

Chapter 15

A Direction for Outdoor and Environmental Education: Assessing and Addressing UNECE Capacities for Preservice Teachers



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Brock University, with a main campus in St. Catharines and a satellite campus in Hamilton, Ontario, has the luxury of proximity to a variety of natural spaces and urban communities. An Outdoor and Environmental Education (O/EE) course has been available at the university for nearly a quarter-century, engaging preservice teachers in environmental education (EE) policy, pedagogy, and practice. This chapter shares the history, development, delivery, and outcomes of the O/EE course. We evaluate some EE approaches and outcomes from previous versions of the course in order to propose some potential improvements for future iterations of the course. We analyse some of our current practices using UNESCO-developed competencies for educators in education for sustainable development (ESD), through the competency categorisations of *Learning to know*, *Learning to do*, *Learning to live together*, and *Learning to be* (UNECE 2012). Examining our O/EE programme in relation to Karrow et al.'s (2016) work may help align our O/EE course with internationally recognised competencies centred on sustainable development, as well as other approaches to EE. It is our hope that in doing so, the course will continue to increase in relevancy and meaningfulness within the context of initial teacher education, while possibly elevating its status and credibility within provincial, national, and international contexts. In so doing, we offer a reimagining of our O/EE course as well as a critique of why we have selected this framework.

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The UNECE competencies are relevant to, and designed for, courses such as our O/EE course. The competencies are descriptors of general practices teachers should be engaged in to enact ESD. These competencies were developed in 2009 during several workshops involving the UNECE Steering Committee on Education for Sustainable Development. The Expert Group included EE scholars, government officials, and experts from international and nongovernmental organisations. These core competencies, as defined by UNECE (2012), include:

- Learning to know: The educator understands the urgent need for change from unsustainable practices towards advancing quality of life, equity, solidarity, and environmental sustainability.
- Learning to do: The educator is able to communicate a sense of urgency for change and inspire hope.
- Learning to be: The educator is someone who is willing to take considered action even in situations of uncertainty.
- Learning to live together: The educator works with others in ways that facilitate the emergence of new worldviews that address sustainable development (pp. 14–15).

From this example, we can identify themes related to understanding sustainable development problems and pedagogy, communicating the importance of changing existing unsustainable practices, and taking action, individually and with others to enact change. However, these competencies do not directly reference past or current unsustainable human development practices that require change, such as capitalism, colonialism, or overconsumption, to name a few (Kanemoto and Moran 2017). There is, however, some acknowledgement of these unsustainable practices in the more detailed section on the *Envisioning Change* area of competencies, stating “our world is characterized by massive inequality, with millions living in poverty while others engage in unsustainable use of the planet’s resources exceeding the carrying capacity of natural systems and hence compromising their regenerative capacities” (UNECE 2012, p. 17).

The competencies are further grouped according to three characteristics of ESD, again as defined by UNECE (2012): *A Holistic Approach* (integrative thinking and practice); *Envisioning Change* (past, present, and future); and *Achieve Transformation* (people, pedagogy, and education systems). These groupings illuminate linkages between teaching competencies and ESD perspectives.

There has been some critique of the concept of ESD, in relation to other approaches to EE, such as environmental sustainability education (ESE) or EcoJustice Education (EJE), among others. The notion of sustainable development is contentious because we might consider questions such as, Development for whom and when?. In their works, scholars such as Orr (2004), Sauvé (2005), Pedretti and Nazir (2011), and Martusewicz et al. (2015) offer various critiques of the limitations of ESD, but each shares a concern that an ultimate prioritisation of human development is not holistic to the needs of our planet and, thus, destined to fail. Having said this, we see the UNECE (2012) competencies as a starting point towards the pragmatic development of O/EE programming that can become more mainstream in

schools and universities, thus establishing O/EE discourses in these institutions due to a correspondence with established UN policy. Further, evolution of these programmes may address many of the potential shortcomings of ESD. However, O/EE programmes need to be established and sustained for this work to be achievable. It is in this regard that we see value in the UNECE (2012) teacher competencies.

