Comparing Education for Sustainable Development in initial teacher education across four countries

Neus (Snowy) Evans
College of Arts, Society and Education
Division of Tropical Environments
James Cook University, Ngumba-bada campus (Cairns), Australia
neus.evans@jcu.edu.au

Hilary Inwood
Dept. of Curriculum, Teaching & Learning
Ontario Institute for Studies in Education
University of Toronto, Toronto, Canada
hilary.inwood@utoronto.ca

Beth Christie
Moray House School of Education
University of Edinburgh
Edinburgh, Scotland
beth.christie@ed.ac.uk

Eva Ärlemalm-Hagsér
School of Education, Culture and Communication (UKK)
Mälardalen University, Sweden
eva.arlemalm-hagser@mdh.se

Corresponding author: Neus (Snowy) Evans

Paper submitted: 16 July 2020
Paper revised: 28 January 2021 and 24 March 2021

Abstract

Purpose: This paper undertakes a cross-comparative inquiry into Education for Sustainable Development (ESD) related to governance, initiatives and practices in initial teacher education (ITE) across four countries with very different contexts – Sweden, Scotland, Canada, and Australia. It provides insights into issues arising internationally, implications for ESD in ITE, and offers learnings for other countries and contexts.

Design/methodology/approach: A cross-comparative study design with overarching themes and within-case descriptions was applied to consider, compare and contrast governance characteristics, initiatives and practices from each context.

Findings: The approaches to governance, initiatives and practices that each country adopts are unique yet similar, and all four countries have included ESD in initial teacher education to some extent. Comparing and contrasting approaches has revealed learnings focused on ESD in relation to governance and regulation, practices, and leadership.

Research limitations/implications: Making comparisons between different contexts is difficult and uncertain, and often misses the richness and nuances of the individual sites under study. However, it remains an important endeavour as the challenges of embedding ESD in initial teacher education will be better understood and overcome if countries can learn from one another.

Originality/value: Scrutinising different approaches is valuable for broadening views about possibilities, and understanding how policies and initiatives translate in practice.

Keywords: Initial teacher education, pre-service teacher education, Education for Sustainable Development, Learning for Sustainability, Environmental Education, Sustainability

Introduction

In demanding times like these, with ecological, economic, social and technological changes and challenges, the importance of embedding Education for Sustainable Development (ESD) into initial teacher education (ITE) cannot be underestimated. This is reinforced by the United Nations' Sustainable Development Goal 4, Target 4.7, that by 2030 all learners will have the necessary knowledge and skills to promote sustainable development (United Nations, n.d.a). Critically, Target 4.7 underpins progress across the entire 2030 sustainable development agenda aiming to promote global peace and prosperity by ending poverty and hunger; achieving universal human rights, gender equality and the empowerment of all women and girls; and ensuring ongoing protection of Earth systems and its natural resources (United Nations, n.d.b). Without building new teachers' capacity in ESD, it is hard to imagine how they, in turn, will enable their future students to develop the necessary

competencies to overcome complex sustainability issues such as climate change, poverty and biodiversity loss.

The push by global policy makers for ESD to be included in ITE is nothing new. A history recognising the importance of ITE in progressing the principles and practices that underpin sustainability dates back to the 1971 International Union for Conservation of Nature (IUCN) Conference on Environment and Conservation Education where a specific session was dedicated to environmental education in primary, secondary and teacher education (International Union for Conservation of Nature and Natural Resources, 1972). Understandings have been reinforced ever since through international policy directives by UNESCO (1978), UNESCO-UNEP (1977; 1988) and UNECE (2005; 2012; 2016). These have been further reinforced by initiatives like the UNESCO Chair on Reorienting Teacher Education for Sustainability (York University, n.d), the Decade of Education for Sustainable Development (UNESCO, 2019a) and the Global Action Programme on Education for Sustainable Development (UNESCO, 2019b). ESD and ITE also continue to be an area for scholarly research around the world (e.g., Council of Ministers of Education, Canada [CMEC], 2012; Evans *et al.,* 2017; Ferreira and Ryan, 2012; Ferreira *et al.,* 2009; Karrow *et al.,* 2016; Karrow and DiGuiseppe, 2019; Kennelly and Taylor, 2007; Nolet, 2009; Steele, 2010; Summers *et al.,* 2005). The enactment of policies and initiatives, however, is problematic. After nearly 40 years, the most recent UNESCO (2018a) report on progress towards ESD finds that pre- and in-service teacher education in ESD is unsatisfactory, citing insufficient teacher training as the greatest problem.

Few would dispute that embedding ESD into ITE is fundamental to ensuring future teachers are prepared to teach in areas related to sustainability. Indeed, around the world, some governments have added ESD to the education agenda. For example, Scotland and Wales include sustainability in the professional standards for teachers (see General Teaching Council for Scotland, 2019; Department for Children, Education, Lifelong Learning and Skills, 2008). In Sweden ESD is embedded into the core curriculum of all students from preschool to year 12. Australia includes ESD (or Sustainability Education as it is known there) as a cross-curriculum priority in the national curriculum for students from Year 1 to 10 (see Australian Curriculum, Assessment and Reporting Authority [ACARA], n.d.) and, thereby, into the education of student teachers. Exactly how such policies and other initiatives are enacted in practice, however, is complicated, with little evidence that any one approach is most effective (UNESCO, 2019c; McKeown and Hopkins, 2014).

This paper adopts a cross-comparative methodology to examine approaches to ESD in ITE based on governance characteristics, initiatives and practices as applied in different corners of the world – Sweden, Scotland, Canada, and Australia – where the first author spent time as part of a six month sabbatical. Governance includes the policies, leadership, and management of an institution as related to ESD (Beveridge *et al.,* 2019). Initiatives refer to a new plan or process to achieve something or solve a problem, and practices are actions taken to accomplish something, in this case to better embed ESD into ITE (Cambridge Dictionary, 2020; Merriam-Webster Dictionary, 2020). The purpose of this paper is to gain insights by comparing issues arising internationally in this field, analysing implications of the issues for ESD in ITE, and identifying insights from this analysis. Scrutinising different approaches can be valuable for broadening views about possibilities, and understanding how ideas work in practice at the ITE system level (Darling-Hammond, 2017). The study's

four countries were selected due to their historical association with ESD, their response to the DESD and subsequent related educational initiatives. The authors recognise the limitation of including only four countries in terms of diversity and global representation. However, this study sought to provide balance between thick and thin descriptions, and limiting to four countries enabled this to happen within the required word limit. Future studies that build on this work and diversify the sample are encouraged.

The paper begins by providing the conceptual background, followed by an explanation of the methodology guiding the analysis. An overview of each country's nuanced approach to ESD in ITE is provided before moving onto a comparison of the countries' approaches and implications for ESD in ITE. But first, to address the issue of terminology, it is noted at the outset that while the term ESD is promoted by the United Nations and taken up in many countries, its use is not consistent globally. In reality, many variations are in use, including Environmental Education (EE), Education for Sustainability (EfS), Learning for Sustainability (LfS), Sustainability Education (SE), Environmental Education for Sustainability (EES) and, more recently, Climate Change Education (CCE). While these variations can be traced back to the philosophical and pedagogical orientations of EE, each term does represent a different area of emphasis for educators (Ferreira *et al.,* 2019; Jickling and Sterling, 2017). Importantly, Jickling and Sterling (2017) warn that when using such terms as ESD there is always a risk that they become empty signifiers. They argue for a critically reflective approach to education capable of responding to an urgent demand to remake education to be responsive to extraordinary and uncertain times. While the terminology may be different, these traditions share a common aim to equip future citizens with the necessary competencies to respond to complex 21st century challenges (UNESCO, 2017). In this paper, the authors have chosen to use the term ESD to reference these various traditions broadly for consistency sake, but do deviate within each of the four stories of practice, recognising the tensions inherent in this choice.

Taking a systems approach to ESD in initial teacher education

This work draws on the concepts of 'systems thinking' and 'embedding' to conceptualise a systems-approach to including ESD in ITE (Ferreira *et al.,* 2019). Systems thinking provides a framework for understanding complex phenomena or managing complex issues or problems by focusing on the whole and the relationships between the different parts that make up the whole (Flood, 2001; Sterling, 2004). Embedding is to enclose closely or to make something an integral part (Merriam-Webster dictionary, 2020). A systems-approach to embedding ESD in ITE, also known as 'mainstreaming' (Ferreira *et al.,* 2006; Ferreira *et al.,* 2007a), refers to integrating ESD in a thorough and systematic fashion (Ferreira *et al.,* 2019) so that it becomes an integral part of a school or program's philosophies, governance, policies, curriculum and pedagogical practices, processes and activities.

