Australian Journal of Environmental Education (2021), **37**, 240–253
doi:10.1017/aee.2021.2

CAMBRIDGE UNIVERSITY PRESS

RESEARCH/PRACTICE ARTICLES

Innovative praxis for environmental learning in Canadian faculties of education

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(Received 20 December 2019; revised 13 December 2020; accepted 01 March 2021; first published online 25 June 2021)

Abstract

This article explores innovative praxis in Environmental and Sustainability Education (ESE) in four preservice teacher education programmes in Canada. ESE is finding its way into teacher education in a variety of innovative and interdisciplinary ways, as both part of mainstream programmes and in their co-curricular margins. Using a case study approach, each case builds on unique connections to Indigenous education, art education, cultural learning or educational gardening, which supports a variety of differing aspects in relation to ESE. These cases share a common theme of building relationships at the heart of ESE teaching and learning in the mainstream and the margins of the academy. Brought together through a Canadian network of faculty, researchers, policy-makers and community educators that was formed in 2016, these cases demonstrate a deep commitment and imaginative capacity for embedding ESE in Canada's teacher education systems.

Keywords: environmental education; sustainability education; preservice teacher education; praxis; innovation

Introduction

Many competing priorities exist in Canadian preservice teacher education (PTE), including Indigenous education (IE), inclusive learning, differentiated instruction, digital technologies, authentic assessment and service learning. Too often Environmental and Sustainability Education (ESE)[1] is overlooked, which we believe is a critical omission. Globally, we face severe disruption from climate change, including loss of biodiversity, desertification, extreme weather events, soil erosion, rising ocean levels and melting ice caps (IPCC, 2018); each of these is inextricably linked to colonisation, oppression, globalisation, industrialisation and hyper-consumerism (Martusewicz, Edmundson, & Lupinacci, 2011). While many scholars recognise the need for widespread social and cultural shifts towards sustainability (Diduck, Sinclair, Hostetler, & Fitzpatrick, 2012), those in all sectors of formal and informal education need to act quickly to mobilise a vast body of theory and research on environmental and social justice issues into practice, resulting in innovative praxis. Using their positions of power and privilege, educators in schools, higher education and community organisations can contribute to creating a new range of compelling approaches, narratives and actions that engage citizens of all ages in addressing the climate crisis, by moving towards more sustainable and equitable forms of living.

As educators and researchers who work in faculties of education in Canada, we can contribute to this shift not only by introducing theoretical approaches to ESE but also by modelling these in

This manuscript is an original work that has not been submitted to nor published anywhere else.

the course of reflective action, which is at the heart of Freire's (1970) definition of praxis. This is not the norm, despite international calls to make it a priority (Evans, Stevenson, Lasen, Ferreira, & Davis, 2017; Hopkins & McKeown, 2005; Nolet, 2013; UN General Assembly, 2017). Little formal mention of ESE is made in policy documents in PTE in Canada, and faculty struggle to find time for it in already overcrowded curricula. Many colleagues note that ESE does not 'fit' into what they teach (as traditional disciplinary approaches to PTE are not conducive to including ESE), nor do they have adequate training or experience to teach about it in an informed way. Competing priorities take faculty and administrators in directions other than ESE, even if they believe it should be included in PTE curricula and programming. There is no doubt that there are significant challenges and barriers to implementing ESE in PTE, both in Canada and worldwide (Evans et al., 2017; Ferreira, Ryan, Davis, Cavanagh, & Thomas, 2009; Miles, Harrison, & Cutter-Mackenzie, 2006).

Still, despite the challenges, ESE is finding its way into PTE in Canada in a variety of innovative and interdisciplinary ways, both as part of mainstream programmes and in the co-curricular margins of these programmes. Some PTE programmes have mandatory courses in ESE; others offer cohorts and/or teaching practica focused on ESE (Karrow & DiGiuseppe, 2019; Sims & Falkenberg, 2013). Some bolster their extracurricular opportunities by offering ESE workshops, conferences and student clubs, while others model the use of educational gardens as sites of experiential and cross-curricular learning (DiGiuseppe et al., 2019; Ostertag, Gerofsky, & Scott, 2016). Such developments are set against a wider shift towards sustainability seen on many university campuses, such as investment in more efficient physical infrastructure, promotion of sustainable transportation options, divestment of pension funds from fossil fuel investments, bans on bottled water sales and an emphasis on fair trade procurements (Bieler & McKenzie, 2017).