As mentioned earlier, we are building on a chapter published by Karrow et al. (2016) that explains the distinction between what preservice teachers bring into their teacher education programmes in terms of their histories, identities, and life experiences and what is possible to nurture in them through their programme. UNECE (2012) states that “As many educators form their views about what it means to be an educator during initial teacher education, this is a critical area for action” (p. 10). Finally, it can be argued that there are few other frameworks with the global reach of these types of recommendations.

15.1 History and Context of the Course

The O/EE course in the Department of Teacher Education at Brock University has a long tradition. In fact, Dr. Doug Karrow inherited the course 15 years ago from his predecessor. Instrumental in its design and implementation, the instructor initially faced general opposition to the course’s development and implementation at the time. It has been understood that many early members of Brock University’s Department of Teacher Education did not feel that “outdoor/environmental education” was essential in teacher education. Nevertheless, the Faculty continued to offer the course at two campuses, primarily because of the determination and perseverance of the course founder and our ability to overcome ongoing challenges in maintaining the course. At the time of this writing, we have official support for offering the course and enough enrolment to offer an optional section at each campus, open to all Primary, Junior, and Intermediate (P/J/I) preservice teachers. Furthermore, an “elective” version of the course (one of four required by all Intermediate/Senior students) is now being offered. However, in this chapter, we focus on the P/J/I course only. As an optional course, preservice teachers may consider taking this O/EE course in addition to their regular credit course load. It has been taught in various modes, both as a regular term course (10 week, 2 h/day) and as an intense-delivery (3 day, 6 h/day) course. Currently, the course is offered over three Saturdays, 6 h each week, for 18 h total, and retains its credit weight both on and off campus.

As instructors, we share our current practices from the course, with each of us focusing on a foundational EE approach. We have been continually amazed at the high quality of student work. In general, student participation in the course was thought to be higher than average, and despite myriad other programme and personal commitments, student attendance was very high, perhaps reflecting students’ motivation for, and engagement with, the course content. The course includes

numerous core and supplementary activities, implemented to achieve the learning goals, including:

- Community/nature walks
- Sense of place and being assignment
- Community inquiry action plan assignment
- Building a birdhouse
- Stream study
- Community mapping
- Food justice workshop with family images
- Environmental art workshop
- A sensory walk
- Reviewing and sharing perspectives on related academic and practitioner articles

As instructors, each of us reflects on one of these activities, evaluating its successes and challenges in relation to O/EE course outcomes and UNECE teaching competencies. We believe it is important that any programme of study undergoes such ongoing review, to remain relevant in the context of emerging research and pedagogy.

15.1.1 Doug Karrow's Reflection

In what follows, I give some context to my delivery of the course and focus on one particular learning activity I developed upon inheriting the course. I should add, when I was originally hired by Brock University, my primary appointment was in science education. However, because my predecessor also taught the optional O/EE course, by way of tradition and convenience, I too assumed instructional responsibility over it.

The course, at the time, consisted of a variety of topics delivered at a local outdoor education centre owned and operated by the local board of education. I had the opportunity to observe the delivery of this course and discovered the course to be primarily oriented towards “practice”. When I took it on, I reconceptualised the course syllabus, aiming to balance current O/EE theory with practice. I have tried to strike a balance between learning activities situated in the outdoors and those EE activities that may occur indoors. *A caveat:* While I did have a strong academic and teaching background in science education, the same cannot be said for O/EE. This course has been a growing experience for me as much as it has been for my preservice teachers.

When I first conceptualised the course, its theoretical backbone was founded on Sauvé's (2005) “Currents of Environmental Education: Mapping a Complex and Evolving Pedagogical Field”. Sauvé provided a concise summary of the major philosophical movements of O/EE and their pedagogical approaches. A central tenet of

the course has been ecological literacy, possessing the knowledge, skills, and dispositions (attitudes) *in, for, and about* the environment (OME 2009). While these were recognised at the time I took over the course, their explicit consideration was rather superficial. The current exercise intends to examine just what internationally recognised preservice teacher EE competencies (knowledge, skills, and dispositions) might consist of and how these learning outcomes might be observed and assessed. At the time I took over the course, central concepts such as sustainability, interconnectedness, and interdependence transcended all course topics, which in turn were derived from Sauvé's EE "currents".

