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## Career Influences of Environmental Education Field Experiences

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Career Influences of Environmental Education Field Experiences

by

Lacey Day

A capstone submitted in partial fulfillment of the requirements for the degree of  
Master of Arts in Education: Natural Science and Environmental Education.

Hamline University

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## CHAPTER ONE

### Introduction

This study sets out to determine what impact, if any, that exposure to environmental education has on the decision to choose a STEM (science, technology, mathematics, and engineering) career. I ask the question: *How do environmental education field experiences influence college major and/or career choice in high school students?* In this chapter, I will express my personal connection to environmental education and the experiences that had influenced me to pursue a STEM major during my undergraduate years, as well as the value of STEM education/careers in present day society.

### My Earliest Encounters With Environmental Education

I was fortunate enough to grow up in a family of outdoorsmen. My father, uncles, cousins, and grandfathers all participate/participated in outdoor activities such as hunting and fishing. When I was in second grade, I began to go hunting with my father. Every Saturday in the fall we would wake up in the early hours to drive to our camp in West Virginia where we would hunt for squirrels. I did not realize it at the time, but my father was teaching me the very basic principles of leaving no trace. He told me to step where he stepped and always reminded me to pick up the wrappers from the snacks I had packed. These small lessons laid the foundation of my interest in the environment.

That same year during school, I went on a field trip to Deep Creek Lake State Park in Deep Creek, MD. I distinctly remember hiking through the forest outside of the Nature Center. I was able to observe scat and the head of a pike fish. Although I cannot recall much else from the trip, these memories have stuck with me.

During the summers of elementary and middle school, my cousins and I ran the neighborhood where our grandparents lived. We would visit a local stream to collect crayfish, catch frogs in the mud puddles, help in the gardens, and pick fresh blackberries. We would also visit my camp during those years. One of the best parts was collecting Fowler's Toads in the yard. These small creatures ignited something in me that connected me to the world. I would set up habitats, collect tadpoles, and watch them grow to adulthood. I did not realize it then, but I was learning the importance of nature and homesteading during those summers.

During fifth grade, I had the wonderful opportunity to attend overnight outdoor school at the University of Maryland's 4-H Center in Western Maryland. The center features cabins, classrooms, pavilions, a dining hall, hiking trails, and is nestled along Lake Cunningham. This five day excursion was incredible for me. I saw moss in the bog, bear tracks on the trail, caught fish, went canoeing, used microscopes, dissected owl pellets, did arts and crafts, and so much more. I was amazed by everything I did that week, even when the weather challenged us with rain and cold temperatures.

It was around this time that I began keeping tropical fish as pets. My father had always kept saltwater fish, but this was the first time since I was born that we kept a freshwater aquarium. This was my project. We specifically kept live-bearing fish, such as guppies, mollies, and swordtails, so that I could raise their young. This experience connected me even further to animals, as well as exposed me to a whole new realm of knowledge.

In sixth grade, I visited yet another state park—Rocky Gap. I was no stranger to this one, although the activities I participated in were much different than anything I had

done previously for school. I remember collecting water samples and completing water quality analyses for Lake Habeeb. I recall visiting a local stream and ruining a pair of tennis shoes in an attempt to collect benthic macroinvertebrates. I had so much fun during that activity. The shoe casualty was well worth it.

The summer after seventh grade, I went on a WorldStrides trip to the Florida Keys with my eighth grade teacher. I remember begging my parents to go. It took a lot of convincing, but I recall telling them that one day I wanted to become a marine biologist and having this experience would be beneficial. On the trip, I snorkeled over a coral reef, swam with dolphins, dissected squids, visited a turtle hospital, and even walked past an alligator in the Everglades. The trip was eye-opening to say the least.

Although my childhood experiences were immersed with environmental experiences, I recognize that that may not be the case for others. I grew up in a middle class white family. We had a large backyard with fruit trees and a front yard with flower gardens and grassy areas.. I understand that for many, the opportunities to be this close to nature are lacking, but it is hard for me to envision a life without. I wish to learn more about how life experiences, such as access to nature, shape one's interest in specific careers.

### **The Years Those First Experiences Influenced**

Freshman year of high school, I remember visiting a local state college, which is now my alma mater—Frostburg State University, to listen to a researcher discuss genetics and cancer. The topic was way over my head at the time, but attending made it clear that his subject matter was something I was uninterested in.

By sophomore year, I had begun to research and visit colleges across Maryland. I knew that I was interested in the environment and even looked into environmental science degrees. I loved my environmental science class that year. I remember having an incubator in the classroom and hatching chicks and turkey poults. The hands-on experience made all the difference.

By junior and senior years I had realized exactly where I wanted to go to school. I chose to attend Salisbury University on Maryland's Eastern Shore. I knew that I would have more opportunities to explore different environments there, specifically the coastal wetlands.

### **The College Experiences that Connected All of the Dots**

The two years I spent at Salisbury University weren't what I had anticipated. I struggled academically and felt that I did not fit in socially. I was a biology major at the time, although to this day I say I should have been an environmental studies major. I got to take classes including introductory biology, microbiology, zoology, and ecology. Throughout these courses, I attended field trips to various locations on the Eastern Shore including Assateague Island National Seashore, Furnace Town, and Pemberton Park. These environmental education opportunities still stand out to me. I recall hiking the trails at Assateague, looking for wild ponies, and even finding a toad on the sand dunes. At Furnace Town, I got my first introduction to trees and the field of dendrology. And Pemberton Park was another excellent hiking spot, as well as a great place to see various animals.

For the remainder of my undergraduate career, I attended Frostburg State University. I changed my major a bit and went the wildlife and fisheries route where I



had many more environmental education experiences. I had plenty of hands-on opportunities to learn during my labs. In my comparative anatomy course, I learned about the classification of animals and their body systems. Each lab, I had the opportunity to complete dissections and learn about evolution first-hand. In my introductory botany course, I was able to compare the various kinds of plants and their cells. In my wildlife techniques course, I was able to spend time in the campus arboretum and at a professor's farm where I learned to set various animal traps, use radio telemetry, and shoot tranquilizer darts. In dendrology, I traveled across campus to learn to identify trees and shrubs in the region. On test days, I visited new locations to identify them in their natural habitats. In my surface water hydrology course, I learned to take water samples and collect benthic macroinvertebrates in leaf packs to determine stream health.

In herpetology, ichthyology, and ornithology I learned to identify specimens of frogs, toads, salamanders, snakes, lizards, turtles, fish, and birds. These classes were disrupted by the COVID-19 pandemic, so the things I learned in class were then applied outside on my own. These classes not only challenged me, but allowed me to test what I learned on my own without the pressure of testing and grades.

### **Making the Connections**

Every memory I have of environmental education has impacted the next step that I have taken for my career path. In today's society, the need for STEM careers is becoming more and more important due to the global economy and economic success of a country (Sahin & Waxman, 2021). Every occupation I can think of can connect, in some way, shape, or form, to STEM. As technology advances, it creeps its way into every aspect of our lives. We, maybe even unconsciously, use technology everyday while on

our smartphones, laptops, televisions, and video game consoles. Even trade careers utilize aspects of STEM such as measurements, sizes of tools, etc. to complete jobs. The basics of budgeting, living off of a wage, and balancing a checkbook require one to know basic mathematics. Science and engineering can be as simple as seeing a problem and developing a solution. Not only is STEM related to nearly all careers, it will also play a key role in how we, as a society, problem solve and think critically in the future. In the U.S., there is currently a STEM crisis. More positions are available than there are trained, American, individuals to fill them (Hossain & Robinson, 2012). In the tristate area (Maryland, West Virginia, and Pennsylvania) there are a wide variety of job opportunities in the STEM field including companies such as Northrop Grumman, IBM, Maryland Department of Natural Resources, University of Pittsburgh Medical Center, and West Virginia University Medicine, despite the region being known for being economically depressed. Researching career choice in high school students is an important step in determining how we can better prepare and train the next generation to support the needs of our current workforce.