To support the development of praxis in ESE in PTE, a Canadian network of faculty, researchers, policy-makers and community educators was formed in 2016, bringing together those who share a commitment to embedding ESE in all levels of Canada's teacher education systems. Formally known as the *ESE in Teacher Education Standing Committee of EECOM*, this group is dedicated to sharing empirically driven, innovative approaches to the praxis of ESE in PTE across Canada. Through research, publications, presentations and a digital communications hub, this network acts as a centre for collaborative research, evidence-based practice, resources and knowledge mobilisation about ESE in teacher education (Inwood & Jagger, 2014; Karrow & DiGiuseppe, 2019; Karrow, DiGiuseppe, Elliott, Gwekwerere & Inwood, 2016). This builds on research done in the past in Canada in this field (Council of Ministers of Education, Canada (CMEC), 2012; Falkenberg & Babiuk, 2014; Hart, 2010; Hopkins & McKeown, 2005; Howard, 2012; Ormond et al., 2014; Sims & Falkenberg, 2013) and aims to advance and support the development of high-quality praxis in ESE in preservice and in-service teacher education in Canada.

Our network of Canadian scholars is not alone in this work. Researchers around the world have been engaged in studies on different aspects of ESE in teacher education, including policy research (Aikens, McKenzie, & Vaughter, 2016), theoretical foundations (Evans et al., 2017; Sauvé, 2005; Zhou, 2015) and case studies (Ashmann & Franzen, 2015; Ferreira & Ryan, 2012; Ferreira, Ryan, & Tilbury, 2007; Karrow et al., 2016; Miles et al., 2006). However, more research is needed to understand better the unique context of ESE within Canadian faculties of education. The CMEC (2012) published a major research study, *Education for Sustainable Development (ESD) in Canadian Faculties of Education*, that found evidence of 'modest but promising progress towards reorienting teacher education to address ESD' (p. 63) while also noting a 'divergence between individual responses and institutional responses' (p. 64) in its implementation, with individual faculty members showing considerably more progress than their programmes. This influential study made recommendations for improving the presence of ESE in PTE in Canada. A deeper investigation of how ESE and operational sustainability is playing out on campuses in Canada has been undertaken in recent years by the Sustainability Education Policy Network (Bieler & McKenzie, 2017; Henderson, Bieler, & McKenzie, 2017). Bolstered by these policy and research

https://doi.org/10.1017/aee.2021.2 Published online by Cambridge University Press

developments, some faculty in PTE programmes are looking for innovative means to introduce ESE to preservice teachers in ways that are authentic, experiential and innovative.

Innovative Praxis in ESE

As four Canadian teacher educators, situated in Ontario, British Columbia and Manitoba, we are experimenting with innovative praxis in ESE in PTE. This article examines the work of each as the start of a comparative case study, exemplifying how PTE programmes in faculties of education are applying different aspects of ESE in response to the needs of the populations they serve through culturally and contextually appropriate approaches. The work being done in these cases is interdisciplinary, multicultural, research-based and sometimes multilingual. While the work at each site is unique, we share a goal of making ESE meaningful, equitable and empowering. Our approaches present opportunities to work prominently in faculties of education, bringing ESE into the mainstream through mandatory, core courses, but also in the margins of PTE programmes, in alternative spaces and places through co-curricular programming.

As PTE faculty members, we share a common desire to cultivate relationships and build community in unexpected ways through ESE. What follows is an introduction to each case, with the intention of sharing a range of unusual approaches that PTE faculty in Canada are using to integrate theory and practice in ESE. Ultimately, our goals are similar: to help shift preservice teachers' and colleagues' awareness of current environmental and social justice realities, and to encourage them to take action and participate in the shift towards sustainability.

Reflecting on the integration of theory and practice began with a presentation that we gave at the American Educational Research Association's 2019 conference (Inwood, Sims, Elliott, & Gerofsky, 2019) in Toronto. Following that presentation, we felt inspired to reflect more deeply on our ideas about ESE and working in the margins, to critically interrogate our fields of study and contexts seeking to understand the cross-overs and differences between them, what we could learn from one another and what these mean for our praxis. It has been a process of reflexivity (Cohen, Manion, & Morrison, 2018) and analytical self-study, based on individual research in ESE that draws on a variety of methodological frameworks, including collaborative action research, arts-based research (McNiff, 2007), critical, anti-racist research (Potvin et al., 2015) and community-based and experiential research (Elliott & Rodenburg, 2019).

