

# Exploring Ecojustice & Environmental Learning through Online Preservice Teacher Education

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## **Abstract**

As teacher education can help communities transition to sustainable, just ways of being, this study reports on the development of, and research on, a national E-course for pre-service teachers focused on Environmental and Sustainability Education (ESE). This collaborative initiative brought together academics, community educators, and K-12 teachers to offer participatory, locally-relevant online ESE learning. By facilitating learning

centred on concepts of indigenization, ecojustice, and place-based learning, the E-course aimed to ensure equitable access to ESE for preservice teachers across Canada. We ask, what are participants' experiences and the impact of their involvement in this E-course? Using a socio-critical lens, the authors draw on survey data to report on the outcomes of the E-course. We hope that it may serve as a new model for online ESE for preservice teacher education, and more broadly highlight the capacity for building understanding about ecojustice education and community connections through virtual learning spaces. *Keywords:* preservice teacher education; virtual learning; national E-course; ecojustice education; community-based inquiry

## Résumé

La formation des enseignants joue un rôle important dans la transition des communautés vers des modes durables. Cette étude rend compte de l'élaboration d'un cours en ligne national destiné aux personnes enseignantes en formation et axé sur l'éducation à l'environnement et à la durabilité (ÉED), ainsi que des recherches menées à ce sujet. Cette initiative collaborative a rassemblé des universitaires, des éducateurs communautaires et des personnes enseignantes de la maternelle à la 12<sup>e</sup> année afin d'offrir un apprentissage en ligne participatif. En facilitant l'apprentissage centré sur les concepts d'écojustice et d'apprentissage critique basé sur le lieu, ce cours visait à assurer un accès équitable à l'ÉED pour les personnes enseignantes en formation initiale à travers le Canada. Nous posons la question suivante : quelles sont les attentes et les expériences des participants et quel est l'impact de leur participation à ce cours? En utilisant une perspective socio-critique, les auteurs s'appuient sur des données d'enquête pour rendre compte des résultats du cours. Nous espérons qu'il pourra servir de nouveau modèle d'ÉED dans la formation initiale des enseignants et, plus généralement, qu'il mettra en évidence la capacité à faire comprendre l'éducation à l'éco-justice et les liens avec la communauté par le biais d'espaces d'apprentissage virtuels.

## **Introduction**

Globally, humans are facing severe environmental and social justice challenges from climate change, biodiversity loss, extreme weather events, and human rights violations, to name only a few (International Panel on Climate Change [IPCC], 2018). As there is an urgent need to learn to live in sustainable, respectful, and life-affirming ways with each other and the Earth's systems, the critical roles that education must assume at all levels is becoming ever more pressing. Teacher education has a central role to play in helping teachers and their students learn to transition to equitable, just, and sustainable ways of living, in harmony with other forms of life (Evans et al., 2017; Fischer et al., 2022; Karrow et al., 2020; Sims et al., 2021). Significantly, the COVID-19 pandemic provided a generative context for creative thinking and innovative collaborations to address the injustices of the climate crisis within the context of preservice teacher education (PTE). Leaning into the increased "digital turn" (Certomà & Corsini, 2021, p.560) of education, both as expanding teaching modalities and in response to global pandemic isolations, a team with expertise in Environmental and Sustainability Education (ESE) in PTE developed a national online E-course to provide more equitable access to ESE for Canadian preservice teachers. This E-course intentionally centred ecojustice and community building in ways that were participatory, inquiry-based, and locally-relevant across a range of geographic regions. This article reports on a two-year study of the experiences of preservice teachers participating in this E-course by drawing primarily on pre- and post-course surveys to investigate the viability and impacts of E-learning in ESE in PTE. Using socio-critical and ecojustice lenses, we ask: what are participants' experiences and the impact of their involvement in this E-course?

## **Theorizing the E-course**

The development and delivery of the ESE E-course emerged from complex conversations and decisions. As faculty in PTE programs, researchers, community educators, and E-course leads, we attuned to socio-critical and ecojustice approaches within the E-course through on-going reflection on relations of power found in ESE practice and research. With years of tendrils of collegial and co-researcher relationships among us, we implemented an integrative approach to theorizing ESE for course development. Strong

ideologies included, but were not limited to, complex relations between humans (particularly those relating to people with identities rooted in equity-deserving and racialized communities) (Ansloos, 2017; Dei, 2005; Kanu, 2016; Lowan-Trudeau & Fowler, 2024; Piquemal, 2017), and between humans, more-than-human entities, and the Earth (Beeman & Sims, 2019; Fawcett & Johnson, 2019). Cognizant of our responsibilities towards social justice and reconciliation, we intentionally invited educators, experts and knowledge keepers from members of equity-deserving, racialized, and Indigenous communities to co-design and co-facilitate the course with us. This focus on the integration of social justice and environmental learning, often referred to as “ecojustice education” (Martusewicz et al., 2020, p.xvi), was both a recurring topic and pedagogical approach. We aimed to decolonize course content and delivery through practices such as embedding Indigenous knowledge, Land-, and place-based approaches, and using student-centred inquiry projects throughout the E-course to engage course participants in active and holistic learning (Allan et al., 2018). We also planned the course with an awareness of the potential discomforts of individual and collective critical reflection on socio-environmental issues and thus integrated opportunities for modelling and sharing affective responses, being vulnerable, and building community (Ojala, 2016).

