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How Can Personalized Learning In The Environmental Classroom Inspire Student-Led Environmental Action And Advocacy?

Sarah Bingea

HOW CAN PERSONALIZED LEARNING IN THE ENVIRONMENTAL CLASSROOM INSPIRE STUDENT-LED ENVIRONMENTAL ACTION AND ADVOCACY?

by

Sarah Bingea

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Primary Advisor: Shelley Orr
Peer Reviewer: Paul Manoppo
Content Reviewer: Joseph Vieau

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CHAPTER ONE

Introduction

The first environmental lesson I ever taught was about food waste. My sixth grade class discussed the energy and resources wasted when people throw away food. Students also discovered that rotting food in a landfill contributes toward greenhouse gases. They created plans to reduce their own food waste, listing ideas like, “only taking what one can eat” and “avoiding single-use products”. I visited the lunch room a week after teaching the unit. I was horrified by how much of their lunch ended up in the trash and how many plastic bags and water bottles students brought in their lunches from home. A week later, we attended an environmental learning center for five days. During the first day orientation, the naturalists explained that we would weigh our food waste at every meal. Our goal was to have less than 10 pounds of food waste by the end of the week. I remember thinking to myself, “Alright, now they will get it. They will be determined to keep their food waste to a minimum because we are actively tracking the food they throw away.” I was wrong. We had over 45 pounds of food waste after the first meal.

After years of teaching lessons on food waste and tracking student food waste at the environmental learning center, I learned you cannot simply make someone care about something by telling them it is “bad”. My students did not understand how their actions negatively impacted the environment. It was something adults told them to care about, not something they actually cared about. This made me wonder if students would be more invested in changing their behavior if they were able to choose and research their own environmental topic, which led me to my research question, *How can personalized learning in the environmental classroom inspire student-led environmental action and*

advocacy? Just because I care about a certain environmental cause does not mean my students will. In exploring personalized learning in the environmental classroom, I hope to help students recognize their own unique connections to the environment and how humans and the environment greatly impact one another. Throughout this chapter, I explore my personal ties to nature, what it means to be an environmental educator, important changes to environmental education, and environmental education's significant role in positive environmental change.

My Connection to the Outdoors

My connection to nature began when I was young. During my youth, I spent a large amount of time outdoors. Whether it was playing basketball in the driveway, building snowmen in our backyard, or biking down the gravel road, I loved being outside. One experience that stands out was the first time my family visited the mountains. Growing up in Minnesota, I was exposed to mostly lakes and prairies. I had never seen such interesting rock formations, let alone elevation that qualified as anything more than a sledding hill. When we made it to Glacier National Park, I was amazed by the terrain. It seemed as though the giant rocks exploded out of nowhere. I remember, as we drove higher, my ears began to pop and I watched the temperature reading on the car thermometer drop. We were in an entirely new world. We pulled over at a picnic area surrounded by pine trees. When I stepped out of the car, I heard a whooshing sound nearby. My brothers and I, who had been complaining in the car, quickly forgot about how hungry we were. Instead of eating our lunch, we sprinted to find gushing rapids running down the mountain. Mist from the rushing river splashed against my face as I awed at the most beautiful aqua blue color I had ever seen.

Throughout my youth, I was lucky to have many first-time nature experiences similar to my first trip to the mountains. Every summer, my mom, dad, two older brothers and I would drive to different natural wonders across the United States, exploring different national and state parks and other wilderness areas. We went camping, canoeing, hiking, whitewater rafting, stargazing, and cooked over a campfire for weeks at a time. As a kid, it was simply magical. I fell in love with the sounds of frogs, crickets, and coyotes at night and the songs of birds waking me up each morning. I endured blisters and sore legs when our family hikes ended up being a couple miles longer than promised. I became a master nature photographer, using tree branches to frame the perfect landscape shot. I learned about plants, rocks, flowers, birds, moose, bears, and rodents during the nightly ranger presentations. My many experiences in nature greatly shaped my environmental ethic. Since I enjoy spending time in natural environments, I value maintaining and protecting natural spaces for myself and future generations. I eventually chose a career in science education because I wanted to help students find their own connections to the natural world.

Environmental Educator vs. Environmentalist

When I first became a middle school science teacher, I had high hopes of inspiring students to care about the planet. I, like many first year teachers, was going to change the world. Quickly, I became overwhelmed by technology, state standards, and school procedures. How was I ever going to teach a meaningful lesson with all of these other expectations? In time, I was able to settle in to the curriculum and learned how to incorporate all of the other school initiatives within my teaching. Once I felt comfortable and on top of things, I thought I would be able to inspire a bunch of young environmental

activists. Unfortunately, this was not the case. I realized my job is not to be an environmentalist, pushing my beliefs onto my students. Instead, it is my responsibility to expose students to multiple viewpoints about environmental topics and encourage them to think critically, come to their own conclusions, and make their own choices in regard to the environment. As described by the Environmental Protection Agency (2021), environmental education is meant to raise people's awareness of environmental issues and provide them with knowledge and skills to help them make educated decisions and take environmentally responsible action. Environmentalists are often viewed as advocates for the environment but environmental educators are meant to be impartial and present multiple viewpoints regarding environmental issues. They support students' development of critical thinking skills and encourage students to make their own informed decisions and opinions.

Positionality

While I am aware it is necessary to remain as neutral as possible when presenting information about the environment, I recognize my experiences and biases play a role in how I design curriculum and present information. As a white, middle-class individual, I have always had wide access to the natural world and felt welcome in environmental spaces. I understand this is not the case for many members of the BIPOC community and people with less economic wealth. The environmental movement has been criticized for favoring the eco-elite, or white affluent individuals. It makes sense why I would care for the environment because I have easy access to outdoor experiences. Environmental products, such as sustainable clothing and outdoor gear, are marketed toward people like me. As an environmental educator, it is important to be cognizant of my biases and not

assume everyone has or will have a passion for preserving the natural world. Keeping this in mind, I have identified changes I want to make in my teaching.

Changes in the Classroom

In the last two years, the Minnesota sixth grade science standards have changed significantly. Previously, the standards focused on Physics concepts, with minimal reference to environmental topics. The new standards, however, emphasize Earth Science and include benchmarks that focus on human impact on Earth's resources and global climate change. Based on my past experience teaching students about food waste, I knew I would need to change the ways in which I delivered content. I want my students to view themselves as a part of the solution, develop problem-solving skills, and use their unique strengths and perspectives to make positive change in an environmental area that is meaningful to them. In order to encourage personal and civic responsibility, I want to support my students in discovering what they are passionate about. The main goal is for students to take ownership of their learning. Students who own their learning and take part in creating their academic objectives take more responsibility for their work (Rickabaugh, 2016). In environmental education, if students own their learning, I believe they will be more likely to engage in environmental action because they have the opportunity to learn about a topic they care about.