Trent University: Implementing a core course in Indigenous Education and ESE

The PTE programme at Trent University, Ontario, features a mandatory, core course of 36 instructional hours that combines IE and ESE. All preservice teachers take the course in combined Intermediate/Senior and Primary/Junior classes (Elliott, Bell, & Harding, 2018). The aims are ambitious: (i) to explain teachers' responsibility to engage in ESE, (ii) to prepare preservice teachers to incorporate ESE in their teaching, (iii) to improve understanding of Canada's relationship with First Nation, Inuit and Métis peoples and (iv) to help preservice teachers understand how they can contribute to Truth and Reconciliation (Truth and Reconciliation Commission of Canada, 2015). These themes were identified as priorities during a programme review in preparation for the government-mandated transition from a 1-year to a 2-year PTE programme.

Prior to introduction of the 2-year programme, ESE and IE were marginalised components of the programme, addressed only in extracurricular activities, one-off workshops and personal endeavours of individual faculty incorporating content into courses. Neither IE nor ESE were seen as priorities by most preservice teachers, despite the Ontario Ministry of Education (2007, 2009) requirement that both should be addressed by all teachers. Cajete (2010) suggests that IE should be holistic, affective and transformational; a communal, social activity that develops self-knowledge. It was a priority to place these concepts at the centre of the new course. Also, to honour the Truth and Reconciliation (2015) calls to action, it was important to create a course that requires

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preservice teachers to critique colonially based, settler preconceptions and to recognise that complex and sensitive issues seldom have easy solutions. There are parallels here to the Australian context, as Nakata, Nakata, Keech and Bolt (2012) write:

> We suggest that colonial critique must always be used to stress the legacy of a very complex and historically layered contemporary knowledge space. Here we do not advocate the quick logic of 'cause-effect' or 'problem-solution' reasoning and its application to practice for Indigenous contexts as the way to traverse these complexities. (pp. 132–133)

Developing a course for all preservice teachers was complicated by their various grade specialisations, the teaching subjects of those in the intermediate/senior stream and personal levels of prior knowledge. It became apparent that an inquiry-based approach could be an effective one to adopt. The benefits of doing this included the fact that the topics of IE and ESE have clear areas of overlap. Ensuring extensive integration of IE and ESE allowed opportunities for innovative pedagogy, assessment and evaluation. Finding ways to integrate the components would bring synergistic benefits and temporal efficiency – important in a course covering such broad topics in only 36 hours of class time. This decision had implications for course content and the modelling of pedagogical practices.

The course addresses three key ESE principles: situating the self in the environment, connections with the environment and interactions between people and the environment. Indigenous teachings and philosophy can inform each of these: the Medicine Wheel; Seven Generations teaching; Kinship and interconnectedness can all offer insights in ESE (Bell, 2013). Introductory activities, many hands-on, sensory, place-based and outdoors, establish a baseline of knowledge and understanding from which to approach more complex issues. Shifting to inquiry-based learning sees preservice teachers collaborating in small groups, each identifying a topic that has relevance to both Indigenous peoples and the environment. Such topics may include availability of safe drinking water on First Nation reserves, mining activity on traditional territories, and traditional ecological knowledge and intellectual property rights. Each topic raises complex problems requiring exploration from multiple perspectives and consideration of the views of diverse players. Many find the task difficult because they have never been required to consider multiple views before and they are used to there being a 'correct answer'. Scaffolding helps groups plan their learning using the sequence *immerse, investigate, coalesce* and *go public* as described in Harvey and Daniels (2015). During the inquiry phase, class instructors act as advisors and, initially, all assessment was of the products of the inquiry process.

Preservice teachers often find the course challenging. Some are shocked when they realise their previous ignorance of difficulties facing many Indigenous communities and their own level of privilege. This can cause them to question perceptions of Canada as a modern, progressive country. Activities requiring them to consider their own behaviours, such as completing a carbon-footprint profile can cause discomfort. Some feel intimidated by the prospect of introducing such topics in their own teaching. In an attempt to help confront and resolve these issues, the course has been refined each time it has been taught. The emphasis on inquiry-based learning is still a central component of the course, but to address their anxiety about this form of learning less of the assessment is based upon this. We think it important for preservice teachers to gain experience of inquiry-based learning, but we do not want their first experience of it to be traumatic. The sequence of sessions has also been altered to shift initial priority to the Indigenous components, as this is the content of the course that causes most concern (so it is best addressed early on). In addition, we have incorporated additional, concrete examples of pedagogy, to boost preservice teachers' confidence in their ability to teach both ESE and IE content. As with many PTE courses, the course evolves as we learn more about our learners' needs and perceptions.