Inspired by these shifts, the development of the E-course (and this study) was situated in a position of eco-social criticality within the field of ESE, which involved an on-going critical reflection on relations of power. We drew on positionings outlined by Robottom and Hart’s (1993) articulation, and Sauvé’s (2005) analysis, of ESE as transformation of socio-environmental realities and peoples. We were also inspired by research on ecojustice education (Elliott, 2023; Martusewicz et al., 2020), Land-based learning (Kress & Horn-Miller, 2023), and climate justice education (Atkinson & Ray, 2024). This attention to critical reflection also privileges place, and place-based pedagogies became both touch-points and tensions in our national course. This framework relates to the fragmented Canadian educational reality, both in policy and implementation, and a diverse geographical and cultural milieu (Yemini et al., 2023). Also, we were hopeful that the diversities and intersectionalities of course developers, leaders, and participants would allow for eco-social issues specific to communities and contexts to emerge. Committed to reciprocity and reconciliation with Indigenous peoples and the Land, we consciously privileged building relationships to Land and community in our approaches to course development, delivery, and research (Allan et al., 2018). In addition, inquiry-based pedagogy provided

opportunities for learners to engage with relevant local eco-socio-scientific wonders and issues (Bencze, 2022). Finally, the principles of a universal design for learning that aligned with the theoretical underpinnings of the E-course (Sims & Desmarais, 2020) were taken into consideration when developing and implementing course assignments.

## Contextualizing ESE in Teacher Education in Canada

The provision of an E-course in ESE responds to the changing landscape of education in Canada, which is increasingly focused on supporting K-12 students' learning about social justice, equity, and inclusion. This is evidenced in part by policy statements provided by the Association of Deans of Education (ACDE), including accords on *Indigenous Education* (ACDE, 2010) and *Education for a Sustainable Future* (ACDE, 2022). This shift is also reflected in some provincial policies, such as in the Ontario College of Teachers' *Accreditation Resource Guide* (2023), which requires Ontario PTE programs to include mandatory training in Indigenous education, and more recently, environmental learning, ecojustice, and climate action. These represent Canadian responses to calls from the United Nations for social justice and ecojustice education at all levels of education to help achieve Sustainable Development Goals (UNESCO, 2022). This E-course also aligns with calls from scholars internationally to better embed ESE in PTE (Evans et al., 2017; Ferreira & Ryan, 2012; Henderson, 2019; Hopkins & McKeown, 2005; Nolet, 2013), and from those who have been leading this work in Canada (Inwood, 2019; Karrow & DiGiuseppe, 2019; Karrow et al., 2020; Kool et al., 2021; Sims & Falkenberg, 2013). In response to this shifting policy landscape brought on by the environmental crisis, this E-course provided a timely solution to address a lack of mandatory ESE courses in PTE programs in Canada, recently evidenced in the national report by Field et al. (2024b).

As course developers and researchers, most of our course development team are non-Indigenous Canadians, working with guidance from two Indigenous scholars. We acknowledge the complexities of living and working on traditional Indigenous Land as white, middle class, cisgendered, able-bodied educators, and how this impacts our enactment of participatory, place-based pedagogies in our teaching and research. Thus, it was imperative that the course planning and delivery include voices from practicing ESE educators as guest speakers, especially those with Indigenous or racialized identities. Through this course, we deepened our ongoing commitment to racial, intersectional,

and environmental justice. At the same time, we are attentive to the limitations of ESE curriculum development in relation to the field of teacher education and the institutions in which we work and recognize that this E-course is only one step on the path of our ongoing learning about and working towards equitable, just, and sustainable ways of living with all beings on the Earth.

### **Developing an E-course in ESE**

The E-course development began in 2020; one of its goals was to involve preservice teachers across Canada. It was designed to take advantage of the increased proliferation of, and desire for, online learning opportunities that arose during the COVID-19 pandemic. Not surprisingly, there has been a growing interest in the intersection of environmental learning and digital technology in recent years (Corres Gallardo & Ruiz-Mallén, 2023; Greenwood & Houghham, 2015) with some scholars in ESE exploring the potential of Massive Online Open Courses (MOOCs) (Lowan-Trudeau, 2023). But having benefited in our own ESE learning from the power of relationality, inspired by teachings of Indigenous scholars (Simpson, 2014; Cajete, 1994; Kimmerer, 2013), and aligned in our belief in the importance of nature, Land, and place<sup>1</sup>, we concluded that MOOCs have not offered sufficient opportunities to develop these concepts via asynchronous learning (Lowan-Trudeau, 2023). We chose instead to develop a synchronous online course with asynchronous components that developed students' relationships to their teacher identities, their individual connections to nature, Land, and place, and with other ESE educators early in their teaching careers. We drew on an emerging body of literature that explores online learning in connection with place-based education (Davis, 2017; Greenwood & Houghham, 2015), and scholarship that acknowledges the pedagogical value of, and opportunities for, this praxis (Lansiquot & MacDonald, 2019; Sims & Desmarais, 2023; Zhao et al., 2020), which we hope to contribute to through this study.

