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Implementing Outdoor Education Curriculum: The Benefits Of, Barriers To, And Materials Required For Successful Outdoor Education

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IMPLEMENTING OUTDOOR EDUCATION CURRICULUM: THE BENEFITS OF, BARRIERS TO, AND MATERIALS REQUIRED FOR SUCCESSFUL OUTDOOR EDUCATION

by

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Introduction

With increasing pressure to meet high-stakes testing goals and demonstrate measurable student growth, schools are increasingly pressuring teachers to accomplish more within their classrooms with the same or less time available. As this trend continues, curriculum deemed "unnecessary" is left by the wayside to make room for topics that are perceived as more important. In my six years of teaching fifth and sixth grade at Pine River-Backus Elementary, I have observed that opportunities for students to explore the outside world freely or in a structured activity are the first things to go as they are seen as more of an enrichment activity or too time-consuming. This is unfortunate as many standards, especially in science, offer opportunities to take students outdoors to study their own world in a more authentic, meaningful way. Pine River-Backus Elementary even has a nearly 20-acre school forest on-site that can be used as a resource, yet rarely is.

As things currently stand, I only know of one other teacher in my current school that actively uses our school forest for educational purposes. This is a shame as we have hundreds of students across kindergarten through twelfth grade that do not have access to anything like this location in their own personal lives. Teachers do not seem to have a problem with walking students out to the playground to exercise for a few minutes at the end of the day but seem to have a lot of excuses for why they never take the kids a bit farther into the forest itself and do something educational instead. The excuses range

from fear of losing students, concern about potential injuries, lack of knowledge about the outdoors, and worries that there will not be enough time to complete other required materials.

The entire situation has left me in a position of confusion. Many teachers express their support and desire to see students learn about their surroundings and have fun in school, yet they avoid the situations where this could happen for a number of reasons. It has become even more apparent now, due to the COVID-19 restrictions placed upon us, that teachers are unwilling to use outdoor resources and activities. Kids are essentially locked within classrooms all day and teachers are still not taking them outside to spread out, learn, play, and enjoy the world in a space where masks are not required and movement is allowed. This has left me wondering one thing: *How can outdoor education be used successfully to improve the success and well-being of children?* Chapter 1 will examine my own positive experiences with the outdoors, why I chose to teach science, and how my experiences with teaching science and working with other teachers led to my own appreciation of outdoor education. Finally, this chapter will examine why I want to share my own knowledge of outdoor education with others so that they can provide this opportunity for even more students.

My History With Outdoor Education

I was born and raised in the Brainerd lakes area. As soon as I was old enough to get around on my own, I began exploring the world around my house. It was heavily wooded and changed on a monthly basis as new plants grew up and old plants and trees fell and died away. I would spend every day, sun up to sun down, outside exploring and

learning about the world. As I grew older I began to explore outward from the safety of my backyard and into new areas. This resulted in me finding joy in ponds, rivers, swamps, and lakes as well. All of my adventures led to an appreciation for the natural world around me and a desire to maintain those areas so that I could enjoy them for the rest of my life and share them with the people closest to me.

When I entered an education program and had to pick out a specialty, biology was a natural fit. I had a great deal of experience with the outdoors and was familiar with many basic concepts related to both biology as a whole and specifically ecology from my time spent studying and exploring nature as a child. I also wanted to show students who may not have grown up with all the same experiences as I did how much fun it could be to get outside. As soon as I began to dig into the material I was reminded of specific projects from my own childhood science classes that I wanted to be able to recreate for my students. I quickly realized that many of the things I remembered were either cool experiments that my teachers let us do or they were some sort of field trip that had to do with what we were learning. This realization inspired me to create as many authentic learning experiences as I could for my students so that they would remember more of the values and ideas that I was trying to instill within them.

Shortly after graduating college, I was hired at my current school district. I learned immediately that they had a school forest available on-site for students and teachers to use. I was excited to find out how other teachers were using the forest and develop lesson plans that would get the kids outside and doing the authentic activities that I remembered fondly. After beginning my career at the school and speaking to others, I

quickly realized that very few people ventured into the school forest. There were conversations about bears patrolling the trails, countless standards to be met, student health concerns to manage, and large class sizes to think about. My excitement about using the forest was dashed almost as quickly as it had been ignited. I fell into a rut similar to the other teachers in the school and found excuses to stay inside, avoiding the use of the forest.

The second thing I learned rather quickly was that science was an afterthought until students made their way to me in fifth grade. I can not say that I remember doing much science myself in elementary school, but I was still surprised at how little was taught to younger students. It seemed only natural to me that kids would be curious about the world around them and want to ask questions that could be answered together with peers and teachers in class. It was easy for me to envision combining a science lesson with some mathematical data collection and a writing assignment about the findings. I discovered, however, that these things were not happening. The driving force behind the lack of science in my school seemed to be that science was not a skill students were tested on until fifth grade, therefore it was not a priority. This coincides with research conducted by Powers (2004) which found that schools felt pressure to ignore science and social studies in favor of content that was tested more frequently at the state level. Instead, the time that could be spent on science was used for additional math and reading curriculum. This is supported by widespread research done by Banilower et al. (2013), which showed that time available to teach science was a problem cited by teachers in 27 percent of elementary schools, versus only 10 percent of high school settings. I initially

questioned a few people about why science topics were not used to meet these ends, but I was rebuffed and did not feel comfortable pursuing the question further as a new teacher.

After about a year of working at the school, I began to participate in peer learning community meetings with the other science teachers in the district. At these meetings, I was able to meet with another teacher who was using the school forest regularly and teaching her students to be good stewards and manage the forest so that it lasted for future generations. Upon seeing what she was able to do with her kids and how passionate they became about their learning, I started to voyage out into the forest more with my own classes, creating basic activities that I felt students would enjoy. Unfortunately, I still lacked the confidence required to really make a lasting impact with my activities and take the next step towards engaging students and fostering a sense of responsibility about their own local environment.

I decided to return to school for a graduate degree and settled on environmental education, as I wanted to improve my science-specific knowledge in addition to general teaching strategies. I immediately found value in the program and its environmental education focus. It provided me with a wealth of new ideas for getting students outside and forced me to begin researching the actual benefits of outdoor education. I discovered that the barriers I was seeing at my school were shared by many educators across the country and world. I also found that there were many benefits to outdoor education beyond being memorable for students.

As I progressed through the courses, my desire to take my students outside for more than a “brain break” increased, to the point that I have begun to plan hour-long

lessons for my 5th graders outside, sometimes several days in a row or multiple days over the course of a few weeks. I have seen the happiness that being outdoors brings to my students and it only increases my desire to repeat the moments. I have also experienced firsthand how much more engaged students are in content when we are looking at authentic examples versus a verbal explanation from within a classroom. The work I have been doing recently has led to increased levels of participation and excitement in my classroom to the point that I am hearing from parents on a daily or weekly basis about how much students are enjoying our activities.

The challenge for me has now become translating my own success into something that I can pass along to other teachers within my school and beyond. Having students come to me with very little scientific knowledge or experience makes the course more challenging to teach from the get-go than it needs to be and leaves students with insecurities about exploring the answers to their own questions. It takes a great deal of time for me to reassure students that they do not need to be told the answer or be correct immediately, as long as they are working hard to find an answer that makes sense. Getting teachers on board with using more science and outdoor education activities in the early grade levels has been a goal of mine for a long time, but it seems more achievable right now than ever before.