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Ontario Institute for Studies in Education: Creating environmental art installations

For the last decade, the PTE faculty and preservice teachers at the Ontario Institute for Studies in Education (OISE) at the University of Toronto have been raising awareness and encouraging action on sustainability through the *ESE Initiative*, which leads programming, research and advocacy in this area. This has resulted in ways to help preservice teachers, staff and faculty learn about and participate in education's response to climate change through courses, conferences, clubs and committees. Perhaps one of its more innovative means is through the creation of over a dozen environmental art installations. Located in OISE's main stairwell, each artwork, created by OISE community members, focuses on an environmental issue with local impact, aiming to raise awareness and invoke action on it. These include the environmental rights of children, the challenges of climate change in urban environments, the need for nature-based learning and the pedagogy of sustainability practices. These installations exemplify a methodological approach to arts-based research (McNiff, 2007) and their impact has recently been studied through a 2-year qualitative case study (Inwood & Kennedy, 2020).

Part of the rapidly emerging environmental art education movement (Anderson & Guyas, 2012; Bertling, 2015), these community-based artworks have been inspired by the global environmental art movement of the past 40 years. Environmental artists include those working on nature-based installations (Goldsworthy, 1990; Sonfist, 2004), to those raising awareness of the un/sustainability of natural and built environments, such as Laderman Ukeles (Feldman Gallery, n.d.) or Burtynsky (n.d.). Collaborative environmental art projects like the Cape Farewell project (Buckland, 2006) and the Beehive Design Collective (n.d.) have also influenced how the OISE artworks have developed. While recent research in environmental art education is beginning to identify some implications for the pedagogy of this emerging field of study (Davis, 2018; Sams & Sams, 2017) there were very few models to follow in similar types of projects in faculties of education (Efthymia, Vasiliki, & Konstadinos, 2012; Inwood & Ashworth, 2017).

From the outset, these installations were collaboratively created by OISE's preservice teachers and faculty, but some have also involved local K-12 students and teachers. Involvement in their creation has been positive and participatory, with everyone welcome to contribute, regardless of previous art-making experience or level of expertise. Cognitive, affective and somatic dimensions of learning have been integral to the process of creating these installations, helping those who participate experience first-hand that art-making is a rich learning experience that involves multiple domains of learning (Inwood & Kennedy, 2020). In this, the process of making each installation has echoed engagement in environmental projects and actions more generally, as even those who do not identify as artists or environmentalists have found a supportive learning community in which to explore new ideas and activities that help the shift towards sustainability. To ensure an alignment between the message of the installations, and the media and techniques used to create them, sustainable art practices have been utilised, from minimising and capturing painting waste water, to using low impact materials like watercolours, to working with natural materials like clay.

These artworks were purposefully installed in the margins of an under-used space in the OISE building: its main stairwell. There were good reasons to consider the potential of using the stairwell as a viable location for integrating art education with environmental action. Encouraging community members to walk the stairs helps to reduce elevator use and conserve energy, while simultaneously improving the individual health and well-being of those able to do so. As a marginal, yet public, space, it was considered to be strictly utilitarian, so no one objected to the addition of art installations in it, allowing those involved to experiment freely. Perhaps not surprisingly, given their location in a faculty of education, these have inspired similar installations as OISE preservice teachers take the ideas they have learned into their own classrooms to inspire collaborative art-making with K-12 students on environmental themes.

There is no doubt that these installations have brought environmental learning to OISE in both experiential and aesthetic ways. A recent study (Inwood & Kennedy, 2020) demonstrated that

https://doi.org/10.1017/aee.2021.2 Published online by Cambridge University Press

preservice teachers' involvement in the creation of these artworks helped to build a sense of community, modelled sustainability practices, and most importantly, instigated further environmental activism for those involved. They have also contributed to a developing understanding of pedagogical strategies for environmental art education in PTE, which includes utilising an experiential and collaborative approach to creating each installation, modelling the tenets of sustainability (such as working with natural materials, or low/no VOC paints), engaging all domains of learning to strengthen an authentic experience and framing art-making as a form of environmental activism.