### **Conclusion**

My life has easily been shaped by the environmental education opportunities I have had thus far. I would not be an environmental educator if I had not had such wonderful experiences throughout my adolescence and early adulthood. Have similar experiences impacted others in the same ways that I have been impacted? Do these experiences influence only the pursuit of environmental careers or is it more broadly the STEM field in general? My own life experiences have led me to ponder the question:

*How does exposure to environmental education influence high school students to pursue STEM majors/careers?* Going forward, this is the question I set to address.

In these next chapters, I will review the literature, address the methodology of this study, discuss results, and allude to implications and limitations of this study. The literature review will define environmental education, discuss theories of career choice, and explain who and what can influence career choice. In the methods section, I will explain what steps I have taken to complete this study. The methods section will explain the steps I took to complete this study, including permissions I obtained and the length of time the survey was available for completion. The results section will include an interpretation of the results that were obtained from the survey. And finally, the conclusion will address the study as a whole. It will briefly review the previous chapters, as well as address the implications within Allegany County Public Schools and the limitations that should be considered when pursuing future research.

## CHAPTER TWO

### Literature Review

#### Introduction

Environmental education programs have positively influenced my personal career choice and path. Throughout school, I attended multiple environmental education programs, as well as participated in outdoor activities with my family. I eventually pursued a bachelor's degree in wildlife and fisheries due to my passion for the outdoors. I'm now working as an environmental educator and even my hobbies outside of work and school are tailored to the outdoors. This has led me to ponder the question: *How do environmental education field experiences influence college major and/or career choice in high school students?* I wonder if I am the only person who has been influenced in this way or if there are others who are following similar paths. To answer my question, I must first analyze the literature to build a foundation for my research. I'll begin by describing key terms that will be useful for understanding the themes associated with career choice. Then, I'll begin to explain career/major choices, career theories, and finally career interests.

#### Key Definitions

##### *STEM*

Science, technology, engineering, and mathematics (STEM) are growing topics of interest across the world today. STEM has become its own field of study, as well as a growing career cluster. With global issues arising such as climate change, food shortages, and natural disasters, the fields that STEM encompasses are becoming more and more important for the continuation of human civilization and conservation of our natural

resources. Hossain and Robinson (2012) explain that the only way we'll address these issues is by training Americans to pave the way in science and technology. According to Xue and Larson (2015), there is a surplus of STEM careers available, while the number of students pursuing degrees relating to those careers is inadequate. One way to ensure more students pursue STEM is by implementing federal STEM educational policy. According to Kuenzi (2008), federal STEM education policy focuses on "improving elementary and secondary preparation in math and science, recruiting new elementary and secondary math and science teachers, retooling current math and science teachers, increasing the number of undergraduate STEM degrees awarded, and supporting graduate and early-career research" (p. 27).

According to the U.S. Bureau of Labor statistics (2022), between 2021-31 STEM careers are set to increase numbers by 10%. They categorize STEM careers as those associated with computers and mathematics, engineering and architecture, physical and life sciences, and managerial and teaching positions that are affiliated with these subjects. Currently, there is a STEM crisis within the United States. Fewer students are pursuing STEM careers, therefore the STEM workforce is lacking (Hossain & Robinson, 2012). As the need for STEM careers increases, the U.S. is being forced to resort to foreign hires to supplement the needs of the growing workforce (Hossain & Robinson, 2012).

### ***Environmental Education***

One experience that may influence a students' career or college major choice may be exposure to environmental education. The North American Association for Environmental Education (NAAEE, n.d.) defines environmental education as a way to help people learn about the environment and develop the skills necessary to meet the

challenges of the future. Environmental education can be formal, such as a program associated with a school or nature center, or informal such as a family camping trip. There are also residential programs in which students and teachers stay overnight at a location and extend the learning beyond the traditional class times. Dettmann-Easler and Pease (1996) state that the benefits of residential environmental education programs include better relationships between students and better relationships between students and teachers, programs that adhere better to some students' learning styles, increase in the self-confidence of students, and students' ability to create lifelong memories. Students may gain interest in specific careers and majors just based on the experiences they have at these programs. These experiences may encourage students to pursue careers in a broad range of fields, including STEM. According to Project Learning Tree (n.d.), environmental education is also important in supporting STEM.

In 1990, the federal government passed the National Environmental Education Act (Public Law 101-619). The law was established due to the inadequacies of formal education in educating students about the environment and preparing them to work in environmental careers (Public Law 101-619). This law has paved the way for engaging students across the country in environmental education and STEM related programs. This regulation set aside federal funding for environmental education programs and established the Office of Education within the U.S. Environmental Protection Agency (Public Law 101-619). Each state has the ability to further require the implementation of environmental education programs within the public schools. Maryland, where this study takes place, each county is required to have their own environmental literacy program (Sec. 13a.04.17.01). As well as the literacy program, Maryland has environmental

literacy standards that must be followed when implementing said programs (Sec. 13a.04.17.01).

### **Career/Major Choice Influences**

A number of influences can be present in the career and college major decision making process. Influences may include the opinions of teachers, parents, and peers, preparation, personal characteristics and life positions, demographics including race and gender, as well as prior career exposure. In studying the impacts of gain/loss on decision making and associated feelings, Charpentier et al. (2016) determined that negative feelings may be important for determining how a decision is made. Career and major choices, similarly, may be influenced by feelings as well. If a student has more positive feelings toward a subject, it can be implied that they may be more interested in pursuing a career in that field versus a career in a field relating to a subject that brings up more negative thoughts.

A students' career/major choice may additionally be influenced by teachers, parents, and peers (Bergin, 2016; Humayon et al., 2018). According to Tey et al. (2020), teachers hold a unique position within a student's life. They can be viewed as role models and confidants for their students. Because of this, students may think highly of their opinions and suggestions about careers and college majors. Hutchinson-Anderson et al. (2015) also found that both middle and high school students felt more prepared to major in science when they had teachers that actively engaged in hands-on activities as well as maintained enthusiasm about the subject matter. Tey et al. (2020) also found that parents of Malaysian students had statistically significant influence on whether their students have STEM interests. This may be due to Asian cultures, which consider the parental

opinion to be very highly thought of. Humayon et al. (2018) state that the influence of parents on career choice in students is prevalent in Asian countries. In Tey et al.'s study (2020), it was determined that friends significantly influenced a student's career choice intention and that a student will be more likely to follow through with a career choice if their peers support them.

A student's positionality, or defining characteristics and position in life, may also influence their choice in career/major. Dickson (2010) states that "women, blacks, and Hispanics" are frequently excluded from pursuing the fields of science and engineering. According to Tsui (2007), these demographics are specifically underrepresented in the STEM field. Dickson explains that the reasons for this include various backgrounds in college preparation, differing dispositions to change majors, and the paygrade in the career may vary based on a student's attributes.

Tsui (2007) states that the reasons that there is low participation in the STEM field by African Americans, Native Americans, and Latinos is due to cultural, structural, and institutional differences. Tsui explains that cultural differences occur because varying cultures have varying expectations. Structural differences stem from laws and regulations that have historically prevented these minority groups from entering the field, for example the Jim Crow laws of the southern United States. And finally, institutional differences are rooted in discrimination.