The biggest advantage that I feel I have working in my favor right now toward the goal of seeing outdoor education and science used in elementary school has to do with the impact COVIDCOVID-19 has had on my school and many others. With our children currently stuck in a desk within a single classroom for nearly the entire school day,

teachers are looking for ways to get kids exercise and stimulation. Outdoor education, especially environmental education, offers the perfect opportunity to take kids on a trip outdoors for much-needed movement and exploration. The time seems perfect for the creation and introduction of some new environmental education curriculum to get teachers who are not comfortable with the outdoors up and moving with their kids. The curriculum would give kids a chance to burn off some energy while also learning to respect and appreciate the natural community around them. Teachers would have a chance to get some fresh air with the kids, build relationships, and see the effects of outdoor education for themselves. Finally, parents would hopefully see the excitement that the new curriculum has inspired in their children, as many of the parents of my current students have reported. All of my experiences and realizations have led me to the same question at this moment in my life: *How can outdoor education be used successfully to improve the success and well-being of children?*

Conclusion

Outdoor environmental education is something that I had available to me from an early age. However, many of my students do not have access to that same opportunity at their own home. My school, having a large school forest on-site, provides a perfect environment for students to gain a greater understanding and appreciation for the environment in an authentic way. Sadly, it is not being used to its fullest potential by my fellow teachers, due in part to several perceived barriers to using the forest. My goal is to provide support for my fellow teachers to allow them to use the available outdoor environmental resources more effectively. To this end, I will be reviewing research on a

number of topics in the next chapter including the benefits of outdoor environmental education, methods for using an outdoor space effectively to educate children, and common perceived and real barriers to using outdoor spaces to educate students. The goal of my research is to be able to create an effective, outdoor environmental education curriculum to be utilized in lower grade levels to jump-start my students' environmental education and passion for the outdoors while also increasing my co-workers' level of comfort with both outdoor and environmental education topics. Chapter two will be a comprehensive review of literature supporting the use of outdoor education and an exploration of its benefits, a look at what research has found to be the biggest barriers to use of outdoor settings in education, and a review of literature that suggests the best ways to use a variety of outdoor locations to teach effectively. Chapter three will provide an overview of the curriculum design model that I will be making use of, as well as a review of the curriculum topic and the intended audience for the curriculum. Chapter four will conclude with a review of my capstone experience and a reflection on the learning that I have done through this process.

CHAPTER TWO

Literature Review

Overview

Years ago, children passed the time by venturing outdoors to explore the world around them. They were curious about their surroundings and wanted to know what everything did and how everything worked. As time has passed and technology has become more prevalent, children have increasingly been found occupying time indoors exploring virtual worlds instead of exploring the natural world around their home (Cohen, n.d.). In fact, research has found that kids today spend four to seven minutes of time outside playing versus seven hours indoors with screens per day (Cohen, n.d.). As children become more consumed with electronics at home, it makes little sense to spend even more time on devices at school when the outdoors could be incorporated into the classroom to provide them with new experiences that will be more memorable than time in front of a screen (Fagerstam & Blom, 2012). This project will focus on creating a curriculum for fourth-grade children that encourages the use of outdoor educational activities to meet the requirements for specific fourth-grade science standards in the state of Minnesota. To create a curriculum that meets the needs of both learners and educators, we must first understand the research question: *How can outdoor education be used successfully to improve the success and well-being of children?*

In this literature review, several factors are examined to construct a response to the research question. We begin by examining the benefits of outdoor education for

learners. Creating a knowledge base for teachers about why going outdoors is beneficial is critical in convincing them to use the designed curriculum. Next, we look at barriers that educators may face or perceive when asked to go outdoors. Facing these barriers and finding ways through or around them will be necessary to ensure that educators can implement the curriculum in their settings. Finally, we look at what kind of resources educators need to effectively educate students outdoors. Without the proper settings or materials, the curriculum will be difficult or impossible to carry out. This literature review begins in the next section with an analysis of benefits for students who learn outdoors.

Benefits to Outdoor Education

Outdoor education has been an informal part of the lives of many people. We have grown up playing outside, working outside, and exploring the natural world in general to understand more about our surroundings. While the benefits of our outdoor education experiences may not be immediately apparent, Cohen (n.d.) suggested that outdoor experiences can lead to students who are, "smarter, happier, more attentive, and less anxious than kids who spend more time indoors" (para. 7). While knowledge of these improvements may convince some educators to use more outdoor education to shape their students, it is important to dig into the research to really understand what kind of specific value outdoor experiences can have for each student. This section of the literature review provides a review of commonly cited benefits of outdoor education and examines the research that supports the stated benefits in children.

Improved Attention and Memory

The end goal of education is to provide students with knowledge and skills that they can take with them into the adult portion of their lives. Fagerstam and Blom (2012) compared the knowledge retention of groups of students who learned indoors to groups of students who learned outdoors. Six months after learning took place, the researchers tested the students to see what they remembered about the learning experiences. While they found that on average, both seventh and eighth graders had low scores for level of understanding of specific content, the outdoor groups did use specific terminology more frequently in their responses. The students with outdoor experiences were also more likely to cite specific examples of work completed in the course, whereas indoor learning students were more likely to cite generic examples of work such as doing worksheets or reading from books. While the work of Fagerstam and Blom (2012) did not demonstrate a greater understanding of general topics in science, it did show that specific facts, vocabulary words, and experiences were remembered over a longer period of time.

Berman et al. (2008) took a different approach to testing the effectiveness of nature exposure on memory. By conducting prolonged and intense memory trials on participants interrupted by long walks in urban or green environments, the researchers sought to discover whether the outdoor setting itself would impact memory. They found that walking through a green environment was significantly more effective for improving number recall success than walking through the urban environment, suggesting that being outdoors alone was not as impactful as being outdoors in nature. Following their first test, Berman et al. (2008) used photographs of green settings and urban settings in place of a

walk between digit recall tasks. They once again found that merely seeing photographs of nature improved memory recall scores compared to urban photograph trials. In their words, "Taken together, these experiments demonstrate the restorative value of nature as a vehicle to improve cognitive functioning" (Berman et al, 2008, p. 1211). While knowledge retention is improved by incorporating the outdoors, fostering a sense of connection to something could be even more important for students in the long run.

Connection to Nature and Community

Cohen (n.d.) has previously pointed out that children are only spending four to seven minutes of time outdoors per day, as compared to as much as seven hours per day inside in front of screens. He suggested that more outdoor exposure could lead to a greater desire to care for and preserve nature by connecting with it directly in ways that many children do not do currently. Stern et al. (2008) studied whether outdoor exposure to nature-based programs actually had a lasting effect on the attitudes and behaviors of children with regards to environmental care. By completing a follow-up survey three months after a nature program, Stern et al. (2008) found that many of the student participants actually improved their environmental stewardship behaviors and retained their knowledge of biological diversity. They noted that student interest in learning and discovery, as well as perceived connection with nature, faded over time. Waite and Goodenough (2018) also found that students reported tremendous enjoyment of their time spent outdoors and connected caring for the outdoors with being able to continue utilizing the resource they were enjoying.

Other researchers have found that outdoor learning experiences had less effect than expected on student connectedness to nature. Ernst and Theimer (2011) found that of seven groups of students exposed to a variety of outdoor education activities, only two demonstrated significant improvements to connectedness to nature. They noted that scores for most groups were high to begin with, which may indicate that their measurement instruments were not sensitive enough to detect meaningful improvements. Ernst and Theimer (2011) stated that, "one implication tentatively suggested by this study and fully supported by the research literature is time" (para. 45). They found that the frequency and length of activities did in fact correlate well with retention of improvements. This was also noted by Stern et al. (2008), as their participants showed more retention over time of connectedness to nature when participating in a five-day program versus a three-day program. Mygind (2009) conducted a longitudinal study that found students were slightly less likely to look forward to going outside as they aged, though they did still report excitement leading up to the events. In addition, Ernst and Theimer (2011) found that age of participants was a potential factor in the results they acquired. They suggested that attitudes of students in eighth grade and beyond are well-formed about nature, with experiences prior to 11 years of age being ideal to best foster a connectedness and appreciation for the natural world.

Positive Social and Emotional Impact

Many teachers today will be quick to tell you that students now more than ever are lacking in independence and struggle with a range of emotions, including anger and depression. It appears that time spent in natural outdoor settings, as opposed to urban

settings or indoor settings, may actually lead to a reduction of stress and an increase in confidence (Cohen, n.d.). By reviewing numerous studies, Bowler et al. (2010) found that emotions were a factor commonly measured by researchers when exposing test subjects to both synthetic and natural environments. By combing through the research, Bowler and colleagues determined that research subjects exposed to natural settings frequently reported improvements in a number of emotional categories, especially anger, fatigue, and sadness or depression. In addition, Pretty et al. (2009) suggested that, "Simple interventions such as a walk in the park at lunchtime or walking or cycling to work are likely to be effective in reducing stress and improving mental health" (p. 24).

Outdoor exposure can also impact positive feelings and emotions. Waite and Goodenough (2018) found that students self-reported a sense of increased confidence and pride when successfully completing outdoor tasks and activities. They found that students were excited to demonstrate what they had learned to peers and adults alike, taking pride in newly-acquired skills. The students in this study also frequently reported making new friends and connections that they would not have otherwise done. The researchers also observed a greater tolerance for students perceived as different from other children. Mygind (2009) also found that students frequently reported playing with new children when taken to a school forest. He found that over two-thirds of his study participants felt they were making new friends regularly outdoors, suggesting that positive social networks were being developed. Interviews done by Fagerstam and Blom (2013) also found that high school students reported feeling more engaged and excited when taken

outdoors to learn, citing that they were therefore much more likely to engage in what was being done.

