Environmental Education: An Active Pedagogy to Integrate Environmentalism, Engagement, and Equity

Olivia Whitmarsh
SUNY Geneseo

Follow this and additional works at: https://knightscholar.geneseo.edu/proceedings-of-great-day

Environmental Education: An Active Pedagogy to Integrate Environmentalism, Engagement, and Equity

Environmental Education: An Active Pedagogy to Integrate Environmentalism, Engagement, and Equity

Olivia Whitmarsh

sponsored by Robert Feissner, PhD

ABSTRACT

The environmental and climate changes occurring on our planet are largely the result of human actions. In concert, rampant bias and inequity exist in many human spheres, including—but not limited to—social, academic, and civic. Environmental education (EE) is a methodology and mindset that integrates systems thinking, hands-on learning, and social justice work across a cohesive curriculum. EE empowers educators, learners, and community members in many ways. Whether it is taking an active role in learning, protecting and restoring the environment, or dismantling biases, EE provides tools for success. I provide five lesson plans that serve as a basis for the development of a science curriculum based in EE principles at the 7–12 level. These lessons may be personalized in a number of ways to suit a variety of learners and learning needs. Ideas to help educators meet students' needs and gradually reduce dependence on teacher-centric learning, is provided throughout. This allows scaffolding of the curriculum for a variety of levels. I provide pedagogical and EE principles to accompany each lesson and detail the process of development of this curriculum.

CLIMATE AND ENVIRONMENTAL CHANGE

Recall the familiar bedtime tale of Goldilocks, the young girl who sampled bowls of porridge, finding one too hot, one too cold, and one of a suitable temperature. Our planet Earth is much like this perfect bowl of porridge; any colder, and we would be unable to grow the food we need to survive; any warmer, and humans ourselves would not fare well. The World Health Organization (WHO) describes the Earth's climate as "life support," without which humans would not be able to exist in our present capacity (World Health Organization, n.d.). But our climate is rapidly changing, and human activities are at fault.

A wide variety of climatic and environmental changes are occurring at this very moment. The United Nations (UN) reports a rapid rise in global temperatures, beginning with the era of the Industrial Revolution, and accelerating through the present day (United Nations, n.d.-b). Associated with this rise in temperature are warmer winters, leading to melting ice caps and less polar sea ice. These in turn lead to sea level rise, putting the lives and livelihoods of coastal organisms—including humans—at risk. Seas are warming as well, causing the destruction of coral reefs, one of the richest and biodiverse biomes on our planet. Unusual temperatures have led to changes in weather patterns, the most notable of which are increasingly violent storms around the globe. As the planet heats, many fertile regions may become unsuitable for agriculture, leaving both farmers and consumers strained. And this is only the tip of the melting iceberg: temperatures are continuing to rise, and it is difficult to predict exactly how this changing climate will impact our lives and our planet in the years to come.

Although there are people who believe that our climate is fluctuating naturally, that humans have not caused any changes in the climate, or even that there are no changes at all, scientists are working diligently to educate the public about this perilous issue and its potential solutions. While there is no panacea, there are certainly human actions that could significantly slow or prevent some climate and environmental changes. The impacts of human activities manifest as increasing temperatures through the concentration of heat-trapping greenhouse gases, brought about by the extraction and burning of fossil fuels, industrialized agriculture, and anthropogenic chemical production (World Health Organization, n.d.). By reducing these practices, humans could slow the rise in global temperature and associated changes in climate and environment. Although these changes have been described as "rapid, far-reaching, and unprecedented" (United Nations, n.d.-a), they are necessary to ensure the continuing vitality of life on our home planet, and even its improvement. In fact, the Intergovernmental Panel on Climate Change (IPCC) reports that limiting global warming often involves "ensuring a more sustainable and equitable society" (United Nations, n.d.-b). Additionally, the effects of climate and environmental change are likely to persist beyond any actions humans take to slow or stop them. This makes it all the more pressing that the necessary measures be taken immediately to mitigate climate and environmental changes. Climate activists and environmental organizations have risen to the task of combatting climate and environmental changes: "without drastic action today, adapting to these impacts in the future will be more difficult and costly," according to the UN (n.d.). In the words of UN Secretary-General, Antonio Guterres, "we have a long way to go" (United Nations, n.d.-a), but taking action to combat and mitigate the effects of climate and environmental change must be undertaken in order to preserve our planet.

Along with the obligation to preserve a livable planet, the need to mitigate climate and environmental changes also involves human health. Those living on or near coastal areas could face flooding and other natural disasters as sea levels rise, posing an obvious safety risk. Increasingly severe storms pose a similar threat. As temperatures change, and local and regional environments change with them, the ability to grow and produce food as we currently do will be compromised. A lack of access to nutritious food is already a per-

vasive issue, particularly in cities, and environmental changes to food production itself will prove disastrous to all consumers. The changing regional climate will also impact the spread of diseases. Some areas may see unprecedented rates of previously-rare illnesses as their vectors, such as mosquitoes, find suitable residence in areas previously too cold to inhabit. Finally, it comes as no surprise that living in close proximity to an industrial plant or similar facility comes with health risks related to air and water pollution, causing a wide variety of health problems from asthma to miscarriages. Higher temperatures themselves have even been linked to pregnancy- and infant-health-related concerns (Flavelle, 2020). As our environment changes, so too will our health. In order to protect humans and other organisms from the loss of their health, safety, and wellbeing, it is of vital importance to combat anthropogenic climate and environmental changes.

