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Place-Based Education and Nature Journaling Curriculum Development

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"All dreams spin out from the same web"

- *Hopi*

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Living in urban environments, it can be difficult for educators to take students outdoors to study nature. Educators must find ways to bring nature to the classroom. Nature journaling uses unique geographies of places as a basis for teaching natural science and other subjects. The nature journaling curriculum development project here, dedicated to natural science and environmental education asks, in what ways could nature study and place-based education be taught to students who live in the urban environment? Goals, learning benefits, and results of nature study and place-based education will be discussed in the literature review. Nature journaling as a tool of learning, along with its benefits, will be discoursed to better understand why the project could be beneficial to education. Development of nature journaling curriculum for students who attend public schools follows the need for continual environmental education development, a longtime goal of the field. Environmental education approaches and already established nature journaling curriculums appear to be most understated at the level of high school students, the chosen level of learner to develop curriculum for. Influences of the project include naturalists and educators who were founders of the field of nature study, first inspiring the ideals that became environmental education. Nature journaling authors Laws and Lygren provide an exceptional guide to assist in the adaptation of a curriculum project meant to meet NGSS cross-cutting concepts in an Understanding by Design development unit. Wisconsin State Standards for Environmental Education and Sustainability are used as educational goals.

CHAPTER ONE: INTRODUCTION

The following capstone project dedicated to natural science and environmental education asks, in what ways could nature study and place-based education be taught to students who live in the urban environment? Goals, learning benefits, and results of nature study and place-based education will be discussed to better understand the aims of my capstone project, development of a curriculum devoted to teaching nature journaling. The intended audience for the work developed here is educators in public schools, who may hope to bring nature studies to the classroom, with curriculum written to meet standards for high school students, with specific attention given to those living in urban environments.

Why should we study nature? What is place-based education, and how does it relate to nature study and environmental education? What is meant by "sense of place"? Why are these ideas significant to individuals, society, and Earth? Explanations to these initial questions will be offered in the chapters to follow. The introductory chapter here details professional rationales for nature study and place-based education, along with personal reasons for pursuing the work of curriculum development based on environmental frameworks, and why public school educators should teach nature journaling.

Rationales for Nature Study and Place-Based Education

To introduce the significant need to answer questions about ecologically-minded educational ideas in the most general way: environmental education attempts to provide

the entire world with well-being, from local to global community scales. Author of *Earth in Mind,* David Orr (2004) contends, "first, all education is environmental education" (p.12). Everything in our world is connected, and all education comes from nature. Orr (2004) then immediately refers to the Greek concept of Paideia, "the goal of education is not mastery of subject matter, but mastery of one's person. Subject matter is simply the tool . . . one uses ideas and knowledge to forge one's own personhood" (p.13). Education should not merely be interpreted as memorization of information, more importantly, it should lead to an understanding of self by the learner. Nature as a tool for ideas and knowledge has the profound ability to invoke lifelong love of learning and a sense of self, contributing to our "personhood", which should be the main goal of education. Personhood could be connected to the concept "sense of place" found in environmental education literature; these educational goals intend to deeply assist in our understanding of self. Such sentiment echoes in the writings of naturalist educator Rachel Carson (1956), who urges, "it is not half so important to *know*, as to *feel*" (p.49). To learn, we must care. Better understanding of self, our personhood and sense of place, could lead us to deeper empathy and better care for nature; if we use the environment as a tool of knowledge and realize we are part of its ecological connections.

With care for the environment, our relationships with nature and each other will naturally improve. Society will continue along a path of stewardship to protect the places we call home and come to further extend our compassion to all living beings and environments. We will see a global awakening, as environmental ideas continue to be realized. Ecological awareness has been at the forefront of society's goals for quite some

time now, notably with international environmental education objectives put forth in the 1970s (UNESCO). Our environmental movement needs proper attention to remain constant, to continually progress forward. Environmental education offers the main solution to global ecological awareness. Orr (2004) asserts, "the ecological crisis is in every way a crisis of education" (Stone and Barlow 2005, x). Environmental catastrophe can be averted through education, in "classrooms that foster ecological imagination, critical thinking, awareness of connections, independent thought, and good heart" (Stone and Barlow 2005 x). The nature journal as a classroom tool promotes critical thinking, ecological awareness, independence, and teamwork.

Looking at ecological awareness from a global perspective, most people in the world live in an urban landscape, so it will be necessary to develop an ecologically literate population in cities if we are to live sustainably. Consequently, we should of course apply nature study and place-based education ideas to an urban landscape. In the literature of place-based education, past focus on outdoor education and ecoliteracy can evoke emphasis on the rural at expense of the urban (Shannon and Galle Eds. 2017, p.5). Anderson (2017) states, "traditionally, environmental science, or nature studies, is thought of as taking place in rural areas, or at least in places less developed by humans" (p. 51). The idea of nature only taking place in faraway wilderness has since been challenged by place-based and urban environmental education. In these models, environmental education does not merely imply the study of nature as something separate from human development, but instead suggests the environments in which we live are factually part of nature. Metropolitan areas, where most Americans live, are given the

opportunity to apply environmental education to schools by using place-based models (Anderson 2017, p. 52).

Cities each have specific uniqueness. One could assume correctly, living in a city may prohibit access to nature, simply because of how cities are structured, catering to traffic and business more than wildlife. Usually, small green spaces are scattered around to promote some access instead of bigger natural areas being available for use. As a result, ecology can be difficult to locate. There has been little research related to urban design and the environment of childhood, but available research indicates a known need to coordinate efforts to increase access to nature for those living in urban environments (Louv 2005, p.261). In the urban environment pictured here, not unlike many others across America, local nature programs available to public schools may be limited, with not enough resources to reach all learners at every level of education. Some true natural areas do exist in urban environments but could remain unreachable by public transit. While natural places may be available as public resources, accessibility to outdoor experiences for young people living in cities can still be an issue for various reasons. Safe access to nature given by public schools would enable learners in highly urbanized environments to be able to take part in exciting outdoor learning experiences.

It may be more difficult for learners in urban environments to reach green spaces by themselves, which is why educators of all kinds should and must take initiative in developing nature-based programs for the public, offered to all learning levels. Despite of our natural needs to engage learning in differing settings, resources may not be readily available for public schools to take excursions to places very far from where students attend school. Nature study and place-based education can engage the skills of the

classroom with knowledge of the outside world, often without having to venture very far. If these approaches were used, character of the local environment and culture could inform curriculum (Sobel 2004, p.22). Educators could draw context from the local environment and culture; and take students out to make observations in simple schoolyards to complete nature journals, if other local environments prove to be unreachable for any classroom learning. Nature and place can be brought to the classroom with motivation on the part of school teachers, many already agree there needs to be more real-life and individualistic approaches to education.

An effective and popular tool of teaching found in nature study and place-based education is the nature journal. Nature journaling is the most popular method of studying nature, going back so far in human history, it's difficult to determine when the practice began. Our most ancient writings describe natural phenomena, the works of naturalists have relied upon the nature journal as a primary tool of study for centuries, and nature has been a fundamental subject of study since the founding of public education. Renowned Harvard biologist Edward O. Wilson declares, "the creative process of nature journaling helps to make the best of experiences the most lasting in memory for anyone wishing to enjoy it" (Walker Leslie 2021, ix).

Keeping a nature journal would ideally be an effective way to teach high school students about local environments. Educators and learners who live within common urban landscapes can seek out nature together, wherever it may be. Place-based approaches to education work to gain an enhanced understanding of place for individual learners, who will get to know the world nearby and themselves better. Students can learn the basic format of a nature journal, and later find personal style and purpose

(Walker Leslie 2021, p.4). These approaches allow for differentiation in learning. Nature journaling will be the basis for the lesson plans in my UbD curriculum development project with a place-based framework, presented in my project after essay conclusions.

Why design a nature journaling curriculum for high school students who attend public schools? In the field of environmental education, nature experiences and emergent place-based curriculums appear to be less emphasized for students who attend public schools, with more programs being offered at private schools as an alternative method of learning. Environmental curriculum activities are more often focused on students at elementary and middle school levels, if they are offered in public schools at all. Nature experiences seem to occur less as children get to higher levels of public school, probable reason could be available curriculums are usually aimed at earlier learning levels. Assumptions for the need of my curriculum development project to assist scholarship are based on personal scholarly observations made while studying graduate coursework literature in the fields of natural science and environmental education, and professional observations made in my community while working as a naturalist educator. Additionally, the lack of freely available lessons online devoted to nature journaling, particularly for high school students, became apparent while researching my capstone project.

In high school, students are better able to strengthen personal bonds with the place they live. Older learners are more advanced in ability to perceive one's environment and our effects on it, and yet they do not seem to have as many natural education opportunities available to them as younger learners do. The fact should be considered,

high schoolers are better equipped to explore and engage independently within a community, are more able to learn independently, and can discuss a variety of subjects amongst themselves at length, when given some guidance from an educator. High school students are becoming adults, who will soon be able to determine new environmental policies and ways to better communities. For these reasons, they are more likely to comprehend and act on the environmental ideas shared here. Care for the environment could be promoted by participation in nature journaling exercises.

In researching what kind of capstone project to potentially formulate, it was discovered local nature centers in my area do not usually offer any programs to students at the high school level. After teaching nature programs for a few years, it became evident there remains an ongoing need for nature programs to reach learners at every level of education, particularly those living in urban environments like my own. In creating a sharable nature journaling curriculum, teachers in public schools would not necessarily need the availability of established programs to bring nature to the classroom, or personally purchase books and design curriculum. In part my project seeks to serve other educators, who may be able to utilize exercises from an already established nature journaling curriculum development that helpfully references the cross-cutting concepts of the Next Generation Science Standards. Hopefully, my curriculum project could in some way give public school teachers more ability to apply nature journaling as a learning method to the places they live and communities they teach for, although those places and communities may differ across unique landscapes.

