

Stanford analysis reveals wide array of benefits from environmental education