Reduced ADHD Symptoms

Attention-deficit/hyperactivity disorder (ADHD) is something that teachers encounter in nearly every classroom they walk into today. Kuo and Taylor (2004) cited ADHD as the most common neurobehavioral disorder found in children. The Centers for Disease Control and Prevention (2020) described ADHD as repeated or severe instances of troublesome behaviors including squirming and fidgeting, forgetfulness, talking too much or at inappropriate times, risk-taking, difficulties with impulse control, and difficulty getting along with others. These behaviors can make it hard for students to be successful in a classroom setting. Kuo and Taylor (2004) reviewed literature suggesting that time spent in nature can relieve symptoms of attention fatigue, which is very similar to ADHD in symptoms. They created a questionnaire that parents answered about their children's ADHD symptoms following exposure to natural settings and found that parents reported significant decreases in ADHD symptoms in their children after exposure to natural settings and activities, as opposed to activities conducted indoors. Guardino et al. (2019) reported that children with disabilities exhibited significantly fewer distracting or off-task behaviors when being taught outside compared to similar activities conducted indoors. Children and Adults with Attention-Deficit/Hyperactivity Disorder (2020), known as CHADD, also discussed the benefits of nature exposure to the general public and ADHD symptomatic children alike. They share that time spent in nature is restorative

to the body as well as the brain, potentially improving attention and lessening the difficulties of some ADHD symptoms.

Physical Health

Sanyaolu et al. (2019) identified obesity as a surging health issue facing North America, with as many as 17% of children currently qualifying as obese. One recommended method of prevention listed by Sanyaolu et al. (2019) is an adequate exercise regime. Mygind (2007) tracked physical activity levels of students in a number of scenarios, including a normal school day, a normal school day with one and a half hours of physical education built in, and a school day taking place entirely in an outdoor setting, to determine whether time spent outdoors would increase physical activity levels in children. What he found was that students spending the day outdoors were more than twice as active in both summer and winter months compared to a traditional day in a school building. Total activity levels between a day with physical education and an outdoor program did not differ, but it is important to note that the physical education class was quite long and intense, suggesting that the levels of activity students were receiving outdoors were quite significant. In a later study, Mygind (2009) found that students self-reported feeling more active when learning outdoors as opposed to learning in a traditional classroom. Pretty et al. (2009) also found evidence suggesting that physical activity in green, natural spaces had positive health benefits for children. Pretty et al. (2009) made the claim that, “if children are encouraged and enabled to undertake more green exercise, then they are more likely to have active exposure to nature embedded in their lifestyles as adults and will reap the associated health benefits” (p. 10). This claim is

also supported by Ernst and Theimer (2011), who noted that more frequent exposure to the outdoors increases feelings of connectedness to nature in children.

It is also important to note the factors that may keep children from seeking out green spaces to play in, and how structured outdoor playtime at school may help relieve these fears. Beyer et al. (2015) conducted a survey study of students that asked them about fears associated with outdoor play. They found that many children were afraid of getting hurt outside, getting lost, or afraid of the strangers that were found in nearby public spaces. By taking some students outdoors for activities while leaving others inside to learn, Beyer et al. (2015) showed that children taken outdoors reported significantly reduced levels of fear about going outdoors to play independently compared to the group left indoors. The children taken outdoors also responded that they were going outside more frequently on their own after being taken outdoors for structured time.

Summary

Outdoor education has a number of academic benefits for children. Students taken outside are more likely to remember facts both during outdoor activities and immediately following outdoor activities. Students also report being more engaged and interested while being taught outdoors. In addition, students with ADHD symptoms have been reported to see reductions in symptom severity immediately after being exposed to natural settings. Combined, these factors would suggest that more frequent attempts to utilize outdoor settings for education would benefit a wide range of students academically.

Outdoor education also has impacts on students beyond the classroom. Students taken outdoors frequently were more likely to establish connections with nature and their own community, creating better stewardship habits. Younger children were especially likely to show positive stewardship growth. Children taken outdoors frequently also demonstrated reductions in negative emotions and growth in self-confidence. In addition, many students reported making new friends while participating in outdoor activities. Finally, structured outdoor activities during school days also promoted greater physical activity in students, both during school hours and outside of school. These increased physical activity levels can lead to a number of long-term, positive health effects in the face of rising obesity rates in the United States.

As examined in this section, outdoor education has a number of clear, positive effects. I intend to use this knowledge to create a curriculum to incorporate more time outdoors for children. Research supports the idea that taking children outdoors to green spaces will improve their quality of life. So why do teachers frequently fail to do so? The problem lies with barriers to outdoor education, both real and perceived, that teachers encounter. The next section will investigate which barriers teachers most frequently encounter when considering the use of outdoor education.

Barriers to Outdoor Education

Outdoor education comes with its share of challenges, both perceived and real. These challenges are viewed as barriers to using outdoor education effectively by teachers. It is important to be aware that outdoor education is frequently grouped together with environmental education and science, resulting in much of the literature focusing

specifically on the challenges of performing environmental education outdoors. Knapp (2020) discussed how many schools renamed their outdoor programs as environmental education in the 1970's, rather than creating entire new programs. This resulted in outdoor education becoming part of many science curriculums instead of being used for multiple subjects, as it was originally intended. Knowing this, it is troubling to see research that teachers in grades kindergarten through third are reporting teaching science every day only 20% of the time, with 35% of fourth through sixth-grade teachers reporting they teach science daily (Banilower et al, 2013). This is in comparison to math, where kindergarten through third-grade teachers reported teaching the subject daily 99% of the time, while 98% of fourth through sixth-grade teachers say they teach math daily (Banilower et al, 2013). What is keeping teachers from teaching science, and by extension, utilizing outdoor education in their classrooms? Ernst (2014) stated that the most significant predictor to use of outdoor settings in education is the teachers' perception of the difficulty of accessing or using the outdoor setting. Teachers report barriers to science and outdoor education that traditionally fall into three categories: a lack of time, a lack of funding, or concern about safety hazards (Ernst, 2014). Understanding these barriers and the reasons behind them is necessary to make outdoor education more accessible to teachers everywhere.

Not Enough Time

Ask any teacher what they need one week before state testing and they will likely all reply with the same answer: more time to teach their kids. Educating students effectively requires time, planning, and a great deal of work on the part of the teacher.

With so many standards to address, the emphasis on state testing, and a general lack of preparation time, teachers often fail to incorporate outdoor education into their curriculum because it is seen as unnecessary (McKeown-Ice, 2000).

The top reasons for avoiding outdoor education cited overwhelmingly by teachers polled was that course time was limited and going outdoors conflicted with mandated course content (McKeown-Ice, 2000). A quick look through the Minnesota Department of Education (2020) State Science Standards website shows conflicting information: there are a number of standards, specifically in science, that could be addressed effectively outdoors and therefore should be considered mandated course content. Looking further into this issue, Powers (2004) found that most schools, especially elementary schools, are focused on literacy and math, while science and social studies are far down the list of priorities. Reese (2018) was told by multiple principals in his research group that the focus of their school was reading, writing, and mathematics, with one going so far as to suggest that the school day is planned down to how many minutes each topic should be taught. This tight focus on math, reading, and writing standards during the day explains why teachers have such little time to teach science or go outdoors for lessons, but does not account for why science is ignored while it also has state-mandated standards that need to be met. One principal that Reese (2018) spoke with suggested that science gets left behind because of the adoption across multiple states of common core academic standards, a set of academic standards requiring minimum proficiencies from students in math, reading, and writing, but not science.

Standardized testing has also played a role in the exclusion of outdoor education from curriculum. The Minnesota Department of Education (2020) website provides a glimpse into where states view science in the educational hierarchy. Math and reading are both assessed statewide in Minnesota on nine occasions before children graduate high school, while science is assessed only three times. With so much emphasis placed on math and reading at such an early age, it is only natural that science will be ignored until it is tested, resulting in fewer opportunities for teachers to spend time on standards traditionally associated with going outside. Ernst (2007) found that an emphasis on state testing was the most detrimental barrier to teaching outdoors for environmental education, even among teachers reporting that their curriculum was environmentally-based. This was also supported by Powers (2004), who reported that schools felt pressure to ignore science in favor of more tested and testable disciplines. With teachers feeling that their day is micromanaged down to the minute (Reese, 2018), little room is left for them to be creative with content and dream up ways to get students outdoors.