Additionally, gender stereotypes influence the decision to pursue careers (Buschor et al., 2014). Dickson (2010) further states that women are less likely to pursue engineering even if they achieve similar standardized test scores as men or begin studying in that field. Overall, Buschor et al. state that engineering is still viewed as a



masculine field. While studying the likelihood for female high school students to pursue and follow through in college STEM majors, Buschor et al. found that overall these students consistently followed through with STEM majors. These students also explained, during qualitative interviews, that since childhood they had been interested in STEM and perceived themselves as scientists. These students additionally were interested in problem solving and careers that involved investigating issues.

The exposure that a student has had to various careers may also influence them to pursue said career. Jogan et al. (2009) found that not only did student attendees of a horse lover's day camp at the University of Arkansas become interested in animal science after attending, but also there was a significant increase in the number of female students that were interested in animal science, attending college in general, and even attending the University of Arkansas.

Career/major choice can be influenced by many factors. These include feelings about the career/major, the opinions of teachers, parents, and peers, as well as their demographics. Career/major choice could potentially be predicted for students prior to pursuing said career. One way this can be done is with career theories.

### **Career Theories**

Career interests could be predicted by one or more career theories. Career theories are those theories which describe how and why someone may pursue a specific career. Career theories often connect multiple career influences to determine exactly how a career is sought after, as well as the life stages that influence how careers are perceived. Career theories I will discuss in depth include, but are not limited to, the theory of planned behavior, developmental theory of career development, trait and factor theory,

general theory of occupational choice, personality theory of vocational choice, social cognitive career theory, early determinants of vocational choice, and the item response theory.

### ***Planned Behavior Theory***

The theory of planned behavior (Ajzen, 1991) can be associated with a person's attitude toward a specific career. According to Moore and Burrus (2018), the theory of planned behavior states that an indicator of behavior is the intention, which is influenced by attitude, subjective norms, and perceived behavioral control. Attitudes refer to how someone regards a behavior (Ajzen, 1991). For example, if someone believes they are "too good" for a certain job, they may never see themselves in that role. Subjective norms relate more to the pressures associated with following through or not following through with an action (Ajzen, 1991). For example, the peer pressures that are associated with high school students attending the prom. If all of their friends are going, they are more likely to attend, but if none of their friends are going there is less pressure to go to the dance. Perceived behavioral control refers to how easy or difficult it is to do something (Ajzen, 1991). For example, working at a fast food restaurant may seem like an easier career path than becoming a doctor.

Ajzen (1991) states that intentions epitomize motivations someone may have to do something. The higher the intention, the more likely it is for someone to follow through. According to Moore and Burrus (2016), this theory has been used to predict academic outcomes, particularly those in mathematics. They found that the theory of planned behavior could be used to predict ACT math test scores. Lipnevich et al. (2016) found that mathematics course grades could even be predicted this way. In a study that

focused on the comparison between actual mathematics grades and self-reported grades, Lipnevich et al. found that self-reported grades corresponded with actual grades for mathematics, which differed for other disciplines. The theory can even be used to predict which courses a student may enroll in during high school and college (Moore & Burrus, 2018). For example, Crawley and Black (1992) and Crawley and Koballa (1992) found that attitudes and perceived behavioral control could determine whether or not a student intended to enroll in a physics or chemistry course.

Moore and Burns (2018) explain that there are two types of attitudes: experiential and instrumental. Experiential attitudes set the tone for an activity, while instrumental attitudes deal with the usefulness of performing the activity. Experiential attitudes arise from a behavior having a positive effect on someone, so in relation to STEM a student may feel as though a science class is exciting and interesting. Instrumental attitudes are those that skew someone to believe the activity is worth their time, so in the case of STEM a student may not feel as though a social studies course would be useful to them if STEM is their real interest. According to Moore and Burrus, because attitude can influence intention in the theory of planned behavior, this means a student could potentially choose to pursue a career based on the societal associations that can be made about someone in that career. For example, a student may choose to become a medical doctor due to the perceived income associated with being a doctor. That same student may avoid working in the fast-food industry due to the general assumptions that those employees make less money and do not require additional schooling.

### ***Developmental Theory of Career Development***

In the developmental theory of career development (Super, 1980), high school students begin to explore various career options available to them (Tang et al., 2019). This period is crucial for students to become exposed to career options that are available to them. Important to this theory is one's own perception of self and the position which they are in (Ireh, 1999). Super describes perception of self as encompassing roles such as: child, student, leisurite (someone who primarily engages in leisure activities), citizen, worker, spouse, homemaker, parent, and pensioner. Super explains that there are additional roles as well, which describe one's position in life and not everyone will serve in all roles. For example one may be a worker and a sibling, but one may not ever be a spouse if they choose not to get married.

The perception of self is influenced heavily by one's position in life (Super, 1980), so for a student it can be heavily influenced by their schooling. From planning courses to prepare students for college to giving students the opportunities to pursue career and technology readiness programs, these opportunities are important for exposing students to the options that are available to them, which will ultimately determine their self perceptions and positions in life (Super, 1980).

### ***Trait and Factor Theory***

The trait and factor theory, first stated by Parson (1909), sets to match a person specifically to a career based on the characteristics and traits of each (Ireh, 1999; Zunka, 1990). This theory could be applied to assign students to careers best suited for their ability levels. For example, those with good organizational skills, teamwork, critical thinking, technical writing, and communication skills may be best suited for an office

environment, while those who prefer more hand-on work may be best suited in the field or laboratory. According to Ireh, “trait and factor theory focuses on the match between an individual’s aptitudes, achievements, interests, values, and personality and the requirements and conditions of occupations” (p. 30). The theory attempts to pair a person’s ability to the requirements of the job to determine success in that position (Ireh, 1999).

### ***General Theory of Occupational Choice***

Another career theory, the general theory of occupational choice (Ginzberg et al., 1951), uses three distinct stages to determine how someone decides upon a career as described by Ireh (1999). The first stage, or fantasy stage, happens between the ages of six to 11. This is when a child picks a career with no barriers in mind to achieving their goal. This is a timeframe when a child may talk of wanting to be an astronaut or firefighter with little explanation as to why. The second stage, or tentative period, happens between the ages of 11 to 17. During this stage, the adolescent begins to consider more barriers that may prevent them from achieving their goal or desire to pursue a career option. People begin to think about the skills they have, their interests, problems that may be associated with each career choice, and overall they begin to think about the reality of a career. Early during this period a person may decide they want a certain career and begin to explore their options. The third stage, or realistic period, happens from the age of 18 and above. This is the stage where reality sets in and someone must decide between the pros and cons of their career choices. In this stage, someone may decide they want to become a chemical engineer since they excelled at chemistry and physics in high school, as well as the potential job outlook and locations where jobs may be available. In

any case, someone in this stage will think critically about the career they are interested in and how it will impact other aspects of their life.

### ***Personality Theory of Vocational Choice***

The personality theory of vocational choice, developed by Holland (1973), which “assumes that when career choice is made the individual becomes a product of the interaction between his or her specific heredity with a variety of cultural and personal forces” (Ireh, 1999). The “forces” include, but are not limited to, the physical environment, culture, social class, peers, parents, and other adults of significance. According to Ireh, the six categories of personality are realistic, investigative, social, conventional, enterprising, and artistic (which are abbreviated with the acronym RIASEC). A realistic person tends to be more combative and less personable. For example, someone fitting this description may be more disagreeable or unable to take criticism well. Careers fitting this personality type include anesthesiologist, building inspector, cook, forest and conservation worker, and transportation engineer among others (The ASVAB career exploration program, n.d.). An investigative person tends to reach toward an understanding of everything. An example of an investigative person is someone who looks at both sides of an issue to fully understand the problem. Careers for this personality type include, but are not limited to anthropologists, computer network architects, computer programmers, market research analysts, and veterinarians (The ASVAB career exploration program, n.d.). A social person as someone who enjoys teaching or beneficial positions. For example, this would be a person who might be said to have a bubbly personality and is seen as outgoing. Careers that this personality is best suited for include athletic trainers, clergy, park naturalist, recreation worker, registered

nurses, teachers, and tour guides (The ASVAB career exploration program, n.d.). A conventional person is defined as “yes man” or someone that follows instructions and prefers auxiliary positions. In many cases, an example of a conventional person could be someone in an administrative assistant-type role that follows the orders of others.