A systems-approach to embedding ESD in ITE consists of two premises. The first is that ITE is a complex and difficult to control system (Steele, 2010) as it is nested within a broader education system that comprises multiple, interconnected, hierarchical levels and institutionalised subsystems (Ferreira and Ryan, 2012; Ferreira *et al*., 2019). Each subsystem, pertaining to the broader education system, has its own rules, interconnections, institutionalised hierarchies, and stakeholders with differing agendas (Ferreira and Ryan, 2012; Ferreira *et al.,* 2019). For example, an education system as a whole consists of a

variety of organisations such as departments of education, boards of teacher registration and accreditation, teacher associations, teacher education institutions, school districts, and schools. Each one of these has multiple members with differing foci, connections and points of influence. Consider, for instance, that a school is made up of a principal, administrative staff, heads of curriculum or departments, teachers, parents and friends associations, local communities and students. Each one of these groups has its own dynamics, has similar or differing agendas and interests, and multiple other connections and influences. Embedding ESD in ITE in a thorough and systematic fashion requires that all actors within the system simultaneously work together for change (Ferreira *et al.,* 2009). However, change under such complex conditions is difficult to control (Steele, 2010), and rarely happens at the same pace.

The second premise is that thorough and systematic change towards ESD requires iterative and tenacious disruption, reorientation and transformation of existing systems and sub-systems (Jickling and Sterling, 2017; Scott *et al.,* 2012; Sterling, 2012; Stevenson, 1987). Disruption is a consequence of change that goes beyond a particular level or sub-system of interest. This means that actions focused on transforming ITE towards ESD must go beyond teacher educators themselves, to include all agents of change and stakeholders, such as departments of education, boards of teacher registration, professional teacher associations, schools and staff, students, business and community members (Ferreira *et al.,* 2009). This is very different to the type of change known as adaptation, which simply changes parts of the system, such as content and courses, to fit in with existing contexts. The authors therefore argue that reorienting and transforming ITE towards ESD that can be sustained long-term will require the disruption and transformation of existing philosophies, policies and practices related to operations, culture, governance, management and curriculum (Evans *et al.,* 2016; Scott *et al.,* 2012).

In summary, a systems approach to embedding ESD in ITE goes beyond tinkering at the edges to adapt practices or make changes to one part of the system. In following Ferreira *et al.,* (2007a, 2007b), systematic change requires the broad-scale adoption of an idea across a whole system so that it becomes mainstreamed into day-to-day operations and practices. In ITE, then, a systems-approach to embedding ESD goes beyond adding a subject or including it into the curriculum, to it becoming an integral part of a programme, department or institution's values, policies, core curriculum and pedagogical practices (Evans *et al.,* 2016). Faculties or departments of education around the world are attempting to bring about this type of systemic change in relation to ESD, with varying degrees of sophistication. As already mentioned, the paper compares how ITE programmes in Sweden, Scotland, Canada, and Australia are working with a variety of administrative, programmatic and curricular changes to embed ESD into their work with pre-service teachers.

Methodology

Despite the continued reliance on and popularity of international comparative research in Higher Education (Cantwell, 2020), tension still remains between the need for comparative generalisability and contextual detail (Kosmützky *et al.,* 2020). This paper proves no exception to the ongoing debate. The authors recognise that taking a cross-comparative approach is useful for examining ESD in ITE policies or legislation, initiatives, and practices across different contexts. However, whilst the cross-comparative benefits enable general

patterns to be revealed, they limit a full examination of the uniqueness of the individual contexts (see Kosmützky *et al.,* 2020 for a discussion of this methodological challenge). Given this tension and limitation, the authors include both overarching themes and within case descriptions. In doing so it is maintained that scrutinising different approaches is valuable for broadening views about possibilities, and understanding how (ESD) ideas work in practice at the ITE system level (Darling-Hammond, 2017).

The comparative framework focuses on three key themes: governance, initiatives, and practices related to ESD. Each author reviewed country specific ESD national, provincial/state and institutional policies, curriculum documents, reports, and guidelines, in combination with critical analysis of their aggregate knowledge and experience to write a narrative case about ESD in ITE within their own country in light of the three themes. The first author then analysed the three narratives independently first, then as a whole to discern unique qualities, similarities and differences (Esser and Vliegenthart, 2017) with a focus on comparing and contrasting governance characteristics, initiatives and practices from each context. Discussions between the four authors followed to discuss and further analyse the cases, resulting in cross-case findings that can be contextualised and understood in relation to the country-specific descriptions.

As part of this process, the authors acknowledged their status as four privileged, female, teacher education academics from white middle class western backgrounds. While the cross-comparative methodology provides a rigorous framework for revealing patterns across the four study countries, the authors recognise the influence of their own subjectivities in interpretation, including understandings of the four countries in this study, within which each one lives and works.

Sweden

In Sweden, the government sees education as an important tool for promoting the concept of sustainable development across Swedish society, and ultimately achieving a sustainable society. Accordingly, ESD, also known as learning for sustainable development and learning for sustainability, is legislated across all levels of education. Within higher education Universities sit under the Swedish Higher Education Act which states that “in the course of their operations, higher education institutions shall promote sustainable development to assure for present and future generations a sound and healthy environment, economic and social welfare, and justice” (Swedish Council for Higher Education, 2019, section 5). Specific to ITE, the qualification descriptors in the Qualifications Ordinance of the Swedish Higher Education Act (Annex 2) requires students to demonstrate the capacity to make assessments in educational processes with particular respect to sustainable development. Overall, Swedish universities are making progress, although the level of progress varies between universities (Lundh and Ruling 2008; Swedish Higher Education Authority [UKÄ], 2018). A northern European study (Tilbury *et al.,*2014) reporting on regional opportunities for developing ESD competences found that some higher education institutions support sustainable development within strategic plans and employ staff specifically to lead and progress strategic work on ESD. A later 2018 evaluation by the Swedish Higher Education Authority (UKÄ) reported that about half of Swedish universities have established overall sustainable development goals and integrated ESD into at least some programmes. A number of universities promote sustainable development through, for example, staff

seminars, training days and networking opportunities. However, overall, there are limited, readily available opportunities for staff development in ESD (Tilbury *et al.*, 2014). Most university lecturers demonstrate greater understanding of ESD as related to curriculum than pedagogy, and focus on one rather than all three of the social, ecological and economic dimensions of sustainability. A similar trend emerges in pre-service teachers. In a study investigating how preschool pre-service teachers describe ESD, Ärlemalm-Hagsér and Larsson (2019) found that responses overwhelmingly support the knowledge over the social and ecological domains. As a result, Swedish pre-service teachers may graduate with only a partial understanding of ESD. In another study, Ärlemalm-Hagsér (2017) critically analysed how pre-service teachers describe their professional experiences (practicums) with ESD. They depict different cultures of 'doing' ESD in early childhood settings, reflecting pluralistic and divergent landscapes of understandings, as well as an absence of transformative whole-institution approaches in the implementation of ESD.

A few initiatives have targeted the advancement of ESD within teacher education generally and, consequently, ITE. These include a national network of teacher educators called Lärhut, and the Global School. Lärhut, now defunct, aimed to grow ESD in teacher education generally and develop teacher educator capacity to integrate ESD in their teaching and learning practices. The Global School is a broader initiative that provides professional development to staff in preschools, primary and secondary schools, pre-service teachers and teacher education academics in learning for sustainable development, including the sustainable development goals, climate change, democracy, human rights, equality, energy, consumption and controversy (Swedish Council for Higher Education, n.d.). The Global School is an important initiative for capacity building in ITE, considering that ESD competencies form part of learning outcomes pertaining to all Swedish teacher education courses, as well as the examination programme that pre-service teachers are required to complete prior to graduation (UNECE, 2016). However, flexible regulation does influence outcomes.

The Swedish Higher Education Act is unregulated. As a result, there is much variation in the application of ESD, the extent to which teacher education institutions engage with ESD, and the rigor of the examinations. For example, Malmö University has 27 goals on content and skills for student teachers, including global challenges, citizenship, sustainability and intercultural themes. Pre-service teachers studying upper secondary education complete a course called *Global challenges in a subject context,* which aims to provide the skills and awareness on how to implement ESD within their teaching practice (Swedish International Centre of Education for Sustainable Development [SWEDESD], 2017). Mälardalen University's early childhood teacher education programme takes a developmental approach to ESD. ESD is implemented throughout the years to align with the development of pre-service teachers' knowledge and skills. This begins in the first year of studies (semester 1-2) with establishing knowledge about ESD as an objective, continues in the second year (semesters 3-4) with consolidating and applying ESD in practice, and is extended in the third and fourth years (semesters 5-7) by deepening the knowledge and critically examining multiple understandings and approaches by problematising ontological and epistemological perspectives on ESD in theory and practice. Interestingly, an evaluation into the integration of ESD in the early childhood teacher education programme at Mälardalen University (Ärlemalm-Hagsér, 2015), found a number of different interpretations. Even though ESD

was incorporated into the programme, varying interpretations and understandings emerged among staff about what pre-service teachers should learn and what sustainability is or may be in ECE settings.