As an elementary school student, I learned to pick up trash, because it was "bad" for the earth. We walked around with garbage bags and plastic gloves and cleaned up any scraps of garbage we could find on the school grounds. On Earth Day, my class planted a tree because it was "good" for the planet. We watched our teacher dig a hole and place the small pine tree in the ground. These activities, while well-intentioned, held little

meaning, other than it was fun to be outside. I did not continue to plant trees or engage in routine community clean-up projects. Even as a child who loved nature, I did not see the connection between these activities and my life.

Now, as a sixth grade science teacher, I am inspired to make changes in the ways I present environmental topics. Students must be the ones who develop plans for environmental action and advocacy in order for it to leave a lasting impact. Personalized learning allows students to define individual learning goals based on their passions and interests. My hope is to adapt my school's curriculum in a way that allows students to take ownership in their learning and encourages them to take action, in their everyday lives, beyond the classroom.

The Bigger Picture

Looking to the future, we know we will face many environmental challenges, including loss of biodiversity, natural disasters, and scarcity of resources. The National Council for Science and the Environment's (NCSE) 2008 publication, *Environmental Research and Education Needs: An Agenda for a New Administration,* explains the following:

> To meet these challenges requires an educated populace and a diverse and competent work force prepared for the rapidly changing world of the 21st century...and education must be a critical element of a national strategy for environmental protection, a sustainable economy and a secure future. (as cited in Potter, 2010, p.27)

Environmental education, in the public school setting, plays a major role in developing environmentally literate citizens who are prepared as future leaders and problem solvers.

It is critical for environmental educators to teach in a way that encourages students to utilize their individual strengths and backgrounds to make positive changes in their local and global communities.

Summary

Throughout this chapter, I have highlighted my motivations to explore the question, *How can personalized learning in the environmental classroom inspire student-led environmental action and advocacy?* My own relationship with the natural world is what first led me to a career in science education. Later, I realized my personal enthusiasm for the environment did not always transfer to my students. My experiences in the middle school science classroom helped me recognize the importance of allowing students to explore their own environmental interests and connections to nature. In order to foster future leaders in the environmental movement, environmental education must allow students the freedom to discover and create their own understandings and solutions to problems in relation to the natural world.

In Chapter Two, I include a history of environmental education and how it has evolved over time. I review research articles that investigate the links between environmental education and environmental action and which strategies have been successful in changing human behavior. I also explore different methods to incorporate personalized learning in a middle school classroom, specifically as it pertains to environmental topics and student engagement in the environmental classroom. In Chapter Three, I describe my work in designing a 6th grade science unit on human impact on the environment and explain the knowledge and information I have synthesized from my literature review to help me build the curriculum. Finally, in Chapter Four, I reflect on

what I have learned throughout my project and how I plan to use my new insights and knowledge in future professional settings.

CHAPTER TWO

Literature Review

The field of environmental education has grown significantly since the environmental movement of the 1960s, when people were mainly focused on air and water pollution. With growing concern for the world's natural resources, the cleanliness of the planet, and humankind's health and well-being, researchers are desperate to determine what will actually make people change their behaviors for the betterment of our future planet. Due to the relevance and urgency of global environmental issues, there is a great deal of research aimed at answering the question, "What leads to pro-environmental behavior?" This literature review attempts to provide a better understanding of the progression of environmental education, the necessary strategies used to encourage environmentally responsible behavior, the most effective methods to engage children and adolescents in environmental learning, and ways to promote student autonomy in the classroom. Reviewing and synthesizing research in these different areas will help answer the question: *How can personalized learning in the environmental classroom inspire student-led environmental action and advocacy?*

Overview

The first section of the literature review provides a history of environmental education, specifically in the United States. It looks at the development of environmental education from past to present and defines the main goals of the field. The second section discusses key factors associated with pro-environmental behavior. It also emphasizes the importance of a positive outlook and presenting a hopeful message about solving environmental issues. The third section focuses on the classroom setting and tools to

promote student engagement and learner agency. The fourth and final section dives into the concept of personalized learning and providing students autonomy to make their own learning goals and choices in the classroom.

Environmental Education

In 1992, the Environmental Protection Agency defined environmental education as "Increasing public awareness and knowledge about environmental issues and providing the skills necessary to make informed environmental decisions and to take responsible actions" (as cited in Potter, 2009, p. 23). Environmental education emphasizes topics which follow larger societal trends and adapts to address the needs of current hot button issues (Monroe & Krasny, 2015). It is important to recognize how environmental education shifted its focus throughout history, from strictly environmental problems, such as land degradation, to an emphasis on how certain environmental issues negatively impact the health and well-being of current and future generations of society. The first part of this section provides an overview of the history of environmental education. The second part of this section highlights the interconnectedness of environmental and human needs and the necessity for environmental education to address where natural and social processes meet.

Historian Lynn White explained in her 1967 essay, the Judeo-Christian way of thinking, which encouraged people to exploit natural resources and value humans over all other living things (Brennan & Lo, 2021). White reflected on humans' ever growing impact on the natural world and warned of the ecological lashback humankind would be certain to face in the final third of the 20th century (White, 1967). Ancient paganism and certain Asian religions had a dualistic view of man and nature, identifying spirits within

different aspects of the environment. Western Christianity, on the other hand, allowed humans to take from the earth without recognizing or considering the resources the environment provides for people (White, 1967). Environmental ethics became a topic of discussion in philosophy in the early 1970s. Environmental ethics opposed the traditional anthropocentric view, which deemed humans as the most important beings on the planet (Brennan & Lo, 2021). The new sub discipline of philosophy, instead, gave intrinsic value to the natural world. It acknowledged the environment as having value on its own, separate from its purpose to provide resources for humankind (Brennan & Lo, 2021).

As environmental concerns heightened, world leaders and organizations worked to devise a plan to increase public awareness and action to protect and improve the future of the environment. Environmental education became an essential part of the plan to save the planet. While many scientists and environmentalists contributed to the foundations of environmental education in prior years, Monroe and Krasny (2015) explain that it was not until the 1968 UNESCO Biosphere Reserve conference in Paris when environmental education was discussed as a global phenomenon. They highlight notes from the conference, which discuss how human-made technological developments have caused issues involving pollution and land degradation. They also addressed people's needs for immediate gains without considering the environmental consequences. The participants of the Biosphere Conference ultimately recommended the implementation of environmental curricula. In 1970, the United States passed the Environmental Education Act, which called for education programs that would inform students about environmental policies and support pro-environmental actions and behaviors (Environmental Education Act, 1970).

One of the most renowned events in the push for universal environmental education was the Tbilisi Conference held by UNESCO in 1977 in Tbilisi, Georgia (Hungerford, 2010). Educators and environmentalists wrote the Tbilisi Declaration, which emphasized problem solving and issue resolution in environmental education (Hungerford, 2010). It also included the following three goals:

A. Fostering clear awareness of and concern about economic, social, political, and ecological interdependence in urban and rural areas.
B. Providing every person with opportunities to acquire the knowledge, values, attitudes, commitment and skills needed to protect and improve the environment.
C. Creating a new pattern of behavior among individuals and groups towards the environment. (Tbilisi Declaration, UNESCO, 1978, p.26)

One thing to note is the fact that the goals did not promote a specific belief system regarding the environment. The goals outlined in the Tbilisi Declaration, rather, highlight the need to provide opportunities for individuals to learn about the environment and ways to protect the environment. In educating people about environmental concerns and how the natural world impacts economic, social and political structures, individuals gain the knowledge necessary to make their own informed decisions and act accordingly. It is essential for people everywhere to have all of the information and receive the full story in order to act in an environmentally responsible way (Potter, 2010).