From what I can recall of personal experience as a student who had a public school education in an urban location, outdoor time rarely took place at school other than

recess. Learning outdoors almost never took place in an everyday classroom experience in the 90s and early 2000s. Our elementary schoolyard was an enormous field, but it was only used for recess, and annual track-and-field day. The practice of schoolyards being under-utilized continues today. Field trips remain a rare occasion, with possibly even less field trips now than in the past, due to lack of monetary resources available to public schools in cities to pursue those experiences. Although factors may make these excursions more difficult, nature and place-based learning experiences for students outside of the classroom should still be made a priority.

If one examines the pattern further, it appears entire generations of children have completely missed out on the once-commonplace natural learning experiences public schools were originally founded upon. One reason for this can be attributed to changes in green space accessibility, due to modern development of urban spaces. A common challenge of urban environments today regarding access to green spaces is safety concerns due to high flows of traffic. Traffic has certainly had a negative effect on childhood, as it has severely restricted children's freedom to roam (Louv 2005, p.261). Playgrounds and parks have not kept up with population growth in most cities, and public spaces have been designed without taking wildlife into consideration (Louv 2005, p.248). Exposure to green spaces provides us with physical and mental well-being, making access to nature a matter of social justice. Public natural areas act as important nodes of congregation to strengthen social bonds (Maddox, Nagrenda, Elmqvist, and Russ 2017).

Though unfortunate in some ways, a positive result of newfound realization of missed nature experiences in childhood by earlier generations of students who are now

teachers seems to contribute to newly emerging nature education ideas and motivations, shared here by myself and others. Those exceptional times students spend additional moments outside playing with friends, or maybe allowed the opportunity to visit a more natural environment (field trips to parks, zoos, or museums), they become more actively engaged in learning experiences. As a naturalist educator working with children who were taking part in field trips, it was clear to me no matter how times may change, the ways in which people become captivated and motivated while learning in a natural environment does not change- people have an inherent fondness for nature and want to affirm connections within communities. Edward O. Wilson (1984) named our human fondness for nature *biophilia*, "the innate tendency to focus on life and lifelike processes" and concluded about our natural instincts to reason optimistically, "to the degree that we come to understand other organisms, we will place a greater value on them, and on ourselves" (p.1-2).

Besides an innate fondness for life, what gives one the desire to seek out nature? Those of us who have passion for the environment as adults were almost always initially guided as children by an adult mentor, in everyday experiences which became special to us. Carson (1956) states, children need the companionship of adults who can share the wonders of nature with them; to discover the joy, excitement, and mystery of the world we live in, to "pave the way for the child to *want* to know" (50). I propose mainstream educators could more often be those mentors and companions of children, to help introduce them to the wonders of nature, which build our sense of place.

How I Found My "Sense of Place"

Like millions of other people living in the Great Lakes region, I grew up in a city. Undoubtedly, fantastic times spent with other children and adults who shared a passion for nature helped me form a "sense of place" throughout my life. I'm attached to Lake Michigan because of the memories I have there; it has special meaning to me because of times spent alone in peaceful reflection or sharing simple joys with loved ones. I often go by the lake to relax, many others in my community do as well. Most naturalists would probably agree simply being near water refreshes the human mind and spirit. I walk along the beach when given the chance to do something enjoyable, my daughter and I treasure hunt (my favorite pastime from childhood), she chases the seagulls. We play at the nearby parks with my son and our dog. People of all kinds visit the city beaches, they hang out on the pier downtown on the waterfront, participating in an array of healthy activities, often some kind of exercise. Around the lake, people easily connect with their minds and spirits, their family and friends. My sense of place developed here.

If I hadn't been able to enjoy outdoor experiences consistently throughout my life, I may not possess the same fondness for my surrounding environment and community that led me here, wanting to promote nature studies for all learners, wanting to contribute to my community. Others share the sentiment, both educators and parents, that we need to rethink our classrooms to foster lifelong enjoyment of learning, in direct relation to daily life. Also, there remains a strong and ongoing need to promote love and care for the environments and life around us. Public schools are the perfect place to promote connections to nature and the community through education. Knowledge shared and

investigated in place education strategies strives to be inclusive, inclusion creates equity in education.

Indigenous Views of Nature

Place-based education asks, "what is the nature of this place"? Nature includes people, we are part of ecosystems. Although I was raised in an urban environment, my family always taught me to follow an environmentally-minded path. We come from an Ojibwe background, to mention indigenous views of nature in my project feels personally necessary and relevant. Ecocentrism, most simply defined as a nature-centered system of values, has long served as an inspiration to me. Spirits of nature have guided my entire life and education.

Native Americans customarily spend every day time in consideration of nature, learning by observing phenomenon and patterns. Belief systems amongst indigenous people around the world share ecocentric views, these universal ideas are commonly illustrated by a web of life that connects us all- the notion is fundamental to being, knowledge, and spirituality. An ecocentric viewpoint expresses, *connection* is fundamental to all life, all people. An adaption of a quote from Chief Seattle proclaims, "Humankind has not woven the web of life. We are but one thread in it. Whatever we do to the web, we do to ourselves. All things are bound together. All things connect."

In elementary school, the stories of Native Americans were not told accurately; curriculum was not inclusive to what was taught to me about history from my family. Many children in our diverse United States have undoubtedly felt similar ways while attending school. Culture should be used as a context for education, viewed

through the lens of place, because people have constantly used culture as a starting point for learning and understanding the world (Ark, Leibtag, and McClennen 2020, p.15). Place-based inquiry allows for many cultures to be explored, creating more collaboration and unity in learning experiences. Nature connects all of us, it effortlessly provides equity and inclusivity in education.

In learning about the environments we live in and how they came to be, what we call "the nature of places", it should be an educational necessity to look at the histories of all people in relation to a place and how they got there. Educators must take care to include indigenous people as part of natural history study to aid in the process of decolonization. Before a much longer discussion on why building relationships with nature and the community is vital to education, it is highly significant to mention how indigenous views directly relate to environmental justice, one of the goals and possible results of environmental education. Decolonization within educational context can be another way to promote equity and inclusivity.

Introductory Conclusions

My graduate capstone project dedicated to natural science and environmental education asks, in what ways could nature study and place-based education be taught to students who live in the urban environment? Goals, learning benefits, and results of nature study and place-based education will be discussed to better understand aims of the project, development of a curriculum devoted to nature journaling. The intended audience for the work here is educators in public schools, who may hope to bring nature studies to the classroom. UbD curriculum has been written to meet standards for high

school students in Wisconsin. Specific attention has been given to those living in urban environments in other states by also utilizing the NGSS cross-cutting concepts in the curriculum design.

The literature review in Chapter 2 will discourse the history and perspectives on environmental education, place-based education, and urban environmental education. The goals, learning benefits, and results of environmental education frameworks will come to be understood, along with the benefits of using nature journals as a learning method. These topics will lead us to nature journaling and place-based education for high schoolers living in urban environments, inspiration for the project curriculum described in Chapter 3. The nature journaling curriculum development project follows *The Understanding by Design Guide to Creating High-Quality Units* (Wiggins and McTighe 2011). Final conclusions in Chapter 4 will detail the limitations of my project, with implications and suggestions for future research.

CHAPTER TWO: LITERATURE REVIEW

One of the most critical conversations humanity is having on a global scale today is presumably the most important question we will ever have to ask in terms of our human survival: how do we live sustainably? We wonder how to prevent the ecological harm we cause, how to apply necessary aid, and find lasting solutions to the varying environmental crises of Earth, our home. We seek to know what we can do as individuals and collectively to solve these crises: climate change, loss of habitat and species, toxicity in our atmosphere and waters, the list goes on continuously... It would be unfair to Earth- its natural environment, human life, and the rest of living species here, to be unable to recognize our foremost influence and responsibility. Humans are the primary cause of these environmental crises, but we are also able to offer solutions to them, if only we make a collective effort. More and more, instead of wondering answers, we enact resolutions. Resolutions lead to revolutions, and there have been many on Earth so far. We are on the edge of what should be the greatest collective human revolution of all time, based on our love of the environments we inhabit and create- an environmental revolution dedicated to the Earth, our home, the place we cannot live without.

Inspiration from these thoughts, actively considered by our global leaders, and to be considered by the leaders of tomorrow who are students today, has led me to my project dedicated to nature journaling and place-based education for high school students. Attention has been given to those who live in urban environments, with examination and explanation for use of place-based and urban environmental education

frameworks in the public school setting. The following capstone project dedicated to natural science and environmental education asks, in what ways could nature study and place-based education be taught to students who live in the urban environment? Goals, learning benefits, and results of nature study and place-based education will be discussed to better understand the aims of my capstone project, development of curricula devoted to teaching nature journaling. The intended audience for the work developed here is educators in public schools, who may hope to bring nature studies to the classroom, with curriculum written to meet standards for high school students, and specific attention given to those living in urban environments.

The following literature review discusses how nature and place-based education may be used to promote "sense of place", along with why these environmental approaches are beneficial to individuals and communities. My project follows the Wisconsin State Standards for Sustainability and Ecoliteracy. If different states have similar standards for environmental education, the methods shared here will likely be able to align with those. With aspiration, the beneficial and necessary roles of nature and place within public education will continue to be realized, and more often put to use. May my project serve to inspire students, educators, and community alike; as the environmental works of many others have inspired me on my personal educational journey, giving me hope for the future of places and people.

