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Benefits of Environmental Education for Low-Income Elementary School Students

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Abstract

This study analyzes the benefits of environmental education for low-income elementary school students. As the world is seeing a turbulent downfall in the state of the environment, fostering a healthy and eager generation to find solutions to this crisis is essential. Through analysis using a literature review and qualitative interviews and surveys with in-service teachers and outreach educators, the results determine there are benefits to implementing environmental education for low-income elementary school students. These benefits extend beyond environmental agency and profoundly impact the cognitive, mental, and physical development of low-income students.

Introduction and Background

In an era plagued with growing environmental crises, environmental education unlocks countless undiscovered solutions. These solutions are limitless, directly depending on a generation fostered in a passion for protecting their communities and the planet. When implemented in elementary schools, environmental education gives students the skills and foundational knowledge to positively impact the world around them. However, while environmental education is crucial for addressing environmental challenges, the benefits it provides for students extend beyond the scope of passion and advocacy.

The benefits environmental education has to offer affect all students. However, its impacts on low-income students are invaluable. Low-income students face disparities in nature access that affect cognitive, mental, and physical development, consequently impacting student health and academic performance (Rowland-Shea 2020). For some students, the only time they have access to nature is at school. Environmental education gives students access to the environment in direct and indirect manners, combating the disparities low-income students face. Its implementation has loose constraints, allowing educators to choose a method that fits the needs of their students.

This study will unveil the benefits of environmental education for low-income students through a literature review defining environmental education, observing its history, and the role of the Next Generation Science Standards and through qualitative interviews and surveys for outreach educators, in-service teachers, and students. The following questions guide this research.

Primary Research Question:

How does environmental education benefit low-income elementary school students?

Secondary Research Questions:

1. What does research say about the benefits of environmental education on elementary school students? To what extent does it apply to low-income elementary school students?
2. How do outreach educators and in-service teachers implement environmental education to benefit elementary school students in general? And to what extent does it benefit low-income students?
3. How do outreach educators and in-service teachers know that environmental education benefits elementary school students, including low-income students, in their classrooms? And how do students feel environmental education benefits them?
4. What are the resources that outreach educators and in-service teachers need in order to implement environmental education success for their students, including low-income students, in their classrooms?

Literature Review

In order to determine the benefits of environmental education for low-income elementary school students, one first has to develop a general understanding of what environmental education is, the history of which it was founded, and the role the Next Generation Science Standards play in schools' incorporation of environmental education. Utilizing the research already conducted in this field, this study analyzes important trends to answer driving research questions to determine the overall benefits of environmental education for low-income elementary school students. The following subsequent paragraphs will define environmental education, unveil its history, and analyze the correlation between the Next Generation Science Standards and elementary schools.

Defining Environmental Education. Environmental education is notorious for its seemingly undefinable attributes, often muddled with its predecessors, outdoor education, nature study, and conservation education (Carter & Simmons, 2010). While the foundation of environmental education is comprised of the hands-on approach of outdoor education, the replenishment and recreation of nature study, and the environmental agency of conservation education, its distinction lies in its emphasis on environmental literacy (Carter & Simmons, 2010). To be environmentally literate is to be aware of the environment and the predicaments it faces while having the skills and background knowledge to work toward solutions (McBride et al., 2013). The United States Environmental Protection Agency, EPA, defines environmental education as "a process that allows individuals to explore environmental issues, engage in problem-solving, and take action to improve the environment" (EPA, 2023). The EPA's definition encompasses the ideology of environmental literacy and establishes environmental education as a process through an individual framework. In comparison, the North American Association for Environmental Education (NAAEE) defines environmental education as a "process that helps individuals, communities, and organizations learn more about the environment, and develop skills and understanding about how to address global challenges" (NAAEE, n.d.). While the NAAEE acknowledges the importance of the process for an individual, similar to the EPA's definition, the NAAEE has a greater focus on an outward approach to education that incorporates a collective effort to tackle global issues at large.

To understand the environment and think critically about global issues, environmental education draws content from disciplines including math, science, social sciences, language arts, politics, and philosophy (Carter & Simmons, 2010). The highest contributor to the fund of environmental knowledge is environmental science (Carter & Simmons, 2010). Within *The*

History and Philosophy of Environmental Education, Carter and Simmons (2010) explain that "environmental science is the engine of data collection and knowledge creation, while EE [environmental education] is the vehicle for dissemination and application of that knowledge with environmental literacy as the ultimate goal" (Carter & Simmons, 2010, p.12). Environmental education is literacy built upon a vast fund of diverse interdisciplinary knowledge used to explore and solve environmental issues within a community and globally.

