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# A Sense of Place in Environmental Education: A Forest Ecology Curriculum

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A Sense of Place in Environmental Education: A Forest Ecology Curriculum

by

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"What's important is that children have an opportunity to bond with the natural world, to learn to love it and feel comfortable in it, before being asked to heal its wounds."

-David Sobel, *Beyond Ecophoiba*

DEDICATION

This capstone is dedicated to the friends, family, and colleagues who guided me on the path to becoming a steward of the environment. Special thanks goes to my parents who have always supported my adventurous spirit.

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**CHAPTER ONE**

**Introduction**

In environmental education, places play a key role in the learning experience. Environmental education encompasses many types of learning, including ecological literacy, science skill development, and general appreciation for nature with the hopes that these learning outcomes will culminate in the creation of stewards for the environment. While these outcomes are valuable for developing students' abilities to understand and care for the planet's ecosystems, they would be moot points without acknowledging the importance of place in environmental pedagogies. In order to engage students with environmental concepts and develop the necessary desires to restore and conserve natural resources, they must first make the choice to care about the places these resources are a part of and in doing so, they develop a "sense of place".

Through this project, I show the value given to environmental education efforts by facilitating students and educators in making connections to their local environments to formulate a sense of place to answer the question "*How does a sense of place help environmental education create stewards for the environment?"* In this project I explore how a sense of place is influenced and how it can be utilized in educational settings through curriculums centered around valuing local places as an important source of learning that can contribute to environmental stewardship. Furthermore, I describe the place-based curriculum that I developed for my locality to utilize as a tool for teaching scientific and environmental course work in line with the academic standards for Minnesota students. In this first chapter, I present the reasoning behind why I wish to explore the sense of place and its benefits to creating stewards for the environment by highlighting my own development into a steward which started with bonding with my local ecosystems and seeing myself as a part of it.

**Personal Development**

Personally, the places I feel most drawn to are the woodlands of Minnesota. This is because I grew up playing and learning in the deciduous forests of central Minnesota. My many hours playing in the forests taught me that I loved being outdoors. The forest just out my back door was where I played in the summer heat and in the frozen snow. Being outdoors gave me a sense of calm and took me to a new world with new elements of play to explore with. My free time was spent building forts out of branches, playing in mud puddles, skipping stones in the lake, and collecting pieces of nature like stones, flowers, and leaves to keep in my room.

These activities led to me making subtle observations about the forest that would eventually help me in school. Observations like leaves changing colors, sorting different types of rocks, and picking apart the pieces of a flower led to me making meaningful transfers of understanding when I started to learn about ecology and environmentalism in school. I was able to take these observations and connect them to concepts presented in my education. Through schooling I was able to learn the *why* behind the phenomenon I had made note of in the forest. The experiences I had from adventuring in the woods also led to me becoming more environmentally aware. I developed a sense of place through experiences that benefited me emotionally, engaged my imagination, and created an attachment to the forest. Because of this, I changed behaviors to protect and nurture my place. My memories of growing up are tied to the forests I played in and shaped my identity as I saw myself as a part of the natural world.

The second important lesson I was taught growing up in the forest was an understanding of the fragility of our natural landscapes. Growing up, I watched the area I lived in become more developed. The tree forts I built along fallen trees were torn down and replaced with luxury cabins. The deer that used to come so close to my house were scared away by the sounds of

construction. The once calm lakes around my hometown became full of boaters. These changes to my place led to an awareness of the nature around me and how impactful humans can be to it. Identifying the interconnectedness of people and ecosystems taught me to see myself as a part of nature rather than a separate entity. This is a concept that is important for environmental stewards to understand; they know that actions indoors, such as pulling water from the tap or turning on the lights, correlate to impacts on natural resources.

My early childhood education contributed to my desire to learn more about my local environment and how I, as an individual in my community, could help fortify the natural landscapes that I had grown so attached to. My elementary school property had a vast outdoor landscape where we could go on nature hikes for class and be outdoors for a decent portion of our schooling, a learning environment that I did not realize many others were not able to enjoy. My elementary school teachers shared their stories of outdoor adventures and frequently took the time to answer my questions about the natural world. They also introduced me to pro-environmental activities in which I could engage, like recycling and composting. As I got older, what started as learning about the trees and birds in my backyard became a desire to be an environmentalist and care for natural places. My environmental stewardship was extrinsically motivated as the outdoors were a place I felt comfortable in and intrinsically motivated by the value I gave nature.

**Educational Experiences**

Having received a mostly outdoor elementary education, I found that afterwards, as a pre-college student, I gravitated towards all things outdoors. I joined extracurricular clubs like the Girl Scouts, 4-H, and my school's gardening clubs. These activities brought me closer to my local settings and community by engaging me and my classmates in volunteer experiences that

focused on helping our local community. I fondly remember when my Girl Scout troop volunteered to clean trash off a local beach and the people who frequented the beach thanked us for cleaning their favorite place. I started to see others who had made bonds to the lands around my hometown. These activities also helped me to create social connections with my peers while engaging in pro-environmental activities.

When it came time to decide what to study as an undergraduate college student, I chose a major in plant science, hoping to do research in forest fauna. However, I happened to sign up for a class called Environmental Education, thinking it would be an easy way to get a credit. To my surprise, this course showed me the world of outdoor education and was the first time I had ever heard of a "steward of the environment". Through this new coursework, I started reading the words of naturalists like Louv and Leopald who wrote on the importance of having outdoor experiences throughout one's life and how these experiences can contribute to a person's ability to see themselves as a part of the natural world. These influential authors inspired me to teach others about the outdoors as their works had taught me so much about environmental education and ethics. Because of their writing and through the activities in this environmental education course, I found a passion in teaching and realized how I could turn my own knowledge and experiences with the outdoors into a career. After this experience, I changed my track to focus on environmental education. Obtaining a college education in environmental sciences helped to further show me the connections between a sense of place and pro-environmental behavior.

As I learned more about the field of environmental education, I came across the ideology of a "sense of place" and began to make the connection between my environmental stewardship and the connections I made playing in the woods as a child. As Leopold (1949) once said, "we abuse land because we regard it as a commodity belonging to us. When we see land as a

community to which we belong, we may begin to use it with love and respect" (p. xxii). In this quote, Leopold concisely states how developing a sense of place can contribute to more pro-environmental behaviors and encourage activism. I had developed a great love and respect for Minnesota's natural landscapes because I saw these landscapes as a community with much to learn and gain from. The sense of place I developed from this emotional connection instilled behaviors in me to be more mindful of nature and led me to desire a profession in the field of environmentalism.

## Professional Settings

Environmental education proved to be a vast field with an abundance of paths from which to choose. After spending multiple summers creating and teaching programming at a children's summer camp, I found my passion for teaching in non-formal settings like camps and nature centers. Outside of traditional classroom settings, I discovered the importance of experiential learning and the ease of which it can be implemented in non-formal educational programming. I saw the connections my campers were making to their local environments as they were outside discovering the world around them. While providing my campers with experiences in nature, I became a guide to the natural world for them. I pointed out the same phenomena I had noticed when playing in the woods and watched their curiosity peak as they asked questions like "*what kind of bird is that*?" or "*how old is that tree?*" Even if I didn't know the answers to their questions, I provided them with sources like books or websites for them to use to answer their inquiries. My work in non-formal settings also made me ponder why these experiences could not be made in formal institutions as well and sparked an interest in creating environmental education programming for formal schooling.

In college, I also was given the opportunity to work with the Minnesota Department of Natural Resources' education program called Project WET (Water Education for Today). The program not only gave me skills for teaching environmental programming, but also gave me the opportunity to work with local schools and educate young minds about water conservation. The students I taught through Project WET showed an eagerness to learn about their local water resources that both inspired and drove me. I received many questions about reservoirs and the local lake systems, which caused me to learn more about these systems myself. Project WET utilized a sense of place by teaching the students about their local water resources and focused on the water systems they interact with. I was able to see a desire in these students to learn more, and beyond that, a desire to do something about the issues facing their water resources.

**Context for Environmental Education**

In his 2008 book *Last Child in the Woods,* author Richard Louv states "Passion is lifted from the Earth by the muddy hands of the young; it travels along grass-strained sleeves to the heart" (p.59). This quote could not more accurately describe my own journey into becoming an environmental steward as it was the unfettered play I had enjoyed outdoors that started a passion to protect the forests for which I have developed my sense of place. My inspiration to create this capstone project came from a desire to define a sense of place in a way that it can be utilized by environmental educators to create similar passions that lead to environmental stewardship in their students. This is all to further explore the question, "*How does a sense of place help environmental education create stewards for the environment?"* Researchers in environmental education like Kudryavtsev, Stedman, and Krasny (2012) have identified the value of a sense of place in stating that a combination of ecological literacy and place attachment can foster

pro-environmental behaviors by creating a connection both academically and culturally to the land.