Preparation time is the final time-based hurdle that educators cite as a barrier to taking students outside for educational purposes (McKeown-Ice, 2000). Principals also made it clear that the focus of their teachers was on the creation and implementation of content that would further student understanding of math and writing, with little time left to get creative in the limited space available to them (Reese, 2018). Powers (2004) noted that many teachers use whatever science materials are passed along to them by others to educate students, having little time of their own to prepare materials that would include

this topic or other outdoor activities. She suggested that issues with preparation time and the teaching of science or use of outdoor education can be combated by doing more cross-curricular work. She reasoned that using environmental education as a basis for incorporating the local community into the classroom was wise since students can venture into the world and connect classroom work done in multiple subjects to real-world events happening all around them within their community. Finally, Ernst (2007) found that teachers who consider themselves environmentally-based educators list a lack of planning time as their third biggest hurdle to providing well-made environmentally-based education for students.

Limited Funding

The second most commonly cited barrier to outdoor education is limited funding to pay for curriculum development and transportation. (McKeown-Ice, 2000). Funding is even cited as the second biggest barrier among teachers who consider themselves to be environmental-based educators (Ernst, 2007). Evans et al. (2012) found that teachers felt a need to have more time to innovate to properly implement outdoor environmental education. Unfortunately, this time would not be paid as there is rarely money in budgets to allow for extra preparatory work amongst teachers. Therefore, the teacher needed to design an outdoor environmental-based curriculum on their own time without compensation. Banilower et al. (2013) discovered that 30 percent of elementary teachers did not have the funds to purchase materials deemed necessary to properly teach science, including outdoor-based environmental education programs.

Additionally, lack of nearby green spaces falls into the category of funding issues. Ernst (2014) noted that many teachers polled did not feel they had a green outdoor space within walking distance of the school. She theorized that this may be due to a lack of recognition of usable spaces on the part of the teachers, resulting in more of a perceived barrier than a real barrier. The lack of nearby green spaces falls under funding because making use of outdoor spaces requires the use of transportation for many schools. Transportation of students can become costly and time consuming. As we have already shown, time is an issue of its own, but funding can be just as problematic as many schools do not budget for outdoor education costs and grants can be very difficult to come by (Evans et al, 2012). Reese (2018) was told by schools that the cost of busing children or collecting money to travel to an outdoor location was a significant barrier to using outdoor experiences in their school. He also found that schools encouraged to use outdoor education in a study found the money they needed through fundraising or by asking families for money, though they did not feel good about putting that burden on the families and were admittedly less likely to use outdoor experiences if families needed to contribute to the cost.

Safety Hazards

Many of the less-frequently cited barriers to outdoor education fall under the umbrella of safety hazards. Simmons (1998) did a nice job outlining perceived hazards teachers felt they might encounter in different outdoor settings with students. She found that worries and perceived hazards differed across settings. Teachers in this study reported worrying about taking large classes to areas with water or ponds, losing a

student, or coming into contact with poisonous plants. Surprisingly, contact with animals was not widely reported as a concern. For urban settings, teachers seemed to fear that the people located at the green spaces could be a potential hazard to their students, while this particular hazard did not appear significantly in any other location. Beyer et al. (2015) noted that parent concerns about safety in green settings may limit children's exposure to the outdoors and foster a fear of those places, particularly in urban areas with low socio-economic status, matching some of the urban fears that Simmons (1998) found. Ernst (2007) did not find fear of safety hazards to be particularly significant, although she did not specify any hazards to differentiate levels of concern, instead grouping them all together as one category that teachers were asked about. Waite and Goodenough (2018) do not cite any specific hazards that are perceived by individuals being taken outdoors, but repeatedly emphasized the need to make those going outside feel safe, ensuring them that the site is free of dangers when introducing the individuals to outdoor activities.

Summary

Teaching outdoors presents a number of challenges, both real and perceived, that must be overcome by teachers. To create a curriculum for outdoor education, I must understand what challenges and barriers teachers may face when trying to implement the activities that I craft. Teachers must begin by realizing that more than science can be taught outdoors. Outdoor education has been cross-disciplinary historically but has become closely associated with environmental education in recent years. Time is the biggest hurdle that teachers face when trying to go outside. Many schedules are closely planned down to the minute to ensure teachers are meeting core standards in math,

writing, and reading. These three subjects are the most-tested and therefore considered the most important in many school systems. Planning outdoor activities in those subjects is possible, but many teachers also cite a lack of planning time to create such activities as a further barrier to using the world around them to teach core subjects. A lack of time to prepare can also be attributed to funding limitations. Teachers are rarely reimbursed for work done outside of paid hours, deterring many from putting together outdoor education programs. Proximity to a forest can also be a financial burden on any school wishing to find an outdoor space to teach in. If students must be taken by bus, costs can quickly pile up and deter schools from doing such trips. Finally, fears related to student safety can keep teachers inside. Things such as strangers, poisonous plants, the risk of losing kids, and access to water can overwhelm teachers and make teaching outdoors seem like an impossible task.

The previous sections have outlined both the benefits to teaching outdoors as well as barriers that teachers may encounter. To make the best use of an outdoor space, teachers must understand how to set up an outdoor learning environment to benefit students while also minimizing or eliminating barriers that may be present. The next section will investigate literature on creating outdoor learning environments to best meet the needs of students and teachers.

Using Outdoor Classrooms

Once teachers have accepted the benefits of outdoor education and worked through the barriers that may be present, the final step is to actually go outside with kids. This step is often the hardest for teachers to take as it requires a great deal of preparation

beforehand. Teachers must find a suitable location to do activities outdoors, create an appropriate lesson, and ensure they have the supplies required to complete the tasks outdoors. Some teachers must go off-site to find locations suitable for what they want to do (House, 2008). Others must invest time and resources preparing a location on-site for students to use (Keteyian, 2015). Once a location has been found, teachers must find creative ways to use that location to engage students in different subject areas. This section reviews different ways that outdoor locations have been used by teachers and community members to educate children outdoors, as well as provide examples of how different subjects have been taught outdoors.

Choosing Off-Site Locations

Not all schools are lucky enough to have a green space large enough for teaching on their campus. House (2008) noted that not everyone has access to outdoor facilities, and those that do are not always going to have access to a wide range of opportunities for learners at that location. Luckily, there are many locations off-campus that can still be used for outdoor learning. Simmons (1998) reported a number of different locations that could be used for outdoor education by teachers, such as rivers, ponds, marshes, deep woods, and county parks. Teachers polled felt strongly that all of the previously listed settings would provide good outdoor educational value for students of all ages. They also reported feeling confident in their ability to teach in those locations, though some felt they would benefit from more training in the areas containing water resources. House (2008) found that off-site learning requires a lot of work beforehand to be successful. She discovered that very few younger students were informed about the location prior to their

visit, and many volunteer supervisors, staff, or trainers found at the site were poorly informed about prior knowledge of children, leading to learning that was either too basic or too advanced for students. Her work highlighted the need to prepare students leading up to an off-site outdoor visit as well as the need for cooperation between the teacher and any outside learning facilitators to ensure that students take as much away from an outdoor learning experience as possible. Waite and Goodenough (2018) also expressed the need to make student learners feel safe before taking them off-site to an outdoor learning environment. This could be done through pre-trip learning and preparation so that students are ready for whatever they encounter outdoors.

Perhaps the biggest challenge to teaching off-site is transportation. We previously investigated the trouble that funding can cause when students need to be transported to a distant location (Reese, 2018). The cost to travel from the school to the off-site location can be very costly if it is not within walking distance. Finally, Guardino et al. (2019) highlighted the need to make sure the location being used has all of the tools necessary to complete the learning activity, including clipboards, pencils, notebooks, chalkboards, clothing, and whatever other materials the teacher may need. House (2008) suggested a number of ways to alleviate the hurdles that funding can create. She discussed having parents contribute funds, doing fundraising activities, as well as seeking out locations that will pay part or all of student transportation costs through grants or educational programs. Together, these strategies can eliminate the headache that funding can create for off-site outdoor learning and enable teachers to utilize outdoor education, even if they do not have the resources available to them on their school campus.