Environmental Education Today

After the Tbilisi Conference, the United Nations held many meetings to support the progression of environmental education, also referred to as EE (Monroe & Krasny, 2015). Today, EE is presented in many different forms. Richard Louv's book, *Last Child*

in the Woods, introduced people to the concept of "nature-deficit disorder", where children lack experiences in nature because the majority of youth entertainment comes from indoor activities and parents worry about allowing their children to explore the outdoors independently (Louv, 2006). Since many children spend little time outside, outdoor education has become a form of EE, exposing and connecting youth to nature through outdoor classes.

Urban environmental education is another key aspect of EE. Urban residents recognize nature in their own communities and learn about ways to improve their own environments (Monroe & Krasny, 2015). Organic community gardens, municipal solid waste programs, and urban beautification are all examples of current projects in urban EE.

One of the most prevalent avenues for EE is its implementation in public primary and secondary schools. Schools in most industrialized countries utilize standardized curriculum and benchmarks. Curriculum standards can be helpful in ensuring certain skills and topics are taught in schools. Oftentimes, however, high-stakes subjects, like reading and math, take precedence over content areas, such as social studies and environmental education (Monroe & Krasny, 2015). Fortunately, many states and schools have adopted new science standards with an emphasis on EE content and skills including problem solving, critical thinking, and communication.

As the discussion and definition of EE has developed, Education for Sustainable Development (ESD) has also come into the picture. Krasny and Monroe (2015) explain that ESD focuses equally on the economy, society, and the environment, emphasizing equity, democracy, and human rights. They go on to highlight how EE has shifted away

from solely focusing on the promotion of environmentally friendly behaviors to also including sustainable behaviors, which highlight the minimization of negative environmental, social justice, and economic impacts. While some groups view EE and ESD as separate entities, Krasny and Monroe recognize the two as partners. EE must work to build a more equitable world and encompass the protection of human rights and preservation of multiple cultures and a well-balanced environment (Rose & Bridgewater, 2003). Orlando Hall Rose and Peter Bridgwater, former directors of UNESCO, explain the need to change the way people approach environmental issues in the journal entry, *New Approaches Needed to Environmental Education and Public Awareness*. They highlight the connection between environmental sustainability and human well-being by acknowledging how people from different cultures and socioeconomic backgrounds are impacted by environmental issues, such as desertification or destruction of wetlands. EE must bridge the gap between the world's social and natural systems and help people recognize how both greatly affect one another.

With the support of EE in schools and the increased awareness of world environmental problems, the next step is transferring knowledge into action. How can environmental education instigate pro-environmental behavior? The next section reviews the factors that contribute to an individual's concern for the environment and the best practices to convert awareness into positive environmental change.

Pro-Environmental Behavior

The 1977 Tbilisi Intergovernmental Conference on Environmental Education defined the objectives of environmental education to include *awareness, sensitivity, attitudes,* and *skills* centered around pro-environmental beliefs and behaviors

(Hungerford & Volk, 1990). Although people's awareness of environmental issues has increased, individuals fail to recognize the role they play in protection and conservation of the environment. People want environmental protection but they want it to come from the federal government. The Science Advisory Board points out that environmental quality is not only determined by government regulations and decisions and nonprofit organizations but it is largely impacted by individuals, families, small businesses and communities (as cited in Potter, 2010). The question remains, if people are aware of environmental issues, what will make them act or change their behavior? Research on pro-environmental behavior helps identify successful and unsuccessful tactics to engage citizens in action that will protect and sustain the environment. The first part of this section highlights factors associated with pro-environmental behavior such as gender, exposure to nature, and socioeconomic status. The second part addresses the importance of presenting a hopeful message about environmental change, one where people feel like they are part of the solution rather than the problem.

Key Factors of Pro-Environmental Behavior

Early US explanations of pro-environmental behavior involved a simple linear progression. Environmental knowledge transitioned to environmental attitude and finally resulted in pro-environmental behavior (Kollmus & Agyeman, 2002). Research, however, revealed there are many other factors that contribute to a person's pro-environmental behavior, or lack thereof. Unfortunately, many programs continue to use the linear approach, assuming environmental knowledge will lead to environmental action. A 1987 meta-analysis performed by Hines, Hungerford, and Tomera attempted to build a better understanding of which factors best predicted a person's tendency toward

pro-environmental behavior. While they were unable to determine exactly which elements would lead to positive environmental action, they were able to devise *The Proposed Model of Responsible Environmental Behavior,* which identified *knowledge and skills, desire to act,* and *situational factors* as possible determinants of a person's willingness to engage in pro-environmental behavior.

Knowledge and Skills. Hines, Hungerford, and Tomera created the model after examining numerous empirically based environmental behavior studies (Hines et al., 1987). They learned that knowledge of environmental issues was indicative of an individual's potential to engage in environmentally responsible behaviors. In addition to knowledge of an issue, however, the individual also needs the knowledge of actions that help to improve the problem and have the skills and abilities to perform such actions (Hines et al., 1987). It is essential for people to have actionable steps to follow in order to feel as though they have some sort of control in the matter.

Desire to Act. Besides having the appropriate knowledge and skills, research also shows a person must have the desire to act in pro-environmental ways. An individual's desire to act depends on their attitude, locus of control, and sense of responsibility to the environment. (Hines et al., 1987) Not surprising, if a person has a positive view of the environment, they are more likely to engage in positive environmental action (Kollmus & Agyeman, 2002). As mentioned in the introduction of this section, some people have an external locus of control and believe leaders and powerful companies and organizations must solve the world's environmental problems (Kollmus & Agyeman, 2002). Others with an internal locus of control are more likely to engage in pro-environmental behavior because they believe their actions can bring about

change (Kollmus & Agyman, 2002). Finally, an individual has a stronger desire to take on environmental action when they have a sense of responsibility to the environment. This is shown in Jeffrey Swanagan's study involving factors that influence zoo visitors (2010). He explains the importance of zoo visitors needing to form personal connections in order to engage in conservation efforts. Visitors who engaged with the elephant exhibit and presentation were more likely to contribute to the elephant conservation effort opportunities offered upon leaving the zoo than those visitors who only passively viewed the elephant exhibit (Swanagan, 2010). Humans have a greater sense of responsibility when they form a connection to the problem at hand.