Finally, as if all of these devastating changes in our lives and health were not enough to cause concern and inspire action, there are a variety of social injustices that must be addressed, in part, through environmental activism and the mitigation of climate change. Minority communities, women, and pregnant persons (and their infants) are at an even greater risk for adverse life and health impacts due to climate change. The increased likelihood of negative pregnancy and infancy outcomes discussed above is particularly devastating for minority communities. In particular, African Americans are statistically more likely to live near sources of air and water pollution, in cities significantly warmer than surrounding areas, with reduced access to air conditioning systems, health insurance, and medical support (Flavelle, 2020). These factors lead to greater risks of stillbirth, premature birth, or other complications for African American families. In his op-ed "Climate Justice is Racial Justice, Racial Justice is Climate Justice," Reverend Lennox Yearwood Jr., a social justice activist, poignantly states, "The climate crisis and environmental justice play out within the same systems of white supremacy and structural racism that are at the root of police brutality" (Yearwood, 2020). In the academic realm of environmental education, much research and work is yet to be done on the power of equitable education to close the achievement gap between African American and other minority students, and their white peers (Rizzo, 2018, p. 299; Staples et al., 2019, p. 217; Briggs et et al., 2019, p. 46; Camasso & Jagannathan, 2018, p. 30). The necessary societal changes that accompany climate and environmental activism go hand-in-hand with racial activism and social justice, making it all the more sensible to pursue environmental activism as a society.

In addition, women often bear a disproportionate load of the emotional work tied to climate and environmental activism, despite being overlooked in favor of male peers. Many women care deeply about the environment and climate, and often feel an emotional connection to both—and this bond is more prevalent in feminine-identifying people than in masculine-identifying people (Gough & Whitehouse, 2019; Rizzo, 2018; Maina-Okori et al., 2018; Mitten et al., 2018; Bajracharya & Maskey, 2016, p. 10). This connection is often exploited by the patriarchal social and political structures prevalent throughout the globe, in which exploitation of feminine entities includes both women themselves and the environment (Mitten et al., 2018, p. 321–322). Blenkinsop, et al. (2018) find that masculinity is often associated with violence against nature, or inflicting pain on other

humans by harming nature in some way. These patriarchal systems and structures also mean that women are disproportionately more impacted by climate and environmental change than men are, and receive less assistance and support when making change in their communities (Gough & Whitehouse, 2019, p. 339–341). Even women in science working directly to combat climate and environmental change, mitigate its effects, and educate the public about these phenomena are often overlooked in favor of men. Publication opportunities, conference appearances, merit- based awards, and countless other accolades are often given disproportionately to men, and this wealth of injustice in academics is only a part of the marginalization women in the field of environmental research, activism, and education experience (Gough & Whitehouse, 2019, p. 335–338; Mitten et al., 2018). Mitten et al. (2019) eloquently summarize this phenomenon:

> In many respects, women have been the silent achievers, heavily involved within nurturing, conservation, and preservation movements over the past century…many women have contributed to the development of the OEE [outdoor and environmental education] profession while being relegated, marginalized, and undervalued. (p. 320)

The contributions of women to the work to combat climate and environmental change, and the disproportionate impact of these changes on women and minorities, add another layer of urgency to the present climate and environmental crisis.

The planet is warming, at an alarming rate. Species' existences are threatened, including our own. Fellow humans face a loss of livelihoods, homes, access to food and water, and personal safety. Our own actions have brought about this crisis, but it is also within our power to slow and stop these effects. Coupled tightly to the climate and environmental crisis are issues of social justice. Non-white persons, particularly African Americans, are disproportionately impacted by the changes in climate and environment. Also disproportionately impacted are non-male persons, whose emotional, academic, and activist work is ridiculed, overlooked, or even exploited for patriarchal gain. In a situation where it seems the Earth, our only home for the foreseeable future, is not a guaranteed safe haven; where marginalized communities feel the pressure of this crisis more acutely; and where human action to tackle all of these environmental, health, and social justice issues would need to be sweeping, large-scale, and radical, where are we to turn? In a word: education.

Environmental Education

In the face of the ecological crisis, there is a viable solution, involving the very thing responsible for these changes: humans. Environmental education (EE) provides an opportunity for humans to mitigate climate and environmental changes, assess biases, and resolve issues of social justice and inequity that are intricately tied to climate justice. EE serves many purposes, chief among them the education of school-aged children and their families about the climate crisis and its effects and possible solutions. Through a variety of hands-on, active learning methods, environmental educators have the potential to slow climate and environmental change one student at a time. The impacts of EE reach

far beyond the climate crisis; indeed, EE may just be the structural and conceptual revolution the American education system needs in order to move forward as a sustainable and equitable learning system.