According to the ASVAB career exploration program (n.d.), careers that fit this personality include accountants, court reporters, information security analysts, loan officers, pharmacy technicians, legal/secretaries, and tax preparers. Someone that is enterprising can be characterized by an assertive role. An example of this could be someone in a management position who is directly telling others what to do. Careers best suited to this personality type include advertising sales agents, coaches, judges, lawyers, detectives/criminal investigators, real estate agents, and travel guides (The ASVAB career exploration program, n.d.). And finally, an artistic person is described as someone who voices their opinions artistically. An example of an artistic person could be someone who is more of a visual learner and explainer instead of giving and receiving verbal descriptions. Careers that suit artistic people, according to the ASVAB career exploration program (n.d.), include actors, film and video editors, musicians, photographers, reporters, and set and exhibit designers.

According to Ireh (1999), a person will choose a career based on their own personality. The ASVAB career exploration program (n.d.) explains that for every personality type there is a suitable work environment. The personality theory of vocational choice is commonly used for the armed services vocational aptitude battery (abbreviated ASVAB) test (The ASVAB career exploration program, n.d.) . The ASVAB is a test often given to high school students who are interested in entering the military or

who are needing career guidance. This test is also used to determine career in the military. According to the ASVAB career exploration program (n.d.), the ASVAB test consists of multiple individual tests covering word knowledge, paragraph comprehension, mathematics knowledge, arithmetic reasoning, general science, mechanical comprehension, electronic information, and auto and shop information. These tests are broken down to form three career exploration scores: verbal skills, math skills, and science and technical skills. After taking the 200 question assessment, students can use their results to explore career options that best fit their personality type (The ASVAB career exploration program, n.d.).

### ***Social Cognitive Career Theory***

The social cognitive career theory (abbreviated SCCT) was originally developed by Lent et al. (1994) and is based on the social cognitive theory of Bandura (1977). Kaminsky and Behrend (2015) describe social cognitive theory as “a theory of motivation that suggests people are purposeful actors in their lives” (p. 386). The theory uses self-efficacy, or belief in oneself, to forecast future behavior (Mupinga & Caniglia, 2019). Therefore, SCCT states that someone will be more likely to pursue a career that they feel they can perform well in, as well as maintain it. Additionally, SCCT focuses on outcome expectations and personal goals (Leung, 2008). Outcome expectations are those results perceived by the individual in question. If a student does not think they are being successful, in turn, they may be unsuccessful. Personal goals can be broken down into choice content goals and performance goals. Choice content goals are those that help dictate which endeavors to pursue, while performance goals are those that are set based on the achievements someone wishes to accomplish (Leung, 2008). An example of a



choice content goal might be deciding to play a sport, while a performance goal might be aiming to receive an A in a class. SCCT could be applied to students to determine their interest in STEM if they already feel confident about their ability to perform well in science and mathematics courses.

According to Leung (2008), there are three pieces to SCCT that work to explain:

1) how academic and career interests develop; 2) how career choices are made by individuals and 3) how well someone performs and sticks with an educational choice or career. Leung explains that career choice is not a linear process and instead “unfolds” as a person interacts with their environment. This means a person’s home environment, school environment, family dynamics, extracurricular interests, etc. can impact career choice. Additionally, a person may need to compromise in career choice due to cultural beliefs, social barriers, etc. (Leung, 2008).

### ***Early Determinants of Vocational Choice***

Early determinants of vocational choice is a theory developed by Roe (1957). According to Ireh (1999), the theory determines that career choice is based on the emotional atmosphere within a home during adolescence. Ireh explains further that this atmosphere would have three separate aspects: “emotional concentration on the child, avoidance of the child, or acceptance of the child” (p. 34). Emotional concentration would signify either overprotection or over demanding nature from the parent. Avoidance would signify exclusion or neglect of the child and acceptance would allude to a child's independence.

## **Career Interests**

Career/major influences, as well as the many career theories mentioned above, may lead to a student's career interest. Career interest is a student's desire to engage in or fascination with a specific occupation. This differs from a career influence because the influences typically are people a student interacts with, their social class, race/ethnicity, etc., while career interest has to do more with a student's individual personality and preferences. Sahin and Waxman (2021) studied high school students' STEM interest over a four-year period and found interest had decreased from freshman to senior year. Further, they explained this could be due to over-exposure to STEM as well as being able to rationally decide to pursue STEM based on the information provided to them over that four-year timeframe.

A student's career interest may be influenced by prior exposure to STEM. Examples of activities where students may be exposed to STEM include field trips, summer camps, university workshops, science clubs, science fairs, and science museums (Baran et al., 2018). Another, more specific, example of this could be from environmental education field experiences. These experiences may take place at school or through school field trips. During a study on students' attitudes toward STEM and STEM careers, Baran et al. found that after attending an out-of-school STEM program, students showed an increased interest in science and engineering based on pre/post test results. They further explain that the specific increase in only science and engineering may be due to the structure of the program and suggest that future studies/programs do more to integrate mathematics and technology. Baran et al. (2018) also noted that the program potentially influenced the students desire to pursue careers in these fields.

In Allegany County, MD, county-wide STEM field experiences begin in fifth grade with an overnight outdoor school program and continue in grades 6, 7, 8, and in their high school earth and space science and chemistry courses. Because these experiences continue all through secondary school, it could be assumed that these activities, as well as others, may ignite interest in STEM careers. Individual schools/grades/classes may host additional STEM based activities and experiences, although those are not required by the Allegany County environmental literacy standards.

In addition to field trips and experiences, project-based learning may also lead students to an interest in STEM careers. According to Verma et al. (2011), actively engaging students, teachers, and community partners in STEM activities relating to careers in the marine industry can interest students to pursue those careers in the future. They held professional development training for teachers and created marine kits with STEM activities that teach students about ship building, an important industry in the Southern Virginia region where the study took place. The project was also supported by the local ship industries, which furthers student engagement in STEM and affiliated careers.

## **Conclusion**

A students' career/major choice can be influenced by a number of factors including parents, peers, teachers, demographics, and career exposure. This can vary from individual to individual, as well as by environment. Additionally, there are multiple theories that set out to determine which career a student will pursue. Many of these theories focus on self-efficacy, environment, and interest. Interest in STEM fields and careers may decrease over time during secondary school, but environmental field

experiences throughout school may kindle or rekindle further interest. With this information in mind, I set out to answer the question: How *do environmental education field experiences influence college major and/or career choice in high school juniors and seniors?* In chapter three, I'll address the methodology that was followed to complete this research including setting and participants, data collection, and ethics.

## CHAPTER THREE

### Methods

#### Introduction

Environmental education is a powerful tool that removes students from their traditional classroom and provides novel and enriching experiences in new and exciting environments. For me personally, these opportunities influenced my own personal college major choice, as well as my career choice. Those hands-on moments of collecting macroinvertebrates in the stream and hiking through a bog were critical influencers for me, but am I the only person that has had similar experiences or is this a common phenomenon? This led me to the question: *How do environmental education field experiences influence college major and/or career choice in high school students?* This chapter sets out to explain the quantitative methods I have followed to pursue this question. To do this, I drafted a survey to ask high school students about their career aspirations and the influence of environmental education, then I analyzed the data that was collected to determine if there is a connection between environmental education field experiences and career choice.

