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Can Providing an Outdoor Education Activity Booklet that Meets State Standards of Learning Increase Environmental Education in the Classroom?

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Can Providing an Outdoor Education Activity Booklet that Meets State Standards of

Learning Increase Environmental Education in the Classroom?

by

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DEDICATION

To my fiancé for continuously pushing me to go after my dreams and supporting me along the way. Also, to my parents for teaching me from a young age that anything is possible and that I have no limits. To my friends that I have gained throughout my educational journey and everyone else who has helped me to get to this place. Thank you.

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Introduction

Introduction

      I began my journey as an educator in the field of environmental education. Then I transitioned into classroom teaching, where I had to reassess all I knew about nature-based education. This transition was not an easy one, as it shifted my way of thinking about how nature is used in education. I know that I am not alone, but I also know that sometimes teachers can feel alone, especially when they are not comfortable teaching a specific topic or subject area. Let's go on a journey through my educational experiences, my relationship to nature, why I chose to do the project I did, and who this project could benefit. When considering what to do for my capstone project, I wanted to bridge the gap between both environmental education and classroom teaching. I wanted to create something that could be used by educators in Virginia that met standards of learning and would serve as an activity that could be self-guided by the students. *Can providing an outdoor education activity booklet that meets state standards of learning increase environmental education in the classroom?* That is the question I am going to try to answer by creating a booklet that teachers can use to help their students investigate nature.

      Taking students on environmental education experiences is not always feasible for school districts because of funding or time. Outdoor education in school systems is something that teachers typically shy away from because they either do not feel comfortable teaching in nature, or they are worried about having their students in nature. But letting students out into nature to explore on their own in a controlled environment is

one of the most beneficial things an educator can do. It allows students to come to their own conclusions and independently connect with nature. Often, students will be able to learn better in nature because it is a new learning environment for them. When students feel comfortable in nature and want to learn more about their environment, they will feel more connected to where they live and they will understand their place in their ecosystem.

My Educational History

In high school, I took many agricultural courses, but there was one in particular that really stuck out to me. I took a course called environmental science, and it changed the trajectory of my life. I felt so invested in my environment and its health that I applied for a grant so that my high school could receive two large recycling bins for cans and bottles because we had previously been throwing them out. I got the grant and my school received the recycling bins, and for the first time in my life, I felt like I could really make a difference. This is what led me to choose my major in college. I received my Bachelor's in Science in Natural Resource Conservation and Management from Paul Smith's College. I had known since high school I wanted to do something to help the environment, but it wasn't until my second year in college that I realized the impact education could have on an issue. I was a part of my college's Center for Campus Sustainability, and each semester I would help to organize a campus-wide vote on sustainable projects for our campus. Part of organizing the vote would be educating students about all the projects prior. This was my first real experience with teaching and I knew it was what I was meant to be doing.

In my current classroom, I teach upper elementary at a Montessori school for a mixed group of students in grades four to six, which is very different from my experience growing up and attending a public school. One of the main differences between my public school education and my Montessori classroom is how the natural environment is treated. With Montessori, nature is viewed as an educational tool to help teach skills that students will be able to use, like gardening and how to identify and take care of plants and animals. There are entire curriculums that have lessons on zoology and botany, which most public schools do not have until high school. My feelings towards those subjects would have been altered sooner if I had learned them in elementary school.

Relationship to Nature

I have always been deeply connected to nature, which began when I was young and would camp with my parents in the mountains. The connection grew when I wanted to explore everything, including the cornfield that grew each year behind my childhood home. My parents liked being outdoors and wanted to share that with me. I also had other family members who felt similarly, and many of my fondest childhood memories were spent outside.

I went to a school that focused on agriculture, so I learned a lot about how plants grow and raising livestock. While that was very beneficial and has helped me connect with the environment, it was also very specialized and did not benefit everyone. Although quite a few did, not everyone that I grew up with went on to become farmers. That left many of us feeling like we didn't fit in because we did not feel as strongly about farming as some of our fellow classmates did. I believe education should be about the whole child and the ability to learn their passions. I think about how much funding my school

received to create such an extensive agricultural curriculum, but I wonder what else that funding could have gone towards. How many other clubs could have been formed that helped students find their passion and go on to pursue their dreams?

When I went to college, I was overwhelmed by how many clubs and organizations I was interested in. In the beginning, I wondered why my high school had not been as inclusive as my college had been. In college, I felt like I had finally found my place because I was surrounded by students that had similar interests to mine. But I also felt miles behind many students because my high school did not have the same courses a lot of other students had access to at theirs. Throughout high school, I easily got good grades and rarely had to study for tests, but that all changed for me when I got to college. When I took my first Biology course, I quickly started to fall behind and realized that I did not have the same educational experience that others did–which was a real a-ha moment for me. That is why I think it is so important to start teaching about the environment at a young age so students don't feel behind or overwhelmed when they begin high school or college. I want to provide an inclusive project that all students can enjoy and feel uplifted in.

Rationale

One of the things I like to ask my students when I see them each morning is what they did the night before. Oftentimes, they say they spent time with their family, went out to dinner, watched tv, or played video games. The thing that concerns me is how much they talk about electronics. Even if they are not directly telling me they spent hours watching Tik Toks or movies, I can tell that they did based on their conversations with me throughout the day. Although I do have quite a few students that play outside, go

camping, and enjoy nature, they are not the majority. When I think of my experiences in nature at a young age, I know they helped me become who I am today. But I wonder how many children get to have that same experience today. Are children still getting outside with all of the advances in technology? Are parents or guardians still able to take their children outdoors when they have such demanding schedules? These are a few of my many concerns for children in this generation. There are so many things to go or see and not enough parks or natural areas where children can go out and enjoy nature. And if students aren't getting to go out into nature in school or at home, then we, as a society, are in trouble.

It is my opinion that creating a connection with nature will help students feel more responsible for it. And with the current health of our environment, we really need the next generations to take on that leadership role and help to change our trajectory. Our global climate crisis is real and needs solutions to help combat it. Those solutions could come from students who are able to realize their passions at a young age and help create real change when they are older. Even if their true passion isn't for the environment, but is art or poetry, those passions could still help create change. Students could create an art piece on global warming or write poetry about their experience in nature. In this guide, students will be able to create authentic representations of their feelings toward and about the environment. That is why environmental education is so important not just in schools, but for children to be learning about their environment outside of school too.

Stakeholders

This project contributes to the overall growth and development of environmental education content in diverse learning environments. If teachers can feel more confident

and comfortable taking their students outside, they will be more likely to advocate for taking them to nature centers or other interpretive centers that help to reinforce environmental education. If funding is also an issue for those teachers, they may become more likely to apply for grants or other resources that could help get their students outside and exploring nature. Change can start with just one teacher adapting this guide into their curriculum and could snowball into something so much bigger.