Situational Factors. Perhaps the most challenging aspect of understanding human pro-environmental behavior is the reality that people come from such a wide variety of backgrounds. Hines et al.'s meta-analysis reviewed the relationship between demographic variables, income, age, gender, and level of education and responsible environmental behavior (1987). While no one situational factor outweighed another in determining someone's tendency to engage in responsible environmental action, each factor is still worth noting in a person's decision making process. Even if a person has the desire paired with the knowledge and skills necessary to act responsibly, financial constraints may act as a barrier towards a person's ability to do so (Hines et al., 1987). On the contrary, situational factors may encourage pro-environmental behavior without a person's knowledge of the environment or desire to act responsibly. Economic incentives, for instance, persuade people to reduce energy consumption (Hines et al., 1987). Even though environmentalists and environmental educators cannot control situational factors, they can help instill environmental hope and present positive messages around change.

Positive Outlook

Environmental hope highlights goal setting and agency thinking, where students are pursuing their goals (Kerret et al., 2020). It is based on a student's belief that they can make a difference. Kerret et al.'s study looked at green schools and hope-enhancing programs to determine if they had an impact on students' pro-environmental behavior (2020). These particular schools provide opportunities where students engage in environmental problem-solving activities and green school initiatives. The study concluded that students who attended schools with environmental-hope-enhancing programs were more likely to report having environmental hope which also correlated with pro-environmental behavior (Kerret et al., 2020). Environmental hope relates to a person's internal locus of control, discussed earlier in this section. An individual needs to feel as though they have the power to make a difference in order to seek out opportunities to make positive environmental change.

It is important to consider the many factors that impact a person's decisions involving the environment. There is no one-size-fits-all approach to convincing a person to make environmentally responsible decisions, however, environmental knowledge, skills, and hope positively correlate with pro-environmental behaviors. When encouraging pro-environmental behavior in the classroom setting, it is equally essential to think about student engagement. Since environmental knowledge and skills are key indicators of an individual's involvement in environmental responsible actions, teachers must work to develop engaging EE curriculum and learning opportunities.

Student Engagement

Research has shown that student engagement is associated with improved academic achievement (Frensley et al., 2020). It is beneficial to recognize and understand elements that contribute to student engagement. The first part of this section explains the Self-Determination Theory and the importance of ensuring students' psychological needs are met in order to increase student engagement. The second section discusses how positive teacher-student relationships lead to academic improvement and increased psychological engagement. The third section looks more closely at strategies to increase student engagement in the environmental classroom through student agency.

Self-Determination Theory

Singapore's former Minister of Education, Mr. Ng Chee Meng, created and defined the term *joy of learning, "*when students are intrinsically motivated, love what they are doing in class, and enjoy attending school" (Ng, 2017 as cited in Wang et al., 2019, p.1). Teachers play a key role in supporting students' joy of learning and intrinsic motivation. The Self-Determination Theory explains that student intrinsic motivation correlates to whether or not a student's psychological needs are met (Wang et al., 2019). The goal is for students to gain satisfaction from the learning process rather than striving for a separate outcome. Unfortunately, students' intrinsic motivation typically declines with increasing age. When students reach adolescence, learning often becomes more performance-oriented, which contradicts intrinsic motivation. Educators have the responsibility to provide assignments and activities that satisfy a student's core psychological needs (Gnambs & Hansfstingl, 2015).

When students' core psychological needs are met, students report higher levels of intrinsic motivation (Gnambs & Hansfstingl, 2015). The core psychological needs include competence, autonomy, and relatedness. Competence refers to a student's ability to master a skill and their perception of their ability. If a student believes they can learn the material, they will be more intrinsically motivated. On the contrary, if they believe the content is out of reach, they shut down and experience feelings of hopelessness. They also stated that autonomy is a student's freedom to make choices in their learning. Children and adolescents need to have a sense of control and voice in their academics. Otherwise, they may feel they are being forced to complete school work. Relatedness involves a student's feeling of belonging. Students who feel as though they are a valuable contributor in class and have positive relationships with their peers and teachers also have more positive academic attitudes (Gnambs & Hansfstingl, 2015).

Teacher-Student Relationships

Relationships are especially important for teachers to be cognizant of because students spend the majority of their days in the classroom. Teachers have the responsibility to build relationships with their students to ensure students feel secure in their learning environment. Security in the classroom provides a safe space for exploration, which, in turn, improves student engagement (Quin, 2016). Daniel Quin reviewed 46 published studies, focused on student engagement, and found that quality teacher-student relationships were indicators of higher psychological engagement, academic achievement, and attendance along with less disruptive behaviors, suspensions, and dropout rates (Quin, 2016). Teachers can establish meaningful relationships with their students by listening to students' opinions and allowing them to share their voices.

Providing opportunities for students to share their voices not only builds teacher-student relationships but also promotes student agency, another integral part of student engagement and motivation.

Six Elements of Environmental Agency

Consistent with the Self-Determination Theory's psychological needs, Stevenson and Dillon's book, *Engaging Environmental Education: Learning, Culture, and Agency,* stresses the importance of student agency or autonomy (2010). Children and early adolescents depend on adults for many aspects of their lives. Adults send mixed messages to youth about the amount of agency they have and how much of an impact they can actually make. Natasha Blanchet-Cohen's research with 10–12 year-old participants, in the International Children's Environment Conference, explored the different experiences and opportunities that promote adolescents in environmental engagement. Her findings helped develop the six elements of environmental agency. The elements include connectedness, engaging with the environment, questioning, belief in capacity, taking a stance, and strategic action (Blanchet-Cohen, 2008).

Connectedness. First and foremost, when it comes to student engagement in the environmental classroom, students need to have a sense of connectedness to nature. Connectedness can be as simple as enjoying time spent in nature. Students form deeper connections when they recognize their relationship between nature and their own well-being (Blanchet-Cohen, 2008). As students build connections with the environment, they form a natural curiosity and want to learn more.

Engaging with the Environment. Young students engage with the environment by learning more about the environment from adults, books, internet resources, and

observations. When 10–12 year olds were asked about their sources of learning about the environment, students identified adults, including parents, teachers and other adults, as major sources of information (Blanchet-Cohen, 2008). Adults must foster students' curiosity about the environment.

Questioning. As children grow up, they move past simply connecting and engaging with the environment. They think critically and begin to ask questions. They recognize the bigger picture and the problems surrounding the environment. They realize the complex relationships between the environment, economy, society, and politics (Blanchet-Cohen, 2008). Most importantly, they start to form their own opinions, beliefs, and morals regarding the environment.

Belief in Capacity. As discussed in the previous pro-environmental section, students need to believe they have the capacity to make change. Students need hope and optimism for the future of the natural world (Blanchet-Cohen, 2008). When children and adolescents believe they can make a positive impact, they are naturally engaged and have increased intrinsic motivation.

Taking a Stance. Adolescents have a challenging time taking a stance. They often face opposition from peers and adults (Blanchet-Cohen, 2008). They already have enough to worry about as they try to fit in socially. Clothes, sports, appearance, and friends seem to take priority over environmental change. When students decide to take a stance on an environmental issue, they separate themselves from their peers and adults (Blanchet-Cohen, 2008). It is an essential element of agency as they begin to think and act independently.