#### A Quantitative Approach

In this study, I have taken a quantitative approach to data collection. Quantitative analysis focuses on comparing variables. In this case, the variables I analyzed were a participant's participation in environmental education field experiences and their desire to pursue a career in the STEM field. According to Creswell and Creswell (2018), surveys are a valid approach to collecting quantitative data. In this study, the independent variable

is the number of environmental education field experiences a student participated in, while the dependent variable is the student's major.

This design was utilized due to its less invasive nature, ease of replication, and low cost (Montello & Sutton, 2013). The survey is cross-sectional and applied through Google Forms. A cross-sectional survey was chosen due to its ability to answer the research question and capture the high school students' responses. By using Google Forms, I allowed participants to submit their survey on their own time, as well as collect data in one document as surveys were submitted.

### **Setting and Participants**

The survey was created using Google Forms, where it was distributed to secondary science teachers. Science teachers were asked by Allegany County's Secondary Science and STEM Supervisor to distribute the survey to their students. The message included information about the study, as well as information about the researcher.

Participants included high school students, primarily freshman, sophomores, and juniors enrolled in Allegany County Public Schools (ACPS) located in Allegany County, Maryland. ACPS has three main high schools, as well as one career and technical school. ACPS had a population total of approximately 1000 high school students during the 2022-2023 school year. Of these students, 436 students participated in this survey. High school students were chosen since they would be more likely to be exploring actual career options and potentially even choosing high school classes based on those career interests.

## **Methods**

### ***Data Collection Tool***

Before surveys could be distributed, parental consent had to be obtained, since participants were minors (See Appendix A). In accordance with the Hamline University Institutional Review Board, a letter of consent was distributed to potential participants by Allegany County Public Schools. The survey consisted of twenty-one multiple choice and open-ended questions (See Appendix A). Multiple choice questions were used to determine which environmental education field experiences, if any, that students participated in, while open-ended questions were used to determine if these experiences increased student interest in the STEM field as a career option. Survey questions were given to Allegany County Public Schools, who created and distributed a Google Form to participating students. Surveys were voluntary and anonymous. Surveys were distributed on May 19, 2023 and data collection lasted two weeks. Allegany County Public Schools received survey results and removed demographic information so that students would not be identifiable.

### ***Data Analysis***

Google Sheets was used to organize data and determine means. Data points, such as career choice, were analyzed by using percentages similar to methods described in Armstrong (1984). To do this, career choices were categorized to fit into the four STEM categories, as well as three additional categories: unknown career choice, other career choice, or non-STEM career choice. Sciences included any careers/majors pertaining to medicine, biology, chemistry, geography, and geology. Technology categorized any careers that primarily utilized technology such as computers and computer programs,

which would include computer sciences. Engineering describes all forms of engineers. Mathematics depicts careers utilizing math, which include accounting and other business related subjects. Because many students indicated being unsure of their intended career choice, an unknown category was created. The non-STEM category allowed for a section dedicated to careers that focused more on professional sports, law, etc. that do not fit into the STEM categories allotted by Armstrong (1984). Demographic information was paired with survey results to determine if there were any trends based on a participant's background and their career/college major choice.

### **Ethics**

Approval to complete this study was obtained by both Hamline University's Institutional Review Board, as well as Allegany County Public Schools. Parental consent was granted for high school students to complete surveys and compliance was made to avoid FERPA violations. Only 143 students returned their consent form, despite 436 participating in the survey. This required additional consent from Hamline's Institutional Review Board, as well as consent from ACPS to pursue data analysis of all participants despite having parental consent. Privacy and confidentiality were maintained throughout the study.

### **Conclusion**

I have taken a quantitative approach to answering the question: *How do environmental education field experiences influence college major and/or career choice in high school juniors and seniors?* I have taken a quantitative approach. Surveys were distributed to ACPS high school juniors and seniors to collect data on their career/college major influences. Data was compiled, along with their demographic information. The



data was then statistically analyzed to determine if the findings were significant and if there is a link between environmental education field experiences and college major/career choice. The next chapter will discuss the results of these surveys in detail.

## CHAPTER FOUR

### Results

#### Introduction

To answer the research question *How environmental education field experiences influence college major and/or career choice in high school students?*, data was anonymously collected from 436 high school students attending Allegany County Public Schools, although the population of students that the survey was distributed to was approximately 1000. To do this, surveys were distributed online by the school system to high school science teachers, who then distributed surveys to their students. In this chapter, I aim to share my analysis of the data and ultimately my findings on the influence of environmental education field experiences on college major/career choice in high school students.

Some participant responses were excluded from the data due to assumed inaccuracy or because the answers participants provided did not answer the question. Examples included, but were not limited to, some freshman and sophomore participants stating they are enrolled in a Center for Career and Technical Education program (found to be inaccurate since only juniors and seniors can attend these classes and enroll in these programs), outdoor recreation activities relating to sporting being reported as a student leisure outdoor experience (which was not an option for the study), etc.

This chapter will highlight the research findings based on the 21 question survey that was administered to participants from Allegany County Public Schools high schools. These findings include: student demographics, student perception of support systems,

student personal values and interests, as well as career choice and college majors, and the influence of environmental education.

### **Participant Demographics**

Demographic information was anonymously collected from participants and analyzed. Demographics included gender, race, ethnicity, year in high school, and whether a student was enrolled in a completer program (Table 1) Completer programs are those that allow students to gain an introduction to a career field. These include enrollment in a trade program at the Center for Career and Technical Education, Project Lead the Way biomedical program, or the Agriculture completer program. These demographics were chosen not only because they give information on the participants background and experiences, but also because they explain which career options participants have already been exposed to at this point in their lives.

Table 1

*Demographic Data from 436 Participants*

Demographic		Female	Male	Nonbinary	Freshman	Sophomore	Junior
	<b>Number of Students who reported Gender &amp; School Year</b>	180	175	13	139	145	144
<b>Completer Program</b>							
	<b>Career Center</b>	7	21	0	0	0	4
	<b>Project Lead the Way</b>	45	13	3	27	15	19
	<b>Ag Completer</b>	1	3	1	0	1	4
<b>Ethnicity</b>							
	<b>Hispanic or Latino or of Spanish Origin</b>	6	8	2	11	2	5
	<b>Not Hispanic or Latino or of Spanish Origin</b>	200	187	14	128	139	137
<b>Race</b>							
	<b>American Indian or Native Alaskan</b>	0	1	0	1	2	0
	<b>Black or African American</b>	12	3	1	9	3	6
	<b>Asian</b>	2	3	0	0	5	3
	<b>Native Hawaiian or Other Pacific Islander</b>	1	0	0	1	0	0
	<b>White</b>	140	142	9	108	118	109
	<b>Two or More Races</b>	23	25	3	18	17	24

*Note.* Survey fields were not required to be completed, so total submissions varied by question.

## **Participant Perception of Support Systems**

Students gain support from a variety of sources including their families, teachers, and peers (Bergin, 2016; Humayon et al., 2018). Participants were asked questions that pertained to their family's values and whether or not participants believe that their families are in support of their career goals. Participants expressed that most of their families (87.9%) enjoy spending time outdoors, although over 10% of participants expressed that their families did not enjoy said time. Lack of family involvement in outdoor activities may decrease interest in STEM careers affiliated with being outdoors (Tey et al., 2020). A student who is not exposed to being outdoors in their youth may show a lack of interest in working outdoors in the future.

Additionally, 94.9% of participants feel their families support their career goals. Although most participants indicated that their families support their career goals, it's important to note that participants who identified as being Black or African American reported a slightly lower average percentage for daily support (88.7%). On the other hand, participants who identified as female (94.8%) aligned more with the average percentage for family support (94.9%). It is important for students to have encouragement in their choices, especially those pertaining to their future. Students are more likely to succeed when they have a sound support system backing their choices (Bergin, 2016; Humayon et al., 2018; Tey et al., 2020; Hutchinson-Anderson et al., 2015).