Environmental education provides a foremost resolution of how to address environmental issues long-term because it gives communities opportunities to form personal and communal relationships with nature. Numerous studies in environmental education and related fields have shown, appreciation for nature builds the foundations of

the personal and communal relationships- what could be defined as "sense of place", one of the most significant ideas to be discoursed and understood for purposes of my project. Aligned with a relationship with the natural world- the global community connecting us- is the relationship individuals have with their local communities. When people have a "sense of place" they are more likely to care about the places they live or interact with because they have special meanings. Literature shared here will show, when people become attached to places that hold special meaning, they take initiative to improve and protect what needs to be. These critical environmental ideas, and the outdoor experiences they would be based upon, could be implemented into public education if made a priority. Concepts of nature and place assist to create understanding of the relationships between individuals and environments. Ideally, these human-environment relationships would be built throughout the lifetime of learners, at all levels of education (UNESCO 1978).

Outdoor activities and other lessons revolving around nature appear to be more available to learners at elementary and middle school levels. There seems to be a need for the continuation of nature study into high school, for learners who will soon to enter the world as influential adults. High schoolers should have access to nature studies and be allowed to have hands-on, real-world experiences in the places they live. Positive environmental attitudes and "sense of place" could result from nature and place-based education. High school students are at a proper academic level to understand the ideas conveyed by these environmental education approaches and put them to action. Nature may not be easily accessible to learners in urban environments, which makes it ever more crucial to experience and examine in public schools.

Humanity as a majority is part of the urban landscape, a fact not likely to change anytime soon, if ever. Urban life creates various effects on the ecological footprint of humans. However, sustainability ideas offer solutions to our currently immense ecological footprint. Urban environmental education, subtopic of environmental education, has been broadly defined as, "any environmental education that occurs in cities" (Russ Ed., Russ and Krasny 2015, p.14). UEE attempts to specifically address environmental literacy among students, foster positive youth development, and inspire community-based environmental stewardship (Russ Ed., Russ and Krasny 2015, p.14). Public schools throughout the urban landscape will need to offer environmental education to students throughout the course of education, with the goal to accomplish an ecological awareness across communities. Fortunately, the need for environmental education to be part of public school curricula seems to become more understood and met consistently than ever before, and hopefully will continue to be. Overall, UEE intends to contribute crucial outcomes of human well-being and environmental integrity in cities (Russ Ed., Russ and Krasny 2015, p.14). Environmental education will now be discussed at length to understand how educators come to reach the subtopics of Urban Environmental Education and Place-Based Education.

Environmental Education and Nature Study

Humans are part of nature. Environmental education in its forms has existed since people began to evolve and migrate, seeking to understand the natural world. Early people were well aware of our connection to the land, they relied on it completely. Truly,

we have examined nature and its related teachings from our humble beginnings. Ability to perceive vast complexities of the natural world around us has always been extremely important in our human quest for knowledge and ultimately, survival. Nature has always been the human basis for knowledge. Our environment has been studied using scientific methods for centuries. Stated plainly by Orr (2004), in conclusion about what humankind seems to have always inherently known, "all education is environmental education" (p.12).

Environmental education consists of many ideas, consistently redefined over the past century as scholars work to develop the field. It would be difficult to discourse all its aspects completely for purposes here; as a field of study, it has become quite expansive and connective. Thought of most simply, environmental education teaches people about nature, and raises awareness about human influence on our environments, by learning about Earth systems across academic subjects. A main goal is to develop a population concerned with solving sustainability problems individually and collectively.

Nature as an all-encompassing study has been incredibly familiar over the course of humanity. Environmental education as we know it grew out of the international Nature Study movement, which started in America and was considered quite popular (Sobel 2004, p.8). In times past, nature study was ordinary practice in the public school. The Nature Study movement of the early twentieth century was pioneered by Liberty Hyde Bailey (1903) in *The Nature Study Idea*; and furthered greatly by educator and nature journalist Anna Botsford Comstock (1911), who wrote the best-selling *Handbook of Nature Study*. Nature studies included ample time spent outdoors, with nature journaling by schoolchildren being a common method of knowledge

assessment. Although the Nature Study works of Bailey and Comstock would be considered dated by our current standards, there remains some notably useful information in regard to the development of best practices to teach and study nature, these ideas have been continually used and developed by environmental education scholars, leading to much progress in the field. Some of the nature study ideas found to apply to my specific work will be shared briefly.

Now over a century ago, when public education was first becoming ever more accessible and mainstream, learning about the natural systems of Earth was believed to be completely fundamental to one's education. Even earlier than the beginnings of American public education models, in 1830s Germany, waldkindergartens developed with nature as the basis for attaining knowledge. Kindergarten was brought to America by immigrants and has long been the foundation for public education around the world, but the nature lessons education was principally based on are now much less focused. Today, it seems out of the ordinary for students, particularly those in urban environments, to partake in the outdoor lessons that were once a significant part of mainstream education.

Environmental Education as we know it now came to be officially defined in 1975. At the United Nations Educational, Scientific and Cultural Organization, the Belgrade Charter was developed, it states the goal for environmental education: "to develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively toward solutions of current problems and the prevention of new ones" (Thompson and Hoffman 2019). The world population

needs to care about the environment, share and possess these qualities if we are to continue our survival by learning to live sustainably. To help meet the goal of sustainability, society should become what is called ecologically literate. Being ecologically literate involves active engagement in positive environmental behaviors. Positive environmental attitudes are thought to be motivated by enjoyable experiences in nature, most notably happy times spent outdoors in early life. Environmental education literature frequently suggests, for growing people to gain environmental awareness, they will have at some time experienced positive connections to a place they care about (Carson 1956, Sobel 2004, Anderson 2017). Positive attitudes toward nature are more likely to be practiced if the population is exposed to environmental education, particularly in public schools, where the majority of people grow up learning.

Priority for environmental education helps to present various ecological issues. Though often based on natural science, the various environmental education frameworks available have great capacity to be methods of interdisciplinary study, representing a few subjects of choice or even combining several together. Environmental education uses nature to create scaffolding for teaching basic school subjects: science, math, reading, writing, art, history, and social studies. It's capable of covering all of these and everything in between. When students are offered the option of learning about a chosen subject and seeing the alternate ways it can be related to other subjects they may not favor as much, they become more excited about learning in a general sense. They are better able to see the connections in learning between subjects, shown to them through all the connections in nature, which offer captivating comparisons. Benefits of

interdisciplinary studies offered by model environment-based programs have been identified in a report by the State Education and Environmental Roundtable, a national effort to study environment-based education. According to the Roundtable study, which examined 150 schools in sixteen states, stunning results indicated, "environment-based education produces student gains in social studies, language arts, and math; improves standardized test scores and grade-point averages, and develops skills in problem solving, critical thinking, and decision making" (Louv 2005, p.206).

According to the National Association for Environmental Education, environmental education has the defining characteristics: led by learners- which provides students with opportunities to construct understanding through active investigation, supports sharing of ideas, prompts inquiry, and provides real-world context that enables learners to develop skills (Thompson and Hoffman 2019). Success of these defining characteristics can be found in the literature and study samples to be mentioned here. An excellent example of educators using urban nature as a classroom comes from ecological restoration programs in the Bronx, where students develop leadership and problem-solving skills by transforming abandoned areas into usable green spaces (Russ Ed., Russ and Krasny 2015, p.20). As mentioned, environmental education has consistently grown as a field, with different frameworks and methodologies becoming part of it. What methods educators choose to use would be dependent on what works best for the community they represent.

Let us picture environmental education today as a tree, which grew from the educational roots of nature study. Branches from the tree of environmental education are its varying frameworks, some of the most well-developed and currently growing in

practice will be referred to here, "place-based education" and "urban environmental education". Though environmental education has a variety of frameworks that could be examined under its lens, place-based education and urban environmental education will be the focuses of the following capstone project, establishment of a nature journaling and place-based curriculum design for educators of high school students. Reasons attention has been given to those living in urban environments will be shared here. Environmental education approaches will be discoursed in the literature. When fused together in an experiential and instructional curriculum, learning from nature and place offers learners ever more opportunity for knowledge and self-development.

Place-based Education and Sense of Place

Development of scholarship concerning place arose in response from concern about how we live and the consequence of our modern lives for the sustainability of places (Wattchow and Brown 2011, p.53). Place-based education, known as PBE, is the "pedagogy of place" or "pedagogy of community" (Sobel 2004, Anderson 2017). Like nature studies, place-based education aims to raise citizens who understand connections in a community. It differs mainly in that it does not focus only on natural geographies of communities, but human geographies as well, the entirety of one's environment. When students possibly have limited access to natural areas while living in urban areas, PBE gives the opportunity to apply environmental education to urban areas more readily because it studies all aspects of a community. Civic engagement and service learning are essential to PBE. Through pedagogy of place, education becomes a preparation for citizenship (Sobel 2004, p.12). Students work to make a difference, to enact solutions to

community issues. They become resources and assets to the place they live. In doing so, they become stewards of nature and culture (Anderson 2017, p.1). A significant characteristic of a place-based approach is use of experiential education methods to help individuals become life-long learners.

Research suggests an experiential, PBE approach that involves interdisciplinary, project-based learning helps students retain curricular content and skills better than traditional approaches (Anderson 2017, p.76). Communal experiences result in dialogue and reflection between learners, which leads to greater understanding. The study of place involves intellectual discussion of direct observations, investigation, experimentation, and skill in the application of knowledge (Stone and Barlow, Eds., 2005, Orr, p.90). Some examples of experiential projects include making art, restoring natural areas, and planting community gardens; these can contribute to a collective sense of place that demonstrates environmental value (Adams, Greenwood, Thomashow, and Russ 2016). The Millennial generation is the largest, most diverse, and most urban in United States history- with 80% of them growing up in cities (Russ Ed., Griswold, Tolman, Breuer 2015, p.135). One example of a nationwide environmental community project comes from Leaders in Environmental Action for the Future (LEAF), a project of The Nature Conservancy, that combines environmental learning in 25 environmentally-based urban high schools with real world environmental work experiences. The LEAF project works to empower the next generation of conservation leaders by restoring habitats, focusing on saving endangered species, and supporting scientific studies (Russ Ed., Griswold, Tolman, Breuer 2015, p.136).