History of Environmental Education. Contemporary ideology for environmental education can be traced back to the 18th century, when Jean-Jaques Rousseau's treatise, *Émile,* was published in France (Fang et al., 2023). *Émile,* while today known for its trailblazing in foundational philosophical work for environmental education, was once a controversial approach to education, publicly burned and banned in the cities of Paris and Geneva (Montin, E. (1908). Written in 1762, *Émile* argued for an education that centers the natural world and allows for learning by doing (Fang et al., 2023). For years following Rousseau's work, many philosophers and scientists around the world, including Louis Agassiz, Johann Pestalozzi, Friedrich Fröebel, Maria Montessori, and Sir Archibald Geikie, echoed and built upon the ideology of a natural approach to education (Fang et al., 2023).

In 1911, Comstock (1939), the first female professor at Cornell University and head of the Department of Nature Study, published the *Handbook of Nature Study*. The *Handbook of Nature Study* played a vital role in teachers' implementation of nature study, a teaching method focused on studying the natural world through observation, interaction, and enjoyment of the environment (Comstock, 1939). It provided guidelines for those with little prior knowledge about common plants and animals but were eager to learn with and teach their students. Comstock explains the purpose of nature study is "to cultivate a child's power of accurate observation and

to build up within them, understanding" (Fang et al., 2023). While Comstock was not the first to implement or encourage nature study, her contribution to nature study made it accessible to a broad range of people. Her work made a lasting impact on the development of environmental education.

The late 1800s and early 1900s were a time of environmental awakening for citizens of the United States. After nature study grew in popularity and authors like John Muir began advocating for protecting wild places, people began to gain interest in environmental conservation. Conservation education is a key extension of general conservation that emphasizes the importance of conserving natural resources with a scientific planning and management approach (Fang et al., 2023). As the Great Depression and the Dust Bowl uprooted the country, conservation education went from an interest to a sought-after need and governmental solution to help rebuild the American economy and protect its resources (Fang et al., 2023). In 1935, Funderback of the Educational Policies Commission of the National Education Association made a statement on behalf of the implementation of conservation education (Disinger 1985):

> Forests, soils, grasslands, water, minerals, oils, fish, game, and scenic beauty are among the rich natural endowments of the area of the North American continent covered by the United States. Realization of the basic importance of these resources, determination to utilize them for the common good through long range planning, and general knowledge of appropriate remedial . . . and preventive conservation procedures are among the marks of an educated citizen. Since future welfare and safety depend on those things, the schools may well assume considerable responsibility for checking the ravages upon the heritage of the nation made by indifference, carelessness, and unbridled selfishness (p. 61).

Not only was conservation a way to bring the economy out of a depression, but vital to ensure the people of America could survive the storm of dust that forever impacted agriculture. Schools have historically been the avenue for change and continued to follow suit with conservation education.

As WW2 concluded, outdoor education emerged, expanding on the elements of nature study and conservation education (Carter & Simmons, 2010). Outdoor education is a method of instruction rather than an ideologic approach (Disinger, 1985). While today, outdoor education has developed into something more, during this time, outdoor education became a part of the typical school experience as an overnight school camping experience (Carter & Simmons, 2010).

Shortly after the emergence of outdoor education, the modern movement towards environmental education began. The 1960s and 70s were a momentous era in the history of environmental education. President Nixon established the Environmental Education Act in 1970. This legislation encouraged the development and implementation of environmental education curricula. It allowed for grant funding to nonprofits, organizations, and institutions by the Office of Environmental Education in the Department of Health, Education, and Welfare (H.R. 18260 Environmental Education Act, 1970). In 1972, the Belgrade Charter framework for environmental education was proposed at the United Nations Conference on Human Environment in Stockholm, Sweden (Cocanougher, 2020). The goal of environmental education in the Belgrade Charter framework (Belgrade Charter, 1975):

> To develop a world population that is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations, and commitment to work individually and collectively towards solutions to current problems, and the prevention of new ones (p.3)

This framework was the first to truly lay out the goals, objectives, audience, and guiding principles of environmental education (Belgrade Charter, 1975). Just a few years later, in 1977, The United Nations Education, Scientific, and Cultural Organization (UNESCO) and the U.N. Environment Programme (UNEP) collaborated to develop their own framework for environmental education (Cocanougher, 2020). The framework was called the Tbilisi Declaration and debuted at the UNESCO-UNEP Intergovernmental Conference (Fang et al.,

2023). The goal of environmental education within the Tbilisi Declaration is as follows (UNEP, 1977):

> The goals of environmental education are: (1) to foster clear awareness of, and concern about, economic, social, political, and ecological interdependence in urban and rural areas; (2) to provide every person with opportunities to acquire the knowledge, values, attitudes, commitment, and skills needed to protect and improve the environment; (3) to create new patterns of behavior of individuals, groups, and society as a whole towards the environment (p.26).

This framework shares the same global view and aim of molding a society with the skills and passion to protect the environment as the Belgrade Charter. The Tbilisi Declaration was an extensive framework for environmental education and its implementation. It included forty-one guiding principles covering environmental education tasks, curriculum teaching, implementation strategies, and international cooperation (Fang et al., 2023).