In Virginia, the standards of learning for science focus on other aspects of science and less on environmental science. That does not mean that just because there are no specific parameters around environmental science, that teachers can not reach any standards of learning by including environmental science into their curriculum. It is my goal with this project to help other educators, like myself, understand that nature-based education is interdisciplinary and can check off more than just the science box.

Conclusion

In developing this guide for educators, I was also able to define where I fit in. For a long time, I felt like a sell-out because I switched to teaching in a school setting, but I now realize that having my background in science and experience in environmental education can be beneficial, not just to my students who can identify most trees around our school because I have instilled that in them, but also my fellow teachers and their students. My experiences in public school helped to shape the way I now teach, and my experiences in college helped me to gain confidence and become comfortable with my passions. My love for nature is something that I now hope to instill in my students and, someday, in my children. I want other teachers to have an easier time adding

environmental education into their curriculum, and I want students to feel comfortable going out into nature.

This project has transformed my mindset about how I feel about teaching. My journey has not been easy, and it is humbling to feel I have finally found my place. I hope that through sharing this booklet that other teachers and educators can find their place and help their students find theirs.

In the next chapter, I will be providing research showing the benefits of nature-based education and how to implement it in the classroom. I will also be discussing the different learning styles and how to incorporate aspects of each into an environmental education curriculum. Finally, I will be discussing climate change and the impact students can have on a local level. In Chapter Three, I will be discussing the project that was created to help bridge the gap between formal education and non-education. After understanding more about the project in Chapter Three, I will go on to reflect on the process in Chapter Four, where I will go through my own learning and how it impacted me as a student and an educator.

CHAPTER TWO

Literature Review

Introduction

In developing this project, many different considerations had to be included. In this chapter, there are many concepts that will help us further comprehend the project. To understand the background of environmental education, there is first a section on the history of outdoor education. Diving into some of the major issues that are happening in our environment today leads us to the next category of climate change. Then there is a category about how science and technology are interdisciplinary. After that, there is a category on finding your place in the environment and, lastly, one on the feasibility of the project. All of these concepts help find an answer to my research question: *Can providing an outdoor education activity booklet that meets state standards of learning increase environmental education in the classroom?*

History of Outdoor Education

To begin this chapter, I feel it is important to provide a relevant summary of the history of environmental education to gain a full understanding of where we are at today. Well-known contributors to modern and historical understandings of outdoor education include naturalists such as John Muir, Aldo Leopold, and Rachel Carson, who helped to develop environmental education in the United States beginning in the early 1900s (Monroe & Krasny, 2015). Environmental education (EE) today looks very different from how it once did.

National Parks

The establishment of the National Parks system is one of the most notable catalysts for environmental education. During the 19th and early 20th centuries, public health was looked at more closely, and having access to things like "fresh air, light and space for movement" became more important than ever (Chawla, 2015, p. 433). This also helped bring awareness to the importance of our public health and our environment. People began to feel a connection to these parks and saw the benefits the environment had to offer everyone.

Major environmental issues, like the Dust Bowl of the 1930s, helped to bring even more awareness around the environment and how to properly manage it. Fraser et al. (2015) found that after agricultural techniques did not prosper in the 1930s, the United States government changed conservation education to be focused on wise use of the country's natural resources, and then again changed it after the 1960s when there were more issues arising from pollution. Wise use is still a concept that is taught today in environmental education, however, it is now more focused on the conservation of land and other natural resources. Then, Rachel Carson wrote about the impact of dichlorodiphenyltrichloroethane (DDT) on environments and public health in *Silent Spring* (Carson, 2015). This issue and novel lit the match that sparked the environmental movement in the 1970s. Those that lived through these issues were able to speak on their experiences and could see the impacts on not only public health but environmental health too.

Storytelling

In the 1970s is when storytelling became a critical part of environmental education. We learn from our experiences, and teaching others about the environmental issues that happened previously became a major aspect of environmental education then and now (Stewart, 2008). Telling a story helps the audience build a connection with the speaker but also with the content, in this case, the environment. If there is a connection between nature and a person, that person is more likely to share their own experiences with others and do more than expected to help their environment.

As an educator, sharing personal experience can often be frowned upon in a formal setting, but that is different in environmental education. Environmental educators are able to share their own experiences in nature with others because it helps to strengthen their presentation and help their audience connect to the topic. It is one thing to know about environmental issues, but choosing to act on that knowledge is something that modern-day environmental education incorporates.

Environmental Education Today

Today, environmental education can be either formal or informal education, and typically ties back to standards of learning in schools. There is also a difference between rural and urban outdoor education. Urban environmental education is a relatively new concept that is still hard to grasp for many but is becoming more common, especially with the growing rate of cities (Monroe & Krasny, 2015). To create a well-rounded environmental education experience, not only should the content relate to the standards of learning, but it should also include a stewardship component that involves the audience in a project that brings about change. This final aspect of an environmental education

experience is important because it can inspire the audience members to create real change in their communities and in the world.

Summary

Environmental education has changed drastically since its inception. With the work of early environmentalists, the National Park system was established and soon started to educate the public about the environment. Then after national environmental issues were recognized, the government shifted its focus on wise use of our natural resources, changing environmental education again. Finally, how EE was presented to students and to the public changed to have more of a focus on storytelling within academic settings. This helped to shape public perspective and lead to connection between people and nature. Those connections led to more action based projects in individual communities and more awareness of environmental issues both locally and globally. The following section is an example of how current environmental issues can be developed into more interactive, environmental education-focused work in the classroom.

Climate Change

A story that is now being told is that of our global climate and how it is changing. Climate change has been happening for generations, but it has increasingly become more urgent in more recent decades. One way to help this is to tie global climate change into curriculum standard goals. This allows students to meet their standards of learning and also comprehend what is happening on a local and global scale to our environment. This can look different depending on the grade level, but it is now explicitly being written into high school curriculum goals.

High School Graduate Goals

Many schools in the United States have a program called "K-14," which refers to the teaching of students beginning with Kindergarten and then including two years of vocational or technical teaching either through another program or a local community college. According to the National Research Council (2012), K-14 graduates should be able to understand the following:

- Fundamental processes that influence climate, at scales ranging from local to regional to global.

- Natural variability and natural cycles in climate.

- Human impact on the climate—that is, how the growth in human population and technology has made it possible for human activity to change climate patterns at various scales.

- How changes in climate can and do influence physical systems, ecosystems, and society.

- Why the scientific community is now convinced that anthropogenic climate change is under way.

- What the range of effects of climate change is and how likely various different scenarios of climate change are under different conditions. (p. 5)

Achieving these goals may seem simple, when it is far more complicated than it seems. To begin, Sobel (2013) suggests introducing climate change at an early age, as long as it is all developmentally appropriate. It also should be introduced beginning with local issues before linking those issues to others both nationally and globally. If concepts are introduced too early or the concepts are too hard to conceptualize, it will cause a child

to shut down completely. This is what Sobel (2013) defines as 'ecophobia.' If students become overwhelmed with the gloom and doom of climate change, then they will be less likely to listen at all to anything in the future because they will remember their bad experience at a young age.