Purposes

EE serves a wide variety of purposes, from a practical response to climate and environmental change, to an opportunity to improve the pedagogical practices of the American public education system. Of course, chief among these is the titular promise of education about the environment and ecology in which we live. Tarrant and Thiele (2016) provide an excellent summary: "the primary purpose of sustainability education remains the instruction, mentoring and training of students, as future stakeholders, to take an active part in the conservation and adaptation of their natural and social environments" (p. 60). The principle of "ecological literacy" is often incorporated as a goal and learning outcome for students of EE. Ecological literacy encompasses "the ability to understand the basic principles of ecology, coupled with the values, skills, and conviction to act on that understanding" (Stone, 2010, p. 35). Evans et al. (2017) add, EE "aims to help learners develop the necessary knowledge, understanding, skills, values, capabilities and dispositions to respond to the complex socio-ecological issues of the 21st century" (p. 406). These goals of responsibility, action, and ecological literacy are core principles of EE.

Bowers (2010) describes the exercise of ecological intelligence (a term related to ecological literacy) as enacting systems thinking, or considering information in as many contexts as possible, in order to gain the fullest understanding of its implications. Nelson (2010) emphasizes this systems-thinking perspective, describing ecological literacy as requiring "a comprehensive and contextual view of a fragile earth, and how science, society, and policy combine and lead to either problems or solutions" (p. 5). Approaching problem-solving from the multiple viewpoints of systems thinking "requires synthesis rather than separation of content knowledge" (Nelson, 2010, p. 6). Incorporating ecological principles into education at any level brings about the use of systems thinking and problem-solving from multiple viewpoints, which provide additional opportunities for positive student outcomes.

Coupled tightly with EE's goal of education about the environmental crisis and the use of systems thinking to approach problems is the cross-curricular opportunity that EE provides educators of every level and subject. As Nelson (2010) reminds us, "exercising ecological intelligence is a collaborative process" (p. 20). This collaboration enables educators from a wide variety of backgrounds, grade levels, and subject areas to work together on EE curricula, projects, and service opportunities. For example, curricula across several elementary grades might build upon knowledge about a local watershed, while in a high school, students might combine knowledge from biology, chemistry, and earth science with skills from English, public speaking, and business classes to present a comprehensive plan to protect that watershed. Perhaps best described by Hart (2010) as "a challenge to complacency in the field of education" (p. 166), EE is a powerful tool for enacting cross-curricular systems thinking within the schooling system. This cross-cur-

ricular impact is often sought after by educators, and is required by some educational standards.

Especially when implemented in multiple classrooms, ecological intelligence and literacy become the norm, creating a social climate in which being environmentally-minded is rewarded and encouraged. Social climate strongly influences behaviors and attitudes; creating a social climate of ecologically-intelligent students encourages ecologically-literate behaviors (Bajracharya & Maskey, 2016, p. 2). This systems-thinking shift from educational complacency to action in the face of the climate and environmental crisis is necessary to preserve our planet. By moving from compartmentalized, scattered classes to a model of integrated, unified curricula, schools will provide the structural change necessary to educate the students they serve in the best way possible, while also ensuring a sustainable future, both locally and globally.

As if these goals of planetary preservation and school system improvement were not enough, EE also strives to provide a way for educators, and society as a whole, to begin the work of recognizing and repairing inequities related to race, class, gender, and numerous other identities. By using systems thinking to analyze both the environmental impacts of anthropogenic climate change and the academic realm of environmental research, it becomes easier to find shortcomings related to social justice and our climate and environment. These shortcomings are opportunities for societies and institutions to learn about their past failings, remedy their current systems, and prevent future harm to historically marginalized communities (Mitten et al., 2018, p. 321–322). Communities of color are disproportionately affected by climate and environmental change through air pollution, proximity to urban heat and pollution, proximity to and lack of assistance during and after major storms, and countless other health and well-being implications (Maina-Okori et al., 2018, p. 290–291; Flavelle, 2020; Yearwood, 2020). These problems are systemic, brought about not solely by environmental changes, but also by social, political, and economic structures, among other factors. The compartmentalization of school subjects prepares students to view these factors in isolation. However, the systems-thinking approach of EE prepares students to tackle these issues with a holistic approach, viewing these factors as intensely intertwined (Capurso, 2010, p. 84).

For students who belong to minority communities themselves, EE is deeply relevant. Racial—and economic—minority students tend to fare worse academically than their middle-class, suburban peers, particularly in STEM fields. This unfortunate reality sets these students up to achieve less than their peers, because of the unjust political, social, economic, and environmental conditions currently biased against communities of color and low-income communities (Camasso & Jagannathan, 2018, p. 30). EE programs and curricula may prove instrumental in reducing this achievement gap, particularly in STEM fields, and empowering disadvantaged students (Camasso & Jagannathan, 2018, p. 37–38). Addressing the needs of an underserved minority of students may have a positive ripple effect upon the larger community through peer-to-peer and/or intergenerational transmission of knowledge, skills, and values (Briggs et al., 2019, p. 46). Social

justice work is a critical goal of EE, to support and empower minority communities and marginalized individuals.