By defining the parts of the sense of place and how it develops, educators can better understand how to implement approaches to environmental education that can develop lasting behaviors that promote the environment (Kudryavtsev et al., 2012). On the other side of environmental stewardship, authors like Aldo Leopold cite aesthetic appreciation for nature as the beginnings of environmental morality. Leopold's writing on land ethics shook the field with statements like "Our ability to perceive quality in nature begins, as in art, with the pretty. It expands through successive stages of the beautiful to values yet uncaptured by language" (Leopold, 1949, pg. 90). The first steps to seeing our land as beautiful, and in need of conservation, starts with simple experiences outdoors and seeing the beauty of nature, as Leopold states.

Within the classroom, focusing on developing positive senses of place can be crucial to achieving educational outcomes that produce students who appreciate their local environments for both the resource benefits they provide and the aesthetic appeal. There is also evidence that shows the bonds people develop through experiences with places correlates to pro-environmental actions and habits (Ardoin, 2014; Broomell et al., 2015; Cheng & Wu, 2015; Kudryavtsev et al., 2012; Linder et al., 2021; Smith & Sobel, 2010). As people experience nature, they develop an attachment to it, and they begin to hold memories of what they learned by connecting ecological facts with memories of being in nature (Albracht, 2019). Additionally, there is significant evidence that shows that making connections to place develops critical thinking skills which are pivotal to developing future environmental scientists who can help solve the complex issues facing the planet (Merritt & Bowers, 2020; Quitadamo et al., 2008; Tal & Abramovitch, 2013;

Vander Ark et al., 2020).

As this project shows with support from the literature, understanding one's sense of place can help environmental educators utilize the development of sense of place with their students in order to promote activism and experiential learning. A sense of place goes beyond the bond of attachment; places can also hold meaning to people (Kudryavtsev et al., 2012). As people become attached to their place and find meaning they are more willing to protect it and care for it (Leopold, 1949). Additionally, localized environmental education is the grassroots of global environmental action (Smith & Sobel, 2010). While there is evidence that you can become attached to a place just by learning more about it, it is easier for people to make memories in their backyards and easier for them to bond with the landscape around them than to read about those landscapes in a textbook (Kudryavstev et al.,2012). The reasoning behind this is best stated by Gruenewald (2003), "curriculum geared toward exploring places can deepen empathetic connections and expand the possibilities for learning outward" (p.8). While having an exclusively place-based education may mean becoming more environmentally conscious of one's own "place", it could also mean developing an overall appreciation for nature and a more in depth understanding of the steps an individual can take to make an impact on their environment.

### Summary

My development into a steward of the environment started with playing in the woods in my backyard. The time I spent outdoors helped to foster an awareness of the land around me and the ecological communities within it. As a child, I could not have surmised that my backyard adventuring in the woods would have led to a lifelong passion to be a part of the environmentalist community. My educational background further solidified this passion by empowering me with ecological literacy which in turn led to activism and my desire to protect

the environment. These are experiences that helped create a foundation for my career and personal development. I have experienced what a sense of place can create and therefore, I see how educators can use it as a tool to improve comprehension of natural landscapes and promote pro-environmental behaviors. The first major step in fostering a sense of place should start with environmental education through place-based experiential learning. Place-based learning lets students ask questions about the world around them and creates memories of being outdoors. These memories in turn can become the strong foundation for environmentalism to be implemented into the learning environment.

The next chapter of this capstone reviews research and literature from professionals in the field of environmental education to discover how they define and address a sense of place. Defining a sense of place will provide the context needed for discovering its use to environmental educators. Chapter Three of this project utilizes this definition and its parts to inform environmental educators on how to foster a sense of place by outlining the place-based educational framework and how it was utilized to create the capstone project. The project itself is a three week forest ecology curriculum for 7th grade students in Minnesota. Chapter Four summarizes the capstone project process, revisits the literature, addresses the implications and limitations within the curriculum and place-based education, and expresses possible future related projects. Overall, this project helps to inform what the sense of place is in academic terms and implement it into place-based pedagogies to answer the question: *How does a sense of place help environmental education create stewards for the environment?*

**CHAPTER TWO**

**Literature Review**

**Introduction**

In this chapter, I explain the definition of environmental stewardship to identify the main outcome of the question *"How does a sense of place help environmental education create stewards for the environment?"* I then define a sense of place as it is recognized throughout literature in environmental education. After defining a sense of place and how it develops, I outline a place-based environmental education framework to implement a sense of place in students. Reasoning on why place-based education can further the goals of environmental education and benefit students' and teachers' learning environments is addressed with support from qualitative research papers, books, and reports and quantitative statistics from educational associations. Additionally, because environmental education goals and outcomes are measured in behavior change and habit formation, this chapter delves into literature that identifies the key developmental processes of habit formation that can be utilized through place-based education to promote long-term, pro-environmental behavior.

**Environmental Stewardship**

Environmental stewardship is the responsible and protective use of natural environments and natural resources (Chapin et al., 2010). The term *environmental stewardship* comes from the combination of two important ideologies in environmentalism: anthropocentrism and ecocentrism. Anthropocentric views of nature align with the idea that humans are the sole entities of moral understanding and all other entities in the universe are a means to human ends while ecocentrism emphasizes humans' dependence on nature (Kopnina, 2020; Kopnina et al., 2018; McNeill, 2001 Steffen et al., 2011). For decades, anthropocentric views penetrated human

connections to land as people utilized natural resources through activities such as logging and mining to create functioning societies in the vast, uncharted landscapes they came across (McNeill, 2001). However, in the middle of the last century, works like *A Sand County Almanac* by Aldo Leopold (1949), *The Tragedy of the Commons* by Garret Hardin (1968), and *Silent Spring* by Rachel Carson (1962) heightened the awareness of ecocentrism for solving the issues facing the planet. Both ideologies have their drawbacks; for example, anthropocentrism would encourage uncontrolled use of non-renewable resources for human gain, and ecocentrism would encourage the ignorance of social, political, and cultural issues involved in environmental protection policy. Therefore, environmental stewardship was coined to combine both the humanistic and ecological aspects of environmental responsibility (Chapin et al., 2010).

Environmental stewardship was later incorporated into the goals of environmental education during the first international governmental conference on environmental education called the Tbilisi Declaration in 1977 in which the United Nations Education, Scientific, and Cultural Organization (UNESCO) set the foundations for environmental education. The goals outlined in that defined environmental stewardship in the Tbilisi Declarations were as follows:

- to foster clear awareness of, and concern about, economic, social, political, and ecological interdependence in urban and rural areas;
- to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment, and skills needed to protect and improve the environment;
- to create new patterns of behavior of individuals, groups, and society as a whole towards the environment. (*Intergovernmental Conference on Environmental Education, Tbilisi, USSR, 14-26 October 1977: Final Report; 1978*, 1977)

These goals outline the philosophy of environmental stewardship that is now widely used in environmental education (Bennett et al., 2018; Chapin et al., 2010; Potter, 2009; Steffen et al., 2011). Overall, a steward for the environment has environmental awareness, knowledge, values, skills, and behavior.

**Sense of Place Definitions**

*Place*

        To understand how a sense of place can be developed and used to create environmental stewards, I need to define exactly what a sense of place is. I feel it is first important to focus on the word *place.* When originally thinking of the definition of the word, I came up with various synonyms such as *space, physical environment, region,* and *location.* However, in researching this word as it pertains to environmental psychology, I found that *place* is more subjective than simply a *location.* Geographer Tim Cresswell also expressed this in his book *Place: An Introduction* (2008) in which he stated, "place is not just a thing in the world but a way of understanding the world" (p.18). He stressed the emotional and social connections to a location make those locations important. That importance, whether it is a menial or elevated importance, defines place as a personal investment in space. When called "place", what would otherwise be navigational coordinates becomes boundless and meaningful (Cresswell, 2014). Much of the research devoted to the understanding of a sense of place is highly correlated with Cresswell's definition of place which gives significance to both the tangible and intangible aspects of a location (Altman & Low, 1992; Ardoin, 2006; Gruenewald, 2003; Kudryavtsev et al., 2012).

        Bennet et al. (2017) reinforced the strong influence of place to environmental stewardship within their definition of stewardship which states that pro-environmental actions are taken within "social-ecological contexts" (p.599). Their research further identified context as

a driver for environmental stewardship as it determines what impacts on the environment need to be addressed and the feasibility of local entities to solve those issues. They use the example of how indiginous communities are negatively impacted by "no-take" conservation because their harvesting practices are intertwined with their cultural identity (Berkes, 1999 as cited by Bennet et al., 2017). While Bennet et al. (2017) utilized the phrase "social-cultural context", their definition of what this means is identical to how Cresswell (2014) defines place. They categorize place as not just the physical dimensions of an ecosystem, but also the ecological, cultural, social, political, and emotional resources that are also present within those dimensions (Bennet et al., 2017; Cresswell, 2014).