Finley (2003) would recognise these environmental art installations as 'useable and responsive' research that can lead to action in a community as well as spark 'visionary critical discourses . . . - that examine how things are but also imagine how they could be otherwise' (p. 293). Others are seeing them in a similar light, as a compelling means of manifesting in physical form the experiential and constructivist theories that inform ESE. In this, they have become a symbol of using the margins of university spaces as one way to let ESE take root and grow in importance over time. These installations will continue to engage diverse members of the OISE community, raising their awareness of environmental issues and inspiring action, one step at a time.

Université de St. Boniface: Culturally sustaining, community-based ESE

The Université de St-Boniface (USB) in Winnipeg, Manitoba supports French-language culture and communities within a francophone minority context.[2] USB's faculty of education is responsible for preparing French-language educators in Manitoba and, more generally, to educate for reconciliation (Truth and Reconciliation Commission of Canada, 2015). Demographically, Manitoban francophone communities are evolving from being primarily descendants of (Catholic) French-speaking voyageurs and the Métis to being more religiously and culturally diverse. For the francophone communities' sustainability, there is a recognised need to enlarge the francophone presence in the province (Rocque, 2011). Targeted immigration has welcomed newcomers, particularly from European (28%) and African (57%) francophone countries (Office of the Commissioner of Official Languages, 2018). These changes have brought vitality, opportunities and challenges (Piquemal, Bolivar, & Bali, 2009). To respond to these, USB's PTE programme offers mandatory education courses with cultural foci that are relevant to the communities served and the context in which USB is situated. These courses facilitate 'an appreciation of cultural diversity and of culture's contribution to sustainable development' (UN General Assembly, 2017, p. 1). Pedagogical approaches are community-focused and community-based, addressing social and cultural aspects of ESE (Block, Sims, & Beeman, 2016).

A cultural diversity course explores issues around ethnicity, socio-economic status, religion, sexual orientation, and gender, and their impacts on classroom teaching (Banks & McGee Banks, 2016). Doing a 'diversity walk' (Sims & Falkenberg, 2013) invites preservice teachers to become more aware of the diversity in the community. During a visit to a francophone school, preservice teachers witness how teachers and schools are responding to the changing demographic and pupils' needs. Community and educational leaders describe francophone immigrants' and refugees' experiences and challenges living in this minority context (Piquemal et al., 2009). LGBTQ educators share experiences and strategies for creating safe, inclusive learning environments.

A French education in minority context course highlights preservice teachers' responsibility as linguistic role models, empowering them as agents for language viability. They learn about the historic struggle for French-language education in Manitoba. A focus is on schools' role in community sustainability (Rocque, 2011). Kriel (2003) explains how for minority languages, education is the institution that generates producers and consumers; hence, having French-language education increases its value as linguistic capital in turn increasing its viability. In the course, emphasis is placed on learning how to integrate francophone culture and community in genuine ways into

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classroom practice (Landry, Allard, & Deveau, 2007). Complementary to this course, two non-mandatory initiatives support the quality of French being taught and the successful integration of preservice teachers educated outside Canada. Living within a francophone minority context, preservice teachers often experience feelings of inadequacy around their language skills. Consequently, an as-needed French course was designed to advance preservice teachers' language skills, build their confidence as linguistic role models and nourish their francophone identity. As for supporting successful integration in practicum experiences, USB provides opportunities for preservice teachers unfamiliar with Canadian classrooms to visit schools to observe various educational experiences/interventions/lessons. Accompanied by a faculty member, they discuss what they observed.

With the Indigenous perspectives course, a goal is to 'live' reconciliation by raising awareness and building relationships between Indigenous and non-Indigenous communities that are quite divided (Comack, Deane, Morrissette, & Silver, 2013). Canadian colonial history and its impacts are explored through experiential activities; community speakers provide first-hand accounts on current issues. Preservice teachers participate in Indigenous community/cultural events and visit community organisations (Sims, 2019).