Citizen science, also known as participatory action research, an environment-based form of experiential learning, could provide even more accessible activities for educators take part in with students. One of the most prominently used methods for people to take part in citizen science has been to create nature journals to keep observational records of seasonal changes, study the migratory flows of animals, and make comparisons between the movements of people and animals. Phenology is the study of cyclic and seasonal natural phenomena, especially in relation to climate, along with animal and plant life. Phenology as nature study is the perfect example of how environmental education can be brought to any classroom. Additionally, phenology studies led with journaling can assist in understanding the phenomenon and realities of global climate change. Keeping a nature journal raises consciousness about interactions in the local environment and helps students to understand how the places they live are ecologically valuable. As students are given access to local environments and gain appreciation for them through exposure, motivation to act on and problem-solve ecological issues becomes of interest and importance. These experiential learning examples demonstrate how environmental education encourages learners to take notice and care for the ecology surrounding them, through direct interactions with the community.

Though meant in part to remedy dire ecological problems, place-based education also seeks to teach and motivate through a positive view. Strengths of PBE are best summarized by the environmental educator who has written most extensively on the theory, David Sobel (2004), "it emphasizes creative exploration and the joyful realization of the ties that connect a person with nature and culture of place" through an approach to

education that begins with love (ii-iii). Creativity, exploration, joy, and love- these are some of life's most important lessons, frameworks emphasizing these should be essential to education. Being able to love learning and feel connected to where they live gives people a better sense of well-being. Allowing for these will lead the way for learners to gain a "sense of place".

Perhaps the most significant goal of place-based education is to help learners to attain a "sense of place". Intrinsic to environmental learning, "sense of place" comprises the attachment and meanings a specific place holds for groups or individuals- it's the emotional connections that bond us to places. Sense of place defines how we view, interpret, and interact with the world (Adams, Greenwood, Thomashow, and Russ 2016). Everyone has unique perceptions of the environment around them. Experiences we have, in the places we are captivated by, deeply assist in our understanding of self. Sense of place- knowing ourselves and our communities, in context of ecological scale in relation to the rest of the world, has a naturally significant role in our lives that should be reflected in our educational systems. When people have a strong sense of place they are more likely to be motivated to formulate actions on environmental issues, they are also more readily able to recognize possible effects these will have on greater communities (Sobel 2004). With natural environments as guides, PBE has the potential capability to uniquely address climate change, growing population, and expanding human control of the environment- exemplifying the environmental education slogan, “think globally, act locally” (Shannon and Galle 2017, p.74).

Place-based education has a main goal of connecting learners to their communities, to help them to feel a sense of belonging, part of what makes up "sense of

place" (Sobel 2004). Developing a "sense of place", one's belonging and attachment to the places they spend time, can be beneficial to people throughout their lives. Place literature discusses how lived experience of place plays an important role for individual and collective identity; it has been suggested place serves as a source of security and identity at individual and collective levels (Wattchow and Brown 2011, p.66). Community can be built by creating bonds, personalizing learning, and promoting contribution. Environmental education literature continually asserts environmental stewardship, the idea of taking responsibility for the natural world to improve and protect it, starts with developing an affinity for the natural world. Naturalist Edward O. Wilson, earlier mentioned and frequently used as an example in the literature of environmental education, once stated about his affinity for nature, “it was searching and dreaming, not systematic knowledge, that led down the scientific path” (Louv 2005, p.151). Local experiences ground students in an understanding in an understanding of why something is important, or why they might want to care, by creating personal connections to real-world places (Vander Ark, Liebtag, McClennen 2020, p.65). To allow learners to know themselves through exploration creates bonds to place, creates an affinity for the natural world, and promotes affections that may endure for a lifetime.

PBE takes place in the community, outside of the classroom walls, with experiential projects being created by learners who feel as though they belong to the community (Sobel 2004). Learners may come to possess better awareness of personal place within the community, the influence of people on places, and even how they can be influential in the community. Through PBE framework, students and educators alike learn about the places they live together. They may work to figure out ways to make the

places they live healthier, happier, and more sustainable. Communities should be inclusive and equitable to society and the environment. One of the ways communities can build inclusivity and equity is by offering more access to nature to many children through public school programming. We all have an influence on our communities and small personal acts can make a positive difference for all of us. Exposure to nature is one small act that makes a difference to communities (The Journal of Sustainability Education 2018).

Cities should work with public school systems to pursue nature exposure on a common level for many children, which would mean a great deal to the community in its entirety. The need to build strong common connections amongst people and the places they live isn't often discussed as an actual academic goal within the realm of public schooling, but place-based education challenges that view (Sobel 2004). Increased practice of using place-based education methods within public schools could very well result in a population of empathetic individuals, who care for the environment and each other, which would accomplish the foremost goals of environmental education. As time goes on, it seems more often public educators will be allowed to take initiatives to meet the societal need of providing care and wellness for individual learners. Experiential education curriculums that promote care like PBE does could be used as teachers continue to meet academic goals. The success rate of the possibilities given by the connections between learners and place in more than an academic sense currently proves difficult to measure, and more research needs to be done in the field of environmental education to make completely accurate conclusions about how these may lead to

ecological consciousness and improved well-being, but the significant hope of nature and place pedagogy is to establish well-known ways to promote a sense of place.

In a city, a sense of place echoes the intersections of culture, environment, history, politics, and economics; it's affected by global mobility, migration, and blurred boundaries of natural and built environments (Adams, Greenwood, Thomashow, and Russ 2016). Urban landscapes are complex places that result in a multitude of human perceptions. To further create an ecologically minded culture within a place, education that focuses on place should be encouraged, to increase the connections between individuals and groups who live there. If groups of individuals who share like-minded ecological awareness and positive feelings for a place exist, it's more likely a sustainable community will arise. Sustainability and environmental justice are connected, living sustainably means recognizing people are inseparable part of the web of life (Lanza 2005, p.213). These ideas must be applied far across our human landscapes, with cities being parts of our living web.

Urban Environmental Education

Cities are dynamic and socially constructed places, created and inherited, constantly growing and changing (Adams, Greenwood, Thomashow and Russ 2016). Sense of place has complex and different meanings to the individual. Exploration and discovery in natural and built environments allows for personal inquiry and collective learning. Use of environmental education framework helps learners come to understand what places mean, allow them to do, and why they are important. The experiential learning approaches utilized by urban environmental education could heighten ecological consciousness, an important consideration for cities. Skills and knowledge specific to

solving urban environmental problems have become an integral part of environmental education. To engage city residents in environmental problem solving, UEE must be relevant to individuals with different cultural, economic, and ethnic backgrounds (Russ Ed., Russ and Krasny 2015, p.18). Educators should use culture as context and view education through place (Vander Ark, Liebtag, and McClennen 2020, p.15). With such respect to diversity, civic culture will be better able to arise and strengthen.

In correspondence to the field of environmental education, learning focused on urban environments was originally conceptualized in the times of the nature study movement and came to further be developed around the environmental movement of the 1960s and 1970s. UEE grew from concerns about science literacy and newfound recognition that experiential learning can enhance understanding of natural history and other aspects of science. Educators were advised to teach about biology, natural science, and resource conservation by taking students to various urban sites, including school grounds (Russ Ed., Russ and Krasny 2015, p.16). Today, UEE continues to take place through exploration of natural, historical, and human elements in cities; and attempts to make environmental education relevant to the everyday experiences of urban residents (Russ Ed., Russ and Krasny 2015, pp.17-18). If PBE and UEE methods were to be used conjunctly, schools may partner with civic groups and city parks to play a role in tree-planting, beautification, and landscaping in the community. Urban wildlife would be better preserved by involving residents in the management of natural areas in cities; urban ecological restoration projects are substantial tools for educating students about urban biodiversity to increase environmental literacy (Russ Ed., Russ and Krasny 2015, p.19).

Preservation of natural areas in an urban region does not necessarily mean children will be exposed to nature (Louv 2005, p.261). UEE gives equity to learners, since not everyone has the same opportunities. Young people who live in urban landscapes may only be exposed to nature if their families have necessary time, resources, and interest to do so. Caregivers may be fearful of allowing children to venture far from home due to the dangers urban life may present, traffic being a commonly cited reason and threat of violence being an unfortunate reality.

Access to quality urban green spaces remains an issue of ecological and social concern, impacting quality of life (Maddox, Nagendra, Elmqvist and Russ 2016). Human health should be a key consideration when we think about our responsibility to the environment we are part of. Those who live in cities may have worries about air pollution, waste disposal, clean-up of waterways, city planning, traffic congestion, lack of recreation areas, and other experiences of urban life (Russ Ed., Russ and Krasny 2015, p.18). Governments must address the tasks of climate change adaptation, reduction of carbon dioxide and other emissions, accommodation of rapid urbanization, and mitigation of environmental injustices (Russ Ed., Russ and Krasny 2015, p.20).

UEE can improve quality of life by remarkable measure. For individuals, it may nurture creativity and reaffirm positive aspects of culture, increase self-esteem and self-confidence, produce positive attitudes towards learning, and improve critical thinking (Russ Ed., Russ and Krasny 2015, p.20). Exposure to nature promotes active citizenship and shows people they possess the power to influence policy and make decisions about the environment. Legitimate outcomes of positive youth and community development have been continuously demonstrated as results of urban nature programs (Russ Ed., Russ

and Krasny 2015, p.20). To break down all the research to its most fundamental level, nature affects our well-being. Numerous studies show people experience an unequal distribution of green space in urban environments. We can conclude from that information, in cities there may be more pronounced need for nature exposure due to the lack of it. Green spaces are scientifically proven to improve mood and physical health, and the relationship amongst these factors appears to be even stronger for those who have less privileged socioeconomic backgrounds (USDA 2018, p.11). The sentiment that nature has a positive effect on our well-being echoes in the words of acclaimed biologist and educator Rachel Carson, "there is something infinitely healing in the repeated refrains of nature- the assurance that dawn comes after night, and spring after winter". Nature brings us together, and its demonstrated benefits bring necessary equality to our world.