Creating On-site Locations

Having access to a green outdoor space on-site can make outdoor education more accessible and convenient. It is not without its own complications, however. In many cases, the site must be created from scratch to meet the needs of the teachers and learners, as well as maintained over time (Keteyian, 2015). In order to accomplish this task, it is critical to have a strong vision in mind for what the site will look like, as well as the necessary manpower and funding to finish the project (Hermansen-Baez, 2019). Hermansen-Baez (2019) recommended finding teachers, parents, local experts such as gardeners and carpenters, and anyone else with useful knowledge or skills to assist in the development of the outdoor classroom. Guardino et al. (2019) provided a list of a number of useful features that may be included in outdoor classrooms. These include seating options such as carpet squares, benches, or logs, clipboards to write on with safe storage locations for the clipboards when they are not in use, some sort of portable easel for writing, locations with sufficient natural lighting, baskets for supplies, and make-shift barriers or partitions for planting, growing, or studying, such as half-buried tires that can be used as planting rings. Keteyian (2015) also went through a similar process when designing an outdoor classroom. She was able to create a vision for an outdoor classroom, recruit help to gather materials and design the location, and finally find people to help create the classroom to meet the needs of her learners. By creating a strong vision, recruiting necessary volunteers, and using available resources, several different teachers were able to create outdoor learning environments for students on-site that would meet

the needs of the learners they worked with (Keteyian, 2015; Guardino et al, 2019; Hermansen-Baez, 2019).

Using Outdoor Spaces

Now that we have established how to find or create an outdoor classroom and what kinds of materials may be needed, it is time to look at how teachers use these spaces to educate students. Eick (2012) studied a teacher and how she used her outdoor classroom to educate students. The teacher focused on science topics within second and third grade classrooms. She would take students outside to collect weather data, find and compare different kinds of seeds, create butterfly gardens with flowering plants to attract them, and study migration times and patterns. She tried to incorporate as much of her daily curriculum as possible into the experiences the students were having outside. Keteyian (2015) also used her outdoor learning space to create flowering gardens and habitats for living creatures that could be studied by students during science classes. House (2008) even documented times when teachers used outdoor learning as an opportunity to teach about sustainable developments using the local school surroundings. She also noted that observation of life cycles, such as the hatching of bird eggs, can be highly beneficial for connecting concepts with reality.

We must remember that outdoor education is not limited to the field of science. It can also extend into math, reading, writing, and physical education. House (2008) shared an example of a teacher using the outside world to teach students about math. The students went outside and identified shapes found around the school grounds to understand how geometry impacts the building and construction of natural objects. The

teachers studied by Eick (2012) continually found ways to incorporate outdoor learning into reading and writing curriculums. He saw one teacher base early morning readings on things that would be explored later in the day, such as macroinvertebrates living in a pond. The teacher would also incorporate poetry based on things observed outside that day, such as trees in a forest. The teacher found that language arts and outdoor learning were almost inseparable, as much of what the class did outdoors could be turned into some form of written reflection or narrative. Finally, the use of outdoor learning environments and its positive impact on physical activity cannot be overstated. Mygind (2007) studied children's physical activity levels while learning outdoors compared to indoors and found that children outside were getting twice as much exercise as their indoor counterparts. This is especially critical now, with the outbreak of COVID-19 forcing many schools to abandon physical education due to social distancing and equipment sanitation requirements.

Summary

Outdoor education can take place in many different locations. Schools that do not have outdoor green spaces on-site may need to travel to distant locations, by foot or by bus, to access the designated learning space. When traveling to a different location, it is critical that the day is well-thought out, students are prepared beforehand, and that all participating adults are aware of students' prior knowledge before the event begins. When making use of an on-site location for outdoor learning, it is important to be aware that the location may need to be prepared for students if it has not been used before. Adding proper seating, gathering needed materials, and finding volunteers to assist in

building a suitable outdoor classroom may be necessary for success. In both situations, it is critical to have a clear vision about what will be accomplished in the outdoor space before committing to anything.

It is also valuable to recognize that many different subjects can be adapted and taught outdoors. Science is taught outdoors most frequently as much of what is found outside in the natural world can be tied to a subject in science quite easily. It is important to realize that math, social studies, language arts, and physical education can also be taught outdoors. It may take creative thinking, but many subjects can be overlapped and taught synchronously outdoors if plans are properly executed. It is critical that I understand the resources available to my fellow teachers as well as the need to incorporate multiple subjects into each trip outdoors to best create a curriculum that makes good use of the time available as well as the space and resources that can be accessed.

Conclusion

Chapter two provided a review of research related to different facets of outdoor education, with the goal being to answer the following question: *How can outdoor education be used successfully to improve the success and well-being of children?* Many of the traditional and well-known benefits of outdoor education were reviewed with research supporting the use of outdoor education, especially in younger children. Barriers to outdoor education were also discussed to highlight challenges that teachers may face when trying to implement outdoor education successfully, but also to show that the barriers can be overcome with proper planning and use of resources. Examples of

locations that could be used for outdoor education were provided, as were suggestions for setting up those locations. Last, examples of previously implemented outdoor curriculum were shared to provide insight into how teachers use their outdoor classrooms to teach science, as well as many other subjects. All three themes investigated in the literature review are critical to understanding how best to craft a curriculum for teachers to use outdoors. The curriculum must be beneficial to the students, user-friendly for the teachers so that it can be implemented effectively by anyone who wishes to use it, and consist only of materials that are available to the target audience. Together, these three critical factors will guide me in my creation of an outdoor education curriculum to be used by fourth teachers.

Chapter three will describe the curriculum design model that I have chosen to use and the benefits that it offers for my project. It will also provide a detailed description of the standards that the curriculum will be designed to meet and an overview of the lessons and activities that will be included in that curriculum. Finally, the next chapter will also describe the intended learning population and general demographics from the school district.

CHAPTER THREE

Project Description

Introduction

The research supporting the many benefits of outdoor education have been discussed previously, as well as the potential barriers that teachers may face and the methods for preparing a proper outdoor learning space. Students learning outdoors have been shown to reap a number of benefits that are difficult to replicate in an indoor setting. While outdoors, students are able to make connections between classroom content and the real world, helping to create lasting memories from material that is often abstract or difficult to relate to. In addition to better recollection and understanding of content, students also benefit socially, emotionally, and physically from outdoor activities. Students learning outdoors have shown an expanded network of relationships, better control of ADHD symptoms, and increased levels of physical fitness as a result of traditional classes being taken outside the confining walls of the school. Taken together, these benefits represent a healthier and lasting method for student education.

Work by Cohen (n.d.) also illustrated the need to remove students from screen-heavy educational settings. When students are only spending four to seven minutes per day in unstructured play environments versus seven hours of time in front of a screen, it becomes critical that teachers spend time engaging students in non-digital ways. One of the best methods to engage student attention and promote use of different senses and resources is to put students in an environment that is unlike anything they are

used to or comfortable with. This environment can stimulate new experiences, learning, and excitement in school-aged children.

This chapter will outline the steps taken in the creation of a curriculum that will feature core components that take place outdoors. The curriculum framework will follow the design put forth by Wiggins and McTighe (2011) and include a project description for teachers, a series of lessons to be completed by students, a number of activities for students to complete that will reinforce key concepts from the lessons, and a rubric for use when grading work completed by students. The goal of this chapter is to create material to meet the needs of the research question: *How can outdoor education be used successfully to improve the success and well-being of children?* The curriculum outlined in this chapter will create an opportunity for inexperienced or reluctant teachers to venture outdoors with their students to learn in a safe, structured, well thought-out environment that promotes successful learning and health benefits for students. With luck, teachers will see the value of the outdoor education experience firsthand and gain valuable experience and confidence in the new environment, leading them to pursue further opportunities to take students outdoors and increase the chances that the benefits of outdoor education are made available to their students. In addition to outlining the curriculum framework, this chapter will also discuss the target subject of the curriculum, as well as the intended population that will be making use of the curriculum.

Project Description

This project included the creation of a curriculum that contains a set of 11 lessons to be taught over the course of several weeks. The lessons were broken down into short,

manageable chunks to make them easier to fit into a standard day of elementary education. The emphasis of learning will be on Minnesota State Science Standards 4E.1.2.1.1 and 4E.1.2.1.2 about erosion and erosion control and will be taught in 4th grade. Some of these lessons will take place in a traditional classroom setting, while others will take place in outdoor settings to utilize the benefits of outdoor education. The general outline for the lessons was completed the first week of February 2021. The classroom-based lesson plans and associated documents were also completed in the month of February 2021. The outdoor activities were designed the first two weeks in March 2021. The project summary was created in the final two weeks of March 2021, and final revisions of the project, as well as creation of a detailed references page, were also completed in the same time frame.