Of particular note, the knowledge and lifestyles of Indigenous peoples have often been overlooked, disregarded, or belittled in Western cultures. EE demands not only recognition of this prejudice and injustice, but serious acceptance of Indigenous culture and knowledge. Some scholars propose a synthesis of Western and Indigenous knowledge to create a more thorough, multifaceted understanding of the environment. Once again, systems thinking abilities are crucial to understanding the environment and the groups of people who live in it. The collaborative efforts of Indigenous and non-Indigenous people will be of utmost importance to this new, synthetic understanding. As Maina-Okori et al. (2018) write:

> The goal to incorporate Indigenous perspectives into ESE [environmental and sustainability education] is the responsibility of both Indigenous and non-Indigenous peoples. The aim is that such collaboration will lead to a closer examination and dismantling of the power dynamics inherent in our field and in wider society. (p. 293)

Indigenous knowledge has long been ignored by fields such as history, ecology, and anthropology, among many others. Additionally, the great emotional distance created between humans and the environment in a Western society makes it particularly difficult to appreciate Indigenous ways of life which are fundamentally connected to the environment (Capurso, 2010, p. 71–78). This distance makes it easier for many people to excuse their actions to degrade the environment and reduce accountability for such activities (Bowers, 2010, p. 21). EE strives to repair not only the environment, but humans' relationship to it, importantly by drawing upon Indigenous knowledge and culture closely tied to the environment.

Another marginalized group, women, benefit greatly from EE and its goals of equity and social justice. Within the academic realm of environmentalism, a movement dubbed "ecofeminism" has arisen to address the related causes of environmental degradation and women's rights. As explained by Rizzo (2018), "analysis of interlocking oppressions and intersectionality is central to critical ecofeminism" (p. 299). Further explored by Maina-Okori et al. (2018), "ecofeminism recognizes and makes linkages between the oppression of women and the exploitation of nature and suggests that although women are often more likely to be involved in environmental protection, they are underrepresented in decision-making processes" (p. 289). In these cases, the term "intersectionality," first created by Kimberlé Crenshaw to describe the interacting prejudices against Black women, is used to describe the overlap between environmental degradation and oppression of women (Maina-Okori et al., 2018, p. 288). Through the examination of related "social, ecological, and economic issues," ecofeminism "can help to inform a critical and inclusive conceptualization of societal problems and to reveal just and sustainable solutions to these problems" (Maina-Okori et al., 2018, p. 293). As can be observed for many other cases, the fights for environmental justice and gender equity are remarkably interrelated.

In the academic realm itself, women's contributions to EE are also chronically underappreciated: "histories of OEE [outdoor and environmental education] and current practices tend to document the efforts and achievement of men—especially white men—whereas the many contributions of women are infrequently recorded or celebrated" (Mitten et al., 2018, p. 318–319). Women are frequently underrepresented in a wide variety of opportunities, as discussed above. In addition to these problems, women of color face even greater challenges in the EE field because of the intersection of race with both gender and environmental issues (Flavelle, 2020).

All of these concerns barely scratch the surface of deep-seated biases and prejudices that interact to cause harm to both marginalized communities and our environment. Clearly, a large body of social justice concerns may be addressed through EE and its critical work to dismantle systems of oppression that affect our planet and ourselves.

Methods

Educators enlist a wide variety of pedagogical methods to best implement these EE practices and knowledge within their classrooms and communities. Chief among these are project-based, hands-on learning opportunities, often through service projects or other community-oriented learning (Stone, 2010, p. 38; Lowenstein et al., 2010, p. 1010–104; Rizzo, 2018, p. 306; Bowers, 2010, p. 22; Riordan & Klein, 2010, p. 120; Camasso & Jagannathan, 2018, p. 32; Tarrant & Thiele, 2016, p. 57; McClaren, 2019, p. 423; Jeronen et al., 2017, p. 3–4). Teachers have a particularly important role in passing along the cultural norms of their societies, and by including environmental norms in their classrooms, they pave the way for students to realistically consider how their actions as humans impact their environment, both natural and cultural (Bajracharya & Maskey, 2016, p. 1–3; Bowers, 2010, p. 14–15). Teachers also (consciously or otherwise) pass along the hidden curriculum, the information students gain from schooling that is not explicitly taught. Hidden curricula often include values, ethics, and biases. By implementing the active learning necessitated by EE, teachers are tapping into the power of the hidden curriculum to intentionally involve their students in caring for and protecting the environment from anthropogenic harm. Field experiences, such as outdoor lab work, field trips, and on-site observations, have proven extremely successful in boosting students' knowledge of and engagement with the curriculum, as well as a number of soft skills such as self-efficacy and communication (Jeronen et al., 2017, p. 3–10). Student involvement in their own learning allows students to control their learning experience, often tailoring it to their needs without even realizing they are doing so. Such an experience facilitates collaboration, discussion, and interest in the curriculum.

McClaren describes students of EE as "active element[s] and co-designer[s] of… [their] learning environment—not just an audience or speaker" (McClaren, 2019, p. 420). This perspective shift—from the student as the quiet, docile recipient of knowledge, to the active, engaged learner creating their knowledge from experiences—teaches students that they are capable of tackling complex issues and solving lengthy problems. This phenomenon is possible no matter the age, grade level, or background of the students. This type of learning increases engagement not only in the classroom where it is implemented, but

throughout the students' schooling experience. It also serves to uplift marginalized students, who may have previously received the message, direct or otherwise, that schooling is not for them. Active students are invested in their own learning, eager to see problems carried through to solutions, and excited to partake in academic opportunities.