Scotland

In 2012 Scotland more formally departed from the ways in which ESD was being developed elsewhere and introduced policy development and implementation titled *Learning for Sustainability* (LfS) (Higgins and Christie, 2018). Learning for Sustainability can be defined as an approach to life and learning which enables learners, educators, schools and their wider communities to build a socially-just, sustainable and equitable society. This development built upon a major national curriculum reform in 2004, *Curriculum for Excellence* (Education Scotland, 2004), which introduced an initiative to embed global citizenship and ESD as themes across learning and included outdoor learning as a key pedagogical approach within the curriculum (Education Scotland, 2008). It also secured a commitment from the Scottish Government, in 2013, to make LfS an entitlement for all learners in Scotland (Scottish Government, 2012, 2013).

The LfS policy context in Scotland is globally unique in that it brings together ESD, global citizenship and outdoor learning as an integrated holistic concept (Higgins and Christie, 2018). The policy architecture of LfS includes regulatory frameworks such as assessment measures; LfS appears in the fourth edition of Education Scotland's self-evaluation framework for schools, *How good is our school?* (Education Scotland, 2015). Further, the Scottish Qualifications Agency (which oversees pupil assessments), committed in 2020 to embedding LfS in all new qualifications, and all existing ones as they come up for revision (Scottish Qualifications Agency, 2020).

The continued commitment to LfS was reconfirmed in 2016 when LfS was aligned with the Sustainable Development Goals through the *Vision 2030+* report (Scottish Government, 2016). This re-emphasized the original (2012) recommendations that:

- all learners should have an entitlement to LfS;
- every practitioner, school and education leader should demonstrate LfS in their practice;
- every school should have a 'whole-school' approach to LfS that is robust, demonstrable, evaluated and supported by leadership at all levels;
- all school buildings, grounds and policies should support LfS;
- a strategic national approach to support for LfS should be established.

Scottish Ministers again accepted all five of the *Vision 2030*+ recommendations and resolved to progress development of the vision by translating the recommendations into an LfS Action Plan (Education Scotland, 2019), which highlights how the recommendations of the Vision 2030+ report will be implemented by Scottish Government over the following three to five years.

Therefore, Scotland has an opportunity to systematically develop LfS throughout ITE, not least through the regulatory structure of the General Teaching Council of Scotland (GTCS) Professional Standards. Currently all ITE provision must conform to the GTCS professional standards, so, by extension all ITE programmes should be steeped in LfS; this is not the case.

As Nicol *et al.,* (2019) note, "despite the existence of LfS in the GTCS professional standards, it appears that such programmes are still being approved where LfS is an "add on" rather than being fully embedded within the initial teacher education curriculum" (p. 27). Their research suggests that whilst a systematic approach was intended, an ad-hoc approach has been the outcome. Other research reveals resistance to change arising from a lack of clarity over what LfS is and means, and a lack of confidence to engage in an approach that may not feel 'relevant' to specific teaching discipline (Christie *et al.,* 2019). Further tension stems from an educational system that does not reflect the philosophy of LfS, resulting in teacher educators experiencing dissonance between the rhetoric and the reality of professional practice, which reflects a piecemeal rather than systematic approach to 'root and branch' change.

To support the development of ESD in ITE specifically, a UK wide community of practice in Education for Sustainable Development and Global Citizenship, *TEESNet (Teacher Education for Equity and Sustainability Network)* was established. In 2019, TEESNet and the University of Edinburgh (Scotland), funded by the British Council, developed professional learning titled *Introducing Learning for Equity and Sustainability in Initial Teacher Education,* offered at an introductory and advanced level. In Scotland it supports the ambition of the LfS Action Plan which seeks to deliver systemic change across all levels of education.

Despite recent research (Christie and Higgins, 2020) supporting LfS as a clear priority in Scottish education, recent ITE specific development of governance and policies are limited if ITE does not systematically embrace and embed the initiatives. Aspirant teachers coming into the profession need to meet the GTCS Professional Standards and, importantly, should be supported by staff and an academic institution that truly understands and values LfS as core to that national regulatory process. However, this is not always the case. Initial teacher education leadership at the organisation level in Scotland mostly overlooks the governmental and regulatory frameworks that exist resulting in patchy and inconsistent whole institution approaches to LfS across Higher Education.

Canada

Education is decentralised in Canada, with governance, policies and practice differing greatly across ten provinces and three territories, making any kind of curricular or pedagogical change towards ESD across the country highly challenging. There is a lack of agreement on the terminology, with some regions using Environmental Education (EE), while others use ESD, signaling a closer affiliation with the UN. While efforts have been made since the 1980s to better embed ESD into ITE, progress has been slow and intermittent (Elliott and Inwood, 2020), and not reflective of a systematic model of change in this area. The UNESCO Chair on Reorienting Teacher Education for Sustainability (York university, n.d.) was established in a Canadian university in 1999, and yet ESD has been marginalised and variable across the country, thanks to the decentralised governance of education, though in the last five years this has started to change slowly as policymakers, administrators, scholars, and educators have begun advocating for its development and implementation (Karrow *et al.,* 2016). A report addressing ESD in Canadian Faculties of Education (CMEC, 2012) found that many faculties of education across the country have been making efforts to embed ESD or "ESD-like principles" (p. 63) into their ITE

programmes, while noting that this work is fragmented, highly variable, and typically relies on champions within each faculty of education. Some faculties of education have developed ESD courses or infused existing subjects with ESD principles and practices, indicative of an adaptive approach, while a few have developed ESD centres or groups. In universities where ESD is least developed, faculties of education tend to "give lip-service to plans for enhancement and improvement" in relation to ITE (Karrow *et al.,* 2016, p. 13). This is not surprising; according to one study (Beveridge *et al.,* 2017), only four provinces (Ontario, Manitoba, British Columbia and Quebec) have governance policies in place related to education's role in sustainable development, and Ontario is the only province with a specific policy framework focused on Environmental Education (Ontario Ministry of Education, 2009). Interestingly, curriculum support documents, including pedagogical guides and resources, are available in these four provinces, as well as in some locales without specific ESD policies, as some school districts have taken responsibility for creating their own resources to support inservice teacher education in this area.

There are signs that ESD in both ITE and inservice teacher education is starting to be found on a broader scale. In 2012, the *Sustainability Education Policy Network* (https://sepn.ca/) began a national research collaboration that examines sustainability practices in Canadian K-12 and higher education contexts. This prolific research team has shared findings in relation to many aspects of ESD, including policy, strategic planning, fossil fuel divestment, and climate change education (Bieler and McKenzie, 2017; Henderson *et al.,* 2017; Hargis *et al.,* 2018), though it has not conducted research into ESD in ITE in a focused way. SEPN's research has informed the work of the *Environmental and Sustainability Education in Teacher Education* (ESE-TE) network (http://eseinfacultiesofed.ca/), an initiative which is dedicated to advancing and supporting the development of high quality ESE in initial and inservice teacher education in Canada through conducting research and professional development, and informing policy. The *ESE-TE* network found its origins in 2013, bringing together faculty and community educators dedicated to this work. It has instigated new research and resources (Inwood and Jagger, 2014; Karrow *et al.,* 2016), and led a *National Roundtable* in 2016 which established a National Action Plan focused on deepening knowledge and praxis about ESD in pre-service and inservice teacher education. An anthology of recent research has already resulted from this new pan-Canadian collaboration (Karrow and DiGiuseppe, 2019), as has a special issue of the *Canadian Journal of Environmental Education (*35(1)), published in 2020. Their work supports a recent announcement by the Association of the Canadian Deans of Education (2019), which has stated its intention to create a new policy statement on sustainability in 2021, signaling that thinking about ESD in ITE is happening more broadly.