As challenging as the pandemic was, it created very real opportunities for increasing and improving online learning and perhaps played a role in expanding ESE nationally at all levels of education. While many PTE programs bolstered their online course

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1 These three terms offer differing but intersecting perspectives on the human relationship to environment, evolving from diverse traditions in the Canadian context.

offerings during the pandemic, the E-course in ESE was unique in many ways. Preservice teachers from different PTE programs across Canada were invited to learn together, working to diminish institutional and jurisdictional silos put in place by thirteen distinct provincial/territorial ministries of education. This large number of educational jurisdictions is partly to blame for the absence of ESE in many PTE programs across Canada; there are no national standards for the curricula of PTE programs and no consensus about including socio-political issues (such as climate change) in already crowded PTE curricula. As teacher educators, we firmly believe that the intersecting eco-justice crises of climate change, decreasing biodiversity, and increasing pollution can no longer be ignored as they threaten the health and wellbeing of the preservice teachers with whom we work, and the future of the K-12 students they will teach. Offering this E-course was one way to advocate for the critical importance of ESE with preservice teachers and support those who may not be able to access ESE courses in their PTE programs. However, having preservice teachers involved from different educational jurisdictions meant that the E-course had to be offered as a co-curricular (non-credit) certificate course, run concurrently with their credit courses in their home institutions. This was done purposefully, to encourage them to reflect on the significance of ESE in conjunction with their core PTE courses, though we acknowledged this added to their already busy academic, family, and work commitments.

The E-course was collaboratively developed by a group of nine educators and scholars experienced in developing and leading ESE courses for both preservice and in-service teachers; the team were employed at four different Canadian PTE programs and two non-governmental organizations (four of the development team are co-authors on this study), representing some collective 200+ years of experience in teaching and learning about ESE. During the development of the E-course curriculum, we shared our expertise in a variety of traditions, which inform the theories and practices of ESE (e.g., environmental education, education for sustainable development, sustainability education, Indigenous education, land-based learning, ecojustice education, outdoor education, nature-based learning, and place-based education), and in our complementary “home” disciplines in the sciences, arts, social sciences, and community development.

Relationship-building was one of the core principles on which the E-course was created. Strengthening relationality between all living beings and the Earth is critical to ESE (Kimmerer, 2013; Kulnieks et al., 2013; Simpson, 2014; Toulouse, 2016; Tuck et al., 2014). Consequently, emphasizing the importance of getting to know each other

(facilitators and preservice teachers alike) was one way to begin this, and it helped build preservice teachers' professional networks and their resiliency for teaching in a climate crisis (Sims et al., 2020). We aimed to facilitate connections and relationships via 'Nature as First Teacher' prompts, along with other smaller synchronous activities. After detailed discussion and reflection, we also crystalized the following overarching course themes, which guided the design of the eight course meetings: introduction to ESE; nature-based learning and ecosystems thinking; Indigenous knowledges, ways of knowing and two-eyed seeing; inquiry-based learning and place-based education; equity, inclusion, and ecojustice; ESE in K-12 schools; and, hope, action, and agency. These themes were selected as a direct response to the intention to centre ecojustice goals, to privilege goals of reconciliation and reciprocity, by highlighting Indigenous approaches to ESE early in the course so that it could be woven throughout. This order also was designed with intentionality that students would move between spaces of comfort and discomfort as learners and educators, as facilitators met them where they were to bring them along (Martusewicz et al., 2020). The course was designed to culminate in student presentations to showcase their own inquiry and place-based learning projects, ideally in groups, so they would have an opportunity to share their (re)new(ed) understandings of their place(s) and how these might inform future teaching practice.

The E-course was also designed around a number of complementary core principles, including the importance of diverse ways of knowing about nature, Land, place, and community, sustainability and regeneration, equity, inclusion, wellbeing, and the role of hope in agency and action. An ecojustice framework was emphasized throughout in several ways. Our course leaders and guest speakers represented diverse lived experiences and identities. We modelled reflection and gave students opportunities to reflect and connect to nature and Land in their own communities. We spent time discussing and developing understanding of systems of oppression in ESE. Along with sharing understandings of interconnectedness, we offered many examples of and opportunities for hope and action. These core principles were manifested in the design of the E-course learning activities, readings, and assignment structure, and the provision of multiple opportunities for synchronous and asynchronous interaction. Difficult choices were made in aiming for a balance of theory and practice in ESE, while delivering an E-course that was participatory, equitable, and inclusive, and ensuring it was locally-relevant in its implementation, all within the delivery timeline. The process of co-designing the E-course was challen-

ging as we wrestled with how to enact the core principles in authentic and meaningful ways in only eight sessions (a total of 16 hours of synchronous learning, complemented by 8-16 hours of recommended asynchronous learning) and across six time zones. The principles were enacted in multiple ways: by centering Indigenous voices at the start of each session; having practicing K-12 teachers of diverse identities share their work in ESE; providing many opportunities for discussion and reflection; and designing assignments that encouraged students to creatively and critically interact with the ecojustice issues at play in their places and communities.