Camasso and Jagannathan lament the underuse of active pedagogical methods, and advocate for their use in classrooms much more frequently. The use of such methods must be undertaken for a sustained period of time, perhaps over the course of several grade levels, to ensure lasting results for students academically, civically, and socially (Camasso & Jagannathan, 2018, p. 32–33). This makes it all the more enticing for whole schools to adopt EE pedagogy, rather than a lone teacher or grade level. Additionally, problem-based and hands-on learning experiences allow teachers and educators to easily emphasize relationships, systems, and concepts in harmony, as they are in the natural world, rather than relying upon a curriculum of atomized facts and standards (Bowers, 2010, p. 23). This has the added bonus of making it much easier for students to understand material conceptually, through tangible involvement in the learning process, no matter how intangible concepts might seem (Stone, 2010, p. 38; Riordan & Klein, 2010, p. 134). This system of learning reinforces students' abilities and interests throughout their entire academic career, and models our human systems on self-sustaining natural ones (Stone, 2010, p. 34). Little else could be as intricately tied to the environment as pedagogy modeled upon the natural world itself.

In addition to these pedagogical practices, teachers of EE are engaged in supporting each individual student upon their academic journey. EE facilitates this practice in a variety of ways. EE can take the form of a curriculum framework, and because sustainability and environmental education involve many disciplines, EE serves as an excellent bridge between otherwise-separated school subjects and departments (Stone, 2010, p. 36–37). By helping students to connect previously-separated subjects, teachers prepare students to enter a world of interconnected phenomena, where nothing happens in true isolation. Furthermore, EE is intricately linked to cultural and location-based knowledge, allowing educators to customize their practices to incorporate local phenomena (Lowenstein et al., 2010, p. 107). In action, this could be a field trip to a local environmental organization, a project about a local environmental feature, or the use of knowledge from local Indigenous groups and leaders to better understand the ecological processes active in the area. EE "offers teachers and students ways of responding in their own communities" (Lowenstein et al., 2010, p. 101) to injustices and changes. The emphasis upon Indigenous and cultural knowledge in the classroom creates a learning environment in which students from a wide variety of backgrounds feel welcomed and heard, despite a society that holds Western scientific methodology to a higher standard than Indigenous and place-based knowledge (Briggs et al., 2019, p. 45–46). In addition to this local-scale individualization, EE intrinsically supports overlooked communities. Rizzo (2018) notes that "ecofeminist theory…rooted in community-engaged learning has the power to disrupt binary thinking" (p. 306) and uplift the struggles of women in a patriarchal society. Students with learning obstacles of various types benefit from the multiple modalities that EE naturally takes, especially the cross-subject bridges and hands-on experiences

(Staples et al., 2019, pp. 208–217). Goleman, Barlow, and Bennett (2010) note the significance of EE as an opportunity for educators to accommodate a wide variety of intelligences, based upon Gardner's multiple intelligence theory and Goleman's social and emotional intelligence theory (p. 91–92). EE educators "offer a wide range of conceptual and material content" (Jeronen et al., 2017, p. 4). The multiple modalities and tangible quality of EE make it ideal for catering to students who learn and are intelligent in a variety of ways.

EE supports students through the use of equitable assessment, and the validation of the emotional aspect of learning. In EE, assessment can be seamlessly integrated into the curriculum, without the need for anxiety-producing and inequitable testing procedures. Project- and service-based learning opportunities allow students to demonstrate their knowledge in the real world, where it makes the most sense for knowledge to be applied (King, 2014, p. 36–37). Indeed, Cassell and Nelson (2010) remind readers that "tests have evolved to become measures of learning accomplishments rather than of native intelligence…they not so much test as they sort, categorize, classify, and label" (p. 181) students.

Furthermore, EE provides a tremendous opportunity for educators to move away from traditional testing and toward project-based assessment that is far more relevant and meaningful. Students who would normally test poorly because of cultural biases, learning obstacles, or other issues directly related to the tests themselves are freed from the burden of the traditional exam. This in turn boosts students' own self-efficacy, positively influencing their academic and emotional well-being (Jeronen et al., 2017, p. 9–10). Students' emotional connections to the environment are also heavily considered in EE, allowing students to connect with the material and share their experiences and feelings in order to create a shared trust in the classroom and schooling experience (Smith, 2010, p. 50–51; McClaren, 2019, p. 428). The support EE provides for students of different abilities, intelligences, experiences, and backgrounds creates a classroom in which learners can flourish both personally and academically.

Impacts

Through the use of EE's hands-on, personalized approach, educators achieve not only the major purposes of EE discussed above, but far more. Of course, EE provides students with a greater understanding of and appreciation for nature, the environment, and the climate, as well as skills and strategies to be a conscientious member of our ecosystem. Beyond this basic ecological understanding, however, EE achieves even greater objectives. The use of hands-on learning methods generates interest and excitement in a variety of academic areas, and encourages students to improve their academic habits and abilities (Ardoin et al., 2018, p. 12; Camasso & Jagannathan, 2018, p. 32–37; Jeronen et al., 2017, p. 13). Stone remarks upon the increased abilities of students both within and outside of the subjects covered by EE. By framing coursework around sustainability and interactive discovery, students become better learners and citizens simultaneously (Stone, 2010, p. 35–38). Teachers are able to incorporate many previously disparate subjects into a single classroom, lesson, or project, helping create multi-disciplinary understandings

and cross-cutting principles that are increasingly sought-after in an educational atmosphere of rigorous standards (Evans et al., 2017, p. 406; Staples et al., 2019, p. 215–217).