### *Sense of Place*

While we utilize our senses of touch, taste, sound, feel, and smell to identify the world around us, these senses are dedicated to the physical learning of the world. For example, people learn not to touch a burning stove because it is hot and people can identify some food as salty or some food as sweet. But what is the sense utilized to understand the metaphysical parts of our world like reality, identity, changes over time, and possibility? Factors of place do not just refer to the physical aspects, they also rely on the senses we have for the non-physical aspects of the world (Altman & Lowe, 1992; Ardoin, 2006; Gruenewald, 2003; Leopold, 1949). People do not just avoid touching a stove because it is hot, they avoid it because the heat causes pain, and people may choose to enjoy salty foods better than sweet foods. When people consider a place that is important to them, many tend to choose their home. It may have its features like doors and windows, but one is also identifying that place as belonging to a person, therefore also giving it importance. The importance one puts on a place may lead to them feeling and performing differently in that place (Altman & Low, 1992; Gifford, 2014; Kuo et al., 2021; Ramkissoon,

2020). Society uses this sense in many other ways and gives special importance to places such as national parks, city buildings, or homes. Physical senses help people to identify places as separate spaces, but a sense of place is the cognitive importance given to a space that can influence behavioral choices connected to an origin (Altman & Low, 1992; Vander Ark et al., 2020). Kudryavtsev et al (2012) takes this definition into account when considering the development of a sense of place, emphasizing the significance of place being understood as psychological. Their research highlights place attachment and place meaning as being the two contributing factors of a sense of place development.

**Place Attachment.** Place attachment is a fundamental aspect to how a sense of place is developed (Ardoin, 2006; Cheng & Wu, 2015; Kudryavtsev et al., 2012; Semken, 2005). Attachment refers to the personal bonds people make to a place and is influenced by intentions and experiences within a place (Cresswell, 2014; Kudryavtsev et al., 2012; Kuo et al., 2021). Intention for a place, meaning what a person uses the space for, is one of the many reasons a person bonds to a place (Broomell et al., 2015; Orbell & Verplanken, 2018). For example, a person may develop a positive sense of place attachment to a community garden because they enjoy gardening and are able to perform gardening in that place. Experiences in a place also help create a strong attachment and stimulate stewardship actions (Altman & Low, 1992; Cheng & Wu, 2015; Kuo et al., 2021 ).

In her chapter of the book *Place Attachment* (1992), contributing author Clare Cooper Marcus identifies how one's memories of a place can be the way in which they store the information of change throughout their life by stating "it is difficult for the mind to grasp a time period in abstract, we tend to connect it through memories of the *places* we inhabited." (p. 89). She goes further in her chapter titled "Environmental Memories" to explain how memories of

being within a place lead to attachments with reasons ranging from reminiscing on key life changes, overcoming fear of an unknown place, connecting place to a person's identity, or simply finding comfort in familiarity. Overall, Marcus's work reflects place attachment as an individual's cognitive experiences with places over the course of their life and the memories they make. These memories lead people to become attached to a place as they connect not only the information they learned to the place they learned it, but also how those memories shaped their identity.

**Place Meaning.** The sense of place is complimented by the implications of social interactions as well as an individual's own experiences. Our world is not void of other people or histories, in both the ecological and social sense. The social science behind places is what develops place meaning. In developing a meaning to a place, environment, social interaction, culture, politics, economics, and visual appeal can all be influencers (Altman & Low, 1992; Fleischer, 2010; Kudryavtsev et al., 2012; Sobel, 2020). We may also distinguish places utilizing the meanings behind them. Case in point, we differentiate between the places in which we work and the places in which we relax. The meaning behind a place can encourage a person's actions within a setting and behaviors they will exhibit while within that place (Kudryavtsev et al., 2012; Kuo et al., 2021). For example, we interact with people differently in a library versus a gym because social cues and cultures cause us to behave in certain ways (Altman & Low, 1992).

Meaning gives social validation to a person's sense of place. In their case study that explores rural housing in Iran, researchers Hadizadeh and Nourtaghani (2021) show the importance of meaning to a sense of place. They surveyed members of the Guilan province to determine how housing types (indigenous or engineered) impacted residents' sense of belonging and connectedness to their homes. Participants reported a better sense of place in indigenous

housing over engineered housing. The differences in connections to the two housing types was attributed to the ease of social interaction and the appreciation of local culture that was experienced in indigenous housing more so than in the engineered housing. The participants in this study who felt a stronger sense of place to their housing were those whose housing reflected their culture and allowed for them to interact with others, which gave them meanings behind their places.

**Sense of Place in Environmental Education**

As I wish to utilize these definitions from literature to answer how a sense of place can be utilized to create stewards for the environment, I now want to address the *how* of this research question. Educational institutions are the foundations for democracy, meant to prepare young minds for the trials and tribulations of being a citizen in society and prepare them to perform their civic duties (Anderson, 2017). Therefore, it is vitally important that these institutions provide an environmental education that not only allows students to understand the world globally, but also locally.

When students understand their local environmental issues it can lead to critical thinking about global environmental issues such as climate change. Broomell et al. (2015) made this conclusion in their international survey from 24 western counties. Their survey revealed that personal experiences with the impacts of climate change as well as understanding of mitigation strategies heavily correlated with people's intentions to act upon their knowledge. This study gave credence to the importance of teaching students to value their local natural resources and know how people impact them. Introducing the steps students can take to be active in protecting local ecosystems equips them with the skills and knowledge to think critically about greater

global conservation issues (Broomell et al., 2015; Gough, 2010; Ramkissoon, 2020; Yencken et al., 2000; Zia et al., 2014).

*Place-Based Educational Framework*

A sense of place plays a key role in the learning paradigm known as place-based education by fostering place attachment through experiential learning and place meaning through guided interpretation and student-driven inquiry (Smith & Sobel, 2010; Vander Ark et al., 2020). Place-based education integrates community involvement into the learning process by having students use their local resources as sources of knowledge and activism. This form of education is a holistic approach to education that contains contributions from culturally sustaining pedagogies, problem-based learning, and community centered learning (Smith & Sobel, 2010). Furthermore, research shows that connections made through place-based education can be utilized to improve critical thinking skills that are intrinsically linked to enhanced ecological literacy (Fleischer, 2010; Gruenewald, 2003; Lippard et al., 2019; Quitadamo et al., 2008). Place-based environmental education focuses on locality over uniform learning, and it will look different in each setting it is implemented in. However, educational researchers Tom Vander Ark, Emily Liebtag, and Nate McClennen (2020, p.3) note six major design principles in creating place-based education in their book *The Power of Place: Authentic Learning Through Place-Based Education:*

- Community as Classroom: Communities serve as a learning ecosystem for schools where local and regional experts, experiences, and places are part of the expanded definition of classroom

- Learner-Centered: Learning is personally relevant to students and enables student agency

- Inquiry–Based: Learning is grounded in observing, asking relevant questions, making predictions, and collecting data to understand the economic, ecological, and sociopolitical world.

- Local to Global: Local learning serves as a model for understanding global challenges

- Design Thinking: Design thinking provides a systemic approach for students to make a meaningful impact in communities through the curriculum.

- Interdisciplinary: The curriculum matched the real world, with the traditional subjects being content, skills, and dispositions taught through an integrated, interscapular, and frequently project-based, approach in which all learners are accountable and challenged (p.3)

***Student Experience***

With a community as a classroom, place-based education encourages collaboration from the community with children's education to expand the classroom–and the learning happens in it–beyond the confines of the school walls. The connections made to community can contribute to place meaning in students' development of a sense of place by incorporating the social and cultural influencers into the learned environmental concepts (Berg et al., 2021; Kojola, 2020; Sedawi et al., 2021; Smith & Sobel, 2010). Sedawi et al. (2021) presented the contribution of personal investments in space to environmental stewardship in their study which examined the effects of a place-based environmental program taught to indigenous fifth grade students who lived along the banks of a polluted river in Israel. The students were exposed to the river and a recent restoration project that the local government was performing. The study outlined the before and after views the students had about the rivers, which showed a greater comprehension of the cultural, political, and ecological concepts after being exposed to the river and its

restoration. Beyond that, the students expressed a heightened sense of place for their locality as the students communicated newfound desires to restore the stream after making their own connections to it through both their own memories and through the teaching in the program that showed the students its importance to the biological and constructed environments they lived in (Sedawi et al., 2021).