Participants were also asked questions pertaining to their teacher's support of their career goals and their interest in the courses they teach. Since teachers tend to be trustworthy adults that students may even look up to as role models, their opinions may be important to some students. Overall, most participants (93.5%) believe their teachers

support their career goals. Having support from adults outside of their family unit is important (Tey et al., 2020), especially because high school students can be impressionable. What's more, participants reported that they believe most teachers (95.2%) are interested in the subjects they teach. Students being exposed to teachers who are disinterested in the subjects they teach can, unfortunately, make or break their opinions of school subjects (Hutchinson-Anderson et al., 2015). Student interest in the subject matter increases when their teachers are enthusiastic as well.

### **Participant Personal Values & Interests**

Students often pursue careers based on their own personal values and interests. Eighty percent of participants agree or strongly agree that they value spending time outdoors. This data point is important since many environmental education field experiences occur outdoors. Because of this, one can assume that students who don't value time outdoors aren't going to be as interested or enthusiastic about programs and events such as environmental education experiences.

Although spending time outdoors may not necessarily impact career choice, it may be indicative of interest in pursuing leisure activities that occur outdoors outside of school. Responses explain that 60.9% of participants do participate in leisure activities outside of school including hunting, fishing, kayaking, camping, gardening, hiking, biking, birding, backpacking, planting trees, paddle sports, and collecting a variety of amphibians and macroinvertebrates. These activities have a number of traits in common. First, they all take place outdoors. They also tend to require some degree of physical activity and movement (unlike passive activities such as watching television or playing a video game). Participants who are interested in these activities outside of school may be

more likely to pursue careers that are tied to the outdoors or even careers that have ties to these specific activities.

### **Career Choice and College Majors**

Students are often encouraged to follow a career path that interests them. That may be a school subject they really enjoyed, a hobby they couldn't get enough of, or even a club or organization they participated in. Prior research by Verma et al. (2011) showed that students who were engaged in STEM activities relating to marine science were often more likely to show interest in pursuing those careers. When asked whether or not they planned to attend college or a technical school, 69.8% of participants reported yes, 9.03% of participants reported no, and 20.4% of participants reported maybe. This data shows that participants have been encouraged to attend a college/technical school. The data also explains that over the years, there is a slight increase in the average number of participants planning to attend college or technical school (Table 2). This could be due to the fact that as high school graduation approaches, students are exposed to more career options and encouraged to choose a career path.

**Table 2**

*Average Number of Participants Planning to Attend a College or Technical School*

	<b>Yes</b>	<b>No</b>	<b>Maybe</b>
<b>Freshman</b>	62.32%	12.32%	24.64%
<b>Sophomore</b>	70.71%	7.14%	22.14%
<b>Junior</b>	76.76%	7.75%	14.79%

*Note.* As the year in school increases, so does the number of participants planning to attend.

When participants were asked what their intended career goal is, a variety of responses were collected including veterinarian, athletic trainer, nursing, carpentry, engineers, and auto body mechanics, just to name a few. Because my interest is in STEM careers, the responses were grouped into seven categories: science, technology, engineering, mathematics, unknown, other, and not STEM. This follows Armstrong (1984) categorization method, with the addition of the categories for unknown career choice, other career choice, and non-STEM career choice. Participant responses indicated that participants intended to pursue a careers in: science (38.9%), technology (4.6%), engineering (6.7%), mathematics (3.9%), unknown (14.6%), other (7.2%), and non-STEM (24.1%). That means that over half of participants (54.1%) intend to pursue careers in the STEM fields (Table 3). Overwhelmingly, the results show that many participants have already determined a career path they wish to follow and nearly 20% of those participants are already enrolled in introductory programs within their high schools that will help them achieve those goals.



**Table 3**

*Total and average number of participants who intend to pursue careers in various STEM and non-STEM fields*

<b>Career Category</b>	<b>Number</b>	<b>Average</b>
<b>Science</b>	152	38.97%
<b>Technology</b>	18	4.62%
<b>Engineering</b>	26	6.67%
<b>Mathematics</b>	15	3.85%
<b>Unknown</b>	57	14.62%
<b>Other</b>	28	7.18%
<b>Non-STEM</b>	94	24.10%
<b>Total Participants</b>	390	

*Note.* Although there were 436 participants, survey fields were not required to be completed and total submissions varied by question.

### **Influence of Environmental Education**

Students in Allegany County Public Schools are exposed to a variety of formal environmental education field experiences. These include, but are not limited to, the After School Program in elementary and middle school, Schoolyard PIERS program, Evergreen Heritage Center's Elementary Edibles program, sixth and eighth grade field trips to Evergreen Heritage Center, seventh grade field trip to Rocky Gap State Park, high school Earth and Space Science field trip to Evergreen Heritage Center, high school Biology field trip to Allegany College of Maryland, high school Chemistry in-class visits from Evergreen Heritage Center, Environthon, and school Volunteer days. See Table 4 for average number of participants who have participated in each of these programs.

Table 4

*Total and Average Number of Participants Who Have Participated in Formal School-Sponsored Environmental Education Field Experiences*

<b>Program</b>	<b>Number of Participants</b>	<b>Average % of Participants</b>
<b>Elementary Edibles</b>	51	18.02%
<b>Schoolyard PIERS</b>	6	2.12%
<b>After School</b>	60	21.20%
<b>6th Grade field trip to Evergreen Heritage Center</b>	181	63.96%
<b>7th Grade field trip to Rocky Gap State Park</b>	123	43.46%
<b>8th Grade field trip to Evergreen Heritage Center</b>	125	44.17%
<b>Earth &amp; Space Science field trip to Evergreen Heritage Center</b>	93	32.86%
<b>Biology field trip to Allegany College of Maryland</b>	33	11.66%
<b>Chemistry in-class visit from Evergreen Heritage Center</b>	96	33.92%
<b>Envirothon</b>	21	7.42%
<b>Volunteer Days</b>	33	11.66%
<b>Other</b>	9	3.18%
<b>Total Participants</b>	283	

*Note.* Although there were 436 participants, survey fields were not required to be completed and total submissions varied by question.

More participants indicated that they attended the sixth grade field trip to Evergreen Heritage Center (41.7%). This could be because freshman participants have

not been exposed to all of the same programs that upperclassmen have. Another reason for this could be because many participants missed out on field trips during the COVID-19 pandemic. If the sixth grade trip was their first return to normalcy, it may resonate with participants more so than other trips. Some environmental education programs or courses in which the programs occurred are also optional. This would explain why the average number of participants who participated in these programs is lower (Schoolyard PIERS, Volunteer days, Environthon, etc.).

Additionally, outside of school students may be exposed to environmental education field experiences. Of the responding participants, 31.8% stated they did participate in non-school-related formal environmental education field experiences through organizations and programs such as 4-H, Boy Scouts/Girl Scouts, summer outdoor camps, and programs at parks and nature centers. Participants responses reveal that of the 31.8%, there was an average of 26.1% of participants in 4-H, 21.0% of participants in programs at parks and nature centers, 43.5% of participants who attended summer outdoor camps, and 40.6% of participants who were in Boy Scouts/Girl Scouts. This information reveals that because these participants are interested in formal programs and organizations that are tailored to the outdoors, they may be more interested in pursuing careers that follow suit.

Participants were also asked if they felt that their own personal environmental education field experiences had influenced their desire to pursue their intended career goal. Of those participants, over half (61.9%) stated that they agreed or strongly agreed that those experiences did influence their intended career choice. Sophomore participants

disagreed and strongly disagreed slightly more than other classes (40.9%), although the reason for this is not necessarily clear.