My most recent delivery of the course had two major assignments: (a) developing a sense of place and being and (b) an outdoor/environmental education action plan (see Inwood and Jagger 2014, p. 41). The first assignment is the focus here. It represents a personal line of inquiry for me as an early academic as I was successful in carving out a modest research agenda around it. From the students' perspective, and that of their instructor, I quickly discovered the experience to be truly transformative, in the sense that it required preservice teachers to question their relationship with *place* and its complex association with *being* (Malpas 2006). Through the experience, many students began to question many of their perceptions, assumptions, and understandings of their relationship with the natural world. Some even began to question their beliefs about teaching, learning, curriculum, and the milieu of K–12 education (Schwab 1969). These were unintended consequences of an activity I simply wished to expose them to, in hope they might begin to expand ontologically through the exercise of a phenomenological encounter. The following is an excerpt of a description of the activity contributed to Inwood and Jagger's (2014) *DEEPER* publication:

Early during the term, teacher candidates are taken on a field trip to a natural setting, e.g., Spencer Falls, one of many beautiful waterfalls along the Niagara Escarpment. We hike along the Bruce Trail, examining some of its geological, biological, and ecological features. Teacher candidates are surprised and amazed such beauty can be found so close to the industrial heartland of Canada. This activity requires they focus intently on a natural entity, such as a tree, insect, or river, developing what is referred to as a phenomenological stance. They are invited to describe the entity using as many of the senses as possible and record these descriptions in written, audio, and embodied forms, sharing narratives, poems, artworks, and even choreographies as a way to reflect deeply about this encounter with another natural entity (Kentel and Karrow 2007, p. 93).

Later in the term, preservice teachers share their developing senses of place and being with their classmates. For many, this is a challenging experience, requiring them to interrogate how they come to know, how their interpretive and perceptual frameworks shape their understandings and experiences, and ultimately who they are as human beings.

At the end of the term, preservice teachers are required to share their Developing Sense of Place and Being presentations with their peers. As part of this they are required to step back and ask how it is they came to understand and know their entity and what assumptions they had about it initially. How did they come to be attracted to their natural entity and what remains mysterious about it? They are asked to consider the interpretive frameworks at play in their understandings, and come to appreciate that they have multiple ways of knowing at their disposal, and that they affect who they are as human beings. (p. 41)

I have observed the experience for many students to be profound on many levels. It is not uncommon for preservice teachers to experience strong emotional responses as a result of this activity. Some even begin to question the all too common preoccupation with the technical aspects of teaching, learning, and curriculum, prescient and foremost in the minds of novice teacher candidates. Also, many preservice teachers develop lasting friendships and begin to appreciate a more poetic way of being in place.

Much of what is described here connects to the core competencies of *Learning to do* and *Learning to know*, both of which ask for educators to understand “why there is a need to transform the way we educate/learn” as well as “the importance of building on the experience of learners as a basis for transformation”, and *Learning to be* a “critically reflective practitioner” (UNECE 2012, pp. 14–15). Since this requires preservice teachers to literally move out of a position of comfort and familiarity, the exercise, for some, is fraught with apprehension, uncertainty, and frustration. True to any phenomenological encounter, this exercise makes the “familiar” become unfamiliar. In this sense, it can be challenging for preservice teachers to persevere; it can also be challenging for the instructor to remain true to the activity and not placate student doubts by acquiescing on the requirements of the activity.