Student driven inquiry is incorporated into the framework of place-based education through problem-based and project-based activities as well as empowering students in their learning by encouraging student agency (Clapp et al., 2015; Kopnina, 2020; Vander Ark et al., 2020). Agency, meaning students' abilities to set goals and take responsibility for making meaningful and helpful changes to themselves and their communities, can lead to students feeling empowered by their abilities to learn about and solve problems (Clapp et al, 2015). By also encouraging students to take credit for their contributions to their community, place-based education inspires students to see the value of education for economic, cultural, and personal gain (Lieberman & Hoody, 1998; Semken, 2005; Smith & Sobel, 2010) Researchers Lieberman and Hoody (1998) presented the possible achievements that place-based education has in their study which organized the data of forty schools that utilized place-based education. Their data showed that using student-centered inquiry increased creative thinking abilities, problem solving capabilities, and more relevant applications of systems thinking. Furthermore, Lieberman and Hoody (1998) showed that student driven inquiry with a focus on place allows students to deepen their understanding of the environment because it "allows students to exercise thinking processes through which they begin to understand interrelationships among natural and socio-cultural systems" (p.70).

Place-based education allows students to get experiences with the natural resources of their localities and provides intrinsic motivations to protect and preserve them by introducing the interrelation between students' natural and constructed environments (Gruenewald, 2003; Gifford, 2014; Smith & Sobel, 2010). The intrinsic motivations to care for the environment are not grounded in test scores but in the individual understanding and reasoning of concepts. By motivating students through projects and inquiries that help their communities, place-based environmental education has students connect problem solving skills with learned ecological concepts and encourages actions to solve issues that students find personally relevant in their communities.

Researchers like Yencken et al. (2000) note that the broad nature of global environmental education reduces the possibilities of local learning opportunities that are valuable to the development of environmental stewardship. Yencken stated, "If we do not think locally, we may ignore rich sources of traditional environmental knowledge and devalue local understanding and experience of environmental problems." (p.4). Involving students in learning about and solving issues in their municipalities allows them to see their relationship as individuals to their community which leads to considerations of the interrelation of communities and global impacts (Ardoin, 2014; Broomell et al., 2015; Gough, 2010). The personal experiences of students are what helps lead students from the local to global issues. By building student confidence to tackle the more complex global issues through an empowered learning process, they can see the differences an individual can make to help protect the natural resources their community uses while also visualizing the importance of natural resources on a global scale (Ardoin, 2006; Gough, 2010; Quitadamo et al., 2008; Russ & Krasny, 2017; Yencken et al., 2000).

*Teacher Roles and Benefits*

Among teachers, burnout has created a disconnect between the passion they have for their jobs and the realities of the system. The National Education Association's 2022 survey of teachers reported that 90% of their 3 million members stated that burnout is a serious issue. The pressures resulting in burnout have only been compounded with pressures resulting from the COVID-19 pandemic. The same survey from the NEA reported that 55% of teachers surveyed in 2022 are planning on leaving education altogether or retiring early because of stressors like increased workloads, staff shortages, and student behavioral issues, further presenting the need for practices within schools that alleviate the stressors being put on teachers. Researchers Smith and Sobel (2010) expressed the benefits of place-based education for alleviating stress-induced burnout in teachers by stating that, rather than taking energy from teachers, place-based education invigorates the learning process on both sides as teachers "rediscover the possibilities and ideals that drew them into education as a vocation and become energized and passionate about their work" (p.xi).

Teachers in place-based education settings are meant to supply structure into education by researching about their local communities, obtaining materials for activities and projects, identifying settings and locations to visit, and connecting with the human resources (Smith & Sobel, 2010). Additionally, the nature of the student-centered aspect to the place-based educational framework means teachers are involved in collaboration and co-inspiration with the students, further allowing teachers to get to know their students and the cultures with which they identify (Clapp et al., 2015; Mcinerney et al., 2011; Vander Ark et al., 2020). Utilizing the local community as a source of learning for students promotes continuous learning outside of the classroom, making teachers the guides for students who seek skills and knowledge on their own.

These roles are a shift from the traditional classroom roles of lecturing, assigning text, and assimilating content material.

Developing a sense of place can also benefit educators themselves because when educators are involved in learning more about the places they teach in and have a positive sense of place for their locality, they can see the importance of what they are teaching( Smith & Sobel, 2010; Vander Ark et al., 2020).  Learning about the natural resources and environments in their locality can also better equip teachers to utilize practices that influence their students' senses of place (Anderson, 2017; Gruenewald, 2003). Researchers Meichtry and Smith (2007) show the confidence boost teachers can get from professional development programs that encourage teachers to develop a positive sense of place. Their study of a Kentucky-based program aimed at training educators to use outdoor learning sites and create place-based environmental curriculum that aligns with state standards helped local teachers to feel more confident in teaching their students outdoors. Their work also shows how place-based education can be beneficial for teachers in making their jobs impactful to students and relevant to ideals they want to instill in themselves and in students (Meichtry & Smith, 2007).

Furthermore, there is not only a need for training teachers in place-based education, but also a desire within teachers to do so. The study performed by Blatt and Patrick (2014) that surveyed pre-service teachers showed that many of them had experiences outdoors that led them to want to teach their future students outdoors. The participants reported that they want to teach their students in local outdoor landscapes, but that their training did not prepare them to do so. Blatt and Patrick (2014) suggested that teacher education should seek to make the role of outdoor and place-based curriculums more robust to build on pre-service teachers' previous outdoor experiences and provide techniques for exposing students to nature.

To help students develop a sense of place, teachers must also be connected and mindful of the places around them (Mcinerney et al., 2011; Potter, 2009). Therefore, the roles of teachers in place-based education include making their own connections to places to enhance the quality of their environmental and science education for both themselves and their students (Anderson, 2017). Doing so not only helps teachers be able to identify how a sense of place is developed but also enhance their knowledge of the local community, both socially and ecologically, to provide environmental education (Anderson, 2017; Mcinerney et al., 2011; Meichtry & Smith, 2007; Vander Ark et al., 2020).

**Practices in Place-Based Environmental Education**

Instilling a sense of place in students through place-based education comes in many forms. Place-based environmental education can be utilized in a variety of educational settings both formal and informal to bring learners closer to their local landscapes and environmental issues. This next section explores the various methods in place-based environmental education that can influence a student's sense of place. Observing nature, performing projects that utilize engineered problem solving, learning about ecojustice, and environmental stewardship are all tools utilized in place-based environmental education.

*Observing Nature*

The development of a sense of place in students should involve experiences that will help students formulate memories and visualize spaces through personal interaction with places (Albracht, 2019; Altman & Low, 1992; Anderson, 2017; Cresswell, 2014). Observing nature in early education can supply students with the cognitive development to process what a place is and what features make it unique (Brody & Tomkiewicz, 2010; Farmer et al., 2007; Linder et al., 2021; Vander Ark et al., 2020). Activities such as nature journaling, mapping, outdoor

group-bonding activities, collecting games, and field trips are examples of ways to develop place-attachment in students as they make observations and connect memories to landscape, furthering their individualized experiences with place bonding (Cresswell, 2014; Vander Ark et al., 2020).

Despite the common misconception that environmental education and place-based education only hold advantages for rural schools with lots of outdoor space with which to work, place-based environmental education is not exclusive to these kinds of schools (Linder et al., 2021; Martusewicz et al., 2020; Russ & Krasny, 2017). Russ and Krasy (2017) argued "shifting environmental education from remote wilderness areas to urban parks, backyards, community gardens, and restoration sites has the potential to make environmental education accessible to people of all abilities and backgrounds" (p.197). Urban environments are not void of nature and in fact are a big contributor to the sustainability of our planet; therefore students in these settings should not be ignored as vital stewards for the environment. Students can identify their sense of place by taking the time to meaningfully observe their landscapes (Albracht, 2019; Ardoin, 2006; Berg et al., 2021; Blatt & Patrick, 2014). Observations of things that, on the surface may not have been connected with nature, such as a drainage ditch or ivy growing on an old building, can be utilized as tools for learning more about how ecosystems work and how to mitigate negative impacts on the environment.

Utilizing observation of nature can also influence the meanings students give to places as noted in the study performed by Berg et al. (2021) in which they gathered the thoughts and opinions of students and teachers around the benefits of outdoor exploration time. They noted that social-emotional understanding and physical activity contributed greatly to students' enjoyment of outdoor exploration time. The study reported that the opportunities to connect with

nature helped the students to make meaningful connections to their local outdoor spaces by expanding perspectives, bonding with nature, having a sense of choice in learning, and enjoyment of the activities they performed outdoors. Observing nature can establish implicit connections emotionally and meaningfully to a natural space and performing activities outdoors is a great way to introduce students to place-based education (Albracht, 2019).

*Projects*

Place-based education does not ignore the importance of understanding the science behind ecology. Rather than test this "ecological literacy" exclusively through standardized testing, students present comprehension through various avenues. One highly utilized avenue for doing so is through the advancement of projects in schools. Projects require students to perform engineered problem solving, engage in logical research, and present relevant data. Projects can also be a platform for engaging with the local community and experiential learning. In environmental education, projects that focus on student problem solving and researching natural phenomena can be a way for educators to enhance the sense of place their students have for their local environments.