### **Conclusion**

High school students are exposed to a wide variety of formal and informal environmental education field experiences in and outside of school. These experiences seem to have influenced many participants to pursue careers in the STEM field. Based on the findings of this study, it seems as though many Allegany County Public School high schoolers are interested in the outdoors, not only in the school setting, but also in their free time. This level of interest may guide student choices in the direction of STEM careers, especially given their high levels of perceived support from both parents and teachers.

To return to the research question for this study, *How do environmental education field experiences influence college major and/or career choice in high school students?*

61.9% of participants agree or strongly agree that their environmental education field experiences have influenced them to pursue their intended career choice. Of the participants who identify as Black or African American, 54.7% agree or strongly agree that their career choice has been influenced by their environmental education field experiences and of the participants who identify as female 68.1% agree or strongly agree. Many seek these experiences outside of school formally and informally, which may escalate their interest levels in related fields, such as STEM. Exposing students to a variety of different programs and trips gives them opportunities to explore their interests within the realm of STEM. Many participants have indicated interest in pursuing STEM careers in fields such as: human health, business, biology, programming, veterinary

health, cyber security, and engineering. Because most of these participants feel as though they have a strong support system (parents and teachers), it is more likely that they will successfully pursue these options when and if they apply to colleges and technical schools in the future. Chapter Five will reflect on this research as a whole, focusing on the positives and negatives, as well as suggestions for future research.

## CHAPTER FIVE

### Conclusion

The research in this thesis sought out to answer the question *How do environmental education field experiences influence college major and/or career choice in high school students?* This chapter will review why this topic was chosen, its connection to prior studies, implications of this research, and finally suggestions for future research.

#### **Why Study the Impact of Environmental Education Field Experiences?**

As an environmental educator, this research topic has been near and dear to my heart. I was influenced, from an early age, by the formal and informal environmental education experiences I had. I can recall specific people, places, and events that have been crucial to my foundation as an educator. Because I have had such positive experiences, which later influenced me to pursue this career within the STEM field, there are surely others who have been or are being influenced as well. This brought me to my research topic. Since I was more interested in learning how these experiences will influence career choice, I wanted to select an age group that has been exposed to or has had more opportunities to be exposed to environmental education field experiences. Because of this, high school students were selected as my participants.

#### **Connecting the Results to Prior Research**

Numerous studies have been conducted on careers and college major choice. Career choice and college major can often be influenced by teachers, parents, peers, preparation, personal characteristics and life positions, demographics, and prior career exposure. The results of this study indicate that high school students in Allegany County

Public Schools feel supported by their families and teachers, which aligns with the findings of Hutchinson-Anderson et al. (2015) and Tey et al. (2020). Additionally, their families, as well as these students individually, value time outdoors. This aligns with prior research findings in Bergin (2016) and Humayon et al. (2018).

There are a number of theories that indicate how and why people choose their careers. The results of this study align more closely with Super's (1980) developmental theory of career development. This theory states that high school students will begin to explore careers that are available to them (Tang et al., 2019), which connects to participants who are already enrolled in completer programs. These programs allow students to explore their career interests early, which will influence their perception of self, as explained by Super (1980).

Interest in STEM and STEM careers increases after students attend out-of-school programs, as determined by Baran et al. (2019). When asked about their exposure to environmental education field experiences, which can be classified as a subfield of STEM, over half of participants in the current study reported that both their formal and informal experiences influenced their career or college major choice. Additionally, over half of participants reported that they intend to pursue careers in the STEM field. This information is imperative for the field of environmental education, as well as Allegany County Public Schools.

### **Implications of this Research**

The state of Maryland has legislation that requires all public school students to participate in environmental education (The Code of Maryland Regulations, 1989). Currently, students in Allegany County Public Schools are offered a number of school

sponsored programs including Elementary Edibles, fifth grade Outdoor School, sixth grade field trip to Evergreen Heritage Center, seventh grade field trip to Rocky Gap State Park, and high school Earth and Space Science field trip to Evergreen Heritage Center, just to name a few. These formal environmental education programs introduce students to topics and activities that otherwise may be difficult for classroom teachers to implement. Because these programs have had such a strong influence on the career choice and/or college major choice of over half of the participants in the current study, it is clear that these programs are impacting the future of the students who attend and potentially the future of the STEM job market. Additionally, this study gathered information on student interests outside of school, which may be beneficial for program planning, as well as gaining a better understanding of student interests and learning styles.

On a broader scale, one should note that Allegany County, Maryland has a very depressed economy. As of 2022-2023, of the 22 schools within Allegany County Public Schools, 10 host programs as Title I institutions. According to Allegany County Public Schools (n.d.):

Title I is a federal program authorized by the Every Student Succeeds Act (ESSA) which provides supplemental funding to schools that qualify according to Free and Reduced Meal Student (FARMS) eligibility. There are ten Title I schools in Allegany County Public Schools with schoolwide programs. The supplemental funding which these schools receive may provide personnel, professional development, instructional materials, and parent/family engagement programs.

As of 2022, Allegany County also has an unemployment rate of 4%, which is higher than the state average (State of Maryland, 2023) of 3.2% and the national average



(U.S. Bureau of Labor Statistics, 2023) of 3.6percent for the same year. Allegany County also sits in a location sandwiched between both Pennsylvania and West Virginia forming a tri-state area that hosts ample employment opportunities, especially in the STEM field, such as Maryland Department of Natural Resources, University of Pittsburgh Medical Center, West Virginia University Medicine, Northrop Grumman, and IBM to name a few.

This “geographic sandwich” places students in Allegany County at the epicenter of opportunity despite the economic hardships that residents may experience here.

Students in Allegany County have ample opportunities to learn about and visit local colleges, such as Allegany College of Maryland located in Cumberland, Maryland and Frostburg State University located in Frostburg, Maryland. Opportunities to continue education in Allegany County are widely available to students through in-county tuition rates, grants, and local scholarship opportunities (Allegany College of Maryland, 2023; Frostburg State University, 2023).

### **Limitations of this Study**

This study was limited by a number of factors. The survey took place at the very end of the school year. Unfortunately, this meant many students did not participate.

Initially, I intended to survey high school juniors and seniors because many had begun visiting colleges and trade schools, talking to military recruiters, etc., so they were already being exposed to, and even choosing, potential majors and career options. Due to timing constraints, the actual participants were in grades nine through eleven.

Additionally, gaining permission from the school system’s attorney and superintendent took time. My intention was to use an opt-out form, so that parents/guardians who did not want their children to participate could opt-out, but the attorney and superintendent

preferred having written consent from parents/guardians for each participant.

Additionally, the results of this study only reflect the views of 434 students. Of these results, only 143 students completed and turned in the consent forms. I was required to obtain special permission from the Institutional Review Board and Allegany County Public Schools to complete the study using the full dataset. This small sample size also may not fully reflect the population of high school students in Allegany County Public Schools.

### **Recommendations for Future Studies**

This study has taught me a lot about the research process. In the future, I would make a number of changes to its design. One suggestion is to open the survey up to other school systems. This would increase the number of participants, as well as change the school-sponsored programs that students are exposed to. I would also add in questions pertaining to positives and negatives associated with said programs. Finally, a long term objective would be to survey a cohort of students each year of high school and follow them through college to determine how their career goals have changed over time and why they have changed.

### **Summary**

*How do environmental education field experiences influence college major and/or career choice in high school students?* Students are exposed to a number of environmental education field experiences throughout their schooling. As someone whose career has been influenced by these programs, I have found it interesting to learn if others have had similar experiences. This study determined that this was in fact true based on the survey results from Allegany County Public School high school students.