Metaphors

One strategy that can be utilized to communicate about climate change is to use metaphors. This is helpful because it takes a hard to understand concept, and makes it more relatable to the audience. Metaphors are tools that are not meant to be taken literally, they just illustrate a point that is being made. One program that could help educators is the National Network for Ocean and Climate Change Interpretation (NNOCCI). According to Climate Interpreter (n.d.), "climate's heart" is the concept that our oceans are like the heart of our planet. Similar to how the heart of an organism circulates blood and helps to keep our body temperature normal, our oceans circulate heat throughout our climate system. The heart also regulates the flow of blood throughout our bodies, and our oceans regulate the flow of water throughout our climate system. When society puts stress on the oceans by burning fossil fuels, its ability to stabilize our climate is less likely, just like if you put too much stress on your heart, it will not be able to stabilize your body. All of these concepts are laid out on sheets for each metaphor and are then explained further on the NNOCCI website (climateinterpreter.org/about/projects/NNOCCI).

The NNOCCI training is one that any educator can take, whether formal or informal, that gives tools on how to use these metaphors and how to draft conversations around climate change. There are ways to avoid negative communications by "bridge and

pivoting" to the metaphors and the concepts that go with them (Climate Interpreter, n.d.).
It also highlights ways to redirect the audience away from disbelieving statements. The
training gives tools to understand these metaphors and then how to use them and what to
avoid and it helps to prepare educators for any circumstance and how to navigate it.

NNOCCI is not the only program that has climate change metaphors. There are
other examples of climate change metaphors from Armstong et al. (2018) like the Carbon
Bathtub. This metaphor shows us that our climate system is like a bathtub, and putting
water into it from the tap is like adding greenhouse gasses to our atmosphere; if more is
added, the bathtub will eventually overflow. But if the plug can be pulled on the bathtub,
the emissions could drain out through carbon sinks.

These metaphors are great tools to help the audience (especially if they are
children) understand the big concepts of climate change. Many of these metaphors, from
both the NNOCCI training and Armstrong et al. (2018), have images that go along with
them, which would highlight each argument more by including a visual aid for the
audience to focus on. Once they feel more comfortable with what climate change is, that
is when the rest of climate education can come into play. This is something that I am
incorporating into my project.

All Sides of an Issue

Another thing to understand with teaching climate education is that all sides must
be presented and the teacher must keep personal biases from the classroom. Hungerford
(2009) states that environmental educators are not advocates on any given issue, they are
providing their audience with "critical thinking and citizen participation skills" for them
to come to their own conclusions (p. 3).

It is important to understand that science in general is intersectional. There are many ways to include science, such as climate science, in other lessons. It would be a waste of time, according to the National Research Council (2012), to teach climate change as its own system apart from other earth systems. Including climate science in a larger context is another opportunity to connect climate change to other issues that are happening on the local level because then a project could be created around it. Environmental education is more effective when it begins in the classroom, where students are able to have a field experience component to help them connect. Then after that, there is a civic engagement component to connect with the local community. Understanding this intersection between formal and informal education is important in this instance and even more so when it relates to climate change.

Climate Justice

Another issue that relates to climate change is called climate justice. This is when groups of people are impacted more by the effects of climate change than others. Kagawa and Selby (2009) created a list including "triple injustice[s]" that explain further:

- First, climate change affects the poorest first and worst. Nearly all of the climate change casualties (deaths), so far, have been among those at most risk—poor people living in what [Jess Worth] calls the 'Majority World.' This death toll is predicted to rise to millions in just a few decades.
- Second, those most affected did not cause climate change, and are powerless to stop it. This marks out the power-gradient between industrialized nations with high fossil fuel burning economies, and those that are less industrialized (lower fossil fuel burning economies).

- Third, the polluters are not paying. Despite interstate agency interventions, commissions, agreements such as the Kyoto Protocol, the gaze of the international media, and wide-scale public awareness, carbon dioxide emissions (which account for 80% of greenhouse gasses) continue to rise in developed countries. The clean development mechanism has failed to provide the support necessary for clean development in developing countries, and the carbon trade market has been plagued by mismanagement and ineffective implementation, and has '. . . perversely enriched the most polluting European energy companies to the tune of billions of dollars, and exported dirty development schemes to the global South.' (p. 79)

These are just some of the injustices that are happening because of climate change. Based on the research above, helping students understand that not everyone will be equally affected by climate change is important for them to be able to grasp the full extent of issues associated with climate change. This is an opportunity to understand more about what is happening in the community and see if there are any climate justice (or environmental justice) issues happening. Being aware of an issue is the first step in helping to solve the issue altogether.

Summary

Through the use of metaphors and presenting all sides of the issue, educators can help inform others about the issues. Climate justice can help to highlight injustices that are happening in communities relating to climate change issues. Climate change education can also be incorporated into other science topics to help reinforce what is

being taught in the curriculum in the classroom, as well as helping students to understand more about their local and global climate issues.

Science and Technology are Interdisciplinary

Many subjects that are taught in schools can also cover other subjects' curriculum, it is all about how the material is presented. Technology is a complex and sometimes a controversial topic regarding environmental education. For many, some technology is less accurate than other sources of technology used in an outdoor setting - devices that rely on signals from towers are not always accessible when outside. Technology can be a broad term that encompasses tools like magnifying glasses, rulers, water resistant paper, etc. Those things are much more reliable in an outdoor setting than other technologies that we would typically think of as electronics, like tablets or cell phones. However, those types of technologies can be more helpful than other types of technology that have been used previously.

Accuracy of Technology

The use of any technology in environmental education can be related to the accuracy of the technology being used. Vallero (2005) has a great visual representation to explain this concept further. Figure 1 (pictured on the next page) is describing the difference between accuracy and precision using a visual representation of a Bull's Eye. Where the shots are in relationship to the center of the Bull's Eye, show how accurate or precise they are. The closer to the Bull's Eye, the more accurate and precise the shot.

Figure 1.

Accuracy of Technology
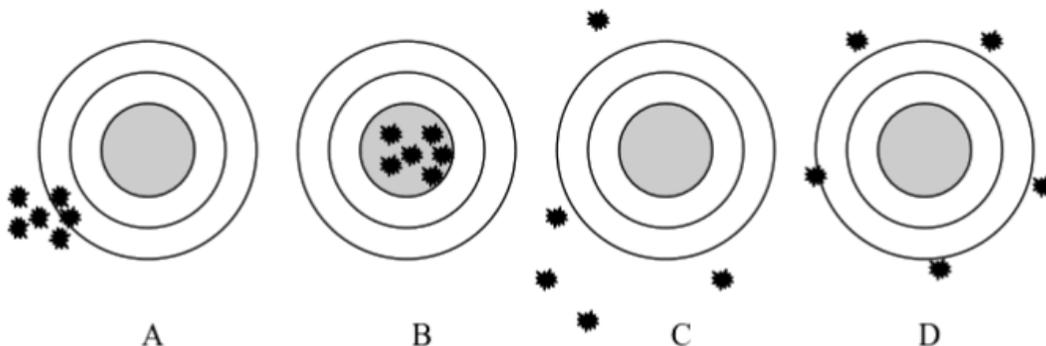
Note. This figure demonstrates the difference between accuracy and precision as seen on these four bull's eyes. Vallero, D. (2005). *Paradigms lost: Learning from environmental mistakes, mishaps and misdeeds*. Elsevier Science & Technology.