Strategic Action. When children and adolescents reach a point of strategic action, they create a meaningful and thought-out plan to engage in environmental action (Blanchet-Cohen, 2008). Students engage in true agency and become active participants in their community. Student environmental agency enables students to see themselves as problem solvers and change makers. They become leaders and take ownership of their learning, which creates a personalized learning environment. The next section will look more closely at personalized learning and the roles of teachers and students in a personalized learning environment.

Personalized Learning

Personalized learning redefines the role of student and teacher, allowing students to collaborate with their teachers to define individual learning goals and pathways and track their own progress (Rickabaugh, 2016). Research on different personalized learning strategies helps provide insight on how to implement personalized learning in the classroom. The first part of this section discusses the need for a change in the traditional school model. The second section defines personalized learning and explains its origins. The final section defines the five main teaching shifts involved with personalized learning, emphasizing learner autonomy.

The Need for Change

Traditional schooling breaks learning down into a linear step-by-step process, requiring students to move through the curriculum at the same pace and in the same sequence (Zmuda et al., 2015). Students learn to follow directions, complete assignments, and work towards receiving a particular grade while teachers provide the content for students using a one size fits all approach (Zmuda et al., 2015). Today, students can easily

find information online. Experts' knowledge on different topics constantly evolves. The traditional schooling method, where students memorize and recall information about predetermined topics, no longer prepares students for the future.

James Rickabuagh (2016) describes how many various school improvement initiatives have attempted to restructure school experiences and settings over the years. Changes, such as reducing class sizes, improving facilities, and upgrading technology can support positive change but do not significantly impact learning outcomes on their own. Student grouping, based on age, ability, gender, or performance has also proven to have minimal impact on learning achievement. Policy makers believe in changing, raising, or creating new standards to promote student growth but research has shown standards have little effect on students' academic success other than providing common goals for students (Rickabaugh, 2016). Change needs to be made on a much deeper level. Students, teachers, and administrators need to reimagine what school looks like and the roles of everyone involved. Students need to view themselves as contributors to society and future innovators rather than passive consumers of content pushed out by their teachers. Personalized learning supports necessary change to allow for student autonomy and agency, where students make their own choices in their learning and share their voices and opinions with their teachers and peers.

Personalized Learning and its Origins

Personalized learning incorporates a variety of academic approaches. Teachers work with students to create learning experiences focused on learner strengths, areas of improvement, and individual passions (Bishop et al., 2019). The concept of personalized learning is not new. In fact, philosophers throughout history, including Jean

Jacques-Rosseau and John Dewey, supported the idea of building academic experiences around student strengths and interests (Zmuda et al., 2015). In 1919, Helen Parkhurst created the Dalton Plan, "a new model of schooling designed to tailor each student's program to her needs, interests and abilities; to promote both independence and dependability; and to enhance the student's social skills and sense of responsibility toward others" (Zmuda et al., 2015, p. 7). This model became the format of the Dalton School and was used by many Montessori schools.

Although it is not new, personalized learning continues to fight against the traditional structure of school. Pressures associated with high stakes testing and meeting state standards dictate many teachers' instruction. In recent years, however, personalized learning has gained more popularity due to lack of student engagement in schools, advancement in technology, increased access to knowledge, and changes in the global economy (Zmuda et al., 2015). The traditional schooling model does not properly prepare students for life beyond high school because it assumes every student should have the same knowledge and skills. Personalized learning draws on students' individual qualities, allows them to explore their passions and follow their own unique paths.

Personalization is often confused with individualization or differentiation, which are both used in education today (Bishop et al., 2019). The major difference between personalized learning and its counterparts is the student role in the classroom. Personalized learning highlights students' ownership of their learning, whereas differentiated and individualized classrooms are more teacher-driven (Bishop et al., 2019). For example, in differentiated instruction, the teacher tailors instruction to the individual student. In an individualized learning environment, the teacher creates a series

of lessons or tasks for students to complete at their own pace. A personalized learning model allows students to pursue their own problems and questions where the teacher facilitates learning through asking questions and providing feedback (Zmuda et al., 2015). Overall, personalized learning allows for student autonomy, which can take place in two main forms: process personalization and outcome personalization (Zhao et al., 2015). Process personalization, which is most commonly used, is when students have choice in the learning process. Outcome personalization is more difficult to achieve, since most standards are predetermined. James Rickabaugh (2016) challenges teachers to work towards outcome personalization along with other forms of personalization by making important shifts in instructional methods.

Implementation of Personalized Learning

While the personal learning model seems to be powerful on paper, many educators wonder how to actually execute personalized learning in their classroom. The personalized learning model takes time to properly implement in the classroom. Teachers must change the way they think about their lessons and planning. James Rickabaugh (2016) describes the five key instructional shifts of personalized learning.

Shift 1. The first major shift moves away from teaching that is focused on curriculum, pacing, and presentation and places emphasis on content, competencies, and learning from the student's perspective. This does not mean teachers ignore curriculum and standards or forget about structure and planning. Instead, it requires teachers to consider learner readiness, what students already know, and what might interest them. Educators are often concerned about standards and getting through the required content, but standards mean nothing if students cannot master them. It is more important to design

lessons around student learning and their individual needs rather than pushing forward to meet predetermined benchmarks.

Shift 2. Traditional school models put teachers in control of what, when, where, and how students learn. The second shift asks teachers to listen to their students before planning instruction. Students share their voice and take ownership of their learning. Teachers communicate with their students and ask them questions to determine what types of instruction best suit their individual needs. Instead of educators deciding what is best for their students, the students tell the teachers what is best for them.

Shift 3. The third shift explains the importance of providing students with a clear purpose for their learning. When students question why they need to learn something, it is unacceptable to respond saying, “because it will be on your test” or “you will need to understand it when you get to high school”. Without a clear purpose of learning, students are less motivated and unfocused in their efforts. One way to help students identify purpose is to ask students to discover and determine the purpose of the learning, which fosters a sense of ownership in their work. Sometimes it can be challenging to convince students of the purpose of learning certain material. If this is the case, teachers should discuss the value of acquiring a new skill or knowledge. It is essential for students to recognize the value of learning as a process, not only as a means to an end.

Shift 4. The fourth shift relates to the third shift. If teachers want students to value the process of learning, then teachers need to build students’ capacity to learn instead of focusing on content accumulation. Educators teach students learning strategies, tools, and habits in contrast to the traditional model where students memorize facts and vocabulary terms. Teachers must reflect on whether or not their instruction is preparing students for

future learning experiences. The goal is to develop "… *powerful learners* rather than simply *proficient students …"* (Rickabaugh, 2016, p. 89).

Shift 5. Many educators work to provide a wide range of learning opportunities, offering students choice in learning environments, multiple levels of support, and a variety of ways for students to show evidence of their learning. Providing access to multiple resources and options, though, is not enough. Teachers must ensure success over access. While access can be a part of success, teachers need to be intentional about the tools they provide for their students and ensure they produce the right kind of environments and experiences that are best for their students. Rickabaugh's five shifts help teachers reframe their thinking around planning, instruction, and assessments. By reflecting on one's own instructional practices and determining what is best for their students, a teacher can work towards incorporating more forms of personalized learning.