For all the reasons discussed here, educators in public schools should make best attempt to use the community as a classroom. When people have time and ability to safely experience the place where they live, they are better able to build attachment and meaning that connects them to the world community- a sense of place. People may become empowered by responsibility as the result of environmental education experiences, where all learners have opportunity to deepen awareness and understanding for the environment and each other (Adams, Greenwood, Thomashow, and Russ 2016). Cities should work toward these worthy goals through educational systems.

Imagining the Goals, Benefits, and Results of Environmental Education

Sustainability and Ecological Literacy

Ecological literacy focuses specifically on the preferred outcome of sustainability. Sustainability means meeting the needs of the present without compromising the needs of future generations. It works to find ways to preserve and renew our precious Earth resources. Ecological literacy presumes we understand our place in the story of evolution, consider how we relate to natural systems, and are ultimately aware of those life connections; it's knowing our health, well-being, and survival depend on working with natural forces (Orr 1990, p.3). Ecoliteracy has an experiential approach; examples of learning strategies include observation, experimentation, and research (McBride et. al 2013, p.16). Objectives of ecological literacy, also called eco-literacy, align well with the lessons of a nature journal: acquire knowledge of ecological concepts and principles, develop observation and experimentation skills related to the scientific method, develop critical thinking about natural systems through analysis and synthesis, and understand environmental realities. These objectives will help us to achieve the scientific thinking necessary for emergence of new sustainability practices. To reach the significant goal of an ecologically aware and sustainable society, we could also assume an equitable state of the world would be met.

Environmental Justice

Diversity and justice are top priorities in environmental education. The United States Environmental Protection Agency (EPA) defines environmental justice as fair

treatment and meaningful involvement of all people with respect to environmental laws, it embraces the principle everyone is entitled to environmental protection (Russ Ed., 2015, pp.82-86). Environmental justice seeks to create environmental equity and address issues of environmental racism and inequalities that are the result of human settlement and industrial development (Russ Ed., Hjarding, King, and Chin 2015, p.82). Scholarly research suggests there tends to be patterns of environmental injustice, where minorities and poor people are more likely to live in areas considered undesirable, with more exposure to toxins and environmental hazards, and while they experience unequal distribution of green space (Russ Ed., Russ and Krasny 2015, p.18) (Russ Ed., Hjarding, King, and Chin 2015, p.82). Those who live in urban environments are more likely to be impacted from the effects of pollution, and have less access to nature areas to spend time in. Ecological consciousness gained from environmental education brings about awareness of issues related to environmental justice and empowers people to change communities for the better. It should be a necessary duty of educators to teach children about how nature and society are connected; and promote sustainable futures. The primary goals of public education are equity and inclusion, which environmental educational opportunities offer. Society must be prepared and dedicated to bettering our world and communities (Vander Ark, Liebtag, and McClennen 2020, p.65).

Decolonization

More often than not, mainstream education has been taught from reflectional perspectives of few privileged individuals. Across subject matter, these narrow narratives prevail. Educators must work to dismantle these colonized belief systems that continue to falsely influence education and cause misinformation in the minds of our

youth. Place-based education can assist in decolonization by offering more broadened perspectives, one way being to learn about the original inhabitants of a place. Another could be to discuss and better understand ecocentric Native American belief systems. These methods would provide more equity and inclusion to education.

A well-known Native American proverb gives the sustainable estimation, “we do not inherit the Earth from our ancestors, we borrow it from our children”. These views move away from common anthropocentric standpoints to more equitable and inclusive ecocentric views of the world and its life. These ideas should be shared far and wide. They would be particularly useful to reflect on in an environmental education sense.

Sustainability, ecological literacy, environmental justice, and decolonization define imaginable apexes of the substantial goals, benefits, and results of environmental education. These critical societal outcomes would bring incredible well-being and unity to communities around the world. Even more benefits could arise within individuals themselves, such as sense of place- the feeling of belonging to a community. My capstone project dedicated to natural science and environmental education has questioned and explored the ways nature study and place-based education could potentially be taught to students who live in the urban environment. After careful analysis of the literature, it has been determined one meaningful way of teaching about nature and place to learners who live in urban environments could be to use nature journals.

Nature Journaling

Record keeping is an ancient tradition. Educator and nature journaling guide Clare Walker-Leslie (2021) notes, "since the dawn of the human mind, people have sought to know nature better and to know their own selves better" (p.3). Her thoughts

connect with the personhood and sense of place we have begun to discuss. Nature journals can influence how people see themselves in relation to places and build collective understandings about community, especially when related projects occur in the school setting. Historically, nature journals were part of curriculum, and they were also trendy amongst adults who chose to be mindful of everyday life experiences (Walker Leslie, Tallmadge, and Wessels 1996, p.35). Today, people share details of life in digital formats, often with many others participating in the same daily activity. Memories can be stored right in our pockets. In a society where technology dominates, journal keeping may be a fading tradition, but the basic ideas put forth by the practice are still commonly in use and continue to apply to everyday life.

Nature journaling offers students connection with their environment, offers educators flexibility as a teaching tool, integrates many disciplines, and allows opportunities for various styles of learning (Walker Leslie, Tallmadge, and Wessels 1996, p.37). Differentiation for learners is an extremely noteworthy consideration for public school teachers, they should keep nature journals in mind as an option for fun class projects that have the capability to strongly relate to individuals and additionally allow for collaboration. The heart of nature journaling is the learning of observation skills; its purpose being practicality, not aesthetics- it's important for educators to encourage the idea that anyone can be an artist (Walker Leslie, Tallmadge, and Wessels 1996, p.39). Any kind of person can enjoy the lessons offered by use a nature journal.

Literature Review Conclusions

Place-based education reflects the community of a classroom. It involves experiential, hands-on, life skill learning. Its methods are meant to cultivate a life-long enjoyment of learning using the community as a tool. There may be a focus on sustainability. If such a PBE curriculum focuses on sustainability, it also strives to develop civic responsibility and stewardship, initiating learning through the natural and human aspects of a community. "Sense of place" is feeling care for and belonging to one's community, it evolves over time through exposure. It may be more difficult for learners in urban environments to reach green spaces by themselves, which is why educators of all kinds should and must take initiative in developing environmentally-based public programs.

PBE and UEE are steadily growing frameworks, though they are not based on new ideas, nature study and environmental education have long taken place. Nature as a teacher should again become fundamental to mainstream education, as it once was at the beginnings of public school. PBE and UEE can assist in bringing nature education back to the forefront, by providing educators with ideas and ways to give students access to local environments, to inspire culturally relevant curriculum. Public school students need access to nature as part of the curriculum, at every level of the educational journey (UNESCO 1978). Ideally, field trips could be taken every season, or more often if possible, to local public natural areas with accessible and suitable learning environments. For the most part, any outdoor environment considered not hazardous could be acceptable, although all outdoor activities offer risk and result in better chance of adventure with experiential learning opportunity. What would be most reachable and

constructive depends on an individual community. Even schoolyard observations could be used for purposes of children getting to know the landscape. People in a community should have a common knowledge of the environment in which they live, educators who provide more access to green areas during the abundant amount of time learners spend in public schools could accommodate such an idea. By developing a "sense of place" through time spent in nature and the community, an abundance of positive life experiences and well-being can result within the individual. Meaningful connections to nature encouraged by educational systems presumably assists in the greater shared goal of forging ahead to an environmentally aware and active populace who envision a sustainable world.

Educators of all kinds can have the ability to offer a variety of lessons through nature with ease. Nature has long been drawn upon for inspiration in learning, being the absolute basis of all knowledge. Working with interdisciplinary methods under the scope of natural science, educators would be able to collaborate across subjects to offer deeper understanding of both nature and the subjects used to explore it. There are endless possibilities when lessons involve nature, it offers opportunity for excitement and adventure in learning. If only a few natural resources were available, in accompaniment with motivated educators, public schools would be better able to offer comprehensive nature curriculum such as one described here. Environmental education would be greatly beneficial to learners living in urban environments not only in a personal sense- it could eventually lead to greater environmental awareness in the communities they are part of and will eventually come to care for and be more active in, as they grow in life.

For purposes here, nature and place as learning resources have been discussed prospectively within the sphere of public education. Public schools remain the most popular form of education and hold vast importance for society, for people around the world continue to believe in availability of knowledge as a foundation for humankind. As with everything from time to time, education could use and seemingly appears to be undergoing some fundamental changes, where everyone involved participates. Urban Environmental Education Review continually asserts in its articles, one of the goals and challenges of environmental education in the 21st century is to "advance progressive urban environmental ideas in a global context" (2021). Environmental education approaches and curriculum that could be potentially useful to meet such challenges going forward have been discussed here and will now continue to be more manifestly presented in my project description.

CHAPTER THREE: PROJECT DESCRIPTION

Background

Learning about nature in an urban environment may present the challenge of access to a green area. The following capstone project dedicated to natural science and environmental education asks, in what ways could nature study and place-based education be taught to students who live in the urban environment? Goals, learning benefits, and results of nature study and place-based education have been discussed in the literature review chapter to better understand the aims of my capstone project, development of a curriculum devoted to teaching nature journaling. The intended audience for the work developed here is educators in public schools, who may hope to bring nature studies to the classroom, with curriculum written to meet standards for high school students, and specific attention given to those living in urban environments by examination and utilization of place-based and urban environmental education frameworks.