15.1.2 Darren Hoeg’s Reflection

In the Spring of 2015, I taught the O/EE course at Brock University’s St. Catharines campus. I used the facilities at an outdoor education centre owned and managed by the local public school board, so students could learn about the conservation of birds and to build birdhouses. This is a standard EE activity for local school-aged children who visit the outdoor centre with teachers. It could be considered a “rich” activity because the teaching and learning involved in building birdhouses incorporates the three characteristics of ESD, and requires of the teacher most, if not all, of the competencies for sustainable development outlined in UNECE (2012).

This birdhouse building activity started with a presentation about the need to conserve various forms of wildlife in the Niagara region, focusing especially on bluebirds. This required me to become knowledgeable about conservation in the area, for competency in *Learning to know* (UNECE 2012). In Ontario, several bird species are endangered, including the Acadian flycatcher, various species of Warblers and owls, and several species of predatory birds, such as the golden eagle (Ontario Ministry of Natural Resources and Forestry 2019). The primary reason for declining bird populations is habitat loss. Although the birdhouses students build may become home to any number of bird species, they specifically target the Eastern bluebird by making the entry of the house a certain size. Conservation of the Eastern bluebird, a cherished bird for birdwatchers across its range, has been an ongoing endeavour since the 1950s in Ontario (Ontario Eastern Bluebird Society n.d.). Eastern bluebirds are seen as worthy of conservation because of these birds’ inherent qualities and characteristics, rather than for utilitarian benefits they may have for

humans (Ontario Eastern Bluebird Society n.d.). “The potential of this activity to foster such orientations is one of the primary reasons teachers choose to do this with students” (B. Murphy, personal communication, May 17, 2015). This rationale represents a competency of the educator to “envision change”, which UNECE (2012) describes as a feature of ESD, a programme “which explores alternative futures, learns from the past and inspires engagement in the present” (p. 13).

Well-managed predator-proof nest boxes (birdhouses) provide a means for Eastern bluebird populations to be successful, making this activity a favourite among outdoor educators in the region. By engaging students in the process of building habitats for Eastern bluebirds with other conservationists in Ontario, this activity can be seen as exemplifying a *Learning to live together* teacher competency (UNECE 2012). Since this was one of the first outdoor education experiences I planned and implemented as an instructor, there was also a large emphasis on *Learning to do* outdoor education for me (UNECE 2012). To build nest boxes, I had to teach students about lumber selection, using tools, and how to fasten materials (nails, screws), cut boards to proper shapes and sizes, and then assemble the birdhouses. The building process requires integrative practices and perspectives from diverse disciplines such as engineering, design, and biology/ecology, a characteristic of a “holistic approach” to ESD (UNECE 2012). For many students, this was the first time working with building materials, and the various disciplines and skills integrated in this activity made assembling the birdhouses challenging.

Student reflections after constructing their birdhouses indicated initial stages of affective responses to the bluebirds that would soon be living in their new houses. Students commented on being excited to be able to provide the birds a place to live, that they had never done anything like that (building birdhouses) before, and that they were excited to see who (what birds) might end up living in the birdhouse. I view these responses as evidence of students beginning to foster an affective connection with nature—an experience in which they start to be able to *envision change*.

This activity also had an enduring influence on some students. As birds start using the houses students erect around their own homes, there exists the possibility of experiencing joy and wonder from watching the behaviour of the birds, how their habits change with the seasons, and seeing mother, with new chicks, emerge from the birdhouse after a period of inactivity. For example, 2 years after the course was completed, a student mentioned to me the birdhouse he built was still supporting bird families. The student described a powerful impact the birdhouse had on his family’s life and that his family members watch as the birds come and go, raise families, and leave. The student demonstrated a real sense of care and concern for the well-being of the birds, and the student suggested that these feelings became extended to the environment as a whole.

The enduring learning that results from this activity is evidence of *achieving transformation* of “the way students learn and in the systems that support that learning” (UNECE 2012). The relationships with nature described by the student above are not only a desired but also an ideal outcome of O/EE (Orr 2004), which suggest the potential for conservation education to contribute to sustainable human interactions with nature. Such experiences provide a context for the development of in/corporeal experiences with nature (Alsop 2011), based on emotional or spiritual

relationships with the living organisms involved—in this case, Eastern bluebirds. These relationships may transcend more analytical types of relationships, such as those stemming from science education—relationships more commonly associated with merely empirical observations of nature (Aikenhead and Ogawa 2007).