The preservice teachers were expected to dedicate 1-2 hours of independent, asynchronous learning between each session, which initially took two forms: sharing entries in a “Nature as First Teacher Journal,” and responding to prompts for an individual monthly learning task. The journal helped to ensure that they connected the concepts and pedagogies of the E-course to place- and nature-based learning. We encouraged them to interrogate their current relationship to their place, how it came to be that way both physically and from which frameworks of understanding, and how it might be different, observable, stewarded, etc. Figure 1 provides a sample of a Nature as First Teacher prompt for reflection from Session 7 on hope and agency. Prior to this culminating prompt, there was a scaffolded series of prompts that began from simple sensory experiences of place and moved outward in complexity of understanding. Students posted responses in the online course spaces to gather feedback from others in the E-course, together highlighting similarities and differences in their responses to place across the country. The second set of independent tasks provided opportunities to connect course concepts to readings and continue dialogue outside of synchronous learning time. These monthly assignments were scaffolded to culminate with students sharing an ESE inquiry project of their own design, alone or in groups, as a form of future visioning, based on one aspect of the E-course into which they wanted to delve more deeply.

**Figure 1**

*Sample of a Nature as First Teacher prompt used to encourage reflection and connection between course meetings. An app called SeeSaw was used in year 1 while we moved to Google docs in year 2 to streamline platforms for students.*

**Nature as First Teacher (NAFT) Journal****March - Entry 7***Hope and Agency*

In this module we acknowledge the anxieties that environmental education can raise, while also developing capacity for action. Take a walk around your community to identify people, places or practices that bring you hope for addressing climate change. What strengthens your capacity for resilience, agency, or climate action personally and/or your community? Feel free to respond to this prompt with visuals and/or words. (Consider reflecting on your NAFT posts to see if these feelings are evident in your (or others) past posts.)

This entry should be posted as March in SeeSaw by April 18; please provide feedback on the entries of 1-2 colleagues after posting your own.

In the design and implementation of the E-Course, we privileged relationship building between participants, between course leaders and participants, and between participants and their places and Land. Learning from the Indigenous peoples on whose territory they live and the Land that sustains them was emphasized and encouraged, knowing that we all have much to learn about systems-thinking, reciprocity, and living sustainably on the Earth. Modelling these pedagogies and concepts was deeply important to course delivery. With the course facilitator providing continuity, monthly leads and guest speakers were asked to make explicit connections between social justice and environmental issues, including exploring how their identities influenced their educational practice; students were then asked to do the same in relation to their own communities. For example, during the session on nature-based learning, along with the simple joys and benefits of learning in and about nature, speakers introduced the negative impacts of lack of access to nature, how and why racialized communities are disproportionately impacted by lack of access to nature, and how classroom teachers can find ways to mitigate that gap through place-based solutions. We intentionally included a diversity of perspectives and experiences in ESE through the inclusion of Indigenous and Black voices as guest speakers and authors

of readings. Session leaders fostered discussions about socio-environmental realities for Indigenous communities in Canada, as related to our monthly course themes, and asked students to connect intentionally with lived experiences of local Indigenous communities. Each course began with a distinct, personalized variation of a land acknowledgement. Course participants were given ongoing opportunities to explore their own communities and make classroom connections from a critical intersectional ESE lens.

## Methods of the Study

The purpose of this study was to explore preservice teachers' experiences and impacts of their involvement in the national E-Course in ESE; it ran in alignment with the first two years of the E-course's delivery. We used a mixed method, case study approach (Cohen et al., 2018), drawing on quantitative and qualitative data collection methods. The case study involved four discrete sections of the E-course (two delivered in 2021-22, and two in 2022-23) as a way of analyzing the experiences of preservice teachers and the facilitators involved. Each year had Saturday daytime and Wednesday evening sections. Data collection methods for each section of the E-course centred on anonymous online entry and exit course surveys (eight in total) as identified in Table 1. Data collection began in August 2021 and was completed by April 2023.

**Table 1**

*Number of E-course registrants overall relative to survey and course completion*

Year of E-course	# Registrants	# of completed Entrance surveys	# of completed Exit surveys	Course completion
1 - 2021/22 (2 x E-course)	94	38	29	45
2 - 2022/23 (2 x E-course)	104	22	23	45
Totals	198	60	52	90

With time and budgetary constraints, we completed an in-depth comparative analysis of the quantitative data sets from both years of the survey and a thematic analysis of quali-

tative responses. The authors implemented a form of interaction analysis, reviewing data collaboratively first in pairs and then as a team to minimize biases and confirm themes (Jordan and Henderson, 1995).