Nature experiences are an important component of place-based education. Design frameworks for the nature journaling curriculum here described include place education explored through nature study, all were discussed in the literature review of Chapter 2. For my capstone project, nature journaling activities follow Understanding by Design theory and curriculum framework. Incorporation of place-based education goals and the intended outcomes of nature journaling into an Understanding by Design curriculum unit

provides more validation for nature journaling projects to educators in public schools, who may need to substantiate claims of benefits to learning using these approaches. Established goals and assessments for learning in the environmental curriculum shared here demonstrate the validity of using place-based and nature journaling approaches.

Theory and Framework: Understanding by Design

Backwards design, also known as Understanding by Design or UbD, was used as the curriculum-planning framework for my project. By using UbD design standards, educators can more purposefully review and improve our unit designs, our teaching, and student achievement (Wiggins and McTighe 2011, p.11). Design standards help educators to specify the desired qualities in unit plans and provide mechanisms for quality control, a validation of curriculum design. Additional validation of the principles and practices of UbD comes from emerging research on the neuroscience of learning. Implications discovered by this research include: (1) Pattern generation by the brain happens when new material is related to previous material, assisting neural connections and long-term memory, (2) experiential and hands-on learning stimulates the senses, making it the most engaging type of learning and assisting with long-term memory, (3) information is best remembered when learned through multiple and varied exposures, followed by authentic use of the knowledge (Wiggins and McTighe 2011, p.6). Wiggins and McTighe (2011) conclude, research findings on the neuroscience of learning provide conceptual support for UbD; and "should guide curriculum and assessment design, as well as instructional practice" (p.6).

A primary goal of UbD is student achievement- to develop student understanding, to make meaning of learning, and transfer it to new situations (Wiggins and McTighe 2011, p.3). One of the tenets of UbD defines understanding as six facets of capacity, to: explain, interpret, apply, shift perspective, empathize, and self-assessment (Wiggins and McTighe 2011, p.4). These capacities serve as indicators of understanding. Students demonstrate understanding when they autonomously make sense of and transfer learning through authentic performance (Wiggins and McTighe 2011, p.3). Nature journals are the perfect tool to assist educators with student understanding. Explanation, interpretation, and application are all accomplished through nature journaling. Empathy and shifts in perspective about the environment could be supported and may be more likely to occur through the nature journaling process and the real-life learning activities it offers. Now after explanation of reasons to use Understanding by Design theory, stages of design for my nature journaling unit will be briefly detailed. These stages were used in my project to create nature and place-based journaling unit design.

Stage 1: Desired Results.

The established goal is **connection**. Students will be able to independently use their learning to ask questions, make observations, and develop critical thinking skills. They will apply concepts, use teamwork, formulate reflections through writing and story-telling, use data analysis to make inferences and comprehend environmental interactions.

Stage 2: Evidence.

The evaluative criteria will be a nature journal project rubric. Students will show they understand by creation of a personally reflective nature journal demonstrating meaning

and transfer of learning. Students will complete a self-assessment survey that reflects on experiences. Educators will conduct a survey in the field by observing student attitudes during place-based experiences and investigations.

Stage 3: Learning Plan.

Educators will use nature journal curriculum prompts given in the lesson plans to instruct students. There will be a class discussion about our place to establish current knowledge. Student success depends upon asking questions, using the senses, using teamwork, and formulating analysis to lead to complex performance. Understanding comes from the capacity to explain, interpret, apply, shift perspective, empathize, and self-assess. Repetition helps to understand and apply knowledge.

Rationales for Nature Journaling

Effective learning requires balanced focus on student understanding and application of knowledge, along with repetition (Wiggins and McTighe 2011, p.5). Nature journaling allows for balanced learning and utilizes repetition, as students repeatedly observe natural phenomena and life to understand and apply knowledge. Patterning as a concept turned out to be of noticeable importance to theory and curriculum for my project; it relates to the neurology of learning, connects to observation making while nature journaling, and has been addressed by the NGSS cross-cutting concepts to be discussed in the next section, Standards and Assessment. National standards of the NGSS were added to the curriculum design as an alternative to goal of "Connection" as defined by the Wisconsin State Standards for Ecological Literacy and

Sustainability. Hopefully the addition of these standards allows for more inclusivity and application to educators outside of my state.

We must ask ourselves, what ways can we change public education to make students more excited about learning? What methods are truly the best ways to learn? Experiential learning rooted in place-based education proves to be effective in addressing both these concerns. Feelings of well-being and positivity toward learning, and improved performances, could very well be the outcomes of curriculum units resembling the one here presented. In addition to these beneficial reasons for promoting a nature study curriculum, PBE framework along with nature journaling as a teaching tool, are culturally relevant learning methods.

Place-based education is culturally relevant because it's the study of local culture. It gets students into the community to learn through it. It helps them come to better know themselves through the place they live. The most substantive goal of PBE involves connecting learners to their communities, for them to feel a sense of belonging, "sense of place". We can all learn about the places we live, each other, and figure out how to make the places we live as good as they can be. Communities should be inclusive and equitable to society and the environment. We all have an influence on our communities and even personal acts can make a positive difference for all of us. Building empathy and changing attitudes aren't usually discussed as actual academic goals, PBE challenges such a viewpoint (Sobel 2004).

Culturally relevant pedagogy such as place-based education has the potential to change individual attitudes toward learning and community positively in a multitude of ways. Cultural relevance remains an extremely important aspect in developing lessons

for urban environments educators should consider, as they are very often teaching learners with a mosaic of backgrounds. Nature study is a culturally relevant practice, evidently a most effective one, continually utilized in some form by people all over the world. Culture, art, history, geology, and ecology are some of the common subjects PBE focuses on. PBE is culturally relevant in that it helps to highlight shared culture and promote community engagement, while it gives way to plenty of self-expression and interpersonal learning through collaboration. Knowledge shared and investigated attempts to be inclusive, inclusion creates equity in education.

High school students in urban environments have been chosen as the learners for a nature study and place-based curriculum. Students going through the transitional stage of adolescence may excel personally and academically when given the voluntary and authentic transformational learning experiences nature and place-based curriculums offer. Transformative learning aligns with the transitional stage of adolescence, and has the transformational qualities involved in the maturation process that can be fostered and enhanced to make successful life transitions (Singleton 2015, 4). High school students have been chosen as the learners for a place-based nature journaling project because they may be able to comprehend more complex concepts in a community, and perhaps could come to feel a "sense of place" through transformational learning experiences. Learners may become more ecologically aware and familiar with ecological literacy. Lastly, it is important to positively influence students of high school level on these environmental ideals because they will soon be entering the world as adults. They are responsible enough to take initiative, but they are also in the process of trying to figure out who they

are and want to be in the future. Sense of place, especially a positive one, helps people to realize all of these.

Learners who are part of the urban landscape often have less access to nature both at school and out of school. Programs that expose them to ecological experiences make it more possible for them to gain a sense of place where they live and expose them to the ideas that make up ecological literacy. In the case of high school students attending public high schools in urban environments, nature study may be a last effort to help them build strong positive connections with their communities before they begin life outside of the public classroom. PBE has been an effective method for interdisciplinary teaching, research shows students have more success when participating in this kind of experiential learning. Studies comparing students in the same schools who are exposed to PBE, alternately known as "environment as an integrating context" (EIC) and those who are not, conclude those students showed improved achievement across subjects; development of critical thinking, problem-solving, increased enthusiasm and engagement in learning, and even gains in summative measures of achievement like test scores and grades (Sobel 2004, p.25).

Natural history curriculum guided by a place-based framework will ask students to create a journal dedicated to observations of local areas. By observing nature, students will get a much better idea of physical and human geography around them, as well as notice the diversity of life. Place study will include journal entries dedicated to science, art, and history. Journals reflect literacy skills.

Standards and Assessment

As a naturalist educator who seeks to share nature study and place-based ideas with public school teachers, it seemed best to reference Wisconsin State Standards for Environmental Literacy and Sustainability to establish goals for my Understanding by Design curriculum development project focused on "sense of place" and nature journaling for high school students. In addition, the nationally utilized Next Generation Science Standards "cross-cutting concepts" will be used in the UbD curriculum development as "habits of mind" and "cross-disciplinary skills" to assist in the established goals of "Connection" as students work on nature journals. National standards of the NGSS were added to the curriculum design as an alternative to goals of "Connection" as defined by the Wisconsin State Standards for Ecological Literacy and Sustainability. Hopefully the addition of these standards allows for more inclusivity and application to educators outside of my state. Standards are to be met with direct consistent observation of natural phenomena in order to recognize and understand the cross-cutting concepts: patterns, cause and effect, structure and function, and systems modeling (Laws and Lygren 90).

These standards outline how "to help students connect, explore, and engage in the world around them". They discuss how environmental literacy is intended to be integrated across subject areas at all levels of education, and state the underlying long-term educational idea is to optimize the health of natural and cultural systems, which requires knowledge and skills in numerous areas. These standards support the development of authentic interdisciplinary thinking skills by crossing content boundaries and increases learning for all students. I was surprised and pleased to find within these standards a very specific reference to culturally relevant teaching, a term described by

Wisconsin scholar Gloria Ladson-Billings (DPI 1994) as "a pedagogy that empowers students intellectually, socially, emotionally, and politically by using cultural referents to impart knowledge, skills, and attitudes". Wisconsin holds a legacy for environmental education that should be further realized in our public schools through equity and inclusion.

Wisconsin State Standards for Environmental Literacy and Sustainability will attempt to be met in the first standard of "**Connect**: Students develop and connect with their sense of place and well-being through observation, exploration, and questioning" (28). These standards could be applicable to any place-based education framework, they seem to align well with the goals of PBE. Perhaps similar standards for environmental literacy and sustainability already exist in other states where educators would like to better promote environmental learning experiences. These standards meant to "connect" students to places they live could potentially be accomplished through a nature journaling curriculum, which has proven to be an effective tool for learning as discussed within the literature review. The following Standards for Environmental Literacy and Sustainability will attempt to build connection, to promote "sense of place" in learners:

C1.B: Sense of Place

- ELS.C1.B.h Analyze relationships between parts of local and global natural and cultural systems. Compare and contrast historical and current resource use, and analyze the effects on local, regional, and global natural and cultural systems.