Despite the lack of federal governance or policy in ESD, a growing interest in ESD within ITE is translating into innovative practice. A few ITE programmes are fortunate to have sustainability as a core function of their university's strategic plans. For example, the University of British Columbia, known for its leadership in campus sustainability, has an ITE cohort focused on Education for Sustainability (Robertson *et al.,* 2020), as well as an extensive educational garden (Ostertag, *et al.*, 2019) to enhance pre-service teachers' involvement in environmental and experiential learning. At the University of Saskatchewan, pre-service teachers take a mandatory "pedagogies of place" course, which critically and experientially examines place through an examination of social justice and environmental issues and how to address these in classrooms. At Trent University, a core course on

Indigenous Education and Environmental Education is a mandatory part of its ITE programme, and is supported by an active Eco-Mentorship programme to enhance students' extracurricular learning. At the Ontario Institute for Studies in Education (OISE), providing extracurricular programming in ESD was a starting point that led to ESD core courses in its ITE programme, an annual ESD conference, an educational garden filled with native plants, and over a dozen community-created environmental art installations. These developments point to the deepening of an adaptive approach to ESD across Canada, but falls far short of the systematic approach needed to effectively and quickly shift ITE programmes towards sustainability in this country.

Australia

In Australia ESD is known as Education for Sustainability (EfS) or sustainability education. Overall, Australia's governance of ESD in ITE can be described as ad-hoc. ESD is not, and has never been, a mandated component of Australian school or ITE. Nevertheless, the Decade of Education for Sustainable Development (DESD) did provide impetus for the Australian government to demonstrate strong leadership by developing a range of supportive national and state policies, frameworks and other initiatives to encourage take-up of ESD across the education sector, and by default ITE. This includes, for example, two national action plans (2000 and 2009) to guide ESD, a national environmental education statement providing a framework for schools wishing to engage with ESD (Australian government, Department of the Environment and Heritage, 2005), and the *Australian Sustainable Schools Initiative* (AuSSI) to support schools to develop a whole-school approach to ESD. However, the end of the DESD in 2014, coinciding with the election of national and state conservative governments and increased attention to standardised education, resulted in withdrawal of ESD support and policy related documents from Australian government websites. It should be noted that policy to direct ESD in school education remains in some states. However, the only existing national framework capable of guiding Australian educators across all states and territories in embedding ESD into the curriculum is the Sustainability Cross-curriculum Priority. The priority forms part of the Australian National Curriculum and aims to "allow all young Australians to develop the knowledge, skills, values and world views necessary for them to act in ways that contribute to more sustainable patterns of living" (ACARA, 2016, para 2). According to ACARA (n.d.), sustainability should be included in all learning areas "in ways that are consistent with the content and purpose of the area of study" (para 4).

Interestingly, and dismaying to sustainability educators, the most recent (2019) national policy document directing the trajectory of Australian education - the *Alice Springs (Mparntwe) Education Declaration* (Australian Government Department of Education, Skills and Employment) has further downgraded ESD by removing references to climate change and sustainability as a cross-curriculum priority. The effect that this latest weakening of ESD has on the future of the sustainability cross-curriculum priority remains to be seen within the context of a curriculum review currently underway. Overall then, prior to and since the end of the DESD, support for ESD has been patchy or non-existent (and most recently downgraded) with ITE programmes mostly ignoring ESD, or including it as an add-on through an elective subject or as an initiative run by small numbers of teacher educators working in isolation at the subject level within programmes (Davis *et al.,* 2015).

There are, nevertheless, teacher education institutions that are working to equip pre-service teachers with the knowledge, skills, values and world views to include ESD into teaching and learning practices. One such institution is James Cook University (JCU), located in the tropical region of Queensland. JCU Education emphasises holistic thinking to produce graduates who value social and environmental sustainability goals and are equipped to include understanding into the teaching and learning of future generations (James Cook University, 2020). Since 2009, the Bachelor of Education (BEd) Primary and Early Childhood Education programmes have adopted a whole-of-programme approach to embedding ESD. The work began with academic staff engaging in collaborative projects to design dedicated ESD subjects and embed sustainability concepts, principles and issues across the primary (Preparatory to Year 6) and early childhood (birth to 8 years of age) majors. This resulted in a core first-year subject, *Foundations of Sustainability in Education* - now renamed *Science and Sustainability in Education*, and a core fourth-year subject, *Service Learning for Sustainable Futures*. More recently, a further core subject has been included in the final year of the two programmes, *Leading Wellbeing and Sustainability in Learning Communities.* In first year, student teachers develop understanding of the underlying science and complexity of global and local social-ecological challenges. These initiatives point to progress in the embedding of ESD in ITE at the program level, but fall short of a systematic approach where the integration of ESD goes beyond curriculum and pedagogy, to be embedded into the program's values, philosophies, governance, and processes.

Discussion

In summary, Sweden has strong governance related to legislative, policy and operational frameworks for the implementation of ESD across all sectors of education. In ITE, ESD competencies form part of course learning outcomes and examination programmes that pre-service teachers are required to successfully complete. Scotland has strong governance in the form of policy and operational frameworks for the implementation of ESD in school education and, by default, ITE. This includes the incorporation of ESD values and citizenship as a national educational priority, ESD as a theme across all learning, an ESD action plan and the inclusion of LfS into the professional standards for teachers, educational practitioners and school leaders. Canada and Australia are not systematic in their approach to ESD. Neither country has national policies to compel or guide implementation. Attention to ESD in school education at state or provincial levels is optional and, therefore, easy for ITE institutions to deprioritise or ignore. Even so, examples of good and innovative practice are available in both countries. A point of difference is that while ESD in Canadian ITE appears to be gaining momentum, in Australia progress appears to be plummeting.

To this point, this paper has introduced different approaches to ESD in ITE. There is much variability between Sweden, Scotland, Canada and Australia, but also some commonalities. In the following section the authors consider similarities and differences across the four countries to draw some insights focused on governance characteristics, initiatives and practices for ESD. Table 1 provides an overview of the data considered.

Table 1: Summary of cross-comparative data

Criteria	Australia	Canada	Scotland	Sweden
ESD policy in education	Sustainability Cross-curriculum Priority in	ESD policy for K-12 education in some provinces	Learning for Sustainability	Swedish Higher Education Act

	the Australian Curriculum ESD policy for K-12 schooling in some states		General Teaching Council for Scotland Professional Standards	
ESD national/ regional policy in ITE	N/A	N/A	Learning for Sustainability Action Plan (2019) outlines Scottish Government commitment to 1) work with Scottish Council of Deans of Education to support the delivery of LfS in ITE 2) work with GTCS to ensure LfS continues to be references in the ITE Accreditation Framework	Sustainable development included in the Qualifications Ordinance of ITE
Regulation of ESD policy in ITE	N/A	N/A	N/A	N/A
ESD institutional policy and initiatives	In some institutions: Strategic plans focused on SD generally (not ESD specifically)	Sustainability and Education Policy Network researching ESD in schools and higher education across Canada In some institutions: Strategic plans Staff employed to lead and progress ESD	In some institutions: Strategic plans focused on LfS Staff employed to lead and progress ESD	In some institutions: Strategic plans focused on SD generally (not ESD specifically) Staff employed to lead and progress ESD Staff seminars, training days and networking opportunities
Leadership of ESD in ITE	In some institutions led by teacher educators: Research and practice	Regional and National led by teacher educators Research and practice	Scottish Government and Scottish Council of Deans of Education (as above) Regional and National led by teacher educators	In some institutions: Research and practice
ITE Initiatives in ESD	N/A	UNESCO Chair on Reorienting Teacher Education for Sustainability ESE-TE National Network of teacher educators	Teacher Education for Equity and Sustainability Network (TEESNet)	Lärhut National Network of teacher educators Global School (PD for inservice teachers)
ESD Practices in ITE programmes	In some institutions. At James Cook University: Local Staff Seminars ESD whole-of-programme	In some Institutions. At the University of Toronto: ESD core/compulsory and elective courses	In some institutions. At the University of Edinburgh: Development of Teacher Education Vision with LfS as a underpinning	In some institutions: At Malmö University: Development of 27 goals on content and skills for pre-service teachers

	approach (core ESD courses & ESD infused across early childhood & primary ITE programmes) ESD stand-alone subjects offered to pre-service teachers	ESD Conferences for pre-service teachers ESD Mentorship & Leadership programmes ITE-ESD Cohorts Educational Gardens ESD Art Installations	approach. Aim to move away from stand-alone LfS inputs within core courses to LfS as an integrated, holistic approach to teacher education.	ESD core/compulsory courses At Mälardalen University: ESD embedded throughout the four year degree in a developmental fashion.