Exploring literature and studies on environmental education, pro-environmental behavior, student engagement, and personalized learning help address the research question: *How can personalized learning in the environmental classroom inspire student-led environmental action and advocacy?* It is necessary to not only have knowledge about environmental education and what leads to pro-environmental behaviors but it is also crucial to understand best teaching practices to engage students in the learning process and help them form personal opinions and think critically about their actions. In learning about the history of environmental education and reviewing multiple studies on pro-environmental behavior, it is evident that there is a desire for change. There is a global push for people to recognize the environment as a precious resource and

a drive to support larger government action as well as local projects that will help preserve the natural world.

Schools can initiate change because they reach a large number of students from various backgrounds. In order to truly inspire change, however, teachers need to use the proper tools and strategies to engage students in learning about the environment and give them the opportunities to be environmental problem-solvers. It is essential for educators to meet the basic psychological needs of students before diving into the content. This means teachers must build relationships with their students, set students up for success where they feel competent and confident, and allow students the freedom to make their own learning decisions.

Conclusion

This literature review provided a brief history of environmental education and how it has developed and changed over time. Environmental education was originally promoted as a way to inform people about environmental issues and raise concern for the environment. Today, environmental education includes the human crises associated with limited resources and access to clean water. With the growing emphasis on incorporating EE in schools and the community, there is hope this will translate into an increase in pro-environmental behavior. The second section of the literature review discussed the key factors that lead to pro-environmental behaviors. While there are many external factors that impact a person's decision to act in environmentally responsible ways, there are strategies environmentalists and educators can use to help encourage people. Simply providing people with knowledge and skills about the environment as well as presenting a hopeful message can lead to pro-environmental behaviors.

In order to understand the best ways to engage students in environmental action and advocacy, the third section of the literature review looked at general student engagement in the classroom and more specifically engagement in environmental education. Students are more likely to be engaged in an academic setting when their psychological needs are met. When they feel competent, have quality relationships and have a sense of autonomy, students are more motivated in school. One way to ensure students' psychological needs are met is through personalized learning, explained in the fourth section of the literature review. Personalized learning allows students to take ownership of their learning, establish personal goals, and make choices in how they demonstrate proficiency.

Chapter Three outlines and summarizes my plan to create a middle school science curriculum unit focused on human impact on the environment. It discusses the purpose of the curriculum and the context in which the unit should be implemented. I will explain how I plan to follow a personalized learning model when designing the unit by having students develop personal learning goals and individual project ideas. Finally, I will include a pacing guide and overview of the lessons and assessments within the unit plan.

CHAPTER THREE

Capstone Methodology

As environmental issues escalate, more states and schools have adopted academic environmental standards as a core part of their curriculum. While many students are aware of environmental problems, it remains challenging to engage students in environmentally responsible behavior. The challenge of converting knowledge into action helped develop the question driving my capstone project: *How can personalized learning in the environmental classroom inspire student-led environmental action and advocacy?* In order to address this question, I designed a curriculum that provides opportunities for students to make their own decisions and find a sense of purpose in their learning, as it relates to environmental concepts.

Chapter Three provides rationale for using a personalized learning model in the middle school science classroom. It highlights research that supports the need for student autonomy and agency and how a personalized learning model allows for student choice and action. I also explain the setting in which I plan to use the curriculum and the participants who will implement the unit's lessons. In the last section, I outline the steps I followed when designing a personalized learning unit emphasizing human impact on the environment.

Rationale for a Personalized Learning Model

Intrinsic motivation is crucial to a student's academic success. Unfortunately, intrinsic motivation decreases as students grow older, starting as early as elementary school (Gnambs & Hanfstingl, 2015). According to the Self-Determination Theory, in order for a student to be intrinsically motivated, there are three basic psychological needs

that must be met (Gnambs & Hanfstingl, 2015). One of these needs is autonomy. Students need to feel they have control over their learning experiences and are not forced to learn certain material or complete specific tasks. Personalized learning allows students to follow their own learning paths, where they form individual goals, choose activities to best support their development, and complete assessments that highlight their strengths and what they have learned (Rickabaugh, 2016).

When looking specifically at motivation to engage in environmental action, it is important for students to feel a sense of agency. A person must feel as though they can have an impact. When students see themselves as contributors to positive environmental change, they are more likely to engage in environmentally responsible behaviors (Blanchet-Cohen, 2010). It is essential to provide a message of hope and possibility within an environmental curriculum because it increases a person's perception of their internal locus of control (Kerret et al., 2020). A personalized learning environment allows students to be problem-solvers and see themselves as agents of change. In the next section, I explain the important groundwork a teacher must establish when implementing a personalized learning curriculum.

Elements of a Personalized Learning Curriculum

In creating a unit that follows a personalized learning model, it is necessary to consider the three core components as described by James Rickabaugh (2016): Learner Profiles, Customized Learning Paths, and Proficiency-Based Progress. Each plays an important role in establishing the foundations of personalized learning in the classroom. The core components provide a framework for students to share their learning needs with

their teachers, make academic decisions based on their strengths and interests, and see their growth over time.

Learner Profiles. Learner profiles are tools co-created by the student and teacher to help form a better understanding of students' challenges and successes both in and outside of the classroom. A learner profile contains four main parts. The first part is *demographic data,* where students share details about their family structure, learning history, and other personal information they choose to include. "By knowing the learner as a person and understanding the supports and challenges present in his or her life, we are better able to help him or her make connections and see the utility of learning" (Rickabaugh, 2016, p. 38). The second part of the learner profile is a student's *academic status.* Educators use a variety of assessments, including test scores, formative assignments, and student reflections to help determine learner readiness in different content areas. The third section, *learning-related skill set,* focuses on students' skills and habits as well as their goals outside of the classroom. Defining their skill set helps students recognize their academic strengths as well as learning tools and strategies that work best for them, which in turn, supports students in becoming independent learners. Finally, students and their teachers determine *potential learning drivers.* Students reflect on their goals and motivations beyond the classroom, such as future career plans or other external factors that might drive their purpose for learning. The learner profiles set the tone of a personalized learning model by placing value on each student's unique background, interests, strengths and goals.

Proficiency-Based Progress. The first step in the actual curriculum development process is to determine the success criteria, or learning targets, for the unit. This helps

develop a proficiency-based rubric which students use to evaluate their learning throughout the unit. Proficiency-based rubrics are important because they allow students to take ownership of their learning through self-evaluation and tracking their individual progress. Instead of focusing only on the end goal, students recognize their growth over time. Progress may look different for each student and does not need to follow one particular path. Once students are aware of the expected outcomes, they codesign their customized learning path.

Customized Learning Paths. Customized learning paths encourage students to make choices in their education. They first identify personal learning goals related to the expected outcomes. Through conferencing, teachers help students create short-, intermediate-, and long-term learning goals that are aligned with the content standards. After establishing their goals, they choose activities and resources to help them achieve their goals. Students work with their teachers to establish progress markers along the way. Progress markers allow students to recognize their growth in learning rather than simply trying to complete checklist items.