Beyond academics, students become more emotionally connected with nature and the environment, embracing a natural desire to see the world holistically and refuting social taboos related to environmental activism and passion (Blenkinsop, et al., 2018, p. 351–355). Teachers, too, benefit from similar phenomena that arise from a deep consideration and critical examination of one's place in our complex ecological and social network, as well as biases related to this complex system (Lowenstein et al., 2010, p. 105–107; Hart, 2010, p. 168). As the lines between in-school learning and larger community learning become blurred, a variety of biases are interrupted for the betterment of all community members (Lowenstein et al., 2010, p. 107; Rizzo, 2018, 306; Staples, 2019, p. 217; Briggs et al., 2019, p. 46). Binary, patriarchal, colonizing, and domineering methodologies are disrupted by ecofeminism, the empowerment of women, queer pedagogy, Indigenous place-based knowledge, and grassroots organizing inherent to EE (Rizzo, 2018, p. 306; Maina-Okori, 2018, p. 289–291; Flavelle, 2020; Yearwood, 2020). Even beyond these illustrious achievements, EE provides students with a wide variety of soft skills, such as communication, problem-solving, cooperation and teamwork, service learning, and more (Ardoin et al., 2018, p. 1–12; Stone, 2010, p. 38; Lowenstein et al., 2010, p. 105–107; Briggs et al., 2019, p. 38–45). These skills are perhaps best summarized by Goleman, Barlow, and Bennett (2010): "ecological intelligence applies these capacities [sympathy and empathy] to an understanding of natural systems and melds cognitive skills with empathy for all of life" (p. 92). Importantly, "institutional environment… seems to be a significant factor in students' awareness and, ultimately, behaviors toward" EE (Bajracharya & Maskey, 2016, p. 11). In other words, making environmental justice and protection the norm combats social and cultural taboos related to environmental activism, and supports and celebrates countless members of minority communities whose welfare is intricately tied to the environment and climate. EE provides a myriad of positive impacts for students, educators, community members, minorities, and countless individuals in unique and profound ways.

Current State of Environmental Education

EE boasts lofty goals, a game-changing pedagogical approach, and impacts far beyond the science classroom. But what does EE look like in our world right now? Unfortunately, EE is far from well-incorporated into public school curricula. It is extremely difficult to change long-held traditions and frameworks that have supported public school curricula for years (Greenwood, 2010, p. 142). Educators trying to incorporate environmentally-oriented courses and curricula often face biases, bureaucracy, and a deep-seated fear of the unknown. Many cite a lack of planning time, misunderstandings of curricula and intent, and constraints from both standards and administrators, among other roadblocks (Evans et al., 2017, p. 412–413; McClaren, 2019, p. 416–418). Schools are often unwilling to make the major changes necessary to thoroughly and effectively incorporate EE into the public school curriculum. Teachers themselves often express resistance to the enormous undertaking required to implement EE (Hart, 2010, p. 155–157).

As it stands now, both public schooling and teacher education programs send graduates out into the world to uphold the status quo, rather than combatting harmful norms (Nelson, 2010, p. 3–4; Cassell & Nelson, 2010, p. 184). Worse yet, the general public has often been educated to monetize or commodify nature, and students and educators are no exception (Bowers, 2010, p. 9). Young people are introduced to a world motivated by economics, rather than ecology (Greenwood, 2010, p. 139–140; Cassell & Nelson, 2010, p. 183). This necessitates a massive overhaul of the public school system and teacher education programs to fully incorporate EE as a framework for learning, rather than the increasingly-common, one-time course on sustainability. This phenomenon, in which an institution adds surface-level changes to appear more environmentally-conscious, without making substantial, impactful changes, has been termed "greenwashing" (Bowers, 2010, p. 11–12). Such limited courses are insufficient to overhaul the state of public schooling, but are indeed a step in the right direction if any change at all is to occur (Greenwood, 2010, p. 145–146). As highlighted by Evans, et al., "there is a clear need to extend the curricula and pedagogical work that is in progress beyond 'patches of green' towards more systemic approaches" (Evans et al., 2017, p. 413).

The human, social, cultural world mimics the natural one, in that all systems are parts of larger, nested systems. Schools are therefore connected in a variety of ways to the communities, governments, and world around them (Stone, 2010, p. 35). Schools and educators have a unique opportunity and responsibility to save the planet through EE practices. The current state of public education pushes sustainability aside in favor of rigorous standards and exams, quantitative performance metrics, and a dense web of bureaucratic hoops through which no single educator can be expected to jump (Evans et al., 2017, p. 406–407). College—and university—level programs have seen some significant improvements over time, as EE and sustainability begin to garner greater attention in standards and institutional policies (Greenwood, 2010, p. 149; Rizzo, 2018, p. 306; King, 2014, p. 36–37). However, EE "does not always address the underlying structures that perpetuate race, class, and gender inequality" and thus, its implementation must be further developed (Rizzo, 2018, p. 299). Because curriculum is "essentially…a conversation about shared values, cultural beliefs, and what and whose knowledge is considered of most worth" (Nelson, 2010, p. 4), it is necessary for EE to be incorporated robustly and swiftly in order to combat climate and environmental change, as well as prejudices and biases tied to these changes.