## **Findings of the Study**

In response to our research questions, the survey data provided an overview of the experiences of participants in the E-course, and reflections shed light on the potential impacts of the E-Course on participants.

### **Recruitment and Geographic Distribution**

Having a diverse geographical representation of course participants was important to offer collective comparisons and connections across Canada. The first year, we had over 260 indications of interest for 100 spaces in two E-course sections, demonstrating significant interest in the online course. The first year, 94 preservice teachers participated in two sections of the E-course from 17 different institutions across four provinces. The second year, 104 preservice teachers registered in two sections of the E-course, coming from 28 different Canadian institutions offering PTE, spread out over six provinces. As shown in Table 2, from the first to second years, there was greater institutional representation in every region except for the Nova Scotia. We attributed these increases and diversity to better promotion for the E-course in these provinces, both through our networks and potentially word of mouth from past participants.

### **Social Demographics of Preservice Teachers**

A large majority of year 1 and year 2 survey respondents were registered in PTE programs (approximately 85%, depending on the year), as opposed to early childhood education or graduate teacher education programs. In both years, approximately 60% wanted to teach at the K-8 level with the remainder to teach at intermediate or senior levels. Respondents ranged in age from 21-50 years old, with approximately 70% being between 21-30 years old. Approximately 78% of respondents identified as female, with far fewer identifying as male and non-binary. Most survey respondents identified as being of Euro-

pean descent or “white” (around 60%), but other ethnicities (i.e. Indigenous; biracial/multiracial; Asian; Black) were also indicated. The vast majority (approximately 90%) of entrance survey respondents identified English as their primary language, with approximately 10% citing French or “other” as primary languages.

**Table 2**

*Number of E-Course participants by year, province, and PTE Institution<sup>2</sup>*

<b>By Province: Numbers of Participants (Institutions)</b>	<b>Year 1</b>	<b>Year 2</b>	<b>Totals</b>
British Columbia	0	4 (4)	4 (4)
Alberta	32 (4)	23 (8)	55 (8)
Saskatchewan	0	4 (1)	4 (1)
Manitoba	4 (1)	17 (4)	21 (3)
Ontario	50 (9)	51 (9)	101 (11)
Nova Scotia	8 (3)	5 (2)	13 (4)
Total	94 (17)	104 (28)	198 (31)

## **ESE Knowledge, Background, and Interests**

Perhaps not surprisingly, survey respondents came to this E-course with an intermediate to significant level of knowledge and concerns about environmental issues (likely what drew them to the E-course in the first place). They identified being most knowledgeable about climate change, followed by pollution, water, and waste issues. However, many had little background or sense of self-efficacy in the application of their knowledge about environmental issues in educational contexts. Significantly, survey respondents stated that their K-12 education was not a source of their learning about climate change or environmental issues, and most learned about it through independent study, postsecondary education, or community-based activities. As for their preferred format for learning, most survey respondents preferred learning about ESE through outdoor or community-based experiences.

<sup>2</sup> No preservice teachers participated in the E-course from Quebec, PEI, New Brunswick, nor the territories of Yukon, Nunavut or Northwest Territories.

Finally, they were motivated to take the course by both a practical concern to be better equipped to integrate ESE and Indigenous perspectives into their future teaching and by broader concerns around the wellbeing of the environment and the future for children.

## **Preservice Teachers' Experiences of the E-Course**

Analyzing preservice teachers' participation and completion rates for the E-course, along with their exit survey responses, provided a glimpse into their experiences and the course's potential impacts. We drew insights through analyzing comparative course participation, quality of learning, and in particular, their expression of preparedness and desire to teach with and for ESE. The majority of those who completed the exit survey (74%) noted that they could not access a similar type of learning in their PTE programs, which confirmed the importance for this type of online offering in ESE at that time. E-course participants and E-course leaders alike indicated that the intentional and integrated themes of Indigenous ways of knowing, place-based education, and inquiry-based learning, woven throughout the course, were especially impactful on their learning and sense of self as ESE educators, as individuals and as a community.

### **Course Participation and Completion**

Course completion, defined as attending seven of the eight synchronous sessions and completing the asynchronous learning tasks, was rewarded with an E-course completion certificate. Of the 94 preservice teachers who registered for the E-course in year 1, 48% fully completed it, and 52% partially completed it. In the second offering of the course with 104 students enrolled, these numbers shifted slightly to 42% full completion and 58% partial completion. As the asynchronous workload required for completion had decreased in year 2, this was likely not a factor in its lower full completion rate; however, the late pandemic re-opening of in-person learning and community involvement were often cited as mitigating factors to preservice teacher retention. This analysis shed light on the lived realities of preservice teachers, and their desire to participate in such learning opportunities, which can be impacted by externalities and responsibilities.