When I was in the early stages of designing the O/EE course, I was hesitant to include the birdhouse activity because its most obvious educational values first appeared to be more closely related to design than outdoor education. Upon reflection, however, I recognise its potential to foster deeper relationships with nature among students. Indeed, building a birdhouse may be an ideal outdoor education experience because it can provide an ongoing interaction with nature, as opposed to the brief interactions more typical of organised and/or institutionalised outdoor education courses.

15.1.3 Erin Sperling's Reflection

For me, the *Sense of Place and Being* activity, as described in detail by Doug Karrow, was also the most impactful and transformative activity in our O/EE course, both for my students and myself as an instructor. Fig. 15.1 is a visual representation

Layer 4: Representation - How
do I share it with others?

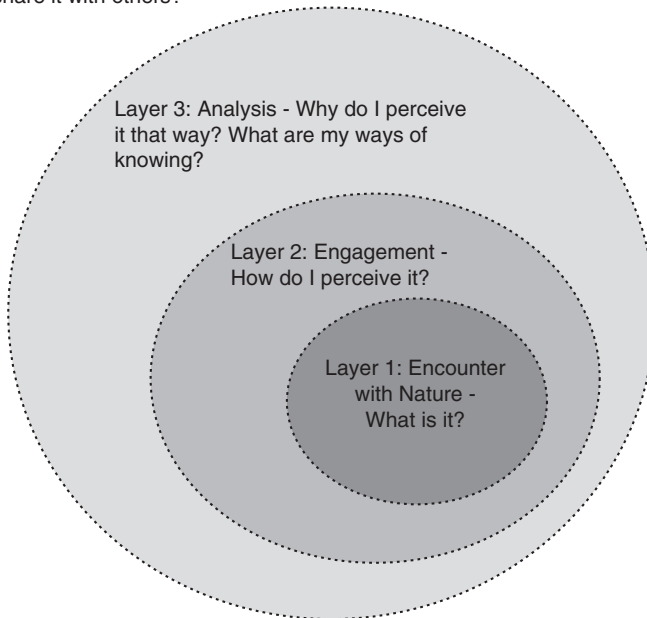


Fig. 15.1 A visual representation of the layers of the *Sense of Place and Being* assignment in an O/EE course for teacher candidates

of the layers of the assignment as I presented it to students. The particular focus of Layer 4 – Representation is highlighted here.

Because of the multilayered approach of this assignment, it required a span of time, a degree of reflection, and a slower pace than “usual” course assignments. The third layer, which called for an analysis of perceptions and influences, was a clear moment for students in their learning process. Many students commented that they had never been given a chance to think “that way” about the world and their connections to it. The metacognitive aspect, which is certainly growing in mainstream education circles these days, is still new to many learners (McCormick 2003). Even while they may have a theoretical understanding of thinking about their thinking, they had not had a chance to practise it in their own learning. So, many of them said that regardless of their discipline or subject area, they would find a way of integrating this activity into their teaching practice. They also commented that the requirement of this assignment was a “mind-opening” experience. There was also much reflection, both in writing and in oral presentations, that the act of doing the assignment was “restorative”, having the requirement to *be* in place, rather than rushing around and producing documentation of knowing.

The opportunity to model and offer moments of restoration is important in our work as environmental educators. Not surprisingly, research has shown a direct link between metacognition and “desirable” EE outcomes (Schraw et al. 2012). In addition, this form of learning is aligned with a *holistic* trait of the *Learning to know* competency (UNECE 2012). The intensity and urgency of the material we are teaching in, about, and for the environment can be daunting and invoke a sense of hopelessness. By giving our students time to pause, reset, and restore, we are helping them renew their energy and passion and giving them permission to just “be” and to rebuild hopefulness while removed from the immediate threatening burden of solving global problems (Orr 2005). This also connects to *Learning to live together*, growing towards the trait of *transformation*, where the educator may help learners clarify their own and others’ worldviews through dialogue and recognise that alternative frameworks exist. Furthermore, as per layer 4, many students created reflective products connected to family and community, noting that their environmental connections were not just personal. This resonates with the *Learning to live together* competency category, most notably from the *holistic* approach of actively engaging different groups across generations, cultures, places, and disciplines.