When working in the linguistic margins, there are certain opportunities and challenges doing community-based work. In all of these courses, but particularly with the cultural diversity and Indigenous perspectives courses, there is a reliance on community collaborators to bring diverse, authentic perspectives and experiences to preservice teachers. This involves bringing speakers into the classroom and taking preservice teachers into the broader community context to build relationships with members of different communities. It also involves gaining a deeper understanding of contemporary issues and learning how to use the community-as-classroom, a foundational pedagogical strategy in ESE (Block et al., 2016; Sims & Desmarais, 2020). Among the preservice teachers, facing difficult issues together in an honest way, like discrimination and racism, if done well, helps build a community of learners. Building bridges between people often found in the margins reveals a common struggle for social justice and equity, highlighting how strength can be found in diversity. In meeting people and engaging around issues, people find commonalities; they come to care about issues that might not be conventionally considered 'theirs' (Sims, Asselin, & Falkenberg, 2020). However, finding appropriate speakers and events that occur in French, particularly with the Indigenous perspectives course, is challenging. Many of USB's preservice teachers are bilingual (English-French), but not all; finding ways to overcome this communication challenge is essential. While a strength at USB is its focus on building relationships between human communities, a shortcoming is its general lack of engagement with the land and natural environments (Beeman & Sims, 2019). A challenge at a faculty level, perhaps understandably, has been the prioritisation of cultural and linguistic aspects of sustainability at the potential expense of learning about other aspects of ESE, notably environmental education. Institutionally, the latter has not been a priority (Block et al., 2016).

Finally, these courses reflect USB's effort to create meaningful, equitable, culturally sustaining education that is relevant to the communities it serves. The cultural diversity and Indigenous perspectives courses help preservice teachers better understand specific needs of the changing demographic while contextualising education within larger societal issues. The French education in minority context course, along with the accompanying (as needed) language course and practicum-preparation observations, is meant to specifically support, on the one hand, French-language preservation, and on the other, the successful integration of francophone newcomers to Canada into the education profession.

University of British Columbia: The Orchard Garden

The Orchard Garden is a student and faculty-led teaching and learning garden on the central campus of the University of British Columbia (UBC) in Vancouver, British Columbia. It is a joint

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project of the Faculty of Education, Land and Food Systems and the School of Architecture and Landscape Architecture, with Education playing the central role.

After several years of lobbying, public meetings and design and visioning charrettes, the Orchard Garden was established in 2010 by a team of graduate students and faculty members. The initial aim was to meet a perceived need in PTE for an outdoor classroom where preservice teachers could gain experience teaching and developing curriculum and pedagogical approaches outside a typical school classroom in the many school garden outdoor classrooms that had been developed across Canada since the late 1990s. The Orchard Garden aims to support PTE through helping new and experienced teachers learn to teach across the curriculum in a school garden (with the garden as co-teacher), support academic research on garden-based ESE and promote university/community engagement through knowledge mobilisation with the broader educational and schools communities.

This work followed the lead of garden-based education research coming forth in North America, Australia and Europe at the time, in connection with a growing international movement for school gardens as learning spaces (Cutter-Mackenzie, 2009; Desmond, Grieshop, & Subramaniam, 2004). Many of the studies in garden-based learning (GBL) focused on the benefits to school-aged students in terms of improved food literacy and nutrition (Parmer, Salisbury-Glennon, Shannon, & Struempler, 2009), a more engaged relationship with the science curriculum) and improvement in academic scores as indicators of learning (Berezowitz, Bontrager Yoder, & Schoeller, 2014).

At the Orchard Garden, with a focus on university-level learning and PTE across the curriculum, there has been an interest in GBL for curricular and pedagogical development with preservice teachers. The Orchard Garden's cross-curricular approach engages with GBL across school subject areas, exploring teachers' and learners' relationships with other people and the greater-than-human world, in dialogue with Indigenous cultural traditions. Practices developed by the Orchard Garden team have been informed by studies in GBL and its beneficial effects on mathematics education, art education and ecoliteracy. The Orchard Garden's programmes are supported by studies of the role of GBL in promoting positive environmental stewardship (Mayer-Smith & Peterat, 2016), cultural diversity (Cutter-Mackenzie, 2009) and Indigenous relationships with plant nations and greater-than-human kin (Hauk et al., 2018). The design of Orchard Garden projects has benefited by its engagement with studies dealing directly with the institutional and educational effects of university campus learning gardens and of learning gardens in PTE in particular (Gaylie, 2009).

The Orchard Garden is a small physical space (400 sq. m) on the edge of the central campus of UBC, but it is also a learning text, a community and broad range of programmes that support teaching and learning, research and engagement. Over 500 UBC graduate and undergraduate students have participated annually in Orchard Garden programmes for each of the past 11 years; 5500 teachers, urban farmers and community activists have had an important part of their academic and professional formation with the garden.