The lessons begin by introducing the concepts of weathering and erosion to students to build a knowledge base before moving into hands-on experiences with the vocabulary. Next, students will conduct a lab simulating weathering and erosion in an abstract way using candy and water. Afterward, teachers will take students outside to identify these forces at work in their own community. Students will then be tasked with recreating weathering effects from different sources outdoors in a lab setting. They will have time to create a plan before being taken outside to attempt a weathering exercise. They will be using their plan to try different weathering tactics on a hardened sand block to determine which methods work best. Afterward, students will reflect on their observations and experiences to find ways to improve their plans. The unit will conclude with students being challenged to create some sort of erosion control method to stop

artificial erosion of materials in an outdoor lab setting. They will have planning time to reflect on their weathering successes and failures to make their erosion control method as strong as possible. After attempting to control erosion, students will once again reflect on what they did and learned to try and improve their plans with their new knowledge. Finally, students will apply what they learned to a short, real-world scenario involving erosion of a field or driveway to practice applying science concepts to real life.

Student learning will be assessed on a 4 point rubric, with each point reflecting an increasing level of mastery demonstrated over the content by students. Each assignment given to students will have a teacher rubric included for use in assessing developing levels of mastery. The skills measured during initial lessons will be critical components for completing the summative assessments effectively and will allow teachers to gauge whether students are acquiring the knowledge they need to be successful down the road. This strategy allows for the identification of any knowledge gaps during learning that need to be addressed with students. The summative assessments in this unit list the standards in the grading rubric and allow for assessment of mastery based on the completion of a lab activity and reflection by students. Sections with multiple components to the standard can be assessed individually and averaged to determine the final level of mastery for a specific standard by one student.

Understanding by Design

Creating a new curriculum can be difficult, especially if it is a content area that teachers are unfamiliar with. Standards-based grading has put even more pressure on teachers to make sure that all of their standards are addressed at some point in the year,

even if it is only briefly. It is easy to get wrapped up in the number of standards that have to be taught and lean too heavily on boxed curriculum that covers a broad range of topics in a subject. This can lead even the best teachers to disaster as they end up spending too much time on content that is not going to be tested, but is required to progress through the boxed set of materials. To ensure that the content being taught is relevant to standards and the knowledge you would like students to acquire, it is often necessary to stray from traditional textbooks and boxed curriculum and create your own set of lessons. Wiggins and McTighe (2011) have pioneered a method of curriculum design intended to help teachers create content that has a direct purpose and goal in mind. As stated in their book *The Understanding by Design Guide to Creating High-Quality Units,* the process outlined "helps to avoid the twin problems of 'textbook coverage' and 'activity-oriented teaching' in which no clear priorities and purposes are apparent" (p. 4). By following a series of steps and guides, readers begin by identifying desired results of learning and working backwards from that point to create lessons that will achieve the desired outcome. If done in its entirety, the process has three core steps that need to be followed in order: identifying desired results, determining what evidence is needed to confidently state that students have learned, and developing a learning plan.

Identifying Desired Results

Wiggins and McTighe (2011) encouraged curriculum designers to start the process by thinking about what the learners should be able to demonstrate or do by the time the curriculum has been taught. This forces teachers to think about what the ultimate goal is of the lessons they are going to be teaching. It answers the question "why are my

kids doing these things in my class?" The first benefit to this model is that it focuses curriculum designers on a clear, concise outcome that they want to work towards. After identifying the goal or result, the second benefit is that it allows the curriculum designer to work backwards, identifying key concepts and knowledge that will be necessary to reach the end goal. This process allows the designer to eliminate any "extra" learning that does not need to be covered, keeping the learning tight, focused, and moving along at a comfortable pace so that more content can be covered during the school year.

As noted in the second chapter, many teachers identified a lack of time to cover all required standards as a reason for spending more time on tested content and keeping lessons indoors (McKeown-Ice, 2000). This design framework will eliminate the unnecessary content and allow for more outdoor exposure time by clearly stating the desired outcome of student learners to ensure that only the necessary components of learning are involved. The emphasis of learning will be on Minnesota State Science Standards 4E.1.2.1.1 and 4E.1.2.1.2 about erosion and erosion control. After my lesson sequence, students should be able to plan and conduct tests to gather data about the impact that different types of erosion have on a section of land and use that information to create and test erosion-prevention strategies that can then be tested and modified. Students will need to be able to plan out basic details of their own experiment, collect and interpret data, and draw conclusions and make decisions based on what they have observed. The lesson plans included in the curriculum will contain sections to remind users of the overarching goal of the unit, as well as the specific goals of the lesson being taught that day.

Determining Acceptable Evidence of Learning

In Wiggins and McTighe's (2011) model, the second stage is to decide how to measure student learning. This will require the assessor to collect artifacts created by students or critique behaviors demonstrated during the learning process that definitively show that learning has taken place and the final outcome has been achieved. Throughout the process of this curriculum implementation, students will be responding to guided questions about their observations and learning that will give them opportunities to demonstrate that they have learned the intended material and then been able to apply it to real situations using the erosion labs. Portions of the assessment will be written responses that occur indoors, but the emphasis of this project will be on the activities related to erosion that students participate in while outside in the school forest or athletic field area. The primary assessment of knowledge will happen outdoors in an attempt to get students to transfer classroom learning to real-world situations and to improve the likelihood that students will internalize and connect with scientific knowledge that will remain with them for a much greater length of time than it would with strictly classroom learning (Berman et al., 2008; Stern et al., 2008). Each lesson plan will include sections to highlight the essential questions and learning goals for the lesson, as well as a list of different learning tools that students will have available to them during the lesson and how those tools will be assessed by the teacher.

Developing the Learning Plan

The final stage in the design framework by Wiggins and McTighe (2011) emphasizes the need to "plan for the most appropriate learning experiences and needed

instruction" (p. 25). This is the point where the lessons themselves are fleshed out based on the knowledge that students will need to reach the learning goals set up in stages one and two. The activities that are chosen and implemented should engage students' minds and concentrate on building the knowledge that the kid will need to meet the learning objectives. By keeping the end-product in mind at all times, teachers will be able to ensure that they do not exercise a blanket-coverage model of learning and instead pinpoint exactly which skills the students need to develop (Wiggins & McTighe, 2011). It also allows for the flexibility to adjust on the fly and spend more time on specific areas that students show they are struggling with, while areas that are quickly mastered can be modified and passed by as needed. This flexibility allows for differentiation for every learner and an increased chance of mastery for all learners (Wiggins & McTighe, 2011).

With the advice and recommendations of Wiggins and McTighe (2011) in mind, there will be two main components to my learning plan: basic knowledge acquisition in a traditionally indoor setting, and application of acquired knowledge in an outdoor setting. Detailed plans will be included for each lesson, with step-by-step instructions guiding teachers through the lesson in an effective order for completion. The lesson plans will also include a short list of key learning activities that teachers can reference if they wish to structure the lesson in a different way. Both indoor and outdoor lessons were written to move students steadily through content, acquiring necessary knowledge as they go. The plans were also organized in a way that allows for students to put newly acquired knowledge to use in an activity shortly after the learning event takes place to increase the chance that knowledge will be retained and internalized.

By interacting in both an indoor and outdoor setting, I hope to engage students in a learning environment they are not familiar with to make the learning process more enjoyable and memorable. I also expect that students will transfer their classroom knowledge more effectively into real-world situations when they conduct experiments outdoors using materials that are actually available in their community shortly after acquiring abstract knowledge in the classroom. It is worth noting that research from chapter two suggests that students spend a great deal of time on devices and that promoting time away from those devices is beneficial, but technology can still be useful in limited quantities. This is evidenced by the benefits of using cameras from Chromebooks, phones, or other sources to document observations to be studied later.

Population and Setting

The curriculum resources that were created will be for use in a school district that serves an average of 950 students per year in grades kindergarten through twelve, with 94% of students identifying as White and 6% of students identifying as students of color. Less than 5% of students are identified as English as a Second Language (ESL), and an average of 23% of students have Individualized Education Plans (IEP). With an average of 70 teachers employed each year, the teacher-to-student ratio comes in at 14:1, though most classes have between 18 and 22 students per adult due to a handful of staff members teaching very small classes. Poverty is also a factor in this district, with as many as 65% of families qualifying for free and reduced lunch each year.