## Quality of Learning

Nearly all exit survey respondents agreed that the E-course met their expectations and was a valuable learning experience (96% of respondents in year 1, 100% in year 2). A strong majority of respondents noted improvements in their understanding of a range of topics, including sustainability issues, ESE in K-12 practice and pedagogy, nature-based learning, Indigenous education, and ecojustice education. Along with ESE content knowledge and pedagogy enhancements, they identified the most valuable parts of the E-course as having access to ESE experts, having synchronous class meetings, connecting with fellow preservice teachers, and learning through their inquiry projects and readings. Many of the E-course participants indicated that the scaffolded nature of the inquiry project, as well as it being directed by their own community-based interests, made it feel more accessible to them. Furthermore, several indicated that the process we modelled and led made it feel very possible to recreate with their own future students.

## Sense of Preparedness to Teach ESE

Perhaps one of the most salient findings from the exit surveys was that many survey respondents agreed that the E-course helped to prepare them to teach ESE in future (97% in year 1, 96% in year 2) and had *strengthened their desire to teach about and for ESE*. The vast majority declared this to be a valuable learning experience that had met their overall expectations. Several survey respondents drew connections to the gap that the E-course filled in their preservice programs. Responding to the question of how they had been able to integrate any of the E-course learnings into their home courses and practicum during and immediately after the course, one respondent shared:

I chose ESE-related topics for class presentations and papers where we had free choice in topic. My program offers no courses on ESE, and these topics were not covered in any of my classes otherwise.

In the course delivery, the intention was that the various themes would be seen as integrated and interwoven, and that student environmental inquiry would also be framed as a mode of reconciliation (Anderson et al., 2017). Some commented on their nascent sense of self-efficacy to facilitate inquiry-based pedagogy and integrate Indigenous knowledge in their own teaching, as indicated by one respondent:

The Indigenous/Two-Eyed Seeing class and my inquiry project prompted me to re-examine the science unit I was teaching in practicum on water to see how I could integrate Indigenous ways of knowing about water into my lessons. I also looked at ways of integrating Indigenous ways of knowing into my geography lessons on my second practicum placement.

For many students, this course represented a support mechanism for their own eco-anxiety and that of their peers. As one respondent described, they became advocates and agents of change for ESE in their home institutions:

I embedded aspects of learning from the ESE course into the [preservice] ed program by shaping project and research choices to align with an ESE stream. Many of the ESE readings and resources transferred to ed program projects. Most notably I was able to introduce themes of hope and agency into ESE discussions as they arose in the ed program lectures. I...[gained]... clarity about Inquiry based learning from this ESE E-course.

The increased awareness and understanding of ecojustice education ranked generally third across respondents, after inquiry-based learning and Indigenous ways of knowing, as valuable to their learning through the course. All indicated that this approach was currently lacking in their current PTE programs. An unexpected but noteworthy impact of the course planning and delivery was a clear increase in a sense of hope and agency for both preservice educators and researchers, knowing that preservice teachers were keen across the country to engage in ESE beyond the scope of their PTE programs. This was indicated multiple times, at the end of E-course meetings, and in team discussions related to this study. For facilitators, the persistence, presence, and humility displayed by our course participants was continually gratifying.

## **Discussion**

Having run the ESE E-course multiple times since its inception in 2021, we can now reflect on the experiences of course participants and identify insights and lessons learned about delivering online learning for preservice teachers in ESE. At the outset, our team

was uncertain that there would be sufficient numbers of preservice teachers interested in taking an ESE E-course to justify the time and effort put into its development, despite the eco-ethical imperative to do so based on the gap in PTE programs across Canada. While research indicated a need for an E-course such as this (Kool et al., 2021), and that providing equitable access to learning in ESE and ecojustice should be a part of PTE (Allan et al., 2018; Elliott, 2023; Martusewicz et al., 2020; Tuck et al., 2014), we were not sure that preservice teachers would be willing or able to make the time commitment required for this critical learning. That our efforts were rewarded in terms of high registration and participation in the first two years was a relief and source of hope.

Findings show that although the course participant survey respondents were very satisfied with their experiences in this ESE E-course, access to ESE is inequitable across the country. This desire and level of satisfaction aligns with research on the need to expand access to ESE for all levels of learning (Elliott, 2023; Evans et al., 2017; Karrow et al., 2020). Survey respondents highlighted the deeper learning and connections they made through the course between environmental learning, equity, inclusion, social justice, and ecojustice, which many scholars argue should be mandatory learning in the 21st century (Tuck et al., 2014; Martusewicz et al., 2020). The respondents across four sections of the E-course were in unanimous agreement that involvement in the E-course improved their understanding of Indigenous education and ecojustice education; this aligns with our original intentions when designing the E-course and with scholars who have advocated for these to be at the heart of ESE (Anderson et al., 2017; Martusewicz et al., 2020; Tuck et al., 2014). All respondents agreed that the E-course was a valuable learning experience that improved their understanding of environmental issues and the range of ESE pedagogies teachers can employ to both cover content and develop student skills. From socio-critical and place-based perspectives, the positionality of the teacher may be integral to learner agency development in addressing socio-environmental issues, whether or not the course is in-person or virtual (Corres Gallardo & Ruiz-Mallén, 2023; Elliott et al., 2020; Yemini et al., 2023). Perhaps most importantly, the respondents agreed that their participation in the E-course had positive impacts by preparing them to teach ESE in future and strengthening both their desire to teach and sense of hopefulness about ESE, as supported by Kanu (2016) and Ojala (2016).