Orchard Garden teaching and learning programmes include credit courses in the university calendar. Each year, our student/faculty team leads two intensive 3-week Community Field Experience practica for preservice teachers, where we collaborate in garden-based teaching and learning activities with the garden and plan and carry out Saturday workshops and a Summer Solstice public celebration together. The Orchard Garden has supported and hosted undergraduate and graduate directed studies courses in the faculties of Education, Land and Food Systems and Landscape Architecture, and a national summer institute course for early childhood educators. A highlight of each academic year is the series of eight Saturday Workshops for preservice teachers, hosted by graduate and undergraduate student team members, which leads to an informal certificate. Research projects by faculty, undergraduate and graduate students based in the Orchard Garden have led to publications, conference presentations and international conference symposia held in the Orchard Garden as venue (notably, the American Educational Research Association,

https://doi.org/10.1017/aee.2021.2 Published online by Cambridge University Press

April 2012; Children and Nature Conference, April 2017; and World Environmental Education Conference, September 2017). Over a dozen graduate theses and dissertations have had research venues in the UBC Orchard Garden.

Research in and of the Orchard Garden includes work in education, global resource systems, landscape architecture and sustainable agriculture. Recently, the Outdoor PLAYbook project (Fox et al., 2016) brought together UBC landscape architects, advocates of risky play from the Faculty of Medicine and educators, all connected with the garden, to create a web resource for schools and parents that won a Canadian Society of Landscape Architects national award of excellence. Undergraduate research papers from the Orchard Garden include a study measuring the effectiveness of biochar in organic agriculture, a study of the integration of the learning gardens with university food systems and the viability of a rooftop learning garden at the new university student centre.

Teaching and programming in the Orchard Garden are always a collaborative undertaking, with graduate, undergraduate, community and faculty team members working side by side with the garden itself. There is a degree of freedom in working at the margins of a large institution like UBC, allowing for greater experimentation, the blurring of boundaries and the piloting of initiatives that may 1 day have more official status within the university.

Working in the Mainstream and the Margins

In these brief case studies, we aim to demonstrate that teacher educators are modelling reflective action (Freire, 1970) to develop praxis in ESE in ways that inspire future generations of teachers to champion sustainability. Some faculty have found ways to engage in this work within the mainstream PTE programme. At Trent University, this was achieved by successfully lobbying for a new type of course that integrated multiple learning objectives related to IE and ESE. At USB, spaces for Indigenous world views and culturally sustaining ESE were created within foundational PTE courses, as well as in those meant primarily to address cultural and linguistic viability. In both contexts, complex issues are raised requiring multiple perspectives and ways of knowing to be considered. While the connections between colonisation, racism, environmental issues and general society are addressed in each case, these are explored in Trent's course through inquiry learning and manifested in a research project. At USB, they are addressed through research, storytelling and relationship-building between communities. In both contexts, preservice teachers find the courses challenging as they confront their own ignorance, preconceptions and complicity about the darker aspects of environmental injustices and oppression in Canadian society. Assignments in both programmes help them overcome fears and anxieties by translating historical and theoretical concepts into pedagogical practice, thereby exploring preservice teachers' potential for agency through their future praxis to create a more just, environmentally viable world.

In the other two cases, at OISE and UBC, a contrasting approach was taken, where marginal spaces have been utilised to broaden opportunities for ESE in co-curricular settings, bringing together community members with interests in experiential learning. OISE's environmental art installations have highlighted the potential of a marginal space like a stairwell to be transformed into an integrative opportunity for teaching, learning and research that emphasises the critical importance of different aspects of sustainability and well-being. Using artistic experiences as a means of building community, raising awareness and instigating activism on environmental issues and climate change has modelled some of the pedagogical strategies used in ESE more broadly. A similar praxis has been used at the Orchard Garden at UBC, which has brought preservice and inservice teachers together with faculty and graduate students to grow garden-based approaches to the generation of theory and practice. Ironically, while these initiatives are lauded by each institution, their very existence has been fragile as they continue to sit in the margins of praxis in these universities.