**Problem Solving** Environmental literacy is meant to provide the building blocks for higher level thinking that will help students solve issues facing the environment (Ardoin, 2006; Tal & Abramovitch, 2013). Place-based education helps prepare students to use techniques that are employed in engineering and scientific fields to engage in real-life engineered problem solving. Problem solving projects use the scientific method, inquiry-based education, and engineered problem solving to engage students in objective and practical techniques to solve problems (Anderson, 2017; Lippard et al., 2019). Students identify an issue or inquiry as well as the importance of solving or answering it; then collect data and create, test, and adjust designs

for solving the issue; and finally communicate their results. Local environmental and cultural issues serve as place-based problems that students can learn about, identify solutions for, test their hypotheses, and communicate their findings.

### Experiential Learning

Experiential learning is an instructional tool in which students make practical contact with and observe natural phenomena. Research on natural phenomena is crucial to meeting standards for scientific mastery and is programmed into place-based education through the research of natural phenomena happening in and around where students are being taught (Berg et al., 2021; Sedawi et al., 2021; Tal & Abramovitch, 2013). Teachers can integrate ecology lessons into place-based environmental education by moving the classroom to be where the action is happening. These kinds of interactions are drivers for contextual cues that help students not only retain knowledge but develop positive emotional connections with the experience of learning (Albracht, 2019; Berg et al., 2021; Smith & Sobel, 2010). Some activities recommended for including experiential include having students create presentations about natural phenomena and learning from a researcher or scientist in the community about natural resources (Tal & Abramovitch, 2013). Researching natural phenomena could also include having students record observations about the natural phenomena happening in their area such as weather, phenology, and bird watching. Using this method of teaching synergizes the learning process as students are able to visualize concepts like nutrient cycling, food webs, and photosynthesis and connect them to how these concepts actually function in local ecosystems.

### Teaching Ecojustice

Ecojustice is a relatively newer concept to environmentalism; however, it is increasingly being shown as an important feature of environmental learning (Fleischer, 2010; Gruenewald,

2003; Martusewicz et al., 2020; Mcinerney et al., 2011). Equity, access, and social justice are intertwined with a sense of place for both students who experience these issues and for the heightened awareness for students who do not (Fleischer, 2010; Martusewicz et al., 2020). Many studies and reports show that problems in the environment are not equally felt, with poor and minority communities feeling the heaviest brunt of issues like pollution and climate change (Martusewicz et al., 2020). Developing a sense of place that leads to pro-environmental behavior also means developing an appreciation for the diversity of cultures present in all habitats as well as acknowledging inequity within environmentalism (Anderson, 2017; Gifford, 2014; Vander Ark et al., 2020). This helps to heighten the importance of pro-environmental behavior as it connects to students' sense of place through community and equity among people (Anderson, 2017; Gruenewald, 2003; Martusewicz et al., 2020).

Ecojustice education is also a way in which urban schools may benefit from place-based education. Researchers Russ and Krasny (2017) address ecojustice as the central approach to teaching environmental education in urban settings. They suggest this because "the character of a city is determined by geological factors and locations, as well as by natural, historic, social, economic, and cultural dimensions." (p. 216) This suggests that the nature present in urban settings is heavily shaped and influenced by humans. It is the interrelation of humans and nature that is present in cities that makes ecojustice education even more valuable to urban environmental education (Russ & Krasny, 2017; Smith & Sobel, 2010).

**Establishing Pro-Environmental Behavior**

Educators in place-based learning situations can impact behaviors by establishing habits such as collecting trash, performing water-saving tasks, planting trees, and providing context to them like preventing pollution, reserving water resources, and building forests. Literature shows

that there is an implicit connection made to the contexts in which habitual learning takes place (Ramkissoon, 2020, Orbell & Verplanken, 2018; Linder et al., 2021). These implicit connections are what develop a sense of place because people associate their surroundings both physically and socially to the context in which they live (Kollmuss & Agyeman, 2002). Therefore, physical surroundings give contextual cues to behave in certain ways and establish habits without much conscious thought (Linder et al., 2021).

By bringing people into natural surroundings and applying pedagogies that promote pro-environmental behaviors, educators can develop habits connected to places that positively impact the environment (Ardoin, 2014). Linder (2021) highlights the importance of habit formation in environmental education by stating "one reason societies struggle to reach policy goals and people fail to change towards more pro-environmental lifestyles might be that many behaviors are now bound by strong habits that override knowledge and intentions to act" (p. 546). Environmental education efforts often focus on ecological literacy; however, the literature suggests that pro-environmental behaviors coincide with habitual skill building more than intellectual understanding of ecological concepts (Bennett et al., 2018; Kollmuss & Agyeman, 2002; Linder et al., 2021; Ramkissoon, 2020) While theoretical modeling predicting or explaining behavior incorporates learned concepts and understandings as a variable driver to habit formation, recent data shows long term habit formation is intrinsically linked to context and experiential learning (Chao, 2012; Fiorella, 2020; Gifford, 2014; Linder et al., 2021; Orbell & Verplanken, 2018; Ramkissoon, 2020).

**Habits and Behavior**

Habits are the fundamental basis for daily actions, which is why it is valuable for environmental education efforts to focus on how people form habits to create sustainable,

long-lasting behaviors that have a daily positive impact on the environment (Linder et al., 2021).

Place plays a key role in formulating habits because place attachment and place meaning, as well

as habit formation, require cognitive development. Place-based education cultivates habit

formation by routinely introducing behaviors in natural contexts and establishing context cues to

perform certain actions routinely (Fiorella, 2020; Linder et al., 2021; Mcinerney et al., 2011).

While motivation and rewards can act as drivers for habit formation, context-cues are the vital

starting point for performing behaviors that are habitual because behaviors can be habitual

without motivation or reward if context-cues are presented (Gifford, 2014; Linder et al., 2021;

Orbell & Verplanken, 2018; Ramkissoon, 2020).

### *Habit Development in Place-Based Environmental Education*

Environmental education uses behavior change as a way to measure outcomes for

programming, therefore developing a dependence on tracking habit and skill formation (Bennett

et al., 2018; Focht & Segovia, 2014; Potter, 2009). The two key development factors of place

attachment and place meaning are influenced by many of the same factors as habitual behaviors

such as repetitive action, quality time spent performing action, physical cues, and social cues,

which means that developing a sense of place coincides with developing habits (Kudryavtsev et

al., 2012; Linder et al., 2021). Habit formation through place-based education additionally

solidifies ecological literacy by connecting memories of performing skills with information

provided by educators–which leads to context-cue development–all the while incorporating

motivation for the actions being exhibited (Bennett et al., 2018; Kollmuss & Agyeman, 2002;

Linder et al., 2021; Ramkissoon, 2020). Overall, the interconnected concepts of habit formation

and a sense of place gives credence to place-based environmental education to provide quality

learning that meets the goals of environmental education and creates stewards for the environment who will make implicit behavior changes to protect the places they are bonded to.

**Summary**

This research is aimed at answering the question, *How does a sense of place help environmental education create stewards for the environment?* Overall, prominent literature on a sense of place identifies two key factors in its development: place attachment and place meaning (Cresswell, 2014; Gruenewald, 2003; Kudryavtsev et al., 2012). Fostering a sense of place means looking into the emotional motivations behind people and their experiences in certain settings. These two separate concepts need to be isolated and influenced individually to create a positive sense of place that motivates positive behaviors and interest in learning more about a place. Place attachment is influenced through individualized bonding to place and the concept of place meaning is influenced by social and societal factors in that place. An education that focuses on developing a positive sense of place influences both traits and can individualize a person's education to motivate a higher standard of learning and long-term behavior changes (Smith & Sobel, 2010). Environmental education utilizing a sense of place within its curriculum is coined as "place-based education" and depends on repetitive, quality experiential learning to teach skills and develop pro-environmental behavior through habit formation. My review of the literature on sense of place shows that place can have an important influence on how people act towards the environment. In the next chapter, I utilize these findings to address the methods in which place-based education can be done to create environmental stewards. Chapter Three describes a place-based forest ecology curriculum I created for this project, the rationale, and the audience meant to be influenced through this research and project.

**CHAPTER THREE**

**PROJECT DESCRIPTION**

**Introduction**

Based on the literature review, the third chapter of this capstone aims to be a guide to

creating programming that creates a sense of place and invokes pro-environmental feelings and

habits to create stewards of the environment. Chapter Three provides an overview of a

three-week forest ecology curriculum unit that I developed utilizing the principles of place-based

education that fulfills required 2019 Minnesota Academic Science Standards. This chapter

includes the framework used in the creation of the curriculum, an overview of how the

curriculum is performed, the rationale for its development, the goals this curriculum hopes to

fulfill, the timeline of creation, and the audience for which this project is intended. The project

was meant to act as a guide for incorporating a place-based curriculum to answer the question:

*"How does a sense of place help environmental education create stewards for the environment?"*

**Framework**

Place-based education is sorely needed as a pedagogical framework to give students

experiences that formulate place attachment and provide meaning to these experiences (Smith &

Sobel, 2010). Utilizing a place-based pedological framework can work to fulfill ecological and

scientific learning standards, develop a sense of place, and encourage lifelong pro-environmental

behavior (Anderson, 2017). Localized place-based environmental curricula will look different

according to the environmental issues or phenomena that students find relevant to research.