From a socio-critical approach, the demographics of the preservice teachers who chose to participate in the E-course was important, which skewed towards white,

Anglophone, and female; not surprisingly, the age, gender distribution, and racial identities appear to be similar to the demographics of preservice teachers in our respective PTE programs. We agree with Allan et al. (2018), Martusewicz et al. (2020) and Piquemal (2017) that attracting participants from a wider range of backgrounds and identities that represent the diversity of the Canadian population is highly desirable, albeit more complex. The course had a registration fee of \$50 in year 1 and \$75 in year 2; however, students had the option to privately indicate their need for a bursary to the course facilitator, of which less than 10 were requested and granted over two years. We noted that the Saturday section involved more older students with many indicating family responsibilities. As course developers, we acknowledge the limitations for the course, particularly its socio-economic and gendered burdens. We became explicitly mindful of barriers to participation, and we tried to accommodate through financial bursaries as well as the timing variation of course sections.

A notable absence in the demographics of the E-course representation was from Quebec institutions offering PTE programs. This finding is disappointing, yet understandable, as the E-course was offered primarily in English with some French-language supports. Francophone preservice teachers from outside Quebec did enroll from the Université de St. Boniface and from bilingual programs such as the University of Ottawa. For francophones living in minority contexts and for other linguistic minorities, as context-appropriate resources in French or other languages are limited, choosing to access English-language learning opportunities is common (Sims & Desmarais, 2020; 2023). However, English-only provision runs counter to our goals of offering equitable access to this learning, and ideally we would find capacity and/or partnership for French-language delivery.

We were also about offering small-scale sections (each capped at 50 students) to learners across the country, which is a very different approach than the high enrollment numbers associated with Massive Open Online Courses (MOOCs). As the 42-60% completion rate of the ESE E-courses reported here was far higher than for MOOCs, which typically have between a 7-10% completion rate (Duncan et al., 2022), small online synchronous courses offer a potential alternative delivery model to MOOCs. This E-course addresses many of the challenges to retention identified in MOOC research, such as the lack of clarity around the intentionality of participants, planned real-time interactive activities, and social network building (Celik & Cagiltay, 2024). Building on Allan et al. (2018), Kimmerer (2013), Ansloos (2017), and Beeman and Sims' (2019) work around

the importance of relationship-building in ESE, the preservice teachers who participated in the E-course were seeking and valuing opportunities to make connections with like-minded educators across Canada. In this sense, this course supports ecojustice education within the broader sphere of PTE – creating opportunities for community- and agency-building around localized and place-based environmental inquiries.

Ecojustice pedagogies offer critical ways forward in sustainability (Lin et al., 2023). As teacher educators, we know that peer-to-peer discussions and storytelling can be valuable ways to deepen learning and prompt high quality inquiry, as well as to potentially embody decolonizing practices. As course facilitators, we modelled a socio-critical approach of localized expertise, encouraging students to draw on their own life and teaching experiences to deepen their learning and that of the course community. The focus on building relationships enabled course participants to create their own supportive communities with their peers and with guest speakers, along with nature in their local communities through their Nature as First Teacher journals and environmental inquiry projects. Research has shown these to be effective strategies to mitigate eco-anxiety and to support the on-going implementation of work in ESE (Sims et al., 2020). Here, we recognize that this course offered initial steps. These kinds of decolonizing and ecojustice-oriented relationships and ways of teaching and learning need to be on-going and sustained.

## **Insights and Implications**

The field of ESE is as rich as any in which to explore the learning expectations and outcomes of online course development and delivery for course leaders and students alike (Evans et al., 2027; Field et al., 2024a). Based on Field et al.'s (2024b) national report, we believe that this might be the first offering of its kind in any discipline that has engaged preservice teachers from multiple PTE programs in Canada. The data in this study leads to the insight that a national E-course can be offered successfully across faculties of education. Small scale E-courses offer a viable alternative to MOOCs as a form of online learning in ESE as they can provide impactful learning that helps to develop preservice teachers' sense of confidence in being ready to teach with and for ESE. It is possible that the openness and participation-driven model facilitated a high rate of retention and engagement. This is worth future consideration.

Despite the challenges that working in geographically diverse communities and across time zones entailed, the national scope of this E-course created some unique opportunities to deepen collaborative learning and build community for preservice teachers, and also for faculty and educators involved in ESE across the country. It was a valuable opportunity to develop and facilitate this E-course for the course development team. As academics and community educators, we learned an enormous amount from working collaboratively, and perhaps more importantly, we extended our own sense of belonging to the community of ESE scholars, which fed into our own desire for hopeful action in the face of crisis (Ojala, 2016; Sims et al., 2020; Thunberg, 2018). The layering and integration of expertise and voices was richer and more locally-relevant in a country as vast as Canada because of this collaborative development process. It enabled us to break down, to some extent, the traditional silos typically in place between PTE programs, and draw from each other's expertise and experience in rewarding ways.