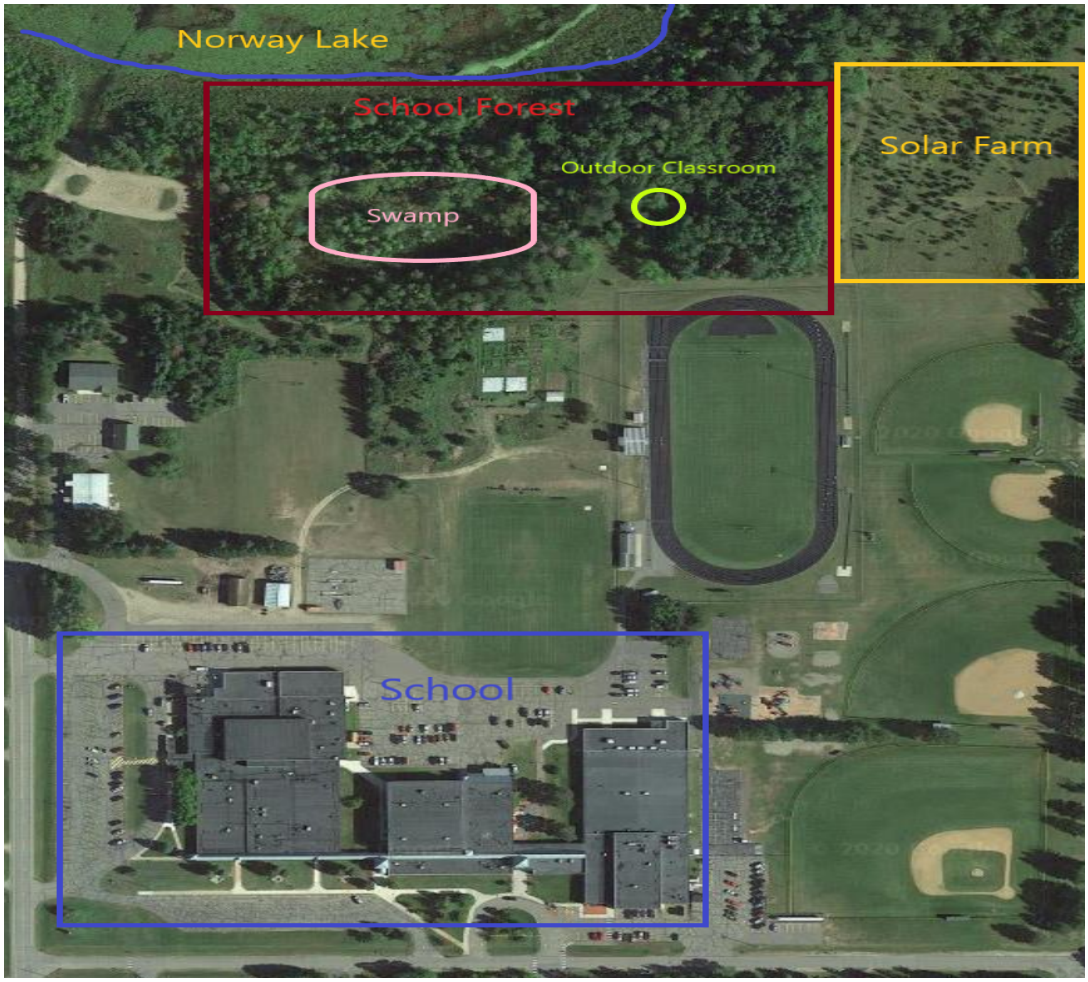
The curriculum that was created will specifically target fourth-grade students and standards. Fourth-grade teachers will be provided with lesson plans, any necessary documents and instructions required to completely implement the curriculum at this site, and rubrics to be used for assessment of completed student work. The students participating in the activities and learning will be between the ages of nine and ten years old. They are evenly split between male and female in a typical year, with demographics closely matching the school averages. Class sizes also hover around the higher end of the school average at 22 students per teacher. Many of the students have been exposed to outdoor settings previously at some point as hunting and fishing are very common recreational activities in the area. Students do still demonstrate high rates of screen usage and infrequent outdoor play despite the availability of green spaces.

The school houses kindergarten through twelfth grade in a single building. The grounds also contain a number of athletic fields, parking lots, a playground, a community garden, and a 20 acre piece of land that is designated as the school forest (see Figure 1). A portion of the school forest, roughly 5 acres, has recently been converted from a buckthorn-infested section of forest to a solar farm. The forest also runs along the edge of a lake and contains a large swamp in the center of the land. One section, roughly a quarter of an acre, is clear-cut to house an outdoor classroom. The outdoor classroom has 2 large wooden platforms containing bench seats for use by students and teachers. The forest has numerous trails cut through it for walking paths that are maintained carefully three seasons per year, with winter being more difficult to maintain due to the narrow trails

being hard to keep plowed. The forest is available for use by anyone in the school or community who wishes to use it.

Figure 1

School Grounds



Conclusion

A great deal of research supports the notion that learning outdoors will improve the health and well-being of children. Chapter three outlined how I intend to use that

research to create a curriculum that allows students to learn outdoors more frequently to reap the benefits associated with that learning model. With access to a large forest on-site, I created a curriculum that makes use of outdoor activities to strengthen student's connections to content by allowing them to simulate classroom concepts in a real setting. In addition to making the content memorable and meaningful, I also expect my curriculum to allow for a greater exploration of the natural world, increased physical activity amongst students during the school day, and increased confidence when they accomplish the tasks set before them. To accomplish this goal, students will be learning both in a traditional classroom setting as well as in a school forest setting. Chapter four will contain a reflection of my personal experience creating the curriculum as well as details about my growth as an educator as a result of the creation process.

CHAPTER 4

Conclusion

Introduction

For my final project, I chose to create a science curriculum for fourth grade that would guide reluctant teachers into more effectively utilizing outdoor learning resources in a structured, guided fashion. In doing so, I attempted to answer the following question: *How can outdoor education be used successfully to improve the success and well-being of children?* Chapter one of this paper outlined my journey to reaching this question and why I want to share my knowledge of outdoor education with other educators. Chapter two examined the research supporting the benefits of outdoor education, explored the most commonly reported barriers to the use of outdoor education, and outlined how to properly create and use an outdoor classroom correctly. Chapter three laid out the design process that I chose to use for my curriculum creation and detailed the type of audience that my curriculum was intended to be used with.

This chapter will serve as a reflection of my experience designing the curriculum detailed in chapter three. I will look back on my struggles and achievements as I completed the curriculum and reflect on my growth as a result of overcoming those obstacles. I will also revisit my literature review from chapter two and comment on which findings impacted my project direction the most. I will be taking time to discuss the future implications of my work on both my own curriculum going forward, as well as the potential impact that my work could have on other teachers that will be receiving copies of my work. I will also spend some time discussing the possible limitations of my

project, as well as my methods for communicating my results to other educators. Finally, I will look toward the future and consider how my work will impact other projects that I am considering undertaking in the coming years.

Personal Reflection

I found the process of curriculum development to be very smooth and intuitive once I had a solid base established. Establishing the base, however, proved to be very difficult and frustrating at times. My biggest challenge from the beginning was creating a lesson template that would categorize and organize all of the information I wanted to add without becoming repetitive or messy. I knew very quickly that I wanted to cover the topics of weathering and erosion, and I also knew what I wanted to do for both indoor and outdoor activities. I attempted to do a set of lesson plans that did not use a table-style format at the beginning, but I quickly abandoned that method because it was too difficult to locate critical information when I needed to track it down quickly for a lesson.

After several frustrating attempts, I revisited Understanding by Design by Wiggins and McTighe (2011) and located the lesson plan template that they offered. I had already been using their curriculum design model, so I decided to take their lesson template and modify it to my own needs. I immediately felt that my curriculum was more organized and the layout seemed to fall neatly into place. After completing my first two lesson plan templates, the final nine fell into place much more quickly.