As seen in Target A, it was precise, but not accurate, whereas Target B was precise and accurate. While teaching, the goal is Target B, to be both precise and accurate. But this helps to show that technology, at times, can be imprecise, whether it is poor service or inaccuracies found on the internet, it does not always work consistently. So although technology can be precise, without accuracy, technology will miss having a Bull's Eye. When teaching in nature, accuracy is important because it will help the presentation run smoothly. Therefore, using technology as a tool to help enhance a presentation can be helpful, as long as the technology is not relied on solely in an outdoor setting.

In my project, I am providing technologies to make the booklet as accessible as possible. This includes putting a ruler to scale in the booklet so that those using the booklet will not have to bring their own into an outdoor setting, or would not have to purchase one. It will be to scale because accuracy, as stated above, is important.

Mobile Phones in the Classroom

There is also the challenge of having mobile phones in the classroom. Keeping students interested and engaged in a topic has become more tedious than ever when students are physically in class, but mentally somewhere else. Kuznekoff et al. (2015) give the suggestion of text breaks for students to get time with their phones without the pressure of having to be mentally present in the classroom. This was concluded after a study on this in the college setting found that using a mobile phone on unrelated content to the course often left students with "decreases in student learning, recall, and notetaking" (Kuznekoff et al., 2015, p. 361). Breaks included in the classroom could then help students focus more on the content and less on what is happening in the outside world. These would have to be implemented at appropriate times and would depend on the age of the students, however. That is why a project like this can help students to get out in nature and forget their phones and other distractions for a time. Teachers and parents could also encourage students to use their phones for taking pictures of things that they see while using the booklet, or download an application on their phone to help them identify plant or animal species. The use of technology can be incorporated into this project, but it is not necessary. Technology, in this case, can be used as a supplemental tool if the participants have it, but the booklet can also be used to its fullest potential without it.

Technology as a Tool

Understanding that technology is a tool that can help any educator is the key in incorporating it into education presentations. Bell et al. (2018) share the idea that "teachers need to be both competent and confident in the use of technology in order for

best practice in learning and teaching to be shared" (p. 733). In order for this to happen, education as a system must have more professional development and training available to teachers for them to feel comfortable teaching more interdisciplinary topics.

Having meaningful professional development for educators is just as important as teaching interdisciplinary topics in a classroom setting. Teaching adults and children require differentiated approaches; Evans (2014) compares the two teaching styles, stating it is more about curriculum based standards for students, but when it comes to adult learners, it is more individualized and based on the needs of those learning. These educators are building on a larger collection of experiences than younger students. Therefore, learning can be more self-directed in their needed professional development. That also means that professional development can not be a one size fits all approach–it must be individualized to help each educator get the most from the experience to take back with them into the classroom.

The role that technology can play in science and vice versa, helps to highlight that both are interdisciplinary. There are also other subjects–like health, history, and geography–that could be incorporated into either science or technology lessons to help reach multiple learning objectives. I hope that once teachers or educators use this booklet, they will be able to teach other educators using their experience to help them feel more confident and competent about teaching about and in the environment.

STEM Education

Science, Technology, Engineering, and Math (STEM) education could help teachers reach curriculum goals in several different subjects all at once. Capraro et al. (2016) put together a book on how these four subject areas can be taught collectively to

meet standards from all four subjects. This book includes learning objectives, subject-specific expectations, and connections between the subject and the standard of learning. There are many lessons that are laid out in this book and readily available for educators. That being said, there are also ways for teachers to support students in other ways that incorporate intersectionality.

Standards of Learning

Once teachers have all the resources they need to help their students learn more about nature, it is then about finding what areas of study can be taught simultaneously. Within the Virginia Department of Education (n.d.b.) website, the Standards of Learning (SOLs) can be viewed. By going through the documents a teacher can make connections between subjects. For example, looking through the Virginia Department of Education (n.d.a.), the Kindergarten SOLs for Health focus on body systems and physical health, which could be taught in a natural setting to help reinforce those concepts. They could also be taught by comparing human health to that of other animals, as well as comparing body systems. Those simple acts can help bridge the gap between intangible and tangible for these young students and help them grasp these concepts with memories to last them throughout their educational journey. Also, in kindergarten, SOLs for geography indicate that students should be able to use simple maps and describe relative location. Going out into nature to help students have a hands-on component for these standards could help students connect to nature and understand more about the geography of their environments. There are many other examples; it is all about finding the keywords that could help link multiple subjects together.

Summary

Technology can be used as a tool in the classroom and in environmental education. Understanding how to use this tool and when to use it is especially important in environmental education because accuracy can make a tremendous difference in an outdoor program. Integrating all subjects into environmental education can help to meet many standards of learning at once, showing that both science and technology can be interdisciplinary. This is a main focus for my project because it is meeting SOLs and it is interdisciplinary.

Finding Your Place in the Environment

Helping others to understand their place in their environment is important and if they can understand that at an earlier age, their learning from that point on will be different. Their view on nature begins to shift and change. As humans, it often feels like our lives are so important, but taking a step back and sitting in a natural environment can help our understanding that humans are just a piece of the puzzle. This is the difference between ecocentrism and egocentrism. Ecocentrism refers to humans as a part of nature, whereas egocentrism refers to humans being in charge of nature.

A historical figure that embodies these ideals is Rachel Carson. In her book *The Sense of Wonder* (2017), Carson showed readers what it is like to be a child out in nature again. She shared her experiences with her nephew outside exploring and his revelations in nature. One thing that she emphasized is the use of our senses. One can find themselves relying heavily on one sense or the other, but do they take time to use each of the senses individually? One of the activities that is included in the activity booklet does just that, helps students to focus just on one sense at a time. This allows students to

experience nature differently. All students should be able to come to their own

conclusions and find their own connections, in nature and beyond.

Nature's Benefits

Beyond making connections in nature, there are also other benefits that nature

provides. Chawla (2015) provides examples of the role of nearby nature in children's

realization of their capabilities in Table 1 (p. 435).

Table 1.