The momentum of the development of environmental education in the 1960s and 1970s quickly dissipated. In 1981, Congress, during the Reagan Presidency, dismantled the Office of Environmental Education. President Reagan also executed a budget cut of 44% for the Environmental Protection Agency (PBS, 2019). During Reagan's presidency, environmental education's progression quickly regressed. In 1990, President George W. Bush reinstated the Environmental Education Act, and a gradual reintroduction to environmental issues followed through both Bush and Clinton's presidencies (Carter & Simmons, 2010). However, congress often opposed the viewpoints that the white house was embracing (Carter & Simmons, 2010). The growing public concern after the *Nation at Risk* report was published sparked the idea and creation of the National Project for Excellence in Environmental Education by the North American Association for Environmental Education (Carter & Simmons, 2010). The National Project for Excellence in Environmental Education sets standards for high-quality environmental education in the classroom (NAAEE, n.d.). When the No Child Left Behind Act of 2001 was

passed, environmental education was left out of the framework despite attempts to reinstate the National Environmental Education Act (Carter & Simmons, 2010).

While environmental education had been stagnant in governmental support within the early 2000s, there has been a recent reinterest and uptick in legislative action. The Every Kid Outdoors initiative began in 2015, beginning as the Every Kid in a Park program to becoming a part of the Every Kid Outdoors Act, offering every 4th-grade student in America free access to the National Parks for a year (National Park Service, 2024). The 2021-2022 Every Kid Outdoors Report states (U.S. National Park Service, 2022):

> Research on EKO participants indicate that without free access, most (73%) would never have visited a national park. Research also shows that participants are more likely to visit parks throughout the rest of their lives if they experience parks with their family or school at age 10 (p. 2).

The Every Kid Outdoors program will continue to change the lives of children in America and build environmental stewards until 2026 (U.S. National Park Service, 2022).

The latest significant environmental education event occurred in 2023 when the No Child Left Inside Act was passed (Carter & Simmons, 2010). The No Child Left Inside Act is a revised version of the Environmental Education Act. Similar to the Environmental Education Act, this act promotes environmental literacy and provides funding for environmental education through grants (NCLI, 2023). The No Child Left Inside Act advocates for environmental literacy and provides 13 significant findings on why it should be implemented (the act itself). Selected notable findings include (NCLI, 2023) :

> (1) Hands-on experiences in nature help build stronger, smarter, and happier children. (2) Children and young adults are increasingly disconnected from the natural world around them, spending less time outside playing, exploring, and learning…(6) Outdoor and environmental education programs have been shown to build critical thinking skills and leadership skills, and can improve student attendance and retention rates…(8)Environmental education, as part of the formal prekindergarten through grade 12 school curriculum, has positive impacts on student achievement in all subjects, and especially in science, reading, mathematics, and social studies, and improves critical thinking skills, enthusiasm for learning, stewardship, and healthy lifestyles (sec 2)

By providing data-driven reasons for why implementation is needed and what it can do, the No Child Left Inside Act will likely encourage more educators and organizations to utilize environmental education. The changes brought forth by the No Child Left Inside Act are not yet known.

Next Generation Science Standards. The Next Generation Science Standards are K-12 science standards utilized across the United States. The National Research Council (NRC), the National Science Teachers Association, the American Association for the Advancement of Science, and Achieve collaborated in a two-step multiyear process to curate a framework for science education that would help students succeed in their future endeavors (NGSS, 2013). A Framework for K-12 Science Education, written by the National Research Council (NRC) of the National Academy of Sciences, is the guiding science-based research the standards are built upon. In the United States, 44 states have adopted the Next Generation Science Standards or based their own standards on the A Framework for K-12 Science Education's research (NGSS, 2013). These standards were created utilizing the three dimensions of science learning: crosscutting concepts, science and engineering practices, and disciplinary core ideas (NGSS, 2013). While the Next Generation Science Standards do not specifically address environmental education, they provide a key fundamental understanding of scientific disciplines vital to environmental education's success. One must first understand the scientific systems being affected to find solutions to environmental issues. The Next Generation Science Standards were designed to be flexible and easily integrated, allowing educators to teach in a way that stimulates and interests their students (NGSS, 2013). NGSS can be taught through the environmental education framework. Together, NGSS and environmental education provide students with sufficient understanding of scientific systems, environmental agency, and literacy to solve global

environmental issues. The standards complement environmental education but alone are not sufficient to implement successful environmental education.

Methods and Procedures

Environmental education is a lifelong process of learning for all ages. My exposure to environmental education was limited growing up and wasn't truly built upon until my time in university. For this project, I knew I wanted to combine my passion for environmental education and my professional interest in teaching. I decided to focus my research on the benefits of environmental education for elementary school students from kindergarten through 6th grade, particularly students from low-income households. As someone who primarily teaches in low-income elementary schools, I wanted my research to positively impact the education my students receive. With the help of Dr.Thao, my capstone advisor, I curated my primary and secondary research questions and designed my approach to research within my prospectus. To begin answering my research questions, I completed a literature review to define environmental education, develop a historical background, and discover what research has already found on the benefits of environmental education for elementary school students. When describing the specific benefits for low-income students, I found that the benefits described in the literature were the same general benefits all students had access to. So, I decided to answer my research question; I had to state the benefits of environmental education and explain why it specifically benefited low-income students. Context was a key aspect of answering this question.