In our O/EE course, I felt grounded while facilitating this assignment, making it a transformative experience for me as an educator. I perceived that the students felt that their experiences and voices were being valued and respected. This was, in fact, my intention. Therefore, I had a sense that they were pushing their own personal boundaries, entering uncomfortable spaces, deconstructing their worldviews, and finding ways of expressing peace in the process. They had full reign of how they would represent their *Sense of Place and Being*, and, through the fourth layer of the assignment, they created pieces of art to share with the class. Many of my students claimed they had not had an opportunity to create this type of work. One student wrote and recited a poem she had written, explaining that she had never written

poetry before (outside of a required school project) and that the act of writing the poem allowed her to process some feelings about her time in a remote Northern community, which she had not taken time to do previously; thus, the process was cathartic for her. Another student painted a canvas to represent a flower he had encountered. It was remarkably beautiful. He mentioned never having painted before, and described the process of learning to paint, and how glad he was that he had carved out the time to do this. Clearly, his commitment to the project was surprising, not only to me and his classmates but even to himself.

In this assignment, the integration of art and environment seemed very impactful to students. Earlier in the course, I had environmental artist and esteemed teacher educator Dr. Hilary Inwood visit the class virtually, to share her perceptions of learning ecoliteracy through the visual arts. I think this introduction to the interaction of art as environmental action was useful to students, especially in helping them begin to think about how they would represent their *Sense of Place and Being* assignment. According to Inwood (2013), “Art education offers a dynamic way to increase the power and relevancy of environmental education by providing an alternative means of furthering learners’ ecological literacy” (p. 130). Based on reflections from their exposure to eco-art with Dr. Inwood, and their subsequent projects, eco-art can help students (a) make connections to the natural world, (b) support learning in other areas of the curriculum, and (c) undertake place-based learning and age-appropriate activism (Inwood 2013). Using art to represent the process and product of this assignment attends to the UNECE (2012) competencies of *Learning to live together*, and “actively engage[s] different groups across generations, cultures, places and disciplines”, as well as *Learning to know* “their personal worldview and cultural assumptions and seek to understand those of others,” through a *holistic* approach (p. 14).

In this O/EE activity, many students produced exemplary reports on the processes they employed; however, one of the challenges was that some students continued to struggle with the third layer of the assignment, which was to reflect on some of the influencing factors on their perceptions of the world. I think this layer, which poses the most metacognitive and philosophical questions of a phenomenological and ontological nature, can be the most challenging, especially because students have not had much exposure to this way of thinking about the world and perhaps struggle with pushing their own boundaries. For this, I think time is one constraint. I also think the education system, of which we are all products, is another constraining factor. While critical thinking is certainly a more prominent skill set in current times, it is still a spectrum of skills, and deep philosophical thinking is not always scaffolded or encouraged in a system that is bounded by assessments and evaluations and curriculum standards.

Other challenges in courses such as the one being discussed here are more generalised. These include resistance by students to spending time outdoors and the limitations described in Karrow et al. (2016) regarding what the students are already bringing into the classroom with them, such as minimal knowledge or experience of the outdoors and ecoliteracy.