Governance of ESD in ITE

Governance is a broad term that concerns a range of characteristics (Addink, 2019). For this paper, interest lies in governance as related to the policies, leadership, and/or management of ESD within ITE in Sweden, Scotland, Canada and Australia. Hence, the authors found the concept of governance useful for helping to think about how ESD is supported within each context and the consequences that arise.

In Sweden and Scotland there is evidence of a national political commitment to ESD, reflected through specific governance, policies and legislation. ESD policies and legislation provide government level leadership support and elevate attention to ESD, however, there is still no evidence of systematic embedding across ITE in practice. Lack of regulation combined with a high degree of freedom in policy interpretation appears to result in inconsistencies between the production and coordinated implementation of policies, and diminishes potential impact. Consequently, the quality and depth of ESD integration varies across institutions, dependent, to a major extent, on the prioritisation afforded to ESD by the institutional leadership (UKÄ, 2018).

Regulation can enforce policy enactment, however, when policy is absent or weak, regulation may not be seen as strong or important enough to attract attention from players across the system. Formalising policy to create an ostensibly accommodating space for ESD within the Scottish curriculum has not necessarily led to the systematic embedding of ESD across professional practice. In Canada and Australia, where there is limited ESD policy and no regulation, as well as limited, if any, support, ESD is included in ITE (and K-12 school education generally) at a specific institution's discretion. The major difference between Sweden, Scotland, Canada and Australia is that ESD has enforced visibility in Swedish and Scottish ITE. However, in all contexts the depth of attention afforded to ESD can vary (e.g., from completely absent to tokenistic to deep and authentic), depending on leadership. Moving forward, one question worth considering is whether policy is seen as strong, valid or important enough to attract attention from regulatory authorities for further monitoring and accountability actions.

Leadership for ESD. An important insight that emerged from the comparison of different approaches to governance is that of leadership. Leadership is identified as a critical enabler of change for ESD (Nicol *et al.,* 2019; Scott *et al.,* 2012; Steele, 2010; World Wildlife Fund – Scotland, 2012). All levels of leadership are important. National and provincial/state level leadership for ESD can stimulate activity at the institutional and local levels. In the ITE

context institutional or departmental leaders can either support or hinder progress on ESD. This is because teacher education institutions and the organisations they are connected to (e.g., schools, universities, government departments) are entrenched within a hierarchical and authoritarian system with top-down decision making and policy processes (Fullan, 2013; Hargreaves and Shirley, 2012). The authors' experience across contexts supports the argument put forward by Nicol *et al*., (2019) that bringing about systematic change for ESD in ITE requires bold decision makers. What emerges from this study is the importance of leadership coherence across all levels of the education system, as pertaining to ITE, from national to provincial/state and institutional. When leadership across levels is disconnected or fragmented, then systematic change for ESD is impaired.

A comparison of the four countries in this study highlights the difference that leadership can make. Scotland and Sweden experience national-level leadership for ESD via specific policies, legislation and initiatives. At the institutional level ESD leadership varies and, concurrently, so does progress. Legislation in Sweden forces attention to ESD, but does not appear to guarantee systematic action with only about fifty percent of Swedish universities having established sustainable development goals and integrated ESD into programmes. This study is not able to report on the extent of ESD integration in Swedish ITE, however, recent studies have found varying levels of interpretations and practices. The situation is different in Scotland as more often than not clear national imperatives are met with weak policy interpretation and translation, therefore action is patchy and, or marginalised across institutions (Moore et al., 2018). Institutional level support for ESD seems to be low and resistance to change widespread, even with a regulatory structure in place to facilitate integration of ESD, consolidation appears limited to individual efforts.

Canada and Australia lack national leadership for ESD and experience varying ad-hoc levels of support for ESD from provincial/state and institutional leaders. In some Canadian ITE programmes, ESD has historically been driven by individual faculty 'champions' who have been encouraged by institutional leaders to follow their passion. More recently, with the climate crisis becoming more urgent, institutional leaders are becoming aware of the importance of ESD and are actively making decisions to support its development across their institutions. The result is a speeding up of pace and a broader reach of change than has been experienced in the past. In comparison, Australia is heading in the opposite direction. A decade long (and continuing) conservative national and state governmental policy landscape directed at 'standardisation syndrome' (Brennan, 2019, p. 19) with associated accountability measures, has hindered considered responses to ESD. Consequently, very few educational leaders, stakeholders and communities are making any decisions on ESD, resulting in a muted landscape related to its provision. An important consideration moving forward, then, is to what extent does leadership in an ITE programme, and at an institution, promote a climate that supports advancement of the competencies required for ESD? And how is this best done?

Initiatives and Practices in ESD in ITE

Initiatives. Despite the contrasting approaches to governance of ESD, similar types of initiatives have arisen to support its embedding in ITE, with varying sources of support and success. All four countries have had national initiatives to support the development of knowledge and pedagogy in ESD for teacher educators: the Lärhut and Global School

national networks in Sweden, TEESnet in Scotland (and the UK), the Australian Sustainable Schools Initiative and the ESE-TE network in Canada. The first three began with government funding, and yet only two of these five initiatives continue to be active, in Sweden and Scotland. The Global School and TEESnet support professional development programmes and regular meetings for teacher educators, continuing to deepen ESD in ITE in these countries. A similar initiative underway in Canada, the ESE-TE network, is a grassroots effort with no federal funding or national governance to support its work; still, it has had modest success in developing a community of practice across the country through the provision of resources, publications, and biennial symposia. This small sampling of cases suggests that neither funding nor governance ensures the longevity or success of these initiatives, they are more likely reliant on ongoing formal or informal leadership to keep them strong.

Practices. Each country contributes different promising practices to embedding ESD in ITE, while recognising their limited reach. Scotland offers the development of an overarching vision that frames ESD as a core element of professional standards for its pre-service teachers, but struggles with the lack of its implementation. In Sweden, core courses in ESD in ITE programmes in two universities, Malmo and Mälardalen, help pre-service teachers at a range of levels develop competencies related to ESD. Similarly, some ITE programmes in Canada offer core and elective courses, along with co-curricular programming, in ESD, providing some pre-service teachers with an introduction to and competencies in ESD before graduation. Only James Cook University in Australia has taken a whole-of-programme approach that embeds multiple courses into its ITE curriculum to ensure that pre-service teachers have the capacity to plan, implement and reflect upon ESD learning experiences across diverse contexts. Even with these pockets of innovative practice, all four countries fall far short of consistent, widespread and systematic approaches to embedding ESD in ITE.

Insights

A number of insights have resulted from this cross-case comparison. Development of a systematic, over an *ad-hoc*, approach to implementing ESD in ITE is illustrated in Scotland where ESD is integrated into curriculum, pedagogy, teaching standards and evaluation of schools and teachers. A systematic approach takes emphasis away from the lone sustainability champion or isolated institutional case study to broaden understanding of ESD as being everybody's responsibility, including that of education departments, teacher accreditation bodies, professional associations, policy makers, schools, teacher education institutions and students (Steele, 2010). A systematic approach is supported by the leading Scottish LfS policy informing document – *Vision 2030+* (Scottish Government, 2016) – which recommends a centrally coordinated approach to implementing LfS "will prevent a piecemeal, 'policy by policy' response" (p. 9) from stakeholders. However, despite good intentions and a well-developed ESD policy architecture across Scottish education, with specific focus on a systematic approach, research finds that ESD practice in Scotland remains patchy and educators at all levels grapple with the translation of policy into reality (Nicol *et al.,*2019; Christie *et al.,* 2019). This is true in Sweden as well; while it has not had the same level of governance as Scotland, Sweden suffers from the same inconsistency in terms of ongoing initiatives and embedding as have Scottish ITE programmes. Even when governance and support are put in place there is no guarantee that these policy architectures will result in a longevity of a systematic approach, as Australia has found

resultant from a change of political leadership. Nor is a grassroots approach highly successful, as evidenced in Canada, in that a lack of governance and funding limits what individual champions working together can do. Combined these findings highlight that despite intentional changes to governance, policy and curriculum, a theory-policy-practice gap (Stevenson, 1987) persists.