The Role of Nearby Nature in Children's Realization of Their Capabilities

Ten Central Capabilities Adapted for children's development from Nussbaum (2011)	Children's Capabilities Associated with Access to Nature A summary of research findings in this review
Life: being able to live to the end of a life of normal length; not dying prematurely	o Increased birth weight and head circumference o Lower infant mortality
Bodily health: being able to have good health	o Lower rates of asthma and allergies in some settings o Vitamin D production from sunlight o Shade protection from excessive sun exposure o Better motor coordination and balance o More moderate to vigorous physical activity o Healthier weight; more stable body mass index
Bodily integrity: being able to move freely from place to place	o More walking and cycling on green streets or near parks o Free exploration and manipulation of the environment
Senses, imagination, and thought: being able to use the senses and have pleasurable experiences; to imagine, think, and reason	o Better concentration; less inattention and impulsivity o Imaginative play; resourceful use of nature's loose parts o Rich multisensory experiences in the natural world
Emotions: being able to have attachment to things and people outside ourselves; to feel a range of emotions; not having one's emotional development blighted by fear, anxiety, or restricted experiences	o Development of place attachments o Experiences of environmental competence o Green retreats for emotional restoration o Less depression, psychological distress, stress; greater sense of energy
Practical reason: being able to form a conception of the good and engage in critical reflection about the planning of one's life	o Participation in evaluating and planning healthy environments
Affiliation: being able to live with and toward others, to recognize and show concern for other human beings	o More cooperative and creative social play
Other species: being able to live with concern for and in relation to animals, plants, and the world of nature	o Direct exposure to the natural world o Learning about nature through exploration and engagement o Sense of affiliation and connection with nature o Childhood play in nature forms a foundation for lifelong care for nature and adult recreation in green spaces
Play: being able to laugh, to play, to enjoy recreational activities	o More outdoor play in green neighborhoods o More creative play in natural settings
Control over one's environment: being able to hold property and have property rights; having the right of political participation	o Freedom to appropriate undeveloped land that is not controlled by adults o Inclusion in participatory planning and design

Note. This table shows the ten central capabilities of children's development and why access to nature is important for them. Chawla, L. (2015). Benefits of nature contact for children. *Journal of Planning Literature*, *30*(4), 433–452. doi.org/10.1177/0885412215595441.

These 10 central capabilities are crucial in a child's own awareness not only of themselves but also of their environment. Having access to these areas can have profound effects on young children.

Another concept that changed this generation was presented by Louv (2008) as Nature Deficit Disorder (NDD). The idea of losing nature and putting it in medical terms really caught the attention of parents and educators. This was the opportunity that environmental education needed to make its break. It then became about saving our children from NDD and getting them out into nature.

When educating students in nature, there are several things to take into consideration. One of the most important considerations is the content that is being taught. In schools, there are goals that must be achieved before moving on to the next, which is the same for outdoor education. One could not simply start by learning about identifying species based on their bones for example, one would start before then for it all to make sense and tie in together. Each age group has their own developmentally appropriate stage in their recognition of environmental action. Sobel (2013) highlights these age groups and their corresponding stage as ages 4-7 empathy, ages 8-11 exploration, and 12-14 social action. Each of these actions builds on each other to create a solid foundation in environmental literacy and connection to nature.

To relate back to the example of Standards of Learning for Virginia, these stages could be achieved through meeting curriculum guidelines. According to the Virginia Department of Education (n.d.a.), in kindergarten SOLs for Virginia for History under the topic of Civics:

The student will demonstrate that being a good citizen involves

- taking turns and sharing;

- taking responsibility for certain classroom chores;

- taking care of personal belongings and respecting what belongs to others;

- following rules and understanding the consequence of breaking rules;

- practicing honesty, self-control, and kindness to others;

- participating in decision making in the classroom; and

- participating successfully in group settings.

Understanding empathy can help to achieve these standards of learning in becoming a good citizen and a good environmental steward. Each of the other age groups and stages of environmental action can also be achieved through meeting their own standards of learning. Sobel (2013) also lists examples of books for children that are developmentally appropriate and help to reinforce each of the environmental action stages at the end of his book. This resource is helpful for all of those age groups to identify their areas of growth for their students.

Powers and Ridge (2019) provide another resource for educators. They highlight different environments and species and include lessons that could be used. Some examples are songs, games, material lists, letters to families about the lessons, and advice from the field from both of the authors. This helps all educators to see what has worked

well and what has not from experienced outdoor educators. It also lists a section on inclusion for all children, cultural considerations, and health and safety issues for each topic. This book is very adaptable for any age group, although it is targeted for younger children, the basic concepts could still be used for older children.

Feasibility

Creating a project for educators to bridge the gap between environmental education and classroom education will mean nothing if all of the other obstacles that must first be considered are not. One connection that could be made would be to help students outside of school with parents. This idea is posed by Monroe and Krasny (2015) and highlight the barriers that parents can have, stating that there are:

> variations in the support of children's nature experiences among parents of different demographic groups. Females were more likely to encourage outdoor experiences for children. Individuals with higher income and higher education levels were also more likely to encourage their children to play outside, potentially due to resource and time availability. Communities of color, with the exception of American Indians, gave children's nature experiences less value than Caucasians, although income was not considered in these results. American Indians rated the importance of these experiences the highest. (p. 134)

This quote above shows that there are barriers to parents as well as students. This is something that educators should consider because not all students and their families have the same access to nature, nor do all demographic groups feel comfortable in nature for various reasons. When developing a natural exploration activity, these barriers must be considered.

Fear of nature could be another barrier for many students. Powers and Ridge (2019) has a whole chapter on common myths about nature and being outside in any type of weather. The chapter also lists examples of how to keep children safe in each scenario and gives danger signs to watch for in different weather. Being able to relieve parents of their fears about nature could have a profound effect on their children. It could open up avenues that they would not have been able to venture out on previously and could change the trajectory of their outdoor experiences.

Another issue that could arise is each school's outdoor space or their time allowed outside of the classroom. Each school is different and, therefore, their outdoor spaces look very different. Creating a project that could be used by any educator with any amount of outdoor space requires simplifying parts of the project (for example with recommendation of games, the amount of space available to play the game would have to vary) to make it all encompassing, but allowing alterations to be made to any of the aspects. The amount of time students are allowed to spend outdoors also differs from school to school. Worth and Grollman (2009) is a great resource for educators that do not have as much time outdoors and can bring nature into the classroom as an extension of a lesson.This allows students to have a hands-on component, while still meeting the time allotment of the school.

Summary

Nature has many benefits that can positively impact students, but there are many barriers that could take that away from them. Some barriers come from school, others come from the student's home. There will always be barriers in the classroom and in

nature, but if an educator has the resources to navigate those barriers, then real change can occur.

Conclusion

Throughout this chapter, insight was gained on the history of environmental education and how it became what it is today. This set the tone for environmental issues, like climate change, and how to effectively communicate about those issues. Then the chapter examined how science and technology are interdisciplinary and could help to meet other Standards of Learning in subjects other than those two. That led to finding our place in our environment and why that is important, not only for students but adults as well. Finally, some of the barriers that can hold students back from learning about nature were highlighted. All of this information can help with the creation of an outdoor education activity booklet that meets state standards of learning to increase environmental education in the classroom.