C1.C: Curiosity and Wonder

- ELS.C1.C.h Investigate and analyze one's own curiosities about patterns that emerge from outdoor exploration to develop new questions, draw conclusions, or formulate new ideas or solutions. Reflect and share how one's perspectives influence personal curiosity, the pursuit of knowledge, and respect for others and the environment.

C1.D: Well-being

- ELS.C1.D.h Analyze the effects of environment and time outdoors on mental, socio-emotional, and physical health. Design and implement a home, school, or community wellness improvement plan that integrates the outdoors to develop mindfulness, confidence, and self-regulation; evaluate the outcomes, and communicate the results.

Goals of environmental education outlined by the UNESCO Tbilisi Declaration on Environmental Education consist of knowledge, attitudes, and skills (Russ Ed., 2015, p.9). Nature journaling curriculum shared here attempts to follow recommendations of the Tbilisi Declaration, an internationally guided effort to develop environmental education worldwide, with desired outcomes as follows : (1) gain knowledge about the environment and nature, (2) develop empathy and beliefs that foster an ethic of environmental responsibility, including positive attitudes towards nature and human-environment interactions, (3) gain critical thinking skills related to identification, prevention, and tackling environmental problems. Environmental education goals are meant to be globally applicable and could be important for educators to consider when developing an environmental curriculum. Preferred outcomes of *knowledge, attitudes,* and *skills* guide the nature journaling curriculum unit here, focused on place and natural

science. Framework of PBE closely follows the objectives of environmental education, showing how EE has come to evolve and be put to use. Simplified recommendations of EE detailed here and the more specific goals of PBE align perfectly with the tool of nature journaling.

Based on these preferred outcomes, qualitative evaluation approaches will be used to measure resulting knowledge, attitudes, and skills of participants; parallel to the curriculum approach of nature journaling based on qualitative observations. Educators will have learners fill out an open-ended evaluation at the end of the program that asks: what they learned overall, if feelings or attitudes toward nature changed as a result from the project, and how satisfied they are after participation in a nature journaling project. Educators will also observe engagement and satisfaction levels of learners throughout the course of the program, to help measure positive attitudes resulting from the curriculum. Using qualitative survey methods, it can be possible to produce a more quantitative evaluation if desired (Russ Ed. 2015, p.12-13). For example, educators could measure how many students were satisfied after participation and reach a percentage rate. Rubrics will be used to evaluate knowledge gained about "the nature of place" through inquiry activities students record in nature journals.

Students will produce individual nature journals based on the place they live for assessment. Final journals can be in either hard copy or digital format, dependent on the preference of the teacher and differentiations for classrooms and students. Nature journals will integrate subject matter; particularly science, art, and writing. Formative assessment will be in the form of completed final journals, demonstrating compilations and reflections of knowledge. Summative assessment will be in the form of journal

keeping during each individual lesson, to create content for the final composition, which allows educators and students to assess knowledge as they take part in the activities. Educators should refer to the unit rubrics and student self-assessments in the project artifact. Instructional strategies for nature journaling will be shared in the unit guide for teachers.

Project Description Conclusions

Public school students in urban environments may not be exposed to nature during environmental education programs often, if at all. Safety of children has proven to be a main concern and reason parents cite for not allowing their children to play outside more often. Public schools struggle to provide resources for participation in educational nature programs, they are not considered a necessity or priority, especially to already underserved urban communities. Despite these challenges, time spent in green spaces must somehow be made a priority. Educators should take initiative and lead the way for positive shifts in public education as described here. Work of my project may be helpful or somehow inspire those who have the motivation to create changes. Environmental education for all children is a matter of justice. Nature in cities needs to be seeded, grown, and nurtured as commons (Maddox, Nagendra, Elmqvist, and Russ 2017). My project has shared the goals, learning benefits, and results of using place education methods and nature journaling; in the hopes these approaches will be more commonly utilized amongst public school teachers, who in turn may make more attempts to give students more access to nature. Access to nature provides inclusivity and environmental justice.

In pursuing master studies of natural science and environmental education, it has been part of my goals to develop a nature curriculum for public schools in my area, while using nature as a classroom. Curriculum presented here could potentially be used in different communities, urban environments included, or used to develop similar lessons. Giving students chances to develop a sense of place through outdoor experiences will provide lessons that resonate in different ways as they continue in life after public school. Nature lessons such as those presented here can provide ideas to other educators across subjects about how an experiential curriculum could happen where they live. Roles of place and nature in the field of education may be further realized and put to use.

Perhaps at a later time the literature review portion of the essay could become more refined or built upon, although it currently meets Hamline University standards for the essay portion of the capstone project and should not exceed its length. Authors and educators very often continually improve upon former work. Nature journaling curriculum development could be expanded in a contextual way reflecting a diversity of places that could potentially be studied through nature journaling. Original anticipations of the project had been to create an incredibly specific place-based curriculum for my hometown in the Great Lakes, an urban environment in Wisconsin. The final result of the nature journaling curriculum development intends to reach and be applicable to more educators and students than its original prospect, with approaches adaptable and useful to other localities.

CHAPTER 4: CONCLUSION

Introduction

My capstone project dedicated to natural science and environmental education has attempted to answer in what prospective ways nature study and place-based education could be taught to students who live in the urban environment. Goals, learning benefits, and results of nature study and place-based education approaches have been discussed with conclusions in previous chapters, which has led to a curriculum development project which uses nature journaling as an educational method. Some environmental challenges of living in the urban environment were presented in the literature review, along with proposals of how educators may be of assistance to overcome these, most of all by promoting nature study and place-based education across disciplines to influence a sense of place among youth. Now, the aims of my curriculum development project devoted to teaching nature journaling to high school students should be better understood. The intended audience for the work developed here is educators in public schools who hope to bring nature study to the classroom, with suggestions given to those living in urban environments who may face the specific challenge of access to nature. The nature journaling UbD curriculum focuses on standards for high school students from the Wisconsin State Standards for Environmental Literacy and Sustainability; but could be potentially adaptable to educators who have similar environmental education standards in other states. The NGSS cross-cutting concepts within the UbD curriculum should be readily applicable to any teachers who attempt to follow these guidelines, though there are some limitations to application for high school students, now discussed in the

following section. My scholarly learning process and a brief synopsis of the literature will also be detailed in the conclusions made here.

Limitations

After careful review of the available Next Generation Science Standards lesson plans in attempt to connect Wisconsin State Standards on Environmental Education and Sustainability to perhaps further reach the intended audience of educators in this work, it was concluded there was not much mention of natural science by the NGSS for high school students in general terms. Due to of the lack of NGSS already in existence dedicated to the natural sciences, it was difficult to connect these available lessons as they are currently written without creating another subsection of my current project, already at its necessary scope. There appear to be no curriculums involving nature journaling already in existence offered to meet the NGSS standards. Although frustrating to realize at first, that turned out to be positive obstacle, because it demonstrates the need for my project. Science educators may try to develop curriculums following NGSS as a guide. However, to actually create a recognized NGSS design is an entirely different process than an educator using the established national guidelines to write curriculum, in order to promote national science standards.

In learning more about the NGSS, one could assume many educators may not even bother trying to utilize such rigid design standards; and would prefer to use the much more straightforward standards of the state they reside. Although it may be an admirable idea to have a national science approach, it seems the NGSS needs more development. Unfortunately, there seems to currently be an enormous lack of shared

curriculum, although the NGSS has been in development since 2013. Future work towards meeting these national guidelines dependent on individual science educators should perhaps be encouraged, and the nature journaling curriculum for high schoolers shared here could inspire science educators down a path to meet these standards by use of nature study and place-based education frameworks. For example, more detailed nature studies dependent on ecologies of place would be appropriate in meeting these standards; but would have to be created specifically for the communities they serve by science educators with knowledge of local environments. Then, the curriculum would have to neatly meet the necessities for NGSS design, which appears to be quite a task for educators who carry full loads already.

In coming to these conclusions, there remains ever more reason for nature journaling to be widely promoted as interdisciplinary curricula by educators of all kinds. Otherwise, students living in urban environments may be even less likely to experience nature. Science teachers, art teachers, and those who teach various electives to high school students could very likely fit nature journaling into individual state standards based on subject. As previously stated in the literature review chapter, educators of all kinds can be inspired by the knowledge nature gives us. The more of us who become inspired and seek to share nature experiences with students, the better. Although these limitations were immediately evident and somewhat discouraging to what I had hoped to accomplish in my curriculum design initially, I was fortunately able to find the helpful and charming book *How To Teach Nature Journaling: Curiosity, Wonder, Attention* (Laws and Lygren 2020) which has a section about how the NGSS fits

into nature journaling, and was able to use those thoughtful suggestions for the UbD curriculum.