So, what and where are the gaps? The authors suggest one gap is in non-adherence to regulation when, for example, ITE programmes without a focus on ESD are approved by accreditation bodies (Nicol *et al.,* 2019). An important consideration, though, is that regulation of ESD is contentious. Accreditation bodies could insist on all ITE programmes incorporating ESD. Regulation can drive new practices and innovation and create widespread and immediate change; however, imposing requirements can drain initiative and improvement (Wyeth & Termini, 2015) and can be less successful in engaging all individuals (Finnveden et al., 2020). Furthermore, those already concerned about over-regulation of education would likely see ESD regulation as a further imposition. Another gap, according to Nicol *et al*., (2019) and this study's findings, lies in leadership. Nicol et al., argue, and the findings from this study concur, that systematic change calls for future-thinking decision makers who 'take an activist stance and advocate for change at all levels of leadership' (p.27); it should not be left to a single committed individual working at the local or ground level. Lastly, the authors suggest there is a need to more intentionally disrupt the multiple interconnected, hierarchical levels, institutionalised subsystems, complex rules and numerous stakeholders and interest groups that make up the ITE system (Ferreira and Ryan, 2012).

Conclusion

This paper represents a collective effort by four teacher educators across three continents to examine the state of ESD across very different contexts in an effort to draw some insights to inform the field. A collective examination of ESD across these four countries, which are at various stages of progress towards embedding ESD in ITE, presents an opportunity for inquiry and learning. The approaches in Sweden, Scotland, Canada, and Australia are different in their focus on different part(s) of the system; however, the issues and challenges shared across the four different countries are similar. Embedding ESD in ITE in a systematic fashion is challenging and none of the countries can offer a 'best practices' exemplar; however, there are pockets of action that offer possibilities. Hence, the challenges posed by trying to systematically embed ESD in ITE will be better understood and overcome if researchers, practitioners, leaders and policy-makers can learn from each other about what works in different contexts. These efforts can then lead to a deeper understanding of how to best go about the work of systematically embedding ESD in ITE.

References:

Addink, H. (2019). *Good governance: concept and context,* Oxford University Press, Oxford.

Ärlemalm-Hagsér, E. (2015), *Rapport om strimman hållbar utveckling i förskollärarprogrammet* [Report on Education for Sustainable Development in a preschool teacher education programme], Mälardalen University, Västerås.

Ärlemalm-Hagsér, E. (2017), "Student teachers' workplace-based learning in Sweden on early childhood education for sustainability: experiences in practice settings", *International Journal of Early Childhood,* Vol. 49 No. 3, pp.411-427. https://doi.org/10.1007/s13158-017-0201-9.

Ärlemalm-Hagsér, E. and Larsson, J, (2019), "Mellan det globala och lokala – förskollärarstudenters meningsskapande om undervisning för hållbarhet i förskolan" [Between the global and the local – preschool teacher students' meaning-making on Education for Sustainability in Swedish early childhood education], *Nordic Studies in Science Education [Nordina],* Vol. 15 No. 4, pp.370-386.

Association of Canadian Deans of Education. (2019), "Quebec City ACDE Statement of Commitment", available at: https://educ.queensu.ca/quebec-city-acde-statement-commitment (accessed 30 November 2019).

Australian Curriculum, Assessment and Reporting Authority (ACARA). (2016), "Sustainability", available at: https://www.acara.edu.au/curriculum/foundation-year-10/cross-curriculum-priorities/sustainability-ccp (accessed 19 January 2021).

Australian Curriculum, Assessment and Reporting Authority (ACARA). (n.d.), "Sustainability", available at: https://www.australiancurriculum.edu.au/f-10-curriculum/cross-curriculum-priorities/sustainability/ (accessed 19 January 2021).

Australian Government Department of the Environment and Heritage. (2000), "Environmental Education for a Sustainable Future: National Action Plan", Canberra, Author.

Australian Government Department of the Environment, Water, Heritage and the Arts. (2009), "Living Sustainably: the Australian Government's National Action Plan for Education for Sustainability", Canberra, Author.

Australian Government Department of Education, Skills and Employment. (2019), "The Alice Springs (Mparntwe) Education Declaration", available at: https://docs.education.gov.au/documents/alice-springs-mparntwe-education-declaration (accessed 5 January 2020).

Australian Government Department of the Environment and Heritage. (2005), "Educating for a sustainable future: A national environmental education statement for Australian schools", available at: https://www.seedengr.com/sustainable-future.pdf (accessed 2 November 2020).

Australian Research Institute in Education for Sustainability [ARIES]. (2009), "Education for sustainability: the role of education in engaging and equipping people for change", Sydney, Author.

Beveridge, D., McKenzie, M., Aikens, K., Strobbe, K. M. and Beveridge, R.M. (2019), "Sustainability in Canadian K-12 Education: Closing the Research Gap on Understanding National Trends", Saskatoon, Canada, Sustainability and Education Policy Network, University of Saskatchewan.

Bieler, A. and McKenzie, M. (2017), "Strategic planning for sustainability in the Canadian higher education system", *Sustainability,* Vol. 9 No. 2, pp.1-22.

Brennan, M. (2019), "Changing teaching and teacher education in the 'Anthropocene'", *On-Education Journal for Research and Debate,* Vol. 2 No. 4, pp.1-6. https://doi: 17899/on_ed.2019.4.6.

Cambridge Dictionary. (2020), "Initiative", Cambridge Dictionary, available at: https://dictionary.cambridge.org/dictionary/english/initiative (accessed 3 December 2020).

Cantwell, B. (2020), "Explanatory accounts in international and comparative higher education research", *Higher Education Quarterly,* Vol. 74 No. 2, pp.149-161. https://doi: 10.1111/hequ.12246

Council of Ministers of Education (CMEC). (2012), "Education for Sustainable Development in Canadian Faculties of Education", Toronto, Author.

Christie, B. and Higgins P. (2020), "Educational outcomes of Learning for Sustainability: A Brief Review of Literature", Scottish Government ISBN: 9781839604706, available at: https://www.gov.scot/publications/educational-outcomes-learning-sustainability-brief-review-literature/pages/3/ (accessed 1 December 2020).

Christie, B., Higgins, P., King, B., Collacott, M., Kirk, K., and Smith, H. (2019), "From rhetoric to reality: Examining the policy vision and the professional process of enacting Learning for Sustainability in Scottish schools", *Scottish Educational Review,* Vol. 51 No. 1, pp.44-56.

Davis, J., Ferreira, J-S., Stevenson, R. and Evans, N. (2015), "A systems approach: partnerships for sustainability in teacher education", *ozEEnews*, June 2015, p.10.

Darling-Hammond, L. (2017), "Teaching education around the world: what can we learn from international practice?", *European Journal of Teacher Education,* Vol. 40 No. 3, pp.291-309. https://doi: 10.1080/02619768.2017.1315399.

Department for Children, Education, Lifelong Learning and Skills. (2008), "Education for Sustainable Development and Global Citizenship: information for teacher trainees and new teachers in Wales", available at: https://s3-eu-west-1.amazonaws.com/hwb-live-storage/a6/75/74/a7/b2db404986e581a1f5cc08f6/information-for-teacher-trainees-and-new-teachers.pdf (accessed 10 November 2019).

Education Scotland. (2008), "Curriculum for Excellence. Building the Curriculum 3: a Framework for Learning and teaching", available at: https://education.gov.scot/Documents/btc3.pdf (accessed 20 March 2020).

Education Scotland. (2015), "How Good is our School?", available at http://www.educationscotland.gov.uk/Images/HGIOS4_tcm4-870533.pdf (accessed 15 May 2020).

Education Scotland. (2019), "Learning for Sustainability action plan", available at: https://education.gov.scot/improvement/Documents/LearningforSustainability-Vision2030ActionPlan.pdf (accessed 20 May 2020).

Elliott, P. and Inwood, H. (2020). Contextualising environmental & sustainability education in pre-service teacher education in Canada. In Karrow, D., and DiGiuseppe, M. (Ed.s.) *Environmental and sustainability education: Canadian perspectives,* Springer Nature AG, Cham, Switzerland, pp. 37-48.

Esser, F. and Vliegenthart, R. (2017), "Comparative research methods", *The International Encyclopedia of Communication Research Methods.* John Willey and Sons. https://doi: 10.1002/9781118901731.iecrm0035, available at: https://onlinelibrary.wiley.com/doi/full/10.1002/9781118901731.iecrm0035 (accessed 15 September, 2020).

Evans, N., Ferreira, J-A., Davis, J., and Stevenson, R. B. (2016), Embedding EfS in teacher education through a multi-level systems approach: Lessons from Queensland, *Australian Journal of Environmental Education,* Vol. 32 No. *1*, pp.65-79. https://doi.10.1017/aee.2015.47.

Evans, N., Stevenson, R. B., Lasen, M., Ferreira, J-A., and Davis, J. (2017), Approaches to embedding sustainability in teacher education: A synthesis of the literature, *Teaching and Teacher Education,* Vol. 63 No. 2017, pp.405-417.