The following chapter will go over the project that was created to help classroom teachers feel more comfortable and confident in teaching about the environment. It will give hands-on experiences students will be able to do outside of the classroom and then bring back and connect with what is being taught in the classroom. This will create the intersectionality that I have been discussing because other Standards of Learning can then be achieved other than those in science.

Adapting environmental education is not challenging; what is challenging is the lack of time and pressure to follow curriculum that teachers face. This booklet will hopefully help teachers be more willing to take students outside the classroom and seek out connections to other classroom lessons. This booklet will already be meeting

standards of learning so that teachers will have one less thing to worry about in regards to teaching their students about the environment. Chapter Three will offer information for educators as well as insight on environmental education. Many educators do not fully understand what environmental education is since it is a relatively new discipline and to some it might seem intimidating. The booklet I have created will help alleviate those misconceptions and help teachers feel less intimidated by outdoor education.

CHAPTER THREE

Project Description

Introduction

This chapter will detail the project created to bridge the gap between formal education and environmental education. The research question guiding this project is: *Can providing an outdoor education activity booklet that meets state standards of learning increase environmental education in the classroom?* The project will be a guide educators can use in their classroom that meets standards of learning and helps students to investigate more of their environment.

The chapter will begin with identifying the intended audience for this project and then will include a positionality section on what I bring to this project, through my own experiences, biases, etc. Then I will introduce the setting for the project and who the audience is for it. After that, I will explain why a project like this matters and how it can positively impact educators in both a formal setting and in environmental education. Next, I will explain the curriculum framework I used to develop the project and the timeline that is anticipated for the implementation of the project. Lastly, I will share how I will assess the outcomes from this project and why those outcomes are important and useful.

Project Description

The project I created is a nature booklet educators can use to meet Virginia Standards of Learning in science, physical education, mathematics, music, history and social sciences, and health, while taking their students outside to enjoy the natural environment at their school or at home. For a full list of all of the standards of learning

that were used in the booklet, please refer to Appendix A. The first part of the booklet is for the students to take with them out in a natural setting, which can either happen in the classroom or at home. The booklet has activities they can do as a class or individually, including things like a nature scavenger hunt, coloring, drawing, moving like an animal, etc. The booklet is designed so that the students can start the booklet at school, while meeting standards of learning and meeting curriculum guidelines with their teachers, and then take it home to finish or show their families. After the activities there is a section of additional resources for parents or teachers to go further in depth with more ideas if they would like to. The project is for students in kindergarten through second grade.

Intended Audience

This project is meant for formal educators that teach kindergarten through second grade. It could be used either by private or public school teachers (or homeschooling parents) and meets standards of learning in the state of Virginia. The grade levels are those in which I have the most personal experience. If those students have a solid foundation in environmental knowledge, the students will (hopefully) make more conscious decisions regarding the environment in the future. This could lead to environmental awareness and then environmental action, which could then possibly improve their communities. This creates a cycle of learning if it continues to be used in schools in the future, because then as parents their children will come home with similar knowledge to share about the environment.

Positionality

As a previous environmental educator and elementary teacher, I created this booklet to bridge these two realms. It is important to note these experiences are limited to

my viewpoint as a white, able-bodied female in her early 20s. I acknowledge that my experiences with education would have been different from those of educators with varying demographics. That being said, there were times when I was very aware of my gender or age as an educator. But there were also times when I had to understand my relationship with nature was very different because of my race.

During my graduate studies, one course stuck with me that inspired aspects of this booklet. The course was called Equity and Inclusion in Environmental Education and each week we were required to go to a different kind of outdoor environment and view it from all different perspectives. This experience really opened my eyes to how inaccessible certain playgrounds are due to a lack of wheelchair accessibility or blind/deaf accessibility. I also went to an outdoor outfitter with this outlook and tallied up how much it would cost to go camping and I was outraged with how expensive it was. Also, there was no bus stop near this outfitting and the roads were not safe for biking, so someone would not be able to go without their own transportation. Seeing all of this first hand made me want to consider all of those barriers when creating this activity booklet. I did not want any student to miss out on nature. That is why I am including activities that any child could do, regardless of money, ability, access, etc.

Working as an environmental educator opened my eyes to many of the barriers people of color or low-income people face with their relationship to nature. In a lot of ways, being environmentally conscious and literate is a privilege that some do not have. In creating this booklet, I wanted to create a resource that helped to shorten the gap between equitable and inclusive resources in environmental education. This is simply a booklet that anyone could use, that has cultural considerations and other considerations

that would help others understand nature, building on their own experiences. I believe that nature should be accessible to all, which is why I made something that could show how that would look.

Summary

Based on my own previous experiences, both personal and professional, my intended audience was set broadly to be inclusive of children, regardless of gender, culture, religion, etc. All children should be able to experience nature and create their own connections to it, that should not be something that only children with extensive privileges can experience. Acknowledging my own background and privileges, as well as how those experiences have shaped my relationship with nature, is crucial in creating an equitable environmental booklet to share with children in Virginia.

Setting

Since I am currently living in Virginia, I felt that it was fitting that I create this project for Virginia educators. That means that it includes information about the state's geography, regions, landforms, etc to help educators and students understand more about their state. Not growing up in Virginia, I had to do a lot of research on my own upon arriving to understand the natural settings in the state. This booklet will help students explore places, such as the Chesapeake Bay, Shenandoah National Park, Blue Ridge Mountains, and Appalachian Plateau, even if they have never visited those regions. This is important because students are not always able to see other parts of their states and the environment that they live in is all they experience. Opening students' eyes to other natural environments that are different from those they are familiar with will help them be more aware of their surroundings and their place in the environment. Helping students

connect with nature is something that I hope to accomplish through the use of this booklet.

Rationale

While researching this topic and how to create this project, many of the books and other resources I read just had resources for teachers. While this is helpful, teachers already have enough on their plates, and figuring out how to incorporate environmental education into their curriculum should not have to be one. Powers and Ridge (2019) provide a book on nature-based learning for children and consider things like cultures, budgets, and previous experience, which inspired me with creating this project. One part from this book I really enjoyed was that there were different levels for each lesson, meaning each lesson could be taken farther if one wanted to or had the resources to, but one wouldn't have to. The only issue with that, though, is it leaves educators, or parents, who can not do more, feeling guilty. That is why I wanted to create this resource that leveled the playing field so to say and put everyone on the same level (even if they are not in reality). which will alleviate any guilt and allow all children to have the same background in nature-based education. This is something that I believe in strongly because as an educator I always want to do more, but do not always have the financial resources to do that.

Frameworks Used

For this project, I am focusing a lot on Place-Based Learning in the environment. This is a concept I have been learning about since beginning my graduate studies, and using it for my project seemed fitting. I think that students should know about where they are living, not just the town name and where the closest grocery store is, but where their

water comes from, and understand the route it has to take to get to their home. Vander Ark (2020) defines Place-Based Learning (PBL) as "anytime, anywhere learning that leverages the power of place to personalize learning" (p. 2). When we learn about where we are from or where we are living, it becomes personal. It is our own individual learning that even if it is taught exactly the same, each student will learn differently based on their own experiences. This is the unique thing about teaching about the environment, it is different for each person. Math will always be the same for every student, and many sciences will also be universal, but not environmental science. Each experience helps to shape how one learns as an individual and that is why placed-based education is so unique and important.