We realize that, as an introductory ESE course, we were able to weave Indigenizing into the curriculum, pedagogies and practices; however, we were less able to offer a decolonizing focus. Via guest speakers, videos, and pedagogies, we tried to integrate and highlight Indigenous content, pedagogies, and voices in meaningful ways, but we do not pretend to have been able to take a deep dive into decolonizing, which would involve a much more robust focus on colonization and racism. While there was some explicit talk about racism and privilege, we are not sure how much students took away from those discussions in the immediate or long term.

There was excellent feedback on the E-course in its pilot year that led to salient changes in the second year of delivery. Participants commented that they would prefer fewer readings, less asynchronous work, and more time for group discussions, which were reasonable requests given the voluntary nature of their participation and their burgeoning responsibilities beyond the scope of their studies. Analyzing the data from both years of the study, along with reflections by the development team (Milligan, 2016) provided several lessons learned to share with others who might like to develop similar types of national E-courses in future. These lessons learned include the following themes related to course participant geographic representation, improving retention rates and how ESE may be positioned in Faculties of Education.

*Enabling greater regional representation and diversity of preservice teachers:*  
Ensuring that an E-course is widely publicized in English and French in all regions can

better balance geographic representation. Geographic representation helps students compare diverse local social and ecological realities; for example, delving into local Indigenous knowledges and contexts brought forth regional stories of water quality, fishing rights, and pipeline access points. It follows that targeted promotion to encourage greater participation from preservice teachers in equity-seeking groups is needed to diversify the sharing of diverse stories (Allan et al., 2018; ACDE, 2010; Dei, 2005; Fawcett & Johnson, 2019; Kanu, 2016). Offering a French version of the E-course would be helpful to improve equitable access for francophones. In the future, promoting the course to diverse communities directly, highlighting the connections made between ESE and social justice issues, and assuring that financial circumstances can be accommodated may all prove supportive of these goals.

*Improving retention rates:* Despite shortening the course sessions (from 2 hours to 90 minutes each) and decreasing the number of asynchronous tasks, participant retention remained a challenge. We wonder, in spite of the changes, if this was because of our collective lives becoming more active outside our homes again after periods of pandemic lock-down. Indeed, some preservice teachers who withdrew from the course in the winter term indicated that, regrettably, the additional demands on their time and energy proved too much to continue E-course participation. Acknowledging the socio-cultural burden of family care that increased particularly for women during the pandemic, we might also consider how this course could be adapted to the time limitations of our majority female-identifying registrants (Dinella et al, 2023).

*Positioning ESE in faculties of education in Canada:* As with Field et al.'s (2024b) study, survey results from the preservice teachers reveal that ESE is perceived as extracurricular in many PTE programs, suggesting that ESE is not important enough to be in core courses. Thus, further outreach is needed to centre ESE as core learning in PTE programs across the country, as recommended by the ACDE's (2022) *Accord on Education for a Sustainable Future* and the Ontario College of Teachers (2023).

We acknowledge the limitations of this type of course in de-centering humans, as higher education traditions have been considered deeply embedded in Anthropocentrism (Lin et al, 2023). Further, the online learning platform, while offering many opportunities, can also be a site of isolation. While we attempted to fill a gap in teacher education in Canada, we realize we do not know the impacts, positive and negative, in the long term of such a course.

## Concluding Comments

The lessons learned through the implementation of these E-courses, as well as this research study, have already been enacted in a new iteration of the E-course offered in 2024-25. Funded by a grant from Environment and Climate Canada, the Accelerating Climate Change Education in Teacher Education project convened a panel of experts to design a new E-course more firmly embedded in ecojustice education. Each session is facilitated by an expert in climate justice education working in collaboration with an Indigenous educator, allowing for a more fulsome discussion of ESE considering decolonization, reciprocity, and regeneration. By accepting both preservice and in-service teachers, different levels of experiences and expertise co-mingle, making the E-course rich in content and inspiring for both learners and facilitators alike.

As we face an uncertain future for humanity and all life on the planet, it can be challenging to remain hopeful, but it is now well understood that socio-environmental action is the best way to generate a sense of hope. As Thunberg (2018) states in her TEDTalk, “once we start to act, hope is everywhere.” Indeed, the climate crisis has been described as the most important public health threat of our times (Watts et al., 2015), causing people to experience distressing emotions, including eco anxiety (Sims et al., 2020) and climate grief. By engaging in the development and delivery of this E-course, we saw emerging evidence that participating preservice teachers became more aware of ecojustice education, more hopeful, and both inquiry- and action-oriented, with a growing confidence that they can address the climate crisis and environmental and ecojustice education issues in their future professional practice. As teacher educators, we have learned an enormous amount about the commitment and resilience of these preservice teachers in ESE, and based on these initial experiences in these E-courses, we will continue to develop and deepen opportunities for online learning in ESE in our own institutions and as a collective.

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