Ferreira, J-A., Evans, N., Davis, J., and Stevenson, R. (2019), *Learning to embed sustainability in teacher education,* Springer, New York, NY.

Ferreira, J., Ryan, L. and Davis, J. (2015), "Developing knowledge and leadership in pre-service teacher education systems", *Australian Journal of Environmental Education,* Vol. 31 No. 2, pp.194-207. https://doi:10.1017/aee.2015.24.

Ferreira, J-A., Ryan, L. and Tilbury, D. (2007a), "Mainstreaming education for sustainable development in initial teacher education in Australia: a review of existing professional development models", *Journal of Education for Teaching,* Vol. 33 No. 2, pp.225-239.

Ferreira, J-A., Ryan, L. and Tilbury, D. (2007b), "Planning for success: factors influencing change in teacher education", *Australian Journal of Environmental Education,* Vol. 23 No. 2007, pp.45-55.

Ferreira, J., Ryan, L., Davis, J., Cavanagh, M. and Thomas, J. (2009), "Mainstreaming sustainability into pre-service teaching education in Australia", Australian Government Department of the Environment, Water, Heritage and the Arts, Canberra, Australia.

Ferreira, J. and Ryan, L. (2012), "Working the system: a model for system-wide change in pre-service teacher education", *Australian Journal of Teacher Education,* Vol. 37 No. 12, pp.29–45.

Ferreira, J-A., Ryan, L. and Tilbury, D. (2006), "Whole-school approaches to sustainability: A review of models for professional development in pre-service teacher education", Australian Government Department of the Environment and Heritage and the Australian Research Institute in Education for Sustainability (ARIES), Canberra, Australia.

Finnveden, G., Friman, E., Mogren, A., Palmer, H., Sund, P., Carstedt, C., Lundberg, S., Robertsson, B., Rodhe, H. and Svärd, L. (2020), "Evaluation of integration of sustainable development in higher education in Sweden", *International Journal of Sustainability in Higher Education,* Vol. 21 No. 4, pp.685-698.

Flood, R. (2001), "The relationship of systems thinking to action research", Reason, P. and Bradbury, H. (Ed.s.), *Handbook of action research – participative practice and inquiry,* Sage Publications, London, pp.133-144.

Fullan, M. (2013), *Motion leadership in action: more skinny on becoming change savvy,* Sage/Corwin Press, Thousand Oaks, CA.

General Teaching Council for Scotland. (2019), "Professional Standards", available at: https://www.gtcs.org.uk/professional-standards/standards-for-registration.aspx (accessed 15 August 2019).

Hargreaves, A. and Shirley, D. (2012), *The global fourth way: the quest for educational excellence*, Sage/Corwin Press, Thousand Oaks, CA.

Hargis, K., Chopin, N. and McKenzie, M. (2018), *Ten Canadian school's stories of climate action,* Sustainability and Education Policy Network, University of Saskatchewan, Saskatoon, Canada.

Henderson, J. Bieler, A. and McKenzie, M. (2017), "Climate change and the Canadian higher education system: an institutional policy analysis", *Canadian Journal of Higher Education*, Vol. 47 No. 1, pp.1-26.

Higgins, P. and Christie, B. (2018), Learning for Sustainability, Bryce, T.G.K., Humes, W.M., Gillies, D., and Kennedy, A. (Ed.s.), *Scottish Education (5th edition),* Edinburgh University Press, Edinburgh.

International Union for Conservation of Nature and Natural Resources. (1972), "Final report: European Working Conference on Environmental Conservation Education", available at: https://portals.iucn.org/library/sites/library/files/documents/NS-SP-034.pdf (accessed 30 November, 2019).

Inwood, H. and Jagger, S. (2014), "DEEPER: Deepening Environmental Education in Pre-Service Education Resource", available at: https://www.oise.utoronto.ca/ese/UserFiles/File/DEEPER%20Guide%202014.pdf (accessed 30 June, 2020).

James Cook University (2020), “About Education”, available at: https://www.jcu.edu.au/courses-and-study/study-areas/education/about-education (accessed 20 September 2019).

Jickling, B. and Sterling, S. (2017), “Post-Sustainability and Environmental Education: Framing Issues”, Jickling, B and Sterling, S. (Ed.s.), *Post-Sustainability and Environmental Education. Re-imagining Education for the Future*, Springer Nature AG, Cham, Switzerland, pp.1-11.

Karrow, D., DiGiuseppe, M., Elliott, P., Gwekwerere, Y, and Inwood, H. (2016), “Introduction to Canadian Perspectives on Initial Teacher Environmental Education Praxis”, Karrow, D. D., DiGiuseppe, M., Elliott,P., Gwekwerere, Y. and Inwood, H. (Ed.s.). *Canadian perspectives on initial teacher environmental education praxis*. Canadian Association for Teacher Education, Ottawa, Canada, pp.4-14.

Karrow, D. and DiGiuseppe, M. (Ed.s.). (2019), *Environmental and sustainability education: Canadian perspectives,* Springer Nature AG, Cham, Switzerland.

Kennelly, J. and Taylor, N. (2007), “Education for Sustainability for the K-6 Curriculum: a unit of work for pre-service primary teachers in NSW”, *Australian Journal of Environmental Education,* Vol. 23 No. 2007, pp.3-12.

Kosmützky, A., Nokkala, T. and Diogo, A. (2020), “Between context and comparability: Exploring new solutions for a familiar methodological challenge in qualitative comparative research”, *Higher Education Quarterly*, Vol. 74 No. 2020, pp.176-192. https://doi: 10.1111/hequ.1225.

Lundh, A. and Ruling, Å. (2008), “Lärarutbildningen och utbildning för hållbar utveckling [Teacher Education and Education for Sustainable Development]”, Swedish National Agency for Higher Education, Stockholm, Sweden.

McKeown, R. and Hopkins, C. (2014), “Teacher Education and Education for Sustainable Development: Ending the DESD and Beginning the GAP” [Monograph], Toronto, York University.

Merriam-Webster Dictionary. (2020), “Embed”, *Merriam-Webster Dictionary,* available at: https://www.merriam-webster.com/dictionary/embedding (accessed 15 October 2020).

Merriam-Webster Dictionary. (2020), “Practice”, *Merriam-Webster Dictionary,* available at: https://www.merriam-webster.com/dictionary/practice (accessed 3 December 2020).

Moore, D., Almeida, S. C. and Barnes, M. (2018), “Education for sustainability policies: ramifications for practice”, *Australian Journal of Teacher Education,* Vol. 43 No. 11, pp.105-121.

Nicol, R., Rae, A., Murray, R., Higgins, P. and Smith, H. (2019), “How can Initial Teacher Education tackle "Super-wicked" Problems?”, *Scottish Educational Review,* Vol. 51 No. 1, pp.17-29.

Nolet, V. (2009), “Preparing sustainability-literate teachers”, *Teachers College Record,* Vol. 111 No. 2, pp.409-442.

Ontario Ministry of Education. (2009), “Acting Today, Shaping Tomorrow”, Queen’s Own Printer, Toronto, ON.

Ostertag, J., Gerofsky, S. and Scott, S. (2019), “Learning to teach environmental education by gardening in the margins of the academy”, Karrow, D. and DiGiuseppe, M. (Ed.s.), *Environmental and sustainability education: Canadian perspectives,* Springer Nature AG, Cham, Switzerland, pp.111-130.

Robertson. P., VanWynsberghe, R. and Ford, B. (2020), “Sustainability learning pathways in the UBC Teacher Education Program: Destination Cohort”, *Canadian Journal of Environmental Education*, Vol. 23 No. 1, pp.50-67.

Scott, G., Tilbury, D., Sharp, L. and Deane, E. (2012), “Turnaround leadership for sustainability in higher education”, report prepared by University of Western Sydney in partnership with The Australian National Institution and the Sustainable Futures Leadership Academy for the Australian Government Office for Learning and Teaching, Office for Learning and Teaching, Sydney.

Scottish Government. (2012), “Learning for Sustainability – Report of the One Planet Schools Ministerial Advisory Group”, available at: https://education.gov.scot/improvement/Documents/One-planet-schools-report-learning-for-sustainability.pdf (accessed 10th November, 2020).

Scottish Government. (2013), “Ministerial response to the One Planet Schools Report (Learning for Sustainability)”, available at: https://education.gov.scot/improvement/learning-resources/A%20summary%20of%20learning%20for%20sustainability%20 resources (accessed 10th November, 2020).

Scottish Government. (2016), “Vision 2030+ Concluding report of the Learning for Sustainability National Implementation Group”, available at: https://education.gov.scot/improvement/Documents/res1-vision-2030.pdf (accessed 17 June, 2020).