To further develop my research, I needed to get first-hand testimonies and data through interviews and surveys. I chose to interview in-service and outreach teachers currently implementing environmental education in the classroom. By interviewing in-service teachers, I get the perspective of a primary teacher who works with their students across multiple disciplines

and can truly see the effects of environmental education over time. By interviewing environmental education outreach educators, I get the perspective of someone specializing in facilitating learning experiences outside of traditional institutional settings, focusing solely on environmental education. These unique perspectives offer variety in data. For my surveys, I initially only wanted to conduct an anonymous student survey for elementary school students attending a low-income school where environmental education is being implemented. However, I ultimately added two more surveys to broaden my data collection. The first survey I added was for adults who were exposed to environmental education when they were in elementary school. I wanted to conduct this survey because I wanted to see a reflection on environmental education and its benefits from an adult's point of view. The second survey I added was an interview-style anonymous survey for in-service teachers.

My original plan for my data collection methods was to interview two in-service educators, two outreach teachers, and three classrooms worth of student surveys. With the addition of the new surveys and difficulty locating teachers available to interview, my plans had changed. For my interviews, I was ultimately able to interview two outreach teachers but could not find any in-service teachers to interview physically (see Appendix A ~ Outreach Educator Interview Questions). With the implementation of my anonymous teacher survey (see Appendix B ~ Anonymous In-Service Teacher Interview Survey), I collected five responses that closely resembled the original interview questions (Teachers 1, 2, 3, 4 & 5). I found this method easier for teachers to respond to as they can easily complete the interview when they have free time. I received eleven classroom responses for my student survey, totaling 206 elementary school student responses (see Appendix C ~ Anonymous Elementary Student Survey). The added adult

reflection survey implemented for a variety of data had a total of thirty-five responses (see Appendix D ~Anonymous Environmental Education Reflection Survey).

The two outreach teachers I interviewed specialized in environmental education (Outreach Educators 1 &2). Outdoor Educator 1 has been an outreach educator for 36 years in Tennessee, often subcontracting out of the American Museum of Science and Energy. Outdoor Educator 2 is an Interpretive Ranger with the Bureau of Land Management who has taught environmental education for 23 years in Monterey County, California. Teachers 1-5 who participated in the anonymous survey have between 2 and 16 years of experience incorporating environmental education in the classroom. The eleven classrooms where student surveys were given were all from low-income schools in Marina, Salinas, and Seaside, California. I came in contact with Outdoor Educator 1 through the help of a family member during the early stages of my research. From the beginning of my project, I knew I wanted to interview Outreach Educator 2, as I had met them while volunteering with a local nonprofit.

In the data-gathering process, I began by contacting Outdoor Educators 1 and 2 and setting up interview dates and times. Interviews were scheduled for 20 minutes but the extraordinary conversations ran around 45 minutes long. With the help of Outreach Educator 2, student surveys were distributed during their typical classroom rotation. To be time efficient, the surveys were conducted to mimic the children's game heads-up-seven-up. While Outreach Educator 2 read the yes or no survey questions aloud, students rested their heads on their desks with their eyes closed and responded with a thumbs up or thumbs down to answer each question. This method ensured students answered the questions without influence from other students. The Anonymous In-Service Teacher Interview Survey was a digital survey that Outdoor Educator 2 sent to the in-service teachers of the classrooms they visited (see Appendix B ~ Anonymous

In-Service Teacher Interview Survey). The Anonymous Adult Survey was a digital survey distributed on CSUMB's My Raft application, my personal social media account, and my classmates.

The methods and procedures I took throughout this research process directly impacted my results and findings. I am glad my methods and procedures did not go as planned. The surveys and interviews I ultimately utilized gave me a greater collection of data to analyze. With the help of the participants of this research, I was able to deepen my understanding of environmental education, its successful methods of implementation, and its benefits for low-income elementary school students.

Results, Findings, and Discussion

After analyzing the data collected through my methods and procedures, conclusions can be drawn to answer my secondary research questions. Through literature review, I was able to define environmental education, decipher the role the Next Generation Standards have in regard to environmental education, and analyze the historical background that has made environmental education what it is today. The qualitative data from my surveys and interviews provide in-service teachers, outreach educators, and students perspectives imperative to answering the following secondary research questions.

What does research say about the benefits of environmental education on elementary school students? To what extent does it apply to low-income elementary school students?

