving learning processes and outcomes; (2) to empower learners to be creative and responsible global citizens through, for instance, strengthening education for sustainable development; and (3) to shape the future education agenda by rethinking education for the future. Sustainability is now widely recognised in many early education and school curricula, and in numerous university policy and graduate attribute statements and courses across the globe.

However, the complexity and contestation of sustainability issues such as climate change pose challenges for a range of disciplines that seek to develop students' understandings and capabilities for action. Researchers across business, engineering and initial teacher education report a lack of a consistent approach to SE and a similar range of barriers, including lack of staff with expertise, faculty support, and time/space in the curriculum, as well as staff and student resistance to the concepts and values of sustainability (Dawe, Jucker, & Martin, 2005; Desha, Hargroves, & Smith, 2008; Tilbury, Crawley, & Berry, 2004; von der Heide, Lamberton, & Wilson, 2012). Nevertheless, engineering provides the strongest point of reference as a disciplinary field that requires graduates to demonstrate outcomes related to economic, social and environmental contexts. For instance, in the United States, ABET, Inc. (the body responsible for certifying engineering programs) requires that students exhibit "an ability to design a system, component, or process to meet desired needs within realistic constraints, such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability" (ABET, n.d., Criterion 3). Similar requirements are mirrored for engineering programs in the United Kingdom (see Engineering Council, 2015) and Australia (see Engineers Australia, 2016).

Within school education, the embedding of complex combinations of interdisciplinary knowledge, understanding, skills, values and dispositions into the curriculum is an important research focus and established challenge. For example, North American, European and Australian education systems have been concerned with developing strategies to integrate complex themes such as multiculturalism into education since the 1960s. More recently, in Scotland, Wales and Australia, cross-cutting themes (Education Scotland, 2016; Welsh Assembly Government, 2008) or cross-curriculum priorities (Australian Curriculum, Assessment and Reporting Authority [ACARA], 2016), which are intended to permeate all areas of the curriculum, aim to develop a set of key attributes for active and informed citizenship. The Scottish curriculum (Education Scotland, 2016) identifies learning for sustainability, enterprise education and global citizenship as cross-curriculum priorities; the Welsh curriculum (Welsh Assembly Government, 2008) recognises consumption and waste, choices and decisions, health, identity and culture, climate change, wealth and poverty, and the natural environment; and the Australian curriculum, K–10 (ACARA, 2016) focuses on Sustainability, as well as

Aboriginal and Torres Strait Islander histories and culture, and Asia and Australia's engagement with Asia.

This paper focuses on the intersection between sustainability and teacher education in order to examine the range of approaches currently being used by academics to embed SE in initial teacher education across the globe. By 'embedding sustainability', we are referring to the inclusion of sustainability as part of the core focus of teacher education policies and practices. Our concern is the extent to which teacher educators are implementing SE into the curriculum and pedagogy of their initial teacher education programs. Although our focus is on sustainability, the process for embedding any type of knowledge, understanding, skills, values or dispositions beyond subject-specific syllabi is a general concern for many educators (Fiford, 2011). Therefore, we consider the specificities of embedding sustainability investigated here to be transferable to other cross-cutting educational priorities and, hence, may be helpful to teacher educators working across and outside the mainstream subject boundaries that continue to shape how most teacher education programs are framed.

Despite increasing demands and expectations to embed SE into teacher education, the extent to which it has been integrated into initial teacher education is unclear (Wals, 2009), with some researchers (Esa, 2010; Ferreira, Ryan, Davis, Cavanagh, & Thomas, 2009; Jenkins, 1999/2000) being most critical of a lack of progress. A scan of the literature, however, reveals an increasing number of publications addressing SE in initial teacher education, which indicates that research on the issue, at least, is being undertaken. Nevertheless, without an accurate appraisal of what is being reported, it is difficult to ascertain the state of play in the field. We contend that such efforts should be informed by a thorough and grounded understanding of the foundations on which SE in initial teacher education is being applied. Through a systematic review of the extant literature, this paper examines how initial teacher education academics embed sustainability in learning and teaching, their rationales for doing so, the theoretical frames and pedagogical approaches they draw upon, and the challenges faced in these endeavours.

Our review was guided by five research questions:

1. What programmatic approaches are being used to embed sustainability education in initial teacher education?
2. What rationales are provided by teacher educators for embedding sustainability education into initial teacher education?
3. What theoretical frames underpin the embedding of sustainability education into initial teacher education?
4. What pedagogical approaches are used for embedding sustainability education into initial teacher education?
5. What problems and/or challenges are faced by teacher educators who wish to embed sustainability education into initial teacher education?

### 1.1. Teacher education and sustainability

Initial teacher education curriculum is driven by government and university level policies and directives, teacher educator interests and teaching approaches, as well as student teachers' personal histories, experiences and interests. For example, in Australia, teacher education programs are developed by universities in consultation with national and state/territory education authorities, and teacher accreditation and registration bodies. For teacher education programs to be accredited in Australia, for example, they must demonstrate that, over the course of the degree, graduate teachers will acquire the appropriate levels of professional knowledge, practice and engagement mandated as a set of seven

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