Scottish Qualifications Agency. (2020), “Learning for Sustainability”, available at: https://www.sqa.org.uk/sqa/80093.html (accessed 10th November, 2020).

Steele, F. (2010), “Mainstreaming education for sustainability in pre-service teacher education in Australia: enablers and constraints”, report prepared by the Australian Research Institute in Education for Sustainability for the Australian Government Department of the Environment, Water, Heritage and the Arts, Canberra.

Sterling, S. (2004), “Higher education, sustainability and the role of systemic learning”, Corcoran, P.B. and Wals, A.J.E (Ed.s.), *Higher education and the challenge of sustainability*, Kluwer Academic Publishers, Dordrecht, pp.49-70.

Sterling, S. (2012), *The Future Fit Framework: An introductory guide to teaching and learning for sustainability in HE,* The Higher Education Academy, York, UK.

Stevenson, R. (1987), Schooling and environmental education: contradictions in purpose and practice, Robottom, I. (Ed.), *Environmental education: practice and possibility*, Deakin University Press, Geelong, Australia, pp.69-82.

Summers, M., Childs, A. and Corney, G. (2005), "Education for sustainable development in initial teacher training: Issues for interdisciplinary collaboration", *Environmental Education Research,* Vol. 11 No. 5, pp.623-647. https://doi: 10.1080/13504620500169841.

Sustainability and Education Policy Network. (n.d.), available at: https://sepn.ca/ (accessed 15 February, 2020).

Swedish Council for Higher Education. (2019), "Swedish Higher Education Act (1992:1434)", available at: https://www.uhr.se/en/start/laws-and-regulations/Laws-and-regulations/The-Swedish-Higher-Education-Act/ (accessed 25 March 2020).

Swedish Higher Education Authority [UKÄ]. (2018), "How Swedish HEI's work in promoting sustainable development", available at: https://english.uka.se/about-us/publications/reports--guidelines/reports--guidelines/2018-02-15-how-swedish-heis-work-in-promoting-sustainable-development.html (accessed 20 August, 2019).

Swedish International Centre of Education for Sustainable Development [SWEDESD]. (2017), "Visby recommendations for enhancing ESD in teacher education: Agenda 2030: SDG 4.7 UNESCO Gap on ESD Action area 3", available at: https://www.swedesd.uu.se/digitalAssets/611/c_611672-l_3-k_btgvisby2016.pdf (accessed 15 September, 2019).

TEESNet (Teacher Education for Equity and Sustainability Network). (n.d.), available at: http://teesnet.liverpoolworldcentre.org/ (accessed 10th November, 2020).

Tilbury, D., Mula, I. and Ryan, A. (2014), "Mapping opportunities for developing education for sustainable development (ESD) competences", available at: https://www.ue4sd.eu/images/RegionalMapping/RMappingNorth.pdf (accessed 3 October, 2019).

United Nations. (n.d.a.), "Sustainable Development Goals: 4 quality education", available at: https://www.un.org/sustainabledevelopment/education/ (accessed 3 October, 2019).

United Nations. (n.d.b.), "Transforming our world: the 2030 agenda for sustainable development", available at: https://sustainabledevelopment.un.org/post2015/transformingourworld (accessed 4 October 2019).

United Nations Economic Commission for Europe [UNECE]. (2005), "UNECE strategy for education for sustainable development", available at: https://www.unece.org/env/esd.html (accessed 10 August 2019).

United Nations Economic Commission for Europe [UNECE]. (2012), “Learning for the future: Competencies in Education for Sustainable Development”, available at: https://www.unece.org/fileadmin/DAM/env/esd/ESD_Publications/Competences_Publication.pdf (accessed 10 March 2020).

United Nations Economic Commission for Europe [UNECE]. (2016), “Ten years of the UNECE strategy for education for sustainable development: Evaluation report on the implementation of the UNECE strategy for sustainable development from 2005-2015”, available at: http://www.unece.org/fileadmin/DAM/env/esd/ESD_Publications/10_years_UNECE_Strategy_for_ESD.pdf (accessed 26 March 2020).

United Nations Educational, Scientific and Cultural Organization (UNESCO). (1978), “The final report: International conference on environmental education”, Paris, France: Author.

UNESCO. (2017), “Education for Sustainable Development goals: Learning objectives”, available at: https://unesdoc.unesco.org/ark:/48223/pf0000247444 (accessed 21 January 2021).

UNESCO. (2018a), “Progress on Education for Sustainable Development and Global Citizenship Education”, available at: https://unesdoc.unesco.org/ark:/48223/pf0000266176 (accessed 15 March 2020).

UNESCO. (2019a), “UN Decade of ESD”, available at: https://en.unesco.org/themes/education-sustainable-development/what-is-esd/un-decade-of-esd (accessed 3 April 2020).

UNESCO. (2019b), “Global Action Programme on Education for Sustainable Development”, available at: https://en.unesco.org/gap (accessed 6 April 2020).

UNESCO. (2019c), “Beyond commitments – How countries implement SDG 4”, available at: https://unesdoc.unesco.org/ark:/48223/pf0000369008/PDF/369008eng.pdf.multi (accessed 4 April 2020).

United Nations Educational, Scientific and Cultural Organisation – United Nations Environmental Programme (UNESCO-UNEP). (1977), “Intergovernmental conference on environmental education—Final report”, available at: http://unesdoc.unesco.org/images/0003/000327/032763eo.pdf (accessed 15 September 2019).

United Nations Educational, Scientific and Cultural Organisation – United Nations Environmental Programme (UNESCO-UNEP). (1988), “Congress on environmental education and training: International strategy for action in the field of environmental education and training for the 1990s”, UNESCO-UNEP, Nairobi, Paris.

World Wildlife Fund - Scotland. (2012), “One planet schools: Connecting school and community research findings – Learning for Sustainability”, available at: http://assets.wwf.org.uk/downloads/1planetschools_web2.pdf (accessed 20 November 2019).

Wyeth, G. B. and Termini, B. (2015). “Regulating for sustainability”, *Environmental Law,* Vol. 45 No. *3,* pp.663-712. https://www.jstor.org/stable/43610985.

York University. (n.d.), “UNESCO Chair in Reorienting Education towards Sustainability”, available at: https://unescochair.info.yorku.ca/ (accessed 19 March 2020).

Neus (Snowy) Evans is a Senior Lecturer in Education at James Cook University, Cairns campus, in the Australian tropics, where she coordinates subjects in the professional studies stream of teacher education undergraduate and postgraduate programmes. Snowy is also Associate Editor (Book Reviews) for the Journal of Environmental Education. Snowy’s research background lies in the embedding of sustainability education in school and initial teacher education. Her research interests overlap with her teaching in the areas of pedagogy, curriculum and professional practice. She’s particularly interested in the intersection between teacher professional practice and sustainability education theory, policy and practice.

Hilary Inwood is a teacher educator, researcher, and artist. She leads the *Environmental & Sustainability Education (ESE) Initiative* at OISE (University of Toronto), and teaches in its *Master of Teaching* program. She coordinates a cohort of graduate students focused on Social Justice and EcoJustice Education, as well as a large-scale partnership between OISE and the Sustainability Office at the Toronto District School Board. Her research focuses on deepening teachers’ knowledge and skills in environmental learning, and on developing curriculum for creative approaches to environmental education. In connection with this, she co-chairs a national network that aims to better embed ESE into preservice and inservice teacher education.

Beth Christie is a Senior Lecturer in Education in the Outdoor and Environmental Education Section of the Moray House School of Education. She is Programme Director for the MSc Learning for Sustainability. She is former Associate Editor now Editorial Board member of the Journal of Adventure Education and Outdoor Learning, and she works closely with Learning for Sustainability Scotland (Scotland’s UN Recognised Regional Centre of Expertise on Education for Sustainable Development). Her research interests span the theory, policy, and practice of learning for sustainability within school-based education, higher education, and social movement learning.

Eva Ärlemalm-Hagsér is a Professor at the Division of Early Childhood Education within early childhood teacher education. Eva is research leader for the research department Children and Young People at School and in Society (BUSS) and coordinates the third-cycle program in the subject of didactics. Her research focus is on education for sustainability in early childhood education and children’s participation and agency within policy and practices. As well as sustainability education in initial teacher education. She is appointed as convener a Special Interest Group (SIG) Sustainability in Early Childhood Education within the European Early Childhood Education Research Association (EECERA) as in the and co-convenor an active participant in the Transnational Dialogues in Early Childhood Education for Sustainability research group since 2010.