Rickabaugh's three core components of personalized learning help establish a framework for planning a unit of instruction that recognizes students' abilities, encourages students to make decisions in their learning, and supports multiple learning pathways. The three core components of personalized learning helped me design a curriculum to meet the needs of my students and colleagues.

Setting

The curriculum is intended to be used in a 6th grade middle school science classroom. The curriculum is based on 6th grade Minnesota State Science Standards and

therefore could be implemented in any classroom following these standards. The unit plan I created mainly addresses the benchmark 6E.3.2.1.3, “Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment” (Minnesota Department of Education, 2019, p. 27). The unit is to be implemented once students have already learned about different Earth processes, such as the water cycle, geological processes, weather patterns, and rising global temperatures. Since the curriculum is based on a personalized learning model, I hope it could be adapted and used in other states and grade levels that have standards that emphasize human impact on the environment.

Participants

The curriculum is designed for 6th grade Science teachers at Wayzata West Middle School but could be suitable for any Minnesota 6th grade science teachers. Two factors that influenced my curriculum design, and may limit other schools from implementing my unit plan, are access to technology and flexible learning periods. Wayzata students have their own iPads, which allows for use of the internet and a wide variety of applications on a daily basis. With this in mind, I provided opportunities for students to use technology resources whenever possible. Wayzata West Middle School also has a built-in 30 minute flex period every day. The flex period allows teachers to easily conference with students, which is a crucial aspect of the personalized learning model.

Putting it into Action

When designing a personalized learning curriculum focused on environmental advocacy, one must provide multiple ways for students to demonstrate proficiency. In

order to accomplish this, I designed the unit around a personal interest project, where students choose to learn about an environmental topic that has meaning to them. The environmental unit contains three main parts, which follow Lee and Hannafin's (2016) student-centered learning framework, *Own It, Learn It, Share It.* I followed this framework when designing my month-long unit plan.

Own It. First and foremost, I established clear and well-defined learning goals. The learning goals are based on Minnesota State Science standards, which are written in student-friendly language using "I can" statements. To ensure students own their learning, I designed a project check-in form where students determine their individual learning goals, the steps they plan to take to complete their project, the product they intend to produce, and how they plan to track their progress. The check-in form also includes a proficiency-based rubric to help students identify where they are in the learning process.

Learn It. After defining the learning goals, check-in forms, and rubrics, I developed lessons to support their project. The lessons expose students to different environmental topics and provide examples of environmental action projects implemented in their local communities. I also found it important to include lessons on research practices, such as explaining how to use empirical data and identifying credible resources. Students need to be exposed to a variety of resources and strategies before engaging in their individual research. Throughout the *Learn It* section of their project, I also created and provided a variety of formative assessments for students to choose from. Formative assessments help students determine their progress toward proficiency in terms of the different learning goals.

Share It. As students gather their research and learn about their topic, the unit plan calls for teachers to conference with students. The last step in creating a personalized learning plan was to design a conferencing form that includes guiding questions to help students determine their progress in learning and identify how they plan to share their final project with their peers, teacher, and community. I also created a peer conferencing form to help students discuss their projects with each other. It is important for students to share their learning throughout the completion of their personal interest project so they can receive multiple forms of feedback and make changes accordingly.

Summary

Chapter Three explained how I plan to address my research question: *How can personalized learning in the environmental classroom inspire student-led environmental action and advocacy?* I discussed the purpose of my curriculum project and the rationale for using a personalized learning model. I highlighted the major components of a personalized learning curriculum and the steps I followed in designing a unit plan focused on human impact on the environment. I also described the intended setting and participants of the project. Chapter Four will include a summary of what I learned throughout the curriculum writing process and how my literature review supported me in creating lessons and assessments. I will also identify challenges I encountered during the design process. Finally, I will explain how I plan to use my curriculum and what I have learned in my future professional career.

CHAPTER FOUR

Reflection

Introduction

After several years of teaching environmental lessons to sixth grade students, I was always surprised by how little interest students took in caring for the environment. I assumed hot button issues, like global warming and climate change, would intrigue students and promote spirited action. I was disappointed with their indifference toward an issue I believe to be relevant to their current and future lives. When I learned the sixth grade standards and curriculum were changing to emphasize even more environmental content, I knew I needed to revamp how I presented environmental topics to my students. While I am firm in my reasons as to why nature is important for me, my students need to discover and develop their own reasons as to why nature is important to them. Instead of pushing my feelings and beliefs about the natural world, it is necessary for students to recognize their own passions, interests, and connections to the environment. The idea of students exploring their own interests and having voice and ownership in their learning aligned with the components of a personalized learning model. This realization led me to my research question, *How can personalized learning in the environmental classroom inspire student-led environmental action and advocacy?*

In this chapter, I highlight my major learnings from my capstone project, which emphasize my discoveries about personalized learning. I also reflect on the resources from my literature review that guided me in completing my project. I discuss future implications my project may have on my profession and workplace as well as limitations of my project. I explain future projects I hope to implement in my teaching and school

and describe how I plan to communicate my project results with my colleagues. Finally, I emphasize the benefits of personalized learning to the field of environmental education.

Major Learnings

In completing my capstone project, I have learned how to create a personalized learning unit by focusing less on the end goal and more on the actual process of learning. First and foremost, I learned the importance of building in time for students to discover relevance in what they are learning. In order to create meaningful learning experiences, students need to make personal connections to the content. As an educator, I often feel stressed for time and as though I need to continue to progress through the curriculum and standards. Students, however, are more likely to receive information once they have identified why the content matters to them. Through creating a personalized learning environmental unit, I learned how to allow time and space for students to discuss and reflect on their own relationship with nature.

I also learned how to create more opportunities for student choice and autonomy in the classroom, which is another essential component of personalized learning. Teachers want to help their students in any way possible to be successful in the classroom. This is why it can be challenging to allow students to make their own choices and decisions. Adults often question whether or not students will make the best decisions in terms of their own learning. It seems simpler to provide students with a distinct path to follow to ensure they achieve all of the state- or school-defined benchmarks. The problem is, learning is not to be limited to an end goal. Learning is a process and students deserve access to multiple learning pathways to help best meet their strengths and needs. While working on my capstone project, I learned how to support and guide students in the

learning process without defining the specific steps students need to take in their learning or the exact final product students must produce to prove their learning.

Finally, I learned personalized learning is not easily defined. When designing my personalized environmental unit, I searched for a specific format or template to follow. I quickly realized, there is no one ideal way to implement personalized learning. Personalized learning, by its nature, can take many diverse forms and look different in different settings. Once I recognized the flexibility associated with personalized learning, I learned it was ok to pull ideas and strategies from multiple sources and examples to create a blend of personalized learning experiences to fit the needs of my students. I also acknowledged that my unit may change and grow from year to year based on my differing students and as I become more comfortable with the implementation of personalized learning. This, perhaps, was my biggest takeaway from the entire project. I learned executing a personalized learning model takes time and patience and a personalized learning unit may change from year to year.