Curricula in place-based education is meant to be this way, but, as Vander Ark et al. (2020),

identified, place-based education is unified by these six guiding principles: (a) Community as a

classroom, (b) Learner-centered, (c) Inquiry-based, (d) Local to global, (e) Design Thinking, and (f) Interdisciplinary. These principles are the educational framework I utilized in the making of my place-based environmental education curriculum. In Appendix A, I outlined each principle and identified how it was utilized in the curriculum.

**Project Overview**

This capstone project is a guide to developing a sense of place in students to facilitate pro-environmental behavior using science and environmental education. My capstone project is a three-week forest ecology curriculum that involves in-class activities, nature journaling, an experiment, and a presentation on an invasive species. The overarching learning goals for this curriculum are to help students connect to Minnesota's forest ecosystems, visualize the root of an environmental issue, fulfill state learning standards, and invoke a sense of environmental activism. This lesson teaches Minnesota students about the local environmental issue of invasive species with the experiment focusing on invasive earthworms as an example. Invasive species disrupt the natural equilibrium of the ecosystems they invade. The Minnesota Department of Natural Resources (MNDNR) notes that there are at least 15 non-native and invasive species of earthworms that are devastating Minnesota's forests by overconsuming the duff layer of dead leaves and organic matter on the forest floor. The duff layer provides protection against erosion and is the growing habitat for forest seedlings. By removing this layer of the forest floor, invasive earthworms contribute to soil erosion, nutrient leaching, and lowers the biodiversity of the forest. Big trees may be able to survive invasion, but the vital species such as wildflowers, saplings, shrubs, and ferns that contribute to proper nutrient cycling, provide homes for animals, and make the forest resilient to disruptions often disappear.

*In-class activities*

Each day outlined in the project introduces a new concept of forest ecology. The activities listed for each day engage the students in local learning about the forests. Through these activities the students classify forest ecosystems by the types of trees, animals, and layers of the forest. There are also activities that have the students evaluate local biodiversity and inquire about the importance of this concept in the form of forest resilience and species richness. There are three overarching themes to the lesson: Identifying forest ecosystems, analyzing the ecology concepts within a forest, and recognizing how humans and the forest are connected.

### *Journal prompts*

The nature journaling prompts in this curriculum provide the learner-centered, inquiry-based, and community as classroom principles of the place-based educational framework. Journaling prompts in the lesson act as a self-assessment of learning and help students synthesize the concepts they learned in each lesson. Some prompts require students to go outside the classroom to make observations and inquiries about nature.

### *Invasive Earthworm Experiment*

The curriculum unit is centered around a larger experiment the students perform in class. The experiment provides the interdisciplinary and design-thinking principles of the place-based education framework. Students utilize the scientific method to create two "mini forest floors" in two liter bottles while the teacher makes one larger model of the forest floor in a larger container for the entire class to use. To model the layers of the forest floor, each bottle will contain a layer of sand, soil, and duff. One bottle will have earthworms in it and the other will be the control with no earthworms in it. A third bottle will have a changed variable that is up to the student's discretion to decide upon. Over the course of the experiment, students will measure the shifts in each layer of sand, soil, and duff to visualize the decomposition of the duff layer. In their

journals, students will write a hypothesis of what will happen in the experiment, identify the independent and dependent variables, record qualitative and quantitative data, create a visual representation of the data, and write a conclusion of the experiment.

### *Presentations*

The final stage of the curriculum has the students create a presentation. During this phase, students will identify an invasive species they want to learn more about in their area. They will utilize the MNDNR's website on invasive species to identify a species to study and create a presentation on. The mode of demonstration is up to the students to decide and can include but is not limited to writing a paper, making a powerpoint presentation, making a poster or 3D model, or writing poetry. Presentations should answer the who, what, when, where, why, and how of the issue of their chosen invasive species:

- Who: What is the invasive species? Who is impacted by it? (people, animals, and plants)

- What: In what way does this invasive species impact the ecosystem it is invading?

- When: When was this species introduced to Minnesota? How did it get here?

- Where: Where is the species from? What limits that species from becoming invasive in its natural habitat?

- Why: Why is this an issue the student cares about? Why should others care?

- How: How is it controlled in Minnesota? Is it a species that can be controlled?

After creating the presentation, the teacher and the students work together to research ways to present their data to their local community. Teachers can help students find local nature centers, science fairs, or public forums for students to present their projects. Students who are uncomfortable with public speaking events may also choose to present their project to a group of family or fellow peers.

*Assessments*

In Appendix B I provide the assessments for this curriculum. Qualitative assessments are in the form of grading rubrics for the experiment and presentations. The qualitative assessment is in the form of a pre/post survey. Teachers may also choose to have the students turn in their nature journals to analyze their qualitative assessment, however, there should not be a grade for the journaling other than grading the students on attempting to answer each journal question.

**Audience and Context**

This curriculum focuses on nutrient cycling, biodiversity, and human impacts to forest ecosystems in Minnesota. These are all concepts taught in 7th grade in Minnesota with the newest state standards for science. Beyond this, the additional science standards being taught to this age group include information which addresses natural selection, cellular identification, cellular respiration, and photosynthesis; all concepts that contribute to understanding the concepts this curriculum introduces. Given these connections to the Minnesota science standards, this curriculum best fits with the requirements for science learning for 7th grade in Minnesota.

The curriculum involves an in-depth study of forest ecosystems present in the state, therefore providing the context for the lesson. Because of the availability of earthworms in bait shops across the state, the experiment can be performed anywhere within the state of Minnesota, despite whether or not earthworms are present in the forest ecosystems in the area. While the experiment is performed indoors, the availability of materials and timeline of learning standards may limit when the lesson can be taught during the school year. It is recommended that this curriculum be taught during the fall or spring semesters of the school year to allow students to be outdoors during the activities and journal writing portions of the curriculum.

**Rationale and Goals**

I developed this capstone project with the intention of answering the question: *How does a sense of place help environmental education create stewards for the environment?* In researching the subject of sense of place and how it can be implemented into education, I felt the need to develop a guide for incorporating these place-based learning strategies into environmental education curriculum. I found that the need for standardization in environmental and science education was stifling the development of a sense of place. These are the same struggles I imagine other educators have with this system and hope to use this research and curriculum to create an awareness for the importance of the learning done in place-based education. By focusing on the places students interact with daily, place-based environmental education encourages students to bond with their local communities and landscapes. These bonds, created through facilitating place attachment and meaning-making, lead to learning empowerment and makes the material relevant to students. In doing so, place-based education has the potential to develop critical thinking skills, scientific reasoning, and environmental responsibility in students (Vander Ark et al, 2020).

As I researched the definition, development, and purpose of sense of place, I wanted to create a place-based curriculum that could be used in my own locality of Minnesota. I utilized the information synthesized in the literature review to develop a curriculum that could be performed by 7th grade students in Minnesota. The curriculum is made to help students to create important connections to develop a sense of place while furthering their learning of science and environmental concepts. I outlined the methods I took to do so in this project to give educators an example of how this can be done so that they may be able to mimic these methods to create programs and curricula that teach about environmental issues in their locality.

**Project Timeline**

The project was developed over the course of two semesters. The literature review and background for the capstone was completed between January 2022 and June 2022. The development of the curriculum was completed in July 2022. This capstone project was submitted in full, with reflections on the efficacy of the curriculum, for publication in August 2022.

**Summary**

Chapter Three described how I utilized both my experiences and research to create a place-based curriculum unit in which students study an environmental issue in their locality. This curriculum was developed with a place-based educational framework. The goals of this curriculum are to teach students about the science behind invasive species, learn about the makeup of a forest, and develop a sense of environmental responsibility to encourage environmental stewardship in the learning process. Within the curriculum students answer nature journaling prompts, perform an experiment to model the invasion of earthworms in the forest, and create a presentation about a local invasive species. Overall, this chapter shows how place-based education can be utilized to create a sense of place in the participants and how developing a sense of place can create stewards of the environment. Chapter Four is a concluding reflection on what I have learned as a researcher, future educator, and learner through the development of this project. It also reflects on the implication and limitations of the curriculum and place-based educational frameworks while also addressing the notions of future research on the topic of a sense of place and its worth in environmental education.