Benefits of Environmental Education for Elementary School Students. Environmental Education offers a multitude of benefits for people of all ages. However, fostering a generation rooted in environmental problem-solving and literacy proves to have significant lasting benefits.) In their work "Early Childhood Environmental Education: A Systematic Review of the Research

Literature," Ardoin and Bown (2020) analyze sixty-six studies worldwide on formal and informal uses of environmental education for children in the early childhood age range. Although the studies employed diverse methods of implementation, each found benefits often overlapping, including and extending beyond the primary objective of environmental education. The review found that 76% of the outcomes in the research literature reported students gaining environmental literacy attributes such as environmental cognition, attitudes, and behaviors (Ardoin & Bowers, 2020). 38% of the studies found cognitive development improved, including cognitive function, academic content, and creativity (Ardoin & Bowers, 2020). Another 38% of the reported outcomes found improved social-emotional development, including social skills development, self-regulation, and autonomy (Ardoin & Bowers, 2020). 24% of the studies reported increased student physical activity and skills (Ardoin & Bowers, 2020). Lastly, nine percent (9%) of the studies found language and literacy development with exposure to environmental education (Ardoin & Bowers, 2020). The diverse benefits found within these sixty-six studies would be an asset to any student's success beyond its aim for environmental literacy, agency, and critical thinking.

In synthesizing the commonalities between the in-service teacher surveys and outreach educator interviews results, in-service teachers and outreach educators agree that environmental education is universally beneficial to all students regardless of socioeconomic status and background. One of the most evident benefits is improved or developed environmental awareness. Students gain a passion for discovery and protecting the environment. Teacher 4 adds that it gives students the tools to address global challenges.

The in-service teacher survey (see Appendix B ~ Anonymous In-Service Teacher

Interview Survey) reveals that environmental education encourages students to read to expand on lesson themes. This reading results in expanded vocabulary, higher reading test scores, and improved oral communication. Students also gain elevated self-esteem and confidence in themselves and their learning. Teacher 4 explains that telling students they are future leaders, environmentalists, scientists, and conservationists aids in getting students excited and confident in their futures. While there are many methods for teaching environmental education, data suggests that nature exploration helps improve students' emotional state and well-being. Outreach Educator 1 adds that a hands-on approach to environmental education allows students to connect to nature.

Benefits of Environmental Education for Low-Income Elementary School Students.

While environmental education can be beneficial for all students, its impact is particularly crucial for low-income students. Students growing up in an economically disadvantaged household often face a disproportionate achievement gap, resulting in low academic performance and difficulty in future success. Living in poverty can come with added stressors that not every child is exposed to. This exposure to constant elevated stress can result in deficiencies in cognitive and emotional development (Bradley, 2022). Some of the cognitive and emotional difficulties low-income students face are mental processing skills, emotional regulation, attention span, behavior management, academic performance, and social skills (Bradley, 2022). A student's performance in school is directly affected by these developmental skills. Although some of these skills are developed at the beginning of a child's K-12 education, the absence of the foundational knowledge acquired at home can place students at an academic disadvantage from the start of their educational journey, making it difficult to keep up with the educational content.

Low-income students do not have an equal opportunity to succeed. It is detrimental that schools and educators allocate resources for an equitable education.

To create an equitable education for all students, bridging the developmental gap that low-income students face is essential. Environmental education is a crucial method to foster the success of low-income students. *Closing the Achievement Gap* is a nationwide study across 40 schools using EIC, Environmental Integrating Context, an environmental-based education program (Lieberman & Hoody, 1998). EIC uses "hands-on, minds-on, environment-based projects and problems" both in and out of the classroom, often utilizing the local environment as a resource (Lieberman & Hoody, 1998, p.25). EIC is just one method of environmental education implementation, but it has proven successful. This study found that the benefits of this environmental education approach include (Lieberman & Hoody, 1998):

> Better performance on standardized measures of academic achievement in reading, writing, math, science, and social studies; reduced discipline and classroom management problems; increased engagement and enthusiasm for learning; and, greater pride and ownership in accomplishments (p.34).

These benefits strengthen the academic, social, and behavioral skills that contribute to low-income students' achievement gap, while giving them confidence in their abilities and knowledge. Creating an equitable learning environment requires giving students the resources they need instead of using a one-size-fits-all approach to education. Environmental education's benefits constitute low-income students' resources to bridge the achievement gap.

Students living in poverty not only face developmental hurdles but also face an increased health risk. This health risk has many contributing factors that include but are not limited to poor nutrition, toxin exposure, and elevated stress levels (AAFP, 2022). While a risk does not guarantee a child will be diagnosed with a particular health issue, preventative action and good health practices should be taken. School plays a crucial role in the health of its students. It is

there that students get nutritional meals and physical exercise, yet a student's mental health is not commonly addressed. A student's health is important to their success in school. Environmental education serves as a tool to manage and improve the health of low-income students, specifically when using nature-based methodology with physical nature exposure. Nature exposure has both mental and physical benefits, including the improvement of global chronic health issues such as depression, cardiovascular disease, and toxic stress, all health risks that low-income students face (Bradley, 2022). While these benefits are essential for managing health risks, low-income students do not get to reap their benefits as they often have disproportionately less exposure or access to nature. Those with access to the outdoors at home often live in areas with a high risk of exposure to pollution, poor air quality, and other environmental stressors (Rowland Shea, 2020). By incorporating environmental education into the classroom, specifically a nature-based approach, students will have access to nature that they oftentimes never get to experience, improving and managing their health and ultimately leading to academic success.