The concepts, tools, and strategies I have learned in developing my capstone project will continue to help me as I improve and add to my personalized learning teaching practices. Specific resources from my literature review have helped shape and will continue to shape these teaching practices. In the next section, I will highlight the most influential resources from my literature review.

Revisiting the Literature Review

While designing a curriculum to address my research question, *How can personalized learning in the environmental classroom inspire student-led environmental action and advocacy?,* I found myself referencing the same specific resources from my

literature review. Natasha Blanchet-Cohen's (2008) six elements of environmental agency and James Rickabaugh's (2016) description of five key instructional shifts of personalized learning helped me combine the necessary components of environmental education and personalized learning practices to design my unit plan.

Environmental Agency Aligning with Personalized Learning

Blanchet-Cohen's research with 10–12 year-old participants highlighted the key elements that lead to environmental agency (2008). Several of the elements aligned seamlessly with personalized learning strategies. The first element Blanchet-Cohen describes is connectedness, where students build their own connections with the environment. This relates to Rickabaugh's first instructional shift of personalized learning, which focuses on the change from teachers emphasizing curriculum, pacing, and presentation, to instead, bringing forth students' strengths, interests and perspectives (2016). In outlining my unit plan, I made sure to include time for students to reflect on and share their connections with and interests in nature.

Another element of environmental agency outlined by Blanchet-Cohen is a student's ability to plan and take strategic action (2008). In taking strategic action, students take ownership of their learning as they use their new knowledge to problem-solve and make a difference in their community. Students taking strategic action relates to one of Rickabaugh's personalized learning ideals which is for teachers to provide students with a clear purpose for their learning. When designing the culminating project for my sixth grade environmental unit, I felt it necessary to provide an opportunity for students to take strategic action. If students learn to take strategic action

in relation to what they are learning, they can also recognize a clear purpose for their learning.

Personalized Learning Instructional Shifts

Aside from helping me recognize connections between environmental agency and personalized learning, Rickabaugh's (2016) five key instructional shifts of personalized learning helped me provide multiple learning pathways within my unit plan. One of the main shifts I recalled while planning the unit activities was the shift from teachers controlling what, when, where and how students learn to teachers listening to students before planning instruction and allowing students to share their voice and take ownership in their learning. I especially paid attention to this instructional shift when creating the final environmental project guidelines and rubric for students. Instead of defining distinct desired outcomes for the students' environmental project, I created success criteria that were more open-ended and allowed for students to design their own product.

Implications

While my capstone project focuses on one sixth grade science unit, I believe it may inspire more change in how science is taught across grade levels in my district. Teachers already implement elements of personalized learning when they incorporate student choice and voice in their classrooms. When educators plan lessons and units through a personalized learning lens, they include even more elements of personalized learning, which leads to more opportunities for students to take ownership in their academics.

Besides opening a door to instigate more personalized learning within the science classroom, I believe my capstone project may also lead to more activities where students

apply their knowledge outside of the classroom. My major goal in designing a personalized learning environmental unit was for students to see themselves as change makers and problem solvers, and motivate students in the academic setting by more than a letter grade. It is essential for students to recognize what they learn in the classroom relates to more than a learning target or state standard. When teachers let students apply their knowledge to their own passions and interests, students recognize the value in their learning. That being said, it can be challenging to allow time for students to engage in projects that highlight their personal goals and interests, which I discuss in the next section.

Limitations

One of my first ideas for my capstone project was to have students design an environmental action plan to be implemented in their local community. Although I still included a final project in which students design an action or advocacy plan to promote positive environmental change, I realized it would be too difficult to expect all students to fully implement their plan. Time is a major limitation because teachers are expected to cover a wide range of content throughout the school year. Perhaps, if I ran an environmental club, where students voluntarily devoted their time to a community action project, it would be more achievable.

Another limitation in designing my environmental unit was my unfamiliarity with actually implementing a personalized learning model. While I have utilized many personalized learning tools and strategies in daily lessons, I have never fully applied an entire personalized learning unit. If I had more time, I would have liked to pilot the unit

in its entirety and make changes according to which activities were successful and which areas needed improvement.

Future Projects

As I have discussed throughout this chapter, my capstone project covers only one science unit. Moving forward, I hope to develop more of the sixth grade science units using the personalized learning model. In order to accomplish this, it will be important to reflect on the successes and challenges throughout the implementation of my first personalized learning unit plan. Just as my students need to recognize learning as a process rather than a means to an end, I also need to understand that teaching is a process that is always changing. There is no one specific way to present a personalized learning model in the classroom. Any educator looking to apply personalized learning in their classroom needs to remember it takes time and will likely continue to change and grow in the years to come.

Communication

Since many of my colleagues are new to the personalized learning model, it is necessary for me to present my capstone project to my professional learning community (PLC), which consists of two other sixth grade science teachers in my building as well as other sixth grade science teachers across the district. I will share the online unit plan and resources in a team meeting. I will also make sure to check in with my building PLC on a weekly basis to receive feedback on how the unit is implemented in their own classrooms. It is essential for me to collaborate with the other sixth grade science teachers in order to receive suggestions and ideas on how to improve the unit, lessons, and

activities. In teaching the same content and using the same unit guide, we can also compare student work and identify how to best support our students' learning needs.

Benefits to the Profession

My capstone project serves as an example of how teachers can shift away from the traditional school model. Students are accustomed to following directions, completing checklist items, and striving to answer questions correctly (Zmuda et al., 2015). The traditional school model, however, does not prepare students for the future because it assumes all students should learn the same things in the same way. As teachers learn to include more opportunities for personalized learning in the classroom, students will take more ownership in their learning. Personalized learning encourages students to be independent learners, follow their own learning pathway, and build on their individual strengths and passions.

In terms of environmental education, my personalized learning unit promotes a sense of agency, which is important in inspiring pro-environmental behavior. A person's likelihood to engage in pro-environmental behavior is often tied to their sense of environmental hope and internal locus of control (Kerret et al., 2020). Personalized learning in the environmental classroom allows students to see themselves as change makers. It fosters the belief that their ideas and opinions matter and can make a difference. If personalized learning can pair with environmental education, hopefully more students will seek positive change for the natural world.

Summary

In Chapter 4, I explained my motivations for addressing the question, *How can personalized learning in the environmental classroom inspire student-led environmental*

action and advocacy? I described what I learned through researching and designing a sixth grade environmental science unit using a personalized learning model and highlighted main resources from my literature review that informed my capstone project. I discussed future implications of my project, limitations I faced in completing my project, and how I plan to share my project with fellow educators. Finally, I explained the project's benefits to the education community and, more specifically, the environmental education profession.

While I am proud of the work I have completed in creating a sixth grade personalized learning unit plan for environmental science, I know my work is far from complete. I recognize teaching using a personalized learning model is an ongoing process that will continue to change and develop as I grow as an educator and as I work with diverse students. Although I know my unit plan is not perfect, I am confident that it will provide students with meaningful learning experiences and allow them to explore their own connections to the environment. Moving forward, I am excited to see how students respond to personalized learning and the ideas and solutions they come up with in relation to environmental action and advocacy.

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