# CHAPTER FOUR

## Conclusion

**The Capstone Project Process**

As a result of producing this project, I further developed my skills as a researcher, writer, and learner. I realized the importance of passion, patience, and composure through the process of choosing a topic, researching it, and producing a review. The ways people connect to places and develop environmental stewardship have been a long-time interest of mine. When I decided to center my project around these topics, I thought the question "*How does a sense of place help environmental education create stewards for the environment?*" would have a straightforward answer. However, my research showed a much deeper level of data, knowledge, and emotion than I originally thought it would. My passion for the topic led to me learning much more about a sense of place and how people connect to places on a psychological level. I had to use patience in my writing. I was so passionate about these topics, even more so after reading the literature on them, that I wanted to say everything about the topic all at once. However, as I produced more content for the literature review, I was obligated to be patient and allow the data and sources to fall into place where they were most supportive and gave a clear picture of the points I was trying to get across. I further refined my ability to communicate in a composed manner as I wrote and organized my literature review and project.

The other portion of the writing process that felt remarkably impactful to me was in defining what a sense of place is. The research not only shaped the rationale for my project but also drove me to thinking critically about the places I have interacted with in my life. While I grew up in a rural area, I now have had the opportunity to experience a more urban setting after living in a city for several years. Before examining a sense of place, I had assumed I was only

deeply connected to the outdoor spaces of my hometown. I now see that I have developed both an attachment and meaning to the city I currently live in. I have the ability to continuously grow my sense of place and understand the importance of fostering it wherever I locate myself in the future. I also developed a respect for the way in which others connect with places. I became excited about the idea of transferring my passion for natural places to my future students.

The opportunity to create this project also gave me the chance to explore a new framework of education to make certain my future students connect to their local environments. In creating a new curriculum, I have many takeaways, but I will limit myself to discussing the two I find most vital to my future as an educator: designing a curriculum is harder than it sounds and designing curriculum gives educators the chance to implement practices and teach concepts that are important to them. When I started the process of creating a curriculum, I found myself immersed in a new world of defining learning goals, researching standards, studying an environmental issue, and developing assessments. These are all vital skills for creating a useful environmental curriculum, but they were not easy to learn. I have a higher appreciation for educators who make their own curriculum as I found it time consuming, meticulous, and easy to derail. However, this process was also empowering to me as I was able to take the topics of a sense of place and environmental stewardship and implement them in a way that is useful within my profession. My hope for this project was that other teachers who want to facilitate environmental stewardship might also be able to create a curriculum about the places they teach in order to further bond with their students and their local communities.

**Revisiting the literature**

Throughout this project, I cited various examples of environmental stewardship initiatives such as Goodman (2022), Edstrand (2015), and Levinson, (2014). Their works

highlighted restoration and protection, everyday choices, community engagement, civic action, and science as important components of environmental stewardship. Ultimately, I became aware of the interrelation of humans and nature that stewards of the environment can notice and act upon. I had to translate this into my curriculum by analyzing the ecological impacts of invasive earthworms in Minnesota while also incorporating how humans are involved. I want the students who engage with my curriculum to not only learn about the science behind this issue, but also develop a positive sense of place for the forest through heightened awareness and visual representation of the issue.

Researching the relationships between people in nature further supported the hypothesis I had that a sense of place is a vital tool for developing environmental stewardship. I incorporated the definition of a sense of place as it pertains to environmental education. In doing so, I found the work of Tim Cresswell (2014) and Kudryavtsev et al., (2012) to be informative and inspiring to the way we utilize places for psychological development. Their works described a sense of place in a manner that takes the concept beyond physical boundaries and more into the cognitive state of mind of students. The book *Place Attachment* (1992) by Altman and Lowe had a profound impact on how I saw places and their importance to environmental stewardship. Contributing author Claire Cooper Marcus outlines an impactful theory that places are proxies for memories and self-identity in her chapter titled *Environmental Memories* (p.87-112). By analyzing environmental memories, she concluded that "reflecting on who and where we once were helps us become clearer about who we want to be." (p.109). If I want my students to become stewards of the environment, I want to help them critically reflect on the places they are connecting their memories to and give them positive and impactful memories to take with them

as they grow. As an environmental educator I want to inspire my students to *want* to learn more about their planet and their place in it.

I've always wanted to find a way to synergize environmental education within the school system. In my professional experiences teaching a wide variety of ages, I have seen students of all ages become interested in learning more about their local ecology and perform student-driven inquiry in non-formal settings. After learning more about place-based educational frameworks, I wanted to find a way to harness the same desires in a formal classroom setting. Place-based education values both ecological and community sources of knowledge to empower the learning process as students are self-driven to learn about their settings and solve local, relevant problems. The book *The Power of Place: Authentic Learning Through Place-Based Education* by Tom Vander Ark, Emily Liebtag, and Nate McClennen highlighted the ways in which place-based education can be utilized within a formal school setting as well. They describe the framework as being community centered, inquiry driven, and inherently multidisciplinary. They urge that implementing place-based pedagogies benefits the learning process by giving students agency and local social and ecological connections. More teacher-centered sources like *Bringing School to Life: Place-Based Education Across the Curriculum* (2017) by Sarah K. Anderson identified how teachers can benefit from the shift in roles. Anderson, as well as Smith and Sobel (2010) highlighted how community involvement in education gives teachers the chance to engage with each other and the vast resources of knowledge their communities have as a way to combat the negative and isolating aspects of education that cause burnout.

In answering the question "*How does a sense of place help environmental education create stewards for the environment?*" I had to perform a detailed analysis of what environmental stewardship means and how a sense of place plays into the creation of

environmentally aware citizens. Overall, I discovered the importance of being a life-long learner, especially when it comes to developing a sense of place. The literature described environmental stewards as passionate learners who have developed knowledge, skills, and appreciation for the environment. Developing a positive sense of place for the natural world correlates with making positive personal memories, connecting one's identity to the environment, and obtaining social and cultural validity for environmental protection. After researching place-based education as the framework to implement environmental stewardship while developing a positive sense of place, I feel more equipped to teach students about the environment and to develop their sense of place. In utilizing this framework, I hope to motivate my students to recognize and appreciate the nature that is always around them.

**Implications and Limitations of Place-Based Education**

The lesson I formulated is meant to give students the chance to research and brainstorm solutions to a local environmental issue. I constructed the lab experiment and journal prompts with the mindset that not every school will have a vast outdoor landscape to utilize or a nearby forest for students to travel to. The experiment itself can be performed in a classroom, however incorporating community into the classroom is vital for the place-based nature of this curriculum. In the collection of the materials, I included ways in which teachers can bring their students outdoors and see that there are vast learning opportunities just under their feet or out their front door. Collecting the worms and reporting their findings to Great Lakes Worm Watch is an excellent way to connect this lesson with the importance of individuals in the community for reporting ecological data to scientists and makes the lesson more relevant as they can see that invasive earthworms are right under their feet

Another implication within this curriculum is the inclusion of local researchers and MNDNR officials who can come into the classroom or be a part of a field trip to the forest. Seeing real scientists and researchers at work and engaging with students further solidifies to students that there are career pathways in environmentalism. It also benefits teachers as they are not given the full load of responsibility to teach their students about local environmental issues, especially if they feel uninformed on the issue. To do this, educators and schools may need to reach out to sources like the MNDNR, local universities, and environmental non-profit organizations to see if this is an option for them.

For students to engage with local learning places, they need to be allowed to go to local learning places; meaning, schools will have to update policies that limit where students are allowed to travel during school. To make place-based education (as well as this curriculum) a possibility, schools need to be transparent and communicative with parents and guardians to calm any unease they may have with their child's safety. While the journaling within this lesson can be done in class, time and spatial constraints may require the prompts to be answered as homework. In doing this, teachers should communicate with parents about the needed requirements for this work. Meaning, teachers should inform guardians that students need to observe their local natural surroundings to properly be able to reflect on their sense of place and get the most out of the journaling homework. They could suggest local parks or natural areas for them to explore and create safety guides for students before they go out to their chosen site. Teachers may also choose to have students answer some of the prompts in class and some outside of class, for example, students could make the biodiversity index during a class where the teacher takes them outdoors and assign the species richness bar graph as homework since this is a prompt that could be done at home.

The project presentations in this curriculum are meant to give the students agency in their learning by choosing their method of demonstration. Every student has their own strengths, and the presentations are meant to allow students to harness their own strengths and choose the method of communication they are most comfortable with as well as able to perform. While the rubric for grading presentations provides a foundation for assessment, educators can adapt it as necessary to reflect their students' learning. For example, if a student decides they want to share what they know about invasive species through poetry, the teacher could grade them on through a literacy lens of assessment or if a student makes a PowerPoint presentation, they can also grade them on their oral communication skills. These are adjustments that require the teacher to effectively communicate one-on-one with their students and validate their chosen demonstration of knowledge.