In-service teachers and outreach educators agreed that while environmental education is beneficial to all, it has a greater impact on low-income students. The lack of exposure and access to the environment low-income students experience was made evident in both the interviews and the teacher survey conducted. Educator 1 emphasized that the lack of exposure low-income students face leads to fear. She notices that children of color disproportionately experience fear in natural environments, specifically fear of wildlife. Through environmental education, students get environmental exposure and gain a sense of comfort. Outreach Educator 1 adds that lessons on identification give students safety skills that are imperative in survival situations but also aid in the feeling of comfort, knowing that their skills can keep them safe (Outreach Educator 1, personal communication, 4 April 2024).

How do outreach educators and in-service teachers implement environmental education to benefit elementary school students in general? And to what extent does it benefit low-income students?

Every facet of education allows flexibility in its mode of instruction; environmental education is no different. The in-service teachers and outreach educators interviewed and surveyed in this study utilize diverse approaches to bringing successful environmental education into the classroom. All five in-service teachers surveyed use a blend of their own environmental lessons and the lessons of a visiting outreach educator. In-service teachers integrate environmental education with other subjects, including ELD and language arts, using literature. They also use technology to bridge gaps in understanding through videos and virtual field trips. When the opportunity arises, teachers give students access to the environment for hands-on learning during nature exploration lessons.

Outreach educators offer the implementation of environmental education in an exciting way for students using unique avenues they might not experience during an ordinary day in the classroom. Whether it's bringing the outdoors inside the classroom or bringing the classroom outdoors, outreach educators implement environmental education to inspire a new generation of environmental advocates. Outreach Educator 1 offers her environmental lessons through the American Museum of Science and Energy where schools have the option of coming to the museum for a lesson or for her to come into the classroom. Her implementation methods are hands-on and interlaced with environmental literacy, covering science standards for subjects including chemistry, biology, physical science, and forces and motion. She begins her lessons with a PowerPoint presentation to give students a sound background before moving to the

hands-on activities for the lesson. She explains that a hands-on approach to teaching transcends barriers like language. Outreach Educator 1 emphasizes the importance of making a lasting impression by being weird, gross, and funny. It will lead to a lesson students will truly never forget (Outreach Educator 1, personal communication, 4 April 2024).

Outreach Educator 2 works directly with classroom teachers across Monterey County and has 56 teachers on a waiting list to get the opportunity to bring her unique perspective into their classrooms. As a Fort Ord interpretive ranger with the Bureau of Land Management, she uses local ecosystems as a basis to teach environmental lessons. Some of the methods of implementation she uses include storytelling puppetry, junior ranger field guides, NGSS integration, and hikes. She also offers outside-of-class Saturday hikes inviting students and families to explore outside together. Both in-service teachers and outreach educators ultimately incorporate a variety of implementation strategies to give students a successful experience with environmental education (Outreach Educator 2, personal communication, 4 April 2024).

How do outreach educators and in-service teachers know that environmental education benefits elementary school students, including low-income students, in their classrooms?

Observations are a key method of evaluation that teachers of all subject areas use to track student performance and reflect on teaching practices. In order to determine if and how the implementation of environmental education is benefitting their students, both in-service educators and outreach educators observe student performance, attitudes, and development. In-service teachers indicated that through observation, they saw students more engaged and asking questions since the implementation of environmental education. They also observed students actively demonstrating an improved consciousness for the environment around the school campus. Students were seen picking up trash around the school, recycling, and turning off

the lights before leaving the classroom. Teachers also observed a behavior shift in students. Students were more excited about coming to school in the morning, eager to learn, and confident in themselves. In-service teachers' survey responses explained that low-income students showed a deeper impact when observing.

Outreach Educators 1 and 2 expressed a key indication of benefits coming from students of the past. Every now and then, the teachers run into a student who they had once taught, one the student stresses how they remember so much of what they had been taught and that it has impacted the person they are today. Outreach Educator 2 gave an anecdotal reference to a past student who is now a 4.0 high school sophomore dedicated to environmental advocacy and impacting her community. The student was moved by the lessons she was taught and began volunteering with local non-profit organizations to help students who were once in the shoes she was in. She hopes to pursue her passion for the environment and make a difference in her future professional endeavors. Outreach Educator 2 expresses that she knows it's benefitting the students from the energy she receives when she walks into a school, and she '"feels like a rockstar" (Outreach Educator 2, personal communication, 4 April 2024). The buzz and excitement the kids have to learn is evident.

When observing the progress of low-income students, Outreach Educator 2 explains they demonstrate a better response to the lessons. As many students haven't had these experiences before, these lessons are new, exciting, and eye-opening. She adds that without this opportunity a lot of these students would have never got to see and experience what is being taught through environmental education (Outreach Educator 2, personal communication, 4 April 2024). Through observation, both outreach educators see the fear students have towards the environment shrink and a growing passion and love emerging.