15.2 Gaps

One of the core competency areas that stands out as needing greater attention in our O/EE programme is *Achieving transformation*—particularly in relation to the education system. Such competencies are expressed as the educator works in ways to challenge unsustainable practices across educational systems, including at the institutional level. Thus, the educator ought to be someone who is willing to challenge assumptions underlying unsustainable practices in educational institutions. These are bigger sets of skills, an enhanced degree of agency, and more ways of knowing than can be achieved in a relatively short course. In fact, they ought to be lifelong learnings. That being said, it is possible to incorporate more learning about educational systems and structures, and the powerful stakeholders therein, to engage with ways that we as educators may create positive structural and systemic change. This can start by exploring, analysing, and identifying ways in which learning about O/EE is itself constrained by institutional mechanisms that work against many of the O/EE competencies we hope to engender in our students. For example, the typical discourse of assessment, performance, and competency pertaining to student and instructor evaluation can be viewed as fuelling the competitive, unsustainable, capitalist systems in the world. Contradictions such as these offer problems that students and teachers can grapple with in their attempts to transform education systems in the context of ESD.

15.3 A New Course for O/EE

With the UNECE (2012) competencies in mind, the gaps we have identified in our foundation O/EE course activities suggest a renewed focus for preservice teacher EE. Since we have highlighted more strengths in the areas of *Learning to do* and *Learning to be*, we see a need to expand opportunities for *Learning to know* and *Learning to live together*. Based on these gaps, and what we have identified above, we could consider incorporating more activist-oriented activities in socially and developmentally appropriate ways. These approaches are loosely supported by the Ontario policy framework for EE (OME 2009). From a place-based approach, we will look to our local communities, since the course is offered in two distinct sites, and see what structures are in place that can be encountered and engaged with. For example, despite the short duration of the course, it may be possible to connect with a local EcoSchool that is looking to move from Gold to Platinum level. This shift in certification requires a degree of community engagement in ecoliteracy with which our students may be able to offer support, as well as giving them insight into the workings of EcoSchool certification (Ontario EcoSchools 2019).

Additionally, we could incorporate more opportunities for intergenerational and cross-cultural learning about the environment, such as having Indigenous elders visit our class to speak about their memories of their local environment. The stu-

dents could become familiar with the protocol and practices of such interactions for their future classrooms and also learn to present this information to young children, passing along the stories.

Based on our reflection of key activities, and the gaps we have noted, assignments in our O/EE course should continue to offer opportunities for student introspection, reflection, and community connections. There should be a balance of learning to know, do, be, and live together. Course materials, delivery, and requirements should be designed to facilitate the learning outcomes that:

- Provide preservice teachers with theory on ecological literacy, with a focus on themes of *interconnectedness*, *interdependence*, and *sustainability*.
- Model effective and diverse outdoor and EE teaching strategies to engage students in holistic, envisioning, and transformative practices.
- Familiarise students with historical, social, and political contexts of EE within the province of Ontario.
- Orient and familiarise students with EE policy directives.
- Provide opportunities to explore philosophical relationship with *place* and *being*.
- Acquaint preservice teachers with teaching and curriculum resources that support O/EE through exposure to local, provincial, and federal EE organisations.
- Provide opportunities for preservice teachers to teach elementary and secondary students and community members to become ecologically literate.
- Provide opportunities for preservice teachers to critically reflect on school setting, how setting may resist change related to ESD, and how to transform settings in institutional systems.

In our O/EE course experiences, we have drawn from the UNECE (2012) framework, and our own teaching and learning practices, to reconsider what our students may learn to do, be, know to do, and live together in their journey to become practicing teachers. We acknowledge the value of opportunities for reflection on, and connection to, nature and for interdisciplinary learning and doing. Our renewed vision suggests learning about power structures that inhibit holistic, visionary, and transformative teaching and learning in ESD, and we endeavour to more fully engage and connect with our community's Indigenous elders to support intergenerational learning for ecoliteracy.

References

- Aikenhead, G. S., & Ogawa, M. (2007). Indigenous knowledge and science revisited. *Cultural Studies of Science Education*, 2(3), 539–591. <https://doi.org/10.1007/s11422-007-9067-8>.
- Alsop, S. (2011). The body bites back. *Cultural Studies of Science Education*, 6(3), 611–623. <https://doi.org/10.1007/s11422-011-9328-4>.
- Inwood, H. (2013). Cultivating artistic approaches to environmental learning: Exploring eco-art education in elementary classrooms. *International Electronic Journal of Environmental Education*, 3(2), 129–145.