I was pleased to find that my initial ideas for the curriculum held up well throughout the entire design process. I had initially created a scope and sequence containing very broad, rough ideas for what I wanted to include through ten lessons in the

curriculum. As I began to flesh out the lessons and add detail, I found that most of what I needed was already present in the initial design. I only chose to add one extra lesson to my initial creation, and that didn't come until the very end when I wanted students to use their knowledge to solve a problem that they might actually encounter in their future. I did change the sequence of some of the lessons as I went, finding that I needed more detail or experience at certain points for students to achieve the desired levels of success that I was setting for them.

The process of creating my own worksheets and rubrics was a familiar one. I have been designing my own curriculum for several years in an attempt to cut out unnecessary bits of information from my lessons to open up additional time for students to spend with critical concepts. I was able to draw upon my own experiences with my past students to determine what sort of data collection tables they would find easiest to use, and was also able to target specific points of learning with the reflective worksheets. Rubric use is something that my school has been targeting this year as a staff development topic, so I have been deeply involved in their creation all year. That was beneficial to me as it gave me an opportunity to practice their creation before I actually got to that point in my project. As a result, I was able to identify the goals that I had for students at different levels of mastery much quicker than I likely would have without the extra practice.

I feel that this process has left me with two very important takeaways: I found that organizing my curriculum in such a detailed manner left me with far higher quality lessons to teach, and I also discovered that incorporating outdoor education into lessons is far more manageable than I had realized previously. Going through the process of listing

standards, learning targets, and detailed lesson plans made me consider possible outcomes or obstacles that I often overlook in my day-to-day teaching and resulted in more complete, precise lessons. I also found that creating lessons with the intention of making some of them deliverable outdoors left me with many ideas for how to take traditionally indoor lessons outside as well. Once I began to focus on the idea that teaching can take place outside, I was astonished to find that a lot of what I was planning to do in the classroom could actually be carried out easily in a park, on a practice soccer field, or in the forest. I am excited to take what I experienced in this design process and apply it to my own classroom and curriculum so that I can get my own students outside even more than I already do.

Literature Reflection

Out of all of the literature I reviewed during this process, the two topics that proved most beneficial to me were the cognitive benefits of learning outdoors and the lists of most commonly perceived barriers to outdoor learning. The work of Fagerstam and Blom (2012) was particularly encouraging to me because it demonstrated that authentic learning left a greater lasting impression on students. The students in their study that were exposed to outdoor learning activities remembered the lessons in much greater detail than the students who were exposed to more traditional learning with worksheets and indoor assignments. Stern et al. (2008) were also able to demonstrate greater knowledge retention within students who were exposed to outdoor learning. I also took to heart that Fagerstam and Blom (2012) did not see greater comprehension of subjects in students, but only found a more detailed memory of topics. This bit of information spoke

to me about the importance of structuring the activities to develop a broader sense of learning so that students take away more than a memory of something fun from the event. It led to me focusing very heavily on the reflection portions of my lessons and taking extra time to craft opportunities for students to apply what they learned to actual life situations to help with the transfer of knowledge from the classroom to the real world.

Knowing what teachers perceive as a barrier to outdoor education was critical for me when structuring my lessons. I needed to be careful to avoid potential pitfalls that would deter teachers from using my lessons, while also creating enough support to leave teachers feeling like they could pull off each lesson and have fun with their kids doing it. McKeown-Ice (2000) did a great job of emphasizing the pressure on teachers to cut out topics viewed as unnecessary, such as outdoor learning, in favor of teaching things that are viewed as more critical to achieving high test scores. This forced me to frame certain lessons in my curriculum in a way that made it seem like going outdoors was the most sensible thing to do. I felt that teachers would be convinced the outdoor learning was necessary if they could not conceive of a way to make the lesson work indoors to save time while still accomplishing the general goal. The work of Banilower et al. (2013) also showed me that funding will always be a concern for teachers. As a result, I did my best to create activities that would require as little funding as possible while still allowing students to see the concepts in action. Together, the emphasis on knowledge retention when learning outdoors and the awareness of perceived barriers that teachers may experience provided me with a solid roadmap to structuring my lessons and curriculum in a way that should meet the needs of most teachers effectively.

Implications

My first and greatest desire is to see my curriculum leave educators feeling more comfortable venturing outdoors with their students. The research highlighted in chapter two and the previous section indicate that there are a number of benefits for children to going outdoors, not only academically, but also physically and emotionally (Fagerstam and Blom, 2012; Mygind, 2007; Pretty et al., 2009). If teachers properly execute my lessons, I believe that they will be able to see the learning and joy in their students that comes from authentic learning in a real-world setting. Once they have seen the benefits of the learning style, I expect that they will want to recreate the moment and find ways to get students outside more often.

My second expectation is that this experience will leave teachers with a greater sense of confidence in their own ability to teach outdoors. We often find ourselves doing things that have worked out well for us in the past. Trying something new can be scary, especially when there is the possibility of failure looming for an adult in front of a group of children. I hope that the curriculum I have designed will leave teachers feeling secure and comfortable in their ability to teach the lessons outdoors, resulting in successful excursions and the confidence that they can successfully educate outside of their classroom effectively.

Limitations

The two biggest limitations that could arise with my project relate to green space availability and time constraints. Not every school will have an on-site forest like mine that can be used to gather resources for weathering and erosion experiments, but most

areas should have locations where weathering and erosion can be observed nearby as they are global occurrences. Most schools should also have some sort of outside location where the weathering and erosion experiments could be conducted, even if the teachers had to provide more supplies to students than intended in my lessons for the lab activities. As for time, teachers may still feel inclined to do the first two lessons about weathering and erosion, then consider it good enough since they technically did a lab activity with students and could check off the standard for the year. I attempted to make my lessons as engaging and fun as possible to encourage teachers to want to do these activities with their students, but the risk of teaching students only enough to gain superficial knowledge and moving on is always present.

Communicating Results

I plan to create a PDF document out of my curriculum sequence to be distributed among fourth grade teachers within my school building. I intend to provide them with as much direction as they need when completing activities and expect that I will be meeting with them during school hours at times to gather feedback about their experiences with the curriculum. If they report positive experiences with the lessons, I intend to use digital resources to share my curriculum with any teachers that would like to attempt it.

Future Projects

I have already begun to use things that I learned during this process in the creation of my own fifth and sixth grade curriculum. Due to the changes made to Minnesota science standards in recent years, I have been in the process of reorganizing my curriculum for both my fifth and sixth grade courses. Seeing how precise lessons and

information become using the Understanding by Design model from Wiggins and McTighe (2011) has led me to use their process of working backwards for all of my curriculum planning. The resulting content I have created has been very precise and has allowed me to spend much greater amounts of time on specific topics than ever before, resulting in greater learning amongst my students. I am looking forward to continuing to use this model to craft a new curriculum for my students the rest of this year and beyond in years to come.

I have also found new, creative ways to get students outside of the classroom as a result of my work on my project. I intend to use my newfound creativity to get students learning outdoors in subjects other than biology. I have discovered that nearly everything we talk about in the classroom can be applied to something beyond the walls of the school, it is just a matter of structuring outdoor situations to meet the needs of the content. As a result, I intend to add more outdoor activities to my own daily lessons this year and in years to come so that I can engage students in meaningful and memorable learning experiences that will hopefully stick with them for the rest of their lives.

Conclusion

I am excited to present my completed curriculum to my coworkers and see the results of my work when they implement it this spring. I am hopeful that they will see their confidence in their ability to teach outdoors blossom and grow while using my curriculum, and I hope that it will instill in them a desire to continue taking students outdoors for authentic learning activities. I have learned a great deal about the benefits and challenges to outdoor education during this process. Not only has it allowed me to

create a curriculum for others to use, but it has also strengthened my own understanding of the value of outdoor education and made me aware of my own excuses for not taking particular subjects outdoors for authentic experiences. The literature I have encountered has strengthened my beliefs in the importance of taking students outside to learn, as well as made me more aware of the fears that some people have about going outside with students. The greatest implication of my work would be that teachers are able to use the curriculum I created to move beyond their fears and find a level of comfort in a new style of teaching to continue their own growth. The greatest limitation to this happening is the availability of an actual appropriate learning environment outdoors that is available for use to classroom teachers. I am looking forward to sharing my project with the teachers that it was created for, and I cannot wait to use what I have learned to make my own curriculum better. I have learned more during this process than I ever imagined I would and have seen myself become a much more effective teacher because of my experiences. I feel strongly that I have grown more in the past seven months as an educator than at any other point in my career, and it is largely due to the things I have learned while completing my capstone project. I cannot wait to continue using what I have learned to become even more effective and make my classroom a place that every student wants to learn.

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