How do students feel environmental education benefits them?

In comparing the responses in both student surveys, it is evident that the perspectives of current and past elementary school students who received environmental education were necessary to determine how they felt and experienced its benefits. Current elementary students responded to a survey designed to find opinions on specific benefits of environmental education. The responses are broken down in Figure 1 below.

Anonymous Elementary School Survey Results

Question:	Yes	No
Do you enjoy learning about the environment in school?	179 (87%)	27 (13%)
Does learning about the environment make you feel connected to the earth?	169 (82%)	37(18%)
Does learning about the environment make you want to help the planet?	188 (92%)	18 (8%)
Do you think what you're learning in environmental education will help you in the future?	180 (87%)	26 (13%)
Do you play outside more since learning about the environment?	122 (59%)	84 (41%)
Do you share what you learn about the environment with your family and friends?	158 (77%)	48 (23%)
Does learning about the environment help you in other school topics like math, science, reading, etc.?	96 (47%)	110 (53%)

Figure 1

The Anonymous Environmental Education Reflection Survey aimed to determine an adult reflection on childhood experiences with elementary education (see Appendix D ~ Anonymous Environmental Education Reflection Survey). Out of the 35 survey responses, 100% of the participants found environmental education beneficial. 52% of the participants attended a low-income school, and 35% grew up in a low-income household. To synthesize the benefits students felt they attained, the results will be broken down into general and low-income student perspectives.

Through this survey, participants described a multitude of benefits they felt they gained through their time as environmental education students. They generally found that environmental education helped expand their knowledge across multiple subjects. For example, students felt it helped deepen their understanding of science concepts and processes. Improved critical thinking skills, creativity, and leadership qualities were benefits participants continue to experience today. Students found that through the activities conducted outdoors, peer relationships improved. Participants described a greater sense of community within their classes. The most common response on this survey was a solidified passion for protecting the environment and acquired sustainability skills that they continue to use throughout their lives.

Participants growing up in a low-income household emphasized the long-term environmental passion and practices they gained. They add that the connection they developed with the environment gave them empathy towards nature. Historical context presented in schools also allowed some students to deepen their connection to the environment and understand how environmental education came to be. Low-income students expressed fears they once had about the environment were eliminated as their bond and safety skills grew. Participants described

appreciative outlooks on the world and overall happiness improving when they spend time outdoors.

What are the resources that outreach educators and in-service teachers need in order to implement environmental education success for their students, including low-income students, in their classrooms?

Implementing a method of education that is not distinctly a part of a school's curriculum can be challenging. While the in-service teachers and outreach educators are successful in their implementation, there are resources that would significantly improve environmental education in the classroom. The most important resource for both in-service and outreach educators reflected in the data was funding. In-service educators expressed funding would allow for more field trips and experiences for their students and supplies for lessons. One survey response suggested organizations like local museums should offer schools free admission opportunities (see Appendix B ~ Anonymous In-Service Teacher Interview Survey). Outreach Educator 2 expressed that funding is an obstacle that both teachers and herself face. Funding for the environmental outreach programs she offers is primarily from grants. These grants fund some supplies like magnifying glasses but do not pay for the extra time she spends preparing materials and lessons for the countless schools depending on her. To complete her duties as a ranger and as an outreach educator, she starts work before sunrise, completing daily tasks with a headlamp on in order to make it to the schools on time (Outreach Educator 2, personal communication, 4 April 2024).

In-service teachers added that better access to quality textbooks and ready-to-go programs would allow teachers to integrate environmental education more easily and frequently. As teachers already have a lot of content to cover, easy integration allows for more learning time.

They also expressed that continued support by outreach educators is essential to giving their students access to the benefits of environmental education. As all surveyed in-service teachers work for low-income schools, their students have a greater need for environmental education.

Problems and Limitations

While collecting data and research for this study, I came across a few problems and limitations. When I began my research, I had intended to formally interview at least three in-service teachers. However, I had difficulty finding local teachers implementing environmental education. Those who did have experience, unfortunately, did not have time available to participate. With the help of Outdoor Educator 2, I was able to survey in-service teachers successfully, but the responses were limited as organic discourse was lacking. A limitation of the surveys was that the teachers who responded were all utilizing the same outreach educator to implement environmental education. This means that my survey results only yielded data from one method of environmental education and did not represent a diverse environmental education experience. While the teachers utilized the help of the same outreach educator, my data still includes unique perspectives and provides sufficient data for this study.

Another limitation I faced was the lack of low-income student representation in my Anonymous Adult Survey. While I needed the perspectives of people who grew up in different socioeconomic backgrounds, I would have preferred to have more low-income perspectives as it is the primary focus of the study. Despite having more responses from students who were not from a low-income background, I still received ample responses to formulate conclusions and answers to my research questions.