Implementation

This booklet is ready to use as of Spring 2022. Implementing into schools becomes a matter of personal preference. I will pass the resource along to as many educators as I can, but also having it accessible to Virginia educators online is a way to broaden the reach of this resource. I have it as a shareable Google document, so if one teacher would like to share it with another, they would just have to send the link to them.

Assessment

A short survey will be available at the end of the booklet for anyone who used it to go and answer a few multiple choice questions. The survey will be free to take and will send me the results electronically afterward. Having this short survey will allow the educators to reflect on the learning that has taken place and will be helpful for me in the future in developing other resources. The survey will also help me see how many students are using this resource and how well it worked.

Conclusion

Throughout this chapter, insight has been incorporated into the project that is being developed for educators and students in Virginia. This booklet will be for students in grades kindergarten through second grade and will be meeting certain standards of learning for those grade levels in Virginia. I reflected on my own experiences and how they shaped my relationship with nature and the potential biases I have due to my race, gender, etc. After acknowledging the privileges I had growing up, I moved on to speak about where the booklet is going to educate about. I explained the major regions, landscapes, and geography of Virginia will be explored in this booklet, allowing students to learn more about the state they are living in, even if they have never visited other sections of it. This led to an explanation of place-based learning and its importance in environmental education and this booklet. Finally, the booklet is accessible online as of Spring of 2022 to educators and will have a short survey at the end to assess the impact of the booklet in classrooms throughout the state of Virginia. This assessment will help with the development of future resources.

The following chapter will provide a conclusion to the project. It will be a reflection on the creation and implementation of the booklet and any learning that came from the process. I will identify the implications of the project and certain limitations it has. I will also share how the results from using the booklet will benefit the environmental education community and formal educators in Virginia.

CHAPTER FOUR

Reflection and Conclusion

Introduction

For my capstone project, I wanted to create an outdoor booklet that would help to bridge the gap between formal and informal education, because I have a background in both. In order to accomplish that I asked the question: *Can providing an outdoor education activity booklet that meets state standards of learning increase environmental education in the classroom?* This booklet is meant for students in grades kindergarten to second grade to be used at school or at home, to explore their environment while meeting Virginia standards of learning. In completing this project I hope that this question can be answered, and the gap can be filled, or at least shortened, between formal and informal education.

In the following chapter, I will be exploring the major learning outcomes that I had from completing this project. I will also revisit my literature review and define which resources were most important to the creation of this project. I will also touch on any implications of the project moving forward, and limitations of creating such a project. Afterward, I will suggest future research that could be done that would complement or go with this project. Finally, I will discuss how I will communicate the results of this project and what benefits it has to the profession of environmental education, as well as for formal education.

Major Learnings

I am someone who is always striving to learn new things, which is one of the reasons I decided to go back to school to get my master's degree. Throughout this

process, I have learned so much not only about my project content, but also about myself as a learner. I have gained insight that I will take with me throughout my career and my life.

One major learning that I gained throughout this process was how many barriers there are for students to get outside and into their environments. This led me to gain a better understanding of my childhood and the privileges I had. Going out into my community to do research for my project helped open my eyes to things that could be changed to make them more accessible on a local scale, such as making sure parks have a ramp and activities to do on a ground level. When I visited a few parks and other places, they would say they were accessible and would have a ramp, but then would not have anything to do once you got up the ramp. After this process, my eyes will forever be open to this kind of injustice. In the future, I hope I can do more with my privilege and voice to make nature more accessible to all.

Literature Review

In reviewing the sources that were used in my second chapter, there is one source, in particular, that was crucial in the creation of my own activity booklet. Powers and Ridge (2019) created a book that I used in one of my courses here at Hamline University, but it helped to guide me in the creation of my booklet. In their book, Power and Ridge have different levels that educators can use for each activity beginning with dipping your toe in, wading in, and diving in. In each of those levels, there are ways the activities could be expanded to help the learner understand further. This was part of why I wanted to create a section for both educators and parents so they could have the choice of how

far they wanted to take the activity. I also wanted to make sure that any additional

resources would be equitable, therefore not requiring the purchase of anything further.

I really wanted to make sure this booklet could be used by any student regardless

of their finances or other barriers that often keep them from enjoying nature. This is also

something that Powers and Ridge (2019) included that I liked. At the end of each chapter

they would include a cultural considerations section to touch on areas that may be

culturally insensitive or give the reader other things to think about that they may have

overlooked. When creating my booklet I tried to take all of these cultural considerations

into consideration to make it as inclusive as possible. I do acknowledge that I am human

and there still could be things I overlooked, but I truly did try my hardest to make sure

the booklet was as equitable as possible.

One of the sources I was better able to connect with through the creation of this

booklet was Carson (2017). I read this book for another class but once I dove into the

creation of this booklet I realized that it would be beneficial to use as a source. Now that I

have completed the project I have since gone back to this book and have realized I can

take so much more from it. Throughout the book, Carson (2017) speaks of sharing nature

with her nephew through simple things such as seeing the growth in young trees. I feel

like I can now connect with that more than ever because I have created something that

students will be able to enjoy and share that joy for nature with either this teacher or

parents/guardians.

Implications

I feel that in creating this outdoor education booklet, environmental education can

be increased both in and out of the classroom. If teachers are able to use this booklet as a

way to meet standards of learning in Virginia, as well as increase their students' exposure to their current environment, then this booklet (in my eyes) has succeeded. This booklet can also be used as a type of stepping stone to increase environmental literacy. Students can use this booklet to get a basic knowledge of where they are living, and from there they could go many different ways with it.

One way that students can go further with the booklet is to create a service project for the environment. This could be done in a number of ways, either through a community recycling program or a wetland clean-up. It could get the students involved in their communities to gain a better understanding of the environment they are living in. This would also benefit their environment and their community and help students feel a sense of stewardship towards the environment.

Limitations

One of the biggest limitations to this project is getting the project into school systems and making it accessible. One of the best ways to do this is through word of mouth, but that is not as effective as I had initially hoped. Keeping the project in Google docs and giving out the URL is one way to make it accessible, but there are still other limitations to getting it out to the public. The biggest issue is that school systems do not always have the ability or approval to use a booklet like this that is not from a more credible source. Another is that educators do not always feel comfortable or confident going outdoors to do activities based on where their school is located, which is understandable. Schools often do not have the resources to take their students to other outdoor settings, either. In realizing all of this, I now know just how many limitations there still are to my project, even though my hope was to make it as accessible as

possible. Understanding that there will always still be barriers to overcome has been a learning experience for me throughout this project.