- Inwood, H., & Jagger, S. (2014). *DEEPER: Deepening environmental education in pre-service education resource*. Toronto: University of Toronto Press.
- Kanemoto, K., & Moran, D. (2017). Identifying species threat hotspots from global supply chains. *Nature Ecology & Evolution*, 1. <https://doi.org/10.1038/s41559-016-0023>.
- Karrow, D., DiGiuseppe, M., Elliott, P., Inwood, H., & Fazio, X. (2016). Initial teacher environmental education capacities. In M. Hirschhorn & J. Mueller (Eds.), *What should Canada's teachers know? Teacher capacities: Knowledge, beliefs and skills* (pp. 162–191). Ottawa: Canadian Association for Teacher Education (CATE).
- Kentel, J., & Karrow, D. (2007). Mystery and the body: Provoking a deep ecology through the situated bodies of teacher candidates. *Complicity: An International Journal of Complexity and Education*, 4(1), 85–101.
- Malpas, J. (2006). *Heidegger's topology: Being, place, world*. Cambridge, MA: MIT Press.
- Martusewicz, R. A., Edmundson, J., & Lupinacci, J. (2015). *Ecojustice education: Toward diverse, democratic, and sustainable communities, 2nd Edition*. New York: Routledge.
- McCormick, C. B. (2003). Metacognition and learning. In W. M. Reynolds & G. E. Miller (Eds.), *Handbook of psychology: Educational psychology* (pp. 79–102). Hoboken: Wiley.
- Ontario Eastern Bluebird Society. (n.d.). *About Eastern Bluebirds*. <http://www.oebcs.ca/bluebirds/index.html>. Accessed 26 Feb 2018.
- Ontario EcoSchools. (2019). *Certification resources: Platinum resources*. <https://www.ontarioecoschools.org/get-certified/platinum-certification/>. Accessed 5 Feb 2019.
- Ontario Ministry of Education. (2009). *Acting today, shaping tomorrow: A policy framework for environmental education in Ontario schools*. Toronto: Queen's Printer for Ontario. <http://www.edu.gov.on.ca/curriculumcouncil/shapetomorrow.pdf>. Accessed 26 Feb 2018.
- Ontario Ministry of Natural Resources and Forestry. (2019). *Golden Eagle*. <https://www.ontario.ca/page/golden-eagle>. Accessed 19 Jan 2019.
- Orr, D. W. (2004). *The nature of design: Ecology, culture and human intention*. Oxford: Oxford University Press.
- Orr, D. W. (2005). Place and pedagogy. In M. K. Stone & Z. Barlow (Eds.), *Ecological literacy: Educating our children for a sustainable world* (pp. 85–95). San Francisco: Sierra Club Books.
- Pedretti, E., & Nazir, J. (2011). Currents in STSE education: Mapping a complex field, 40 years on. *Science Education*, 95(4), 601–626. <https://doi.org/10.1002/sce.20435>.
- Sauvé, L. (2005). Currents in environmental education: Mapping a complex and evolving pedagogical field. *Canadian Journal of Environmental Education*, 10(1), 11–37.
- Schraw, G., Olafson, L., Weibel, M., & Sewing, D. (2012). Metacognitive knowledge and field-based science learning in an outdoor environmental education program. In A. Zohar & Y. Dori (Eds.), *Metacognition in science education: Contemporary trends and issues in science education* (pp. 57–77). Dordrecht: Springer. https://doi.org/10.1007/978-94-007-2132-6_4.
- Schwab, J. (1969). The practical: A language for curriculum. *The School Review*, 78(1), 1–23. <https://doi.org/10.1086/442881>.
- United Nations Economic Commission for Europe (UNECE). (2012). *Learning for the future: Competences in education for sustainable development*. https://www.unece.org/fileadmin/DAM/env/esd/ESD_Publications/Competences_Publication.pdf. Accessed 26 Feb 2018.