The last problem I faced was the lack of research on the benefits of environmental education for low-income students. The majority of the published research I read focused on the

general benefits of environmental education as opposed to a focused study. However, the few relevant studies I did find include large sample sizes across the U.S., providing diverse concrete evidence to support my research. I also found that focusing on why environmental education is beneficial in addition to what the benefits are allowed for a well-rounded understanding of the benefits of environmental education for low-income elementary school students.

Recommendations

The data collected in this study exposes a critical need for environmental education. I recommend that parents of elementary school students, educators, school districts, and the California State Board of Education advocate for the implementation of environmental education as it's benefits, surpass environmental literacy, and affects the growing minds of our youth. As educators have expressed a dire need for increased funding, I recommend governmental agencies and stakeholders consider allocating more money toward grant funding for the use of environmental education. As low-income students disproportionately have limited natural access, elevated health risks, and developmental challenges, environmental education should be utilized and encouraged by the schools to close the achievement gap this community has faced for generations. Lastly, I encourage educators and parents alike to experiment with environmental education and discover the boundless benefits for themselves.

Conclusion

As the literature review and the data collected through this study align, it provides sufficient evidence that environmental education is beneficial to low-income elementary school students. Low-income students disproportionately face nature deficits and increased stress that affect academic performance and developmental health. In-service and outreach educators use unique methods of environmental education to teach lessons with a lasting impact. While there is

no one way to teach environmental education due to its adaptable design, educators and researchers have found that nature-based education is the most successful in improving the academic performance and developmental health of low-income elementary school students. Students, new and old, have expressed that environmental education has allowed them to connect to the environment in a way they never were able to before, as many low-income students experience a nature deficiency. Teachers and students alike stated that environmental education boosts academic performance, improves mental and emotional well-being, develops environmental cognition, attitudes, and behaviors, and excites students about learning and coming to school. In order to allow low-income students to close the achievement gap, defeat nature deficiency, and build fundamental developmental skills, all while learning how to impact the world around them, educators and schools need funding, support, and encouragement to implement environmental education.

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Appendix A

Outreach Educator Interview Questions

1. In what ways do you implement environmental education?
2. How often do you incorporate environmental education into your lessons?
3. How long have you been teaching or incorporating environmental education in your classroom?
4. Do you think environmental education benefits elementary school students, including low-income students?
5. What benefits does environmental education have for elementary school students in general? And to what extent does it benefit low-income students?
6. If so, how do you know that environmental education benefits elementary school students, including low-income students?
7. What are the resources you need or could use in order to implement environmental education success for your students?

Appendix B

Anonymous In-Service Teacher Interview Survey

1. How long have you been implementing environmental education in your classroom?
2. What grade or grades have you taught?
3. Do you teach environmental education independently, with the help of an outreach/resource teacher, or solely through an outreach educator?
4. If you are teaching, in what ways do you implement environmental education? What methods do you use?
5. to what extent does it benefit low-income students? Ex: does it improve test scores, behavior, environmental passion, etc.
6. How do you know environmental education benefits elementary school students, including low-income students?
7. What resources do you need or could use to implement meaningful environmental education for your students?

Appendix C

Anonymous Elementary Student Survey

1. Do you enjoy learning about the environment in school?

   ☹️ No Yes 😃

2. Does learning about the environment make you feel connected to the Earth?

   ☹️ No Yes 😃

3. Does learning about the environment make you want to help the planet?

   ☹️ No Yes 😃

4. Do you think what you're learning in environmental education will help you in the future?

   ☹️ No Yes 😃

5. Do you play outside more since learning about the environment?

   ☹️ No Yes 😃

6. Do you share what you learn about the environment with your family and friends?

   ☹️ No Yes 😃

7. Does learning about the environment help you in other school topics like math, science, reading, etc.?

   ☹️ No Yes 😃

Appendix D

Anonymous Environmental Education Reflection Survey

1. In what grade or grades did your teacher implement environmental education? Select all that apply.

- ☐ Preschool
- ☐ Kindergarten
- ☐ 1st
- ☐ 2nd
- ☐ 3rd
- ☐ 4th
- ☐ 5th
- ☐ 6th
- ☐ Middle School
- ☐ High School

2. What forms of environmental education were implemented? Select all that apply.

- ☐ In class lectures or instruction
- ☐ In class labs
- ☐ Field Trips

□Science Camp

□Other:

3. Did you attend a low-income school?

□Yes

□No

4. Did you grow up in a low-income household?

□Yes

□No

5. Outside of school, before learning about environmental education, did your family spend time outdoors?

□Yes

□No

6. After learning about environmental education, did your family spend more time outdoors?

□Yes

□No

□Roughly the same

7. In classes where environmental education wasn't being implemented, were you getting sufficient exposure to science?

   □Yes

   □No

   □Somewhat

8. Was environmental education beneficial? *

   □Yes

   □No

9. If so, what were the benefits of environmental education for you while you were in elementary school? What are the benefits long term?

10. If not, what was hindering the success of environmental education? Where could it have been improved?