Of course, the prognosis is not all doom and gloom; EE has demonstrated a wide range of positive impacts in its current capacity (Camasso & Jagannathan, 2018, p. 32–33). It is also important to remember that sustainability and EE "are not final destinations, but paths of learning" (Tarrant & Thiele, 2016, p. 62), and there are no rules for implementing EE in a right or wrong way. Small victories at the post-secondary level, and within some schools and local governments, fuel a movement toward widespread implementation of EE. The achievement of EE's many goals and positive impacts for students, educators, and communities will soon follow.

Why Environmental Education?

EE is a massive change from the status quo, for students, educators, school systems, and communities. Every aspect of the education process, at all grades and levels, is impacted by a shift toward EE, and every community member feels its effects. EE addresses the environmental and climate changes brought about by human actions, and provides the next generation of learners with the means to combat and mitigate these changes to preserve our planet, our environment, our climate, and our own health and safety. But EE does so much more: challenges to racism, sexism, homophobia, colonization, classism, and other social justice issues are essential elements of EE. Social justice is intricately tied to EE, through its reliance on Indigenous knowledge, the work of local community leaders, the contributions of long- overlooked women and minorities, and even students themselves. EE will provide the environmental safety and stability we need to collectively and systematically combat social justice issues, both present and future. As the climate and environment change, our need to implement EE accelerates rapidly. The best time to implement EE was yesterday; the next-best time is today. There has never been a moment in our modern history that has needed environmental activism more, and opportunities to advance social justice are unfolding around us every day. Whether it is through the stabilization of the climate and environment, access to education and resources, commitment to grassroots organizations and local governments, uplifting of minority communities, appreciation of the contributions of overlooked minorities and women, the personal and civic development of students, or the countless other positive impacts EE brings about, every individual will be positively impacted by EE.

Of course, the transition from traditional curricula to EE will be sweeping, often overwhelming at first, and will likely garner negative reviews from those who are not committed to its installation. However, once EE programs and infrastructure begin to arise across the country and world, the many benefits of EE will become readily apparent. Children will experience higher-quality academics, learn from hands-on experiences, and create practical and meaningful knowledge. Educators will collaborate, across grade levels and subject boundaries, to support their students and communities in ways that are currently not possible. The voices of the overlooked will finally be uplifted, sparking change for countless persecuted and underrepresented communities worldwide. All of these changes will continue into the future as well. Our collective understanding of the climate and environment will improve, along with best practices for protecting them. We will learn how to listen to and celebrate the work of underrepresented communities, and over time, these communities will finally see equitable treatment, representation, and opportunity. The learners of today will be inventing the life-saving, planet-preserving technologies of tomorrow. If we are lucky, a few might even become the next generation of environmental educators. Widespread and thorough implementation of environmental education is our best chance to preserve our planet, expand our knowledge, uplift the overlooked, and support a future that is stable both ecologically and socially: "it is in school classrooms that a new world must be born, if it is to be born at all" (Cassell & Nelson, 2010, p. 196).

REFERENCES

Ardoin, N. M., Bowers, A. W., Roth, N. W., & Holthius, N. (2018). Environmental education and K-12 students outcomes: A review and analysis of research. *Journal of Environmental Education*, *49*(1), 1–17. https://doi.org/10.1080/00958964.2017.1366155

Barjracharya, S. M., & Maskey, V. (2016). Students' awareness, values, perceptions, and behaviors toward environmental sustainability (ES): A comparative study. *International Journal of Sustainability Education*, *12*(3), 1–14. https://doi.org/10.18848/2325-1212/cgp/v12i03/1-14

Blenkinsop, S., Piersol, L., & Sitka-Sage, M. De D. (2018). Boys being boys: Eco-double consciousness, splash violence, and environmental education. *Journal of Environmental Education*, *49*(4), 350–356. https://doi.org/10.1080/00958964.2017.1364213

Bowers, C. A. (2010). Educational reforms that foster ecological intelligence. *Teacher Education Quarterly*, *37*(4), 9–31.

Briggs, L., Krasny, M., & Stedman, R. C. (2019). Exploring youth development through an environmental education program for rural indigenous women. *The Journal of Environmental Education*, *50*(1), 37–51. https://doi.org/10.1080/00958964.2018.1502137

Capurso, M. (2010). Surviving stereotypes: Indigenous ecology, environmental crisis, and science education in California. *Teacher Education Quarterly*, *37*(4), 71–86.

Carmasso, M. J., & Jagannathan, R. (2018). Nurture thru Nature: Creating natural science identities in populations of disadvantaged children through community education partnership. *Journal of Environmental Education*, *49*(1), 30–42. https://doi.org/10.1080/00958964.2017.1357524

Cassell, J. A., & Nelson, T. (2010). Visions lost and dreams forgotten: Environmental education, systems thinking, and possible futures in American public schools. *Teacher Education Quarterly*, *37*(4), 179–197.