Future Research and Projects

After completing this project, I began thinking about what comes next. My immediate idea was that another booklet should be created for other grade levels. But I think it is more than just that. This booklet was a broad introduction to the five regions of Virginia and ways that nature could be enjoyed. I think if there was going to be a future project or research, it should be into each individual region of Virginia and be for older students. Having a foundation with this current booklet, a booklet that could be created after this one would help to build on the foundation that has already been laid for students in Virginia. I also would like to explore major natural areas in each region that students could learn more about through the use of the booklet, even if they will never visit them. This will help students understand more about the state they are living in and what makes it special.

Communicating Results

For this project, I decided that a passive survey would be the best way to get results from participants. I created a short questionnaire and included the link to it at the end of the booklet so that those who use the booklet can visit their survey on their own if they wish to. The results then get emailed to me and I will be able to know when the booklet has been used and how it worked for the educator or parent that used it. This was the most feasible way for me to have results because this way it is all in the hands of those who use the booklet.

Benefits to the Profession

This booklet is one that can benefit not only environmental education but also classroom education as well. It is a way for teachers to reach curriculum standards, while also getting their students outside to enjoy nature. This can lead to a connection to nature that could go much farther than classroom instruction alone could. Students will be able to better understand the region of Virginia they are living in and begin to comprehend all of the simple activities that can be done outside the classroom that are still fun and meet standards of learning.

The booklet is also a benefit to environmental education because it will get students to experience nature on their own. Once they have done that their educators or parents could take them to more natural areas or centers to gain more knowledge about their environment. The booklet also gives students the opportunity to find out which aspects of nature they enjoy the most, which could lead them to find the things they are interested in or passionate about. This was true for me and my experience in nature and I hope that by creating this booklet other students will be able to find what they are passionate about.

Conclusion

Throughout this chapter, I have reflected on the process of my creating my capstone project through several different categories. I first explored my major learnings throughout the process and then went on to revisit my literature review and the sources that were important to my project and connected with me as a learner. I then spoke about the implication and limitations of my project and discussed future research or projects

that could be done after this one. Finally, I was then able to communicate the results of my booklet and the benefits it has to the profession of both environmental education and formal education.

This paper and the capstone project to go with it aimed to answer the question: *Can providing an outdoor education activity booklet that meets state standards of learning increase environmental education in the classroom?* In developing the activity booklet I sought to spark a connection between students and their environment. I wanted students to be able to explore the region that they live in, as well as understand more about the other regions of Virginia, even if they have never visited them before. I feel that in completing this paper and project I was able to find the in-between formal and informal education and help students have a more equitable experience in nature. It is my hope that students will use this booklet and seek out more information about where they live and what else lives in their environment. I look forward to finding out more from the results of the project and hope to use this information to guide my learning beyond Hamline University.

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APPENDIX A.

Virginia Standards of Learning Met in the Project

Science:

K.1.   The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

      c)   a set of objects is sequenced according to size;

      d)   a set of objects is separated into two groups based on a single physical characteristic;

      g)   a question is developed and predictions are made from one or more observations;

      h)   observations are recorded

K.2.   The student will investigate and understand that humans have senses that allow them to seek, find, take in, and react or respond to information in order to learn about their surroundings. Key concepts include

      a)   the five senses and corresponding sensing organs; and

      b)   sensory descriptors used to describe common objects and phenomena

K.4.   The student will investigate and understand that the position, motion, and physical properties of an object can be described. Key concepts include

      a)   colors of objects;

      b)   shapes and forms of objects;

      c)   textures and feel of objects;

      d)   relative sizes and weights of objects

K.5.   The student will investigate and understand that water flows and has properties that can be observed and tested. Key concepts include

      b)   water flows downhill; and

      c)   some materials float in water, while others sink

K.8.   The student will investigate and understand that shadows occur when light is blocked by an object. Key concepts include

      a)   shadows occur in nature when sunlight is blocked by an object

1.4.   The student will investigate and understand that plants have basic life needs and functional parts and can be classified according to certain characteristics. Key concepts include

      a)   plants need nutrients, air, water, light, and a place to grow

1.5.   The student will investigate and understand that animals, including humans, have basic needs and certain distinguishing characteristics. Key concepts include

      a)   basic needs include adequate air, food, water, shelter, and space (habitat)

1.8.   The student will investigate and understand that natural resources are limited. Key concepts include

      b)   factors that affect air and water quality; and

      c)   recycling, reusing, and reducing consumption of natural resources

2.8.   The student will investigate and understand that plants produce oxygen and food, are a source of useful products, and provide benefits in nature. Key concepts include

      c)   plants provide oxygen, homes, and food for many animals; and

      d)   plants can help reduce erosion

Physical Education:

K.1   The student will demonstrate progress toward the mature form of selected locomotor, non- locomotor, and manipulative skills to understand the various ways the body can move.

      a)   Demonstrate and differentiate between walking, running, hopping, galloping, and jumping

      i)   Demonstrate fast, slow, and moderate speeds

1.4   The student will demonstrate basic knowledge and skills for safe and cooperative play, individually and with others, without reminders from teacher.

      b)   Demonstrate safety rules for activity

      c)   Demonstrate safe use of space

1.5   The student will identify basic nutrition concepts of energy balance.

      c)   Explain that the body needs water

2.1   The student will demonstrate approaching (at least two critical elements) and mature form (all correct critical elements) of locomotor, non-locomotor, and manipulative skills.

     d)   Demonstrate mature form for hop, jump, leap, skip, run, jog, gallop, and slide

Mathematics:

 K.9   The student will compare two objects or events, using direct comparisons, according to one or more of the following attributes: length (longer, shorter), height (taller, shorter), weight (heavier, lighter), temperature (hotter, colder), volume (more, less), and time (longer, shorter).

K.12   The student will sort and classify objects according to one attribute.

2.12   The student will

     a)   draw a line of symmetry in a figure; and

     b)   identify and create figures with at least one line of symmetry

Music:

2.2   The student will apply a creative process for music.

     a)   Brainstorm ideas for creating music

History and Social Sciences:

K.1   The student will demonstrate skills for historical thinking, geographical analysis, economic decision making, and responsible citizenship by

     e)   comparing and contrasting people, places, or events

1.1   The student will demonstrate skills for historical thinking, geographical analysis, economic decision making, and responsible citizenship by

     e)   comparing and contrasting people, places, or events in Virginia history

1.5   The student will develop map skills by

     d)   locating Washington, D.C., the capital of the United States, and Richmond, the capital of Virginia, on a United States map

1.6   The student will develop a geographic understanding that

     a)   the location of Virginia determines its climate and results in four distinct seasons

       b)   the landforms of Virginia affect the places people live

Health:

1.1   The student will identify the basic components and functions of human body systems and the importance of safe practices, positive interpersonal relationships, and environmental health.

       d)   Recognize that physical activity is a form of healthy entertainment

1.2   The student will explain that good health is related to healthy decisions.

       d)   Identify ways to increase physical activity