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In all four contexts, there has been a desire to cultivate relationships between people and the environment, revealing a strong sense of interconnectedness and dedication to an ethic of care and responsibility. USB has learned from UBC's and Trent's experiences how to further develop relationships with the environment and nature through hands-on learning experiences and the relevance of place. OISE has drawn inspiration from Trent's integration of IE and ESE, reminding them of the centrality of Indigenous ways of knowing in discussions of sustainability. Trent has been inspired by the collaborations between faculty and students at UBC to maximise the role of instructors as fellow learners as students work on their case studies. And UBC can learn from Trent and USB how to bring innovative ESE courses into the mainstream of PTE, and from OISE, how to create a more permanent presence for inspired, arts-based ESE initiatives.

At the outset of this article, these case studies were framed as examples of innovative praxis in ESE. By working simultaneously in and with mainstream and marginal communities and spaces, as researchers and educators, we are continually reflective of how place and pedagogy intersect with research and theory generation. We have intentionally sought to create spaces that affirm the connections of ESE to the viability of living in a minority language, respect for Indigenous ways of knowing, and that reclaim otherwise fallow spaces through plant-based or artistic installations. A comparison of these praxes across universities leads us to ask whether our Canadian faculties of education have truly made a firm commitment to ESE in PTE; certainly, we are not the only ones to consider this (CMEC, 2012). These initiatives have required faculty to become champions of ESE in PTE programmes, sometimes against significant opposition and possibly at the risk of career advancement. All of these initiatives require the intentional building of meaningful relationships between people, disciplines and communities, as well as a high level of personal dedication and perseverance on the part of faculty, students and other participants to engage with ESE work in the context of universities, whether as part of the mainstream or in the margins.

Conclusion

Engagement with ESE in PTE offers a wide range of opportunities for members of faculties of education to position themselves as leaders of social and environmental change by exemplifying innovative and hopeful ways to move towards a sustainable future. In this, they can demonstrate how to support and manifest the tenets of Indigenous worldviews and culturally responsive education as fundamental to ESE and deepen connections with the broader communities in which faculty and preservice teachers teach and learn. These opportunities are best realised if all involved in PTE are meaningfully engaged in planning and implementing ESE, including faculty, staff and preservice teachers. This should include the provision of resources, the establishment and/or revision of curricula, leadership by deans and provosts, and the creation of policy by those in Ministries of Education and provincial teacher education accreditation agencies (Sims & Falkenberg, 2013). Comprehensive change requires a whole-system, interdisciplinary approach to fully implement ESE-PTE throughout Canada (Inwood & Jagger, 2014; Karrow & DiGiuseppe, 2019; Karrow et al., 2016). This is a change that is long overdue and urgently needed.

We hope that the examples of praxis offered in these cases may inspire others to innovate with ESE in PTE initiatives, and that the growing climate crisis will increase tangible support from universities to lead to a transformation of praxis in PTE that is more fully needed (Evans, 2020). These cases may prove helpful to others to demonstrate that utilising their own expertise and passions to form innovative pathways of their own into ESE will help to provide preservice teachers with learning opportunities that are relevant to their context. As members of the Canadian ESE-TE national network, we are dedicated to supporting ESE champions in faculties of education by promoting the exchange and mobilisation of ESE-TE practices, resources, research and information. As this network develops, we anticipate Canadian faculties of education will enhance their ESE-TE programmes by including more mandatory and elective ESE courses,

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co-curricular programming and research activities. This has the potential to significantly enhance ESE-PTE, and as a result, embed ESE in K-12 classrooms and other educational settings across Canada.

Endnotes

1. While it is common to refer to Education for Sustainability (E*f*S) in Australia, in this article 'Environmental and Sustainability Education' is used (ESE) to reference this field of study in Canada by the national network of teacher educators focused on ESE in Canada (to which we belong). While the terms Environmental Education (EE) and Education for Sustainable Development (ESD) are commonly used across the country, we use ESE as a way to recognize the rich variety of traditions that describe the shift to sustainability in education, including EE, ESD, Education for Sustainability (E*f*S) and Ecojustice Education (EJE). While there are commonalities among all of these terms, each has its own nuance and philosophical grounding that make it distinct; using ESE is our way of referencing their shared focus on the environment and sustainability in education, while also recognizing the tensions that exist between them.

2. Only 3.2% of Manitobans identify French as their first official spoken language (Office of the Commissioner of Official Languages, 2018).

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Cite this article: Sims, L., Inwood, H., Elliott, P., & Gerofsky, S. (2021). Innovative praxis for environmental learning in Canadian faculties of education. *Australian Journal of Environmental Education* **37**, 240–253. https://doi.org/10.1017/aee.2021.2