Finally, as always when observing forces of nature, not every experiment will go smoothly. There is no way to predict what the worms will do in the experiment, some students may see clearer results than others, it may take a lot longer than three weeks for changes to be visible, and accidents happen all the time that might destroy the experiment. To avoid these concerns, I implemented a larger version of the two-liter bottle "forest floors" for class-wide use in case their own experiment does not work out. This is an additional reason why I chose to have the students create a final project where they must research on their own, so that even if the worm experiment doesn't go according to plan, their expressions of learning will be shown. If done correctly, the students' journals will also show a sophisticated scientific process through their outlining of the scientific method and engineered problem solving. The answers to the journal prompts will also indicate critical reflection of the environmental issue they are studying through observations, inquiries, and creativity.

**Future Related Projects**

      The multidisciplinary nature of place-based education makes this framework valuable for learning beyond that of environmental stewardship. I see many opportunities to utilize this framework and this project in both the formal and non-formal sectors of education. Communities are full of opportunities to learn and people to learn from. Math can be learned through studying architecture design, social studies can be taught in a museum or town hall, students can be encouraged to hone their reading skills while exploring a local library. After creating one curriculum using this framework, I am now equipped with a template for incorporating local learning into any future curriculums I design as an environmental educator in formal and non-formal settings. Non-formal settings can benefit from the lack of time and spatial constraints that a 50-minute science class may have while formal settings can benefit from their capabilities to connect with the community and greater ability to fund place-based learning expeditions.

      It should also be noted that place-based education is not meant to encourage students to forget where they have come from and fully accept a new place. Rather, it is a way in which teachers can show students those places are dynamic, and every place has new opportunities. Developing a sense of place for where students are currently located can help them feel more connected to a new setting and allow them to see their place in the community they are located in. Acknowledging the cultures present and their histories is part of the community as a classroom aspect of place-based education. Indigenous students can gain support through their learning paradigm using tribal knowledge and appreciation. Students who have been displaced as refugees can benefit from the opportunities to discover their new settings and find themselves welcomed as new members of the community. The chance to make powerful and helpful changes

in one's community can help students who feel no connection to their local settings to see that they are also important and make impactful change in their community

My project reflects just one local environmental issue that teachers can use to encourage environmental stewardship. This planet is full of different ecosystems and communities living within them, each with their own learning opportunities. I am simply providing a template of how to utilize them. By doing some research on their local environments, teachers can create their own place-based curriculum based on what is relevant to their students. Environmental issues such as water resource availability, air pollution, wetland and habitat loss, and waste disposal are all examples of issues most communities experience and need students to care about. They can be learning opportunities in science for subjects like cycling, weather, and ecology. Furthermore, nature journaling is not exclusive to this curriculum. John Muir Law's extensive library and guides on nature journaling inspired much of the journaling prompts. His book *How to Teach Nature Journaling* is a great way for other educators to be informed on how to integrate nature journaling into their curriculums. Nature journaling is a great way to allow students to perform inquiry, enhance their observational skills, and make connections to themselves and their local surroundings to further develop their sense of place.

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**Appendix A**

**Place Based Education Framework**

(a) Community as a Classroom:

- Observe and record data on a local forest ecosystem.

- Visualize and interpret a local environmental issue

- Create a visual presentation explaining an environmental issue and research methods to present this data to local community members.

(b) Learner Centered:

- Students illustrate their own observations of natural landscapes in their journals

- Students chose the media in which they will present the data during the presentation.

- Students perform their own research into invasive species to create presentations

- Students actively work to find a way to present their data in a way that is interesting to them

(c) Inquiry-Based:

- Students ask and answer questions to understand the world based on their collected research through nature journaling

- The activities the students are engaging in brings them out of the traditional classroom and gives them time to make observations and ask questions.

(d) Design Thinking:

- Students utilize the scientific method to complete the earthworm experiment

- Students perform a design thinking process to create their solution presentations in which their design defines the issue, generate ideas for solutions, create designs to solve said solutions

(e) Interdisciplinary:

- Mathematical understandings are implemented with the collection of qualitative data

- Engineering principles are incorporated in the designing process

- Creative arts are implemented in the creation of their presentation as they also need to be aesthetically pleasing

- Writing competencies are incorporated through journaling and in the creation of presentations

**Appendix B**

**Assessment tools**

| | Does not meet expectations 0 | Partially meets expectations 1 | Meets expectations 2 |
|---|---|---|---|
| **Presentation Grading Rubric** | | | |
| **Aesthetics** | Student did not create a presentation | Student created a presentation, but it is not organized or legible | Student created a presentation that looks organized and readable |
| **Articulation** | Student cannot explain any part of their design | Student can explain the parts of their design but does not connect their collected data to their explanation | Student can explain each part of their presentation including the process of making it and how it connects to the data they collected |
| **Who, what, when, where, why, and how** | Student presentation does not answer any of the questions | Student presentation answers some of the questions | Student presentation answers all the questions |
| **Showing it off** | Student made no effort to present their presentation to anyone else | Student made and effort identify how they could show off their presentation but did not engage in trying to do so | Students identified a way in which they could show off their presentation and engaged in presenting it or otherwise had a reasonable excuse as to why they could not. |

**Experiment Grading Rubric**

| | Does not meet expectation 0 | Partially Meets expectations 1 | Meets Expectations 2 |
|---|---|---|---|
| **Material Collection** | Student did not collect any materials | Student only collected a few of the materials | Students collected all necessary materials and showed a thoughtful analysis of the reasoning behind why certain materials were chosen. |
| **Research** | Student has no notes in their journal on invasive earthworms | Student took some notes on invasive earthworms | Student has one page or more of notes on earthworms organized in an outline format |
| **Research Question** | Student has no research question listed in their journal | Student has a research question listed but it does not pertain to the subject. | Student has a research question that pertains to the subject. |
| **Human history of the issue** | Student has not identified how the issue of invasive earthworms came to Minnesota or identified how people are impacted by invasive earthworms | Student has identified the way in which earthworms got to Minnesota, but did not relate the impacts to humans | Student has identified the way in which invasive earthworms got to Minnesota and expressed how people are impacted by them |
| **Model** | Diagram modeling the experiment is not present | The diagram modeling the experiment is not legible or labeled | Diagram modeling the experiment is present and labeled |
| **Hypothesis** | No hypothesis is presented | An informal hypothesis is presented | A formal hypothesis that identifies the control, independent, and dependent variables is presented. |
| **Data Collection** | Student did not collect any data in their journal | Student collected only quantitative or only qualitative data | Student collected both qualitative and quantitative data |

| Data Summary | Student did not summarize their findings | Student summarized only their qualitative or only their quantitative data | Student summarized qualitative data using a table, graph, or chart and summarized qualitative data at least one paragraph |
|---|---|---|---|

| PRE-SURVEY Thinking about the place you identified as a forest, please fill in the boxes to show how much you agree or disagree with the following statements: | | | | | |
|---|---|---|---|---|---|
| | Strongly Disagree | Somewhat Disagree | No Opinion | Somewhat Agree | Strongly Agree |
| This place has unique value that I cannot find in other places | ○ | ○ | ○ | ○ | ○ |
| I am happier in this place than any other place like it | ○ | ○ | ○ | ○ | ○ |
| The things I can do in this place are hobbies of mine | ○ | ○ | ○ | ○ | ○ |
| I identify with the landscape of that place | ○ | ○ | ○ | ○ | ○ |
| That place means a lot to me | ○ | ○ | ○ | ○ | ○ |
| I don't care more about this place compared to others | ○ | ○ | ○ | ○ | ○ |
| I have memories tied to this place | ○ | ○ | ○ | ○ | ○ |

| I try to protect this place from being harmed | ○ | ○ | ○ | ○ | ○ |
|---|---|---|---|---|---|

| Why did you choose this place? |
|---|
| |

| What is important to you about this place, if anything? |
|---|
| |

| **Post-Survey** Thinking about the place you identified as a forest, please fill in the boxes to show how much you agree or disagree with the following statements: | | | | | |
|---|---|---|---|---|---|
| | Strongly Disagree | Somewhat Disagree | No Opinion | Somewhat Agree | Strongly Agree |
| This place has unique value that I cannot find in other places | ○ | ○ | ○ | ○ | ○ |
| I am happier in this place than any other place like it | ○ | ○ | ○ | ○ | ○ |
| The things I can do in this place are hobbies of mine | ○ | ○ | ○ | ○ | ○ |
| I identify with the landscape of that place | ○ | ○ | ○ | ○ | ○ |
| That place means a lot to me | ○ | ○ | ○ | ○ | ○ |

| | | | | | |
|---|---|---|---|---|---|
| I don't care more about this place compared to others | ○ | ○ | ○ | ○ | ○ |
| I have memories tied to this place | ○ | ○ | ○ | ○ | ○ |
| I try to protect this place from being harmed | ○ | ○ | ○ | ○ | ○ |

| |
|---|
| How has your opinion of the forest changed since you last completed this survey? |
| What are some new things you have learned about the forest? |