Many students felt they had the support from both their families and their teachers, which has been noted in prior studies as being an influence in career and major choice (Hutchinson-Anderson et al.; Tey et al.). Being supported is imperative to identifying a sense of self.

Over half of participants in the current study reported that they intend to pursue a career in STEM and over 60% reported that their career and/or major choice was influenced by the environmental education field experiences they have had. This means that these experiences are crucial for introducing students to career options and fields.

Allegany County Public Schools will be able to use this information to make decisions going forward about the content and approach to their school sponsored environmental education programs. Additionally, future studies may benefit from an increased sample size, including additional school districts, and potentially implementing a long term study to focus on how these programs change career and major interest over time.

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**APPENDIX A**  
**Survey Questions**

*Demographic Questions*

1. To which gender identity do you most identify?
  - a. Female
  - b. Male
  - c. Nonbinary
  
2. How do you identify your race? Choose all that apply.
  - a. American Indian or Native Alaskan
  - b. Asian
  - c. Black or African American
  - d. Native Hawaiian or Other Pacific Islander
  - e. White
  - f. Two or more races
  
3. To which ethnicity do you most identify?
  - a. Hispanic or Latino or Spanish Origin
  - b. Not Hispanic or Latino or Spanish Origin
  
4. Which year of high school are you currently in?
  - a. Freshman
  - b. Sophomore
  - c. Junior
  - d. Senior

5. Are you currently enrolled in a career/technical program at your local high school or at CCTE (i.e. career and technical program through CCTE, Project Lead the Way, Ag Completer, etc.)?
  - a. Yes
  - b. No
6. If you said yes to question 5, which program type?
  - a. Career & Technical Education Program (through CCTE)
  - b. Project Lead the Way
  - c. Ag Completer
  - d. Other \_\_\_\_\_

*Formal Environmental Education Experiences*

7. Have you participated in school-sponsored environmental education programs?
  - a. Yes
  - b. No
8. If you answered yes to question 7, which of the following did you participate in?
  - a. Elementary Edibles (growing & tasting vegetables in your elementary school)
  - b. Schoolyard PIERS Program
  - c. After School Program
  - d. 6th Grade field trip to Evergreen Heritage Center
  - e. 7th Grade field trip to Rocky Gap State Park
  - f. 8th Grade field trip to Evergreen Heritage Center

- g. Earth & Space Science field trip to Evergreen Heritage Center (high school)
  - h. Biology field trip to Allegany College of Maryland
  - i. Chemistry in-class visit from Evergreen Heritage Center
  - j. Envirothon
  - k. Volunteer Days
9. Have you participated in formal environmental education opportunities not sponsored by your school?
- a. Yes
  - b. No
10. If you answered yes to question 9, which of the following have you participated in?
- a. Boy Scouts/Girl Scouts
  - b. 4-H
  - c. Summer outdoor camp
  - d. Programs at Nature Centers

*Informal Environmental Education Experiences*

11. Have you participated in other leisure (for fun) outdoor experiences not sponsored by your school?
- a. Yes
  - b. No

12. If you answered yes to question 11, please explain. Examples may include, but are not limited to catching tadpoles or crayfish, birding, planting trees, etc.

*Education/Career Aspirations*

13. What is your intended career goal?
14. Do you plan to attend college or a technical school?
- a. Yes
  - b. No
  - c. Maybe
15. If you answered yes to question 14, what is your intended college major?

To what degree do you agree or disagree with the following statements.

16. I value spending time outdoors.
- a. Strongly disagree
  - b. Disagree
  - c. Agree
  - d. Strongly agree
17. My family values spending time outdoors.
- a. Strongly disagree
  - b. Disagree
  - c. Agree
  - d. Strongly agree
18. My science teachers are interested in the subjects they teach.
- a. Strongly disagree

- b. Disagree
- c. Agree
- d. Strongly agree

19. My teachers support my career goals.

- a. Strongly disagree
- b. Disagree
- c. Agree
- d. Strongly agree

20. My family supports my career goals.

- a. Strongly disagree
- b. Disagree
- c. Agree
- d. Strongly agree

21. I feel that my environmental education experiences (mentioned in questions 8, 10, & 12) have influenced my desire to pursue my intended career choice.

- a. Strongly disagree
- b. Disagree
- c. Agree
- d. Strongly agree

### Informed Consent to Participate in Research

Your student is being asked to participate in an anonymous online survey about the influences of environmental education on career choice. The survey will first ask for general demographic info such as grade, race/ethnicity, gender identity, and technical program enrollment. (As this survey is completely anonymous, we will not ask for your child's name). Then, questions will be asked about your child's formal environmental education experiences (school-sponsored programs and field trips, organizations outside of school sponsoring similar programs/trips). Next, questions will be asked about informal outdoor education experiences (outdoor leisure activities). Then, questions will be asked about career goals and aspirations (career choice, college attendance, college major). Finally, the survey will ask questions pertaining to your child's value scale of the outdoors and their assumed support system (family, teachers).

We assure you that this survey is completely anonymous. We will not ask your child's name, initials, birth date, email address, team or club your child is a member of (if applicable), or any other potentially personally identifying information. We will also not ask about any of the following sensitive information: sexual activity, victimization, illegal behaviors, information that could reasonably place your child at risk for criminal or civil liability, and information that could be damaging to you or your child's financial standing, employability, or reputation.

Although this study is of minimal risk, there is always some level of risk associated with participating in any study. For this study, the risks include the loss of privacy or confidentiality (although this is minimized greatly by not collecting personally identifying information). Your student's participation in this study is entirely voluntary, and completing the survey should take no more than 15 min. If you do not wish for your student to participate in this study, please check the box below.

Student's full name: \_\_\_\_\_

I allow my student to participate in this survey.

I do not allow my student to participate in this survey.

Parent/Guardian name (printed) \_\_\_\_\_

Parent/Guardian name (signature) \_\_\_\_\_

### **Student Assent (Top of Survey)**

You are being asked to participate in an anonymous online survey about the influences of environmental education on career choice. The survey will first ask for general demographic info such as grade, race/ethnicity, gender identity, and technical program enrollment. (As this survey is completely anonymous, we will not ask for your name.) Then, questions will be asked about your formal environmental education experiences (school-sponsored programs and field trips, organizations outside of school sponsoring similar programs/trips). Next, questions will be asked about informal outdoor education experiences (outdoor leisure activities). Then, questions will be asked about career goals and aspirations (career choice, college attendance, college major). Finally, the survey will ask questions pertaining to your values of the outdoors and your assumed support system (family, teachers).

We assure you that this survey is completely anonymous. We will not ask your name, initials, birth date, email address, team or club you are a member of (if applicable), or any other potentially personally identifying information. We will also not ask about any of the following sensitive information: sexual activity, victimization, illegal behaviors, information that could reasonably place you at risk for criminal or civil liability, and information that could be damaging to your financial standing, employability, or reputation.

Although this study is of minimal risk, there is always some level of risk associated with participating in any study. For this study, the risks include the loss of privacy or confidentiality (although this is minimized greatly by not collecting personally identifying information). Your participation in this study is entirely voluntary, and completing the survey should take no more than 15 min. If you do not wish to participate in this study, please exit the survey at this time.

By completing this survey, you are giving your assent. You may stop taking the survey at any time if you decide you no longer want to continue. If you would like to discuss concerns or questions about this survey, you may contact the student researcher at [lday04@hamline.edu](mailto:lday04@hamline.edu) or the Faculty Advisor for this research project at [jeimer@hamline.edu](mailto:jeimer@hamline.edu). (If you do not want to participate, simply close the form and disregard the message. If you begin the survey and decide you no longer want to participate, simply close the form; your answers will not be recorded.)