Scholarly Learning Process

Without any nature-based lesson plans already offered by the NGSS or Wisconsin State Standards on Environmental Education and Sustainability, I had to formulate curricula entirely on my own based only on the knowledge gained while earning my MAEd in Natural Science and Environmental Education. Since I have read an abundance of literature in these fields, choosing a gap-niche to focus my project on was quite challenging for me, because while more development must be done regarding high-quality assessments of learning with PBE and UEE frameworks, there are many ways I could have chosen to take while contributing useful scholarship to my field. At first, I was studying literature specifically based on ecological literacy to conceptualize the goals of environmental education. Nature journaling was not my focus until the very end of my project when I realized I was having difficulties in creating nature curriculum that could meet the national and state standards I was aiming for within the realm of eco-literacy. PBE and UEE were always my focuses but connecting these frameworks in a meaningful curriculum was what I found I had to do. At first, my project was specifically dedicated to science studies at Lake Michigan in the urban environment I live in. Then I thought it would be more beneficial to scholarship if the concepts of PBE and UEE reached more public school educators who may not be at all familiar with these inspirational frameworks of environmental education. Along the way it became apparent that in my own community and elsewhere, high school students are the most underserved level of learner when it comes to environmental education. While the idea of nature journaling is

not a novel concept, it proved to be the most meaningful way to write the curriculum design that connects PBE and UEE to the NGSS and Wisconsin State Standards on Environmental Education and Sustainability. Brief overview in relation to the literature of my project will be given now, before discussion of scholarly implications and final conclusions.

Literature Synopsis

Learners who are part of the urban landscape often have less access to nature both at school and out of school. Programs that expose them to ecological experiences make it more possible for them to gain a sense of place where they live and expose them to the ideas that make up ecological literacy. In the case of high school students attending public high schools in urban environments, nature study may be a last effort to help them build strong positive connections with their communities before they begin life outside of the public classroom. PBE has been an effective method for interdisciplinary teaching, research shows students have more success when participating in this kind of experiential learning. Studies comparing students in the same schools who are exposed to PBE and those who are not, conclude those students showed improved achievement across subjects; development of critical thinking, problem-solving, increased enthusiasm and engagement in learning, and even gains in summative measures of achievement like test scores and grades (Sobel 2004, 25).

Although there are different approaches to environmental education educators could decide to use, nature journaling as practice is one proven way to teach nature study and place-based education to students, even for those who live in urban environments. Benefits and results of nature journaling activities align well with the student

accomplishment goals of Understanding by Design theory. Literature dedicated to place education frameworks and how to use nature journaling as a learning method consists of an array of subjective guidelines educators could choose to follow and develop. My curriculum project attempts to better establish a set of goals for educators who would like to immediately teach using place-based education and nature journaling methods, as there can be an abundance of suggestions within the literature to consider before actual work of development can be done. Summaries of these goals may initially seem complicated, but they follow general environmental education guidelines that have already been established on global, national, and local levels; these guidelines of various scales align well when fused together to create more concrete goals.

Educators need not use all the suggestions to curriculum goals here, but hopefully can find a few of the goals helpful to utilize while using nature journals as a learning method and may easily be able to adapt unique place-based curriculum dedicated to the different urban environments they teach in as a result of my project. Incorporation of place-based education goals and the intended outcomes of nature journaling into an Understanding by Design curriculum unit provides more validation for nature journaling projects to educators in public schools, who may need to substantiate claims of benefits to learning using these approaches. Established goals and assessments for learning in the environmental curriculum shared here demonstrate the validity of using place-based and nature journaling approaches.

We must ask ourselves, what ways can we change public education to make students more excited about learning? What methods are truly the best ways to learn? Experiential learning rooted in place-based education proves to be effective in addressing

both these concerns. Feelings of well-being and positivity toward learning, and improved performances, could very well be the outcomes of curriculum units like the one presented here. In addition to these beneficial reasons for promoting a nature study curriculum, PBE framework along with nature journaling as a teaching tool, are culturally relevant learning methods.

Place-based education is culturally relevant because it's the study of local culture. It gets students into the community to learn through it. It helps them come to better know themselves through the place they live. The most substantive goal of PBE involves connecting learners to their communities, for them to feel a sense of belonging, "sense of place". We can all learn about the places we live, each other, and figure out how to make the places we live as good as they can be. Communities should be inclusive and equitable to society and the environment. We all have an influence on our communities and even personal acts can make a positive difference for all of us. Building empathy and changing attitudes aren't usually discussed as actual academic goals, PBE challenges such a viewpoint (Sobel 2004).

Culturally relevant pedagogy such as place-based education has the potential to change individual attitudes toward learning and community positively in a multitude of ways. Cultural relevance remains an extremely important aspect in developing lessons for urban environments educators should consider, as they are very often teaching learners with a mosaic of backgrounds. Nature study is a culturally relevant practice, evidently a most effective one, continually utilized in some form by people all over the world. Culture, art, history, geology, and ecology are some of the common subjects PBE focuses on. PBE is culturally relevant in that it helps to highlight shared culture and

promote community engagement and gives way to plenty of self-expression and interpersonal learning through collaboration. Knowledge shared and investigated attempts to be inclusive, inclusion creates equity in education.

Implications and Future Research

The literature of PBE and UEE along with nature journaling have apparent gaps, authors often cite more research needing to be done in the form of data collection from student assessments to better measure the benefits and success of goals of environmental education methods. UEE has been specifically developed to address the gap of how to teach nature in an urban setting, but the field seems to remain relatively unknown to public school teachers, possibly due to lack of necessary resources for educators to even consider it as a possibility. There is a continued need for more urban environmental educators, whomever they may be. Regardless of settings, these educators will need what their students need: factual knowledge, sense of confidence, understanding of specific neighborhoods, connection to local environmental organizations, positive nature experiences, a supporting peer network, and access to various resources they need to succeed (Russ Ed., O'Dowd, Robertson, Goodale and Russ 2015, p.121). More explicit gaps in the training of urban environmental educators that need to be addressed include unity and mission in the field, guidelines for excellence for practitioners, and national or state standards that recognize and promote urban environmental education (Russ Ed., O'Dowd, Robertson, Goodale and Russ 2015, p.122). Additionally, few educators can find appropriate urban environmental education curricula or suitable lesson plans. Although the list may seem daunting to look at currently, the subfield of urban environmental education will continue to cultivate. My project has sought to address part

of the gap of available UEE applicable curricula and suitable lesson plans, and hopefully has accomplished the goal of contribution to my fields of study.

Environmental education initiatives around the world continue to progress, but research appears to have been progressing rather slowly until recently, it seems much of the relevant scholarly development has taken place in the past ten or fifteen years. In the field of science, it's preferable to have about 30 years of data to examine to make relevant conclusions. We are now reaching such a point regarding the concrete data we have available to analyze reflecting nature and place pedagogies and the resultant new frameworks of environmental education, place-based and urban environmental education. Scholars of the environment, naturalists, and educators will continue to build upon our work, which seems to be reaching a pivotal point in progress. We can anticipate greater developments and expect the popularization of these important real-life approaches to education in public schools, an exciting prospect as we move ever forward in the best practices of education.

Research shared here with proposed formative and summative assessments in the UbD curriculum to measure success of a nature journaling initiative intends to assist the process of using nature and place as pedagogy in mainstream education. NGSS cross-cutting concepts could be of immediate use to science teachers, with the curriculum design meant to meet concepts for high school learners. Place-based education approaches and nature journaling as a learning method can be used by an even greater range of educators across subjects, who may have the freedom to use these three short lessons as they are already presented or have less to adapt to meet relevant state standards. Data to be collected from formative and summative assessments after the

process of nature journaling offers benefits to the profession in that such assessments provide quantified and qualitative measures of successful educational methods. Future research should be done in the form of assessment data collection to further demonstrate success of the benefits of environmental education. It's recommended when educators use nature journals they keep some record of how well learners respond to nature and place-based methods of learning, most noteworthy of all perhaps being student enjoyment of activities and deepened love of learning. Measuring sense of place has proven to be a difficult task, and more research should be done on how it benefits individual and community well-being, maybe in the form of surveys throughout the lives of students who are able to experience environmental education.

Educators in public schools will likely be able to use the nature journaling curriculum presented here, which relies upon well-established UbD theory and utilizes cross-cutting concepts from the NGSS. Suggestive frameworks of place-based and urban environmental education have been introduced for educators who may want to think about or gain ability to bring nature and community to the classroom, to better initiate real-world learning experiences. This work could be a starting point for those educators who are unfamiliar with using nature and place as ways to teach; and would like to have some synthesized overview to understand the benefits and goals of these approaches. Curriculum design here has intended to go farther than introduction by offering condensed nature journaling lessons nearly any educator can pick up and utilize in any classroom, even without seemingly having much access to nature. Perhaps the most important lesson of this work is simply for both educators and learners to understand, nature is everywhere, we are part of our environments. Educators need not

know everything about local nature or the community to feel capable to teach about it, they can engage in the learning process with their students through these frameworks. Nature provides unexpected learning in countless instances and can be a teacher throughout our lives. Educators should consider what they personally value about the natural, human, and built environments they find themselves part of, and reflect on those values while they teach from a place of care.

Summary: Where from here…

Ideas about the importance of urban environmental education have been shared in the hope that more public school teachers will be able to offer nature experiences to students with detailed plans of nature journaling instruction available, along with presented reasonable benefits to learners. NGSS cross-cutting concepts and UbD curriculum dedicated to place-based education and nature journaling should be readily applicable to any teachers who attempt to follow these design guidelines. Some limits could exist for educators in urban environments who may not have as much access to nature, or in public schools unable to provide resources or accommodations to educators for different reasons. Educators should evaluate nature experiences with student surveys and if possible keep track of the concluded data to demonstrate success of projects and ensure continuation. Scholarly research indicates positive individual and community outcomes could arise from place-based education projects unified with time spent in nature, that aligns with the curriculum development offered here.

My personal plan to use my capstone project in the future may come to be realized sometime in my teaching career. It's likely the same challenges discussed in the

literature and here in the concluding chapter will have to be overcome to implement my ideas. If the necessary resources are available to partake in the outdoor experiences my curricula development suggests, the nature journaling project could easily be used in a science course and maybe offered to other educators as an interdisciplinary template while we work together with students. Hopefully, my work here will be enough to convince public school administration of the need to allow students to have nature experiences in our community. To give learners these experiences could help them feel a sense of belonging to the world; or discover a love of learning they have not yet known.