Evans, N., Stevenson, R. B., Lasen, M., Ferriera, J.-A., & Davis, J. (2017). Approaches to embedding sustainability in teacher education: A synthesis of the literature. *Teaching and Teacher Education*, *63*, 405–417. https://doi.org/10.1016/j.tate.2017.01.013

Flavelle, C. (2020, June 18). Climate change tied to pregnancy risks, affecting black mothers most. *The New York Times*. https://www.nytimes.com/2020/06/18/climate/climate-change-pregnancy-study.html

Goleman, D., Barlow, Z., & Bennett, L. (2010). Forging new norms in New Orleans: From emotional to ecological intelligence. *Teacher Education Quarterly*, *37*(4), 87–98.

Gough, A., & Whitehouse, H. (2019). Centering gender on the agenda for environmental education research. *The Journal of Environmental Education*, *50*(4-6), 332–347. https://doi.org/10.1080/00958964.2019.1703622

Greenwood, D. (2010). A critical analysis of sustainability education in schooling's bureaucracy: Barriers and small openings in teacher education. *Teacher Education Quaterly*, *37*(4), 139–154.

Hart, P. (2010). No longer a "little added frill": The transformative potential of environmental education for educational change. *Teacher Education Quarterly*, *37*(4), 155–177.

Jeronen, E., Palmberg, I., & Yli-Panula, E. (2017). Teaching methods in biology education and sustainability education including outdoor education for promoting sustainability: A literature review. *Education Sciences*, *7*(1), 1–19. https://doi.org/10.3390/educsci7010001

King, D. (2014). Preparing pre-service teachers to teach primary science. *Teaching Science: The Journal of the Australian Science Teachers Association*, *60*(4), 34-37.

Lowenstein, E., Martusewicz, R., & Voelker, L. (2010). Developing teacher's capacity for ecojustice education and community-based learning. *Teacher Education Quarterly*, *37*(4).

Maina-Okori, N. M., Koushik, J. R., & Wilson, A. (2018). Reimagining intersectionality in environmental and sustainability education: A critical literature review. *The Journal of Environmental Education*, *49*(4), 286–296. https://doi.org/10.1080/00958964.2017.1364215

McClaren, M. (2019). Revisioning environmental literacy in the context of a global information and communications ecosphere. *The Journal of Environmental Educcation*, *50*(4-6), 416–435. https://doi.org/10.1080/00958964.2019.1687408

Mitten, D., Gray, T., Allen-Craig, S., Loeffler, T., & Carpenter, C. (2018). The invisibility cloak: Women's contributions to outdoor and environmental education. *Journal of Environmental Education*, *49*(4), 318–327. https://doi.org/10.1080/00958964.2017.1366890

Nelson, T. (2010). Introduction: Education and the environment. *Teacher Education Quarterly*, *37*(4), 3–7.

North American Association for Environmental Education. (2019). *K-12 environmental education: Guidelines for excellence* [Pamphlet]. https://cdn.naaee.org/sites/default/files/eepro/products/files/k-12_ee.lr_.pdf

Nowotny, J., Dodson, J., Fiechter, S., Gur, T. M., Kennedy, B., Macyk, W., Bak, T., Sigmund, W., Yamawaki, M., & Rahman, K. A. (2018). Toward global sustainability: Education on environmentally clean energy technologies. *Renewable and Sustainable Energy Reviews*, *81*(2), 2541–2551. https://doi.org/10.1016/j.rser.2017.06.060

Riordan, M., & Klein, E. J. (2010). Environmental education in action: How expeditionary learning schools support classroom teachers in tackling issues of sustainability. *Teacher Education Quarterly*, *37*(4), 119–137.

Rizzo, T. (2018). Ecofeminist community-engaged learning in Southern Appalachia: An introduction to strategic essentialism in the first year of college. *Journal of Environmental Education*, *49*(4), 297–308. https://doi.org/10.1080/00958964.2017.1383873

Smith, G. (2010). Teaching about sustainability. *Teacher Education Quarterly*, *37*(4), 47–54.

Staples, A. F., Larson, L. R., Worsley, T.-E., Green, G. T., & Carroll, J. P. (2019). Effects of an art-based environmental education camp program on the environmental attitudes and awareness of diverse youth. *The Journal of Environmental Education*, *50*(3), 208–222. https://doi.org/10.1080/00958964.2019.1629382

Stone, M. K. (2010). A schooling for sustainability framework. *Teacher Education Quarterly*, *37*(4), 33–46.

Tarrant, S. P., & Thiele, L. P. (2016). Practice makes pedagogy: John Dewey and skills-based sustainability education. *International Journal of Sustainability in Higher Education*, *17*(1), 54–67. https://doi.org/10.1108/IJSHE-09-2014-0127

United Nations. (n.d.-a). *About the sustainable development goals*. Retrieved July 4, 2020, from https://www.un.org/sustainabledevelopment/sustainable-development-goals/

United Nations. (n.d.-b). *Climate change*. Retrieved July 5, 2020, from https://www.un.org/en/sections/issues-depth/climate-change/

World Health Organization. (n.d.). *Climate change and human health: Risks and responses summary*. World Health Organization. Retrieved July 5, 2020, from https://www.who.int/globalchange/climate/summary/en/

Yearwood, L., Jr. (2020, June 22). *Climate justice is racial justice, racial justice is climate justice*. Shondaland. https://www.shondaland.com/act/a32905536/environmental-justice-racial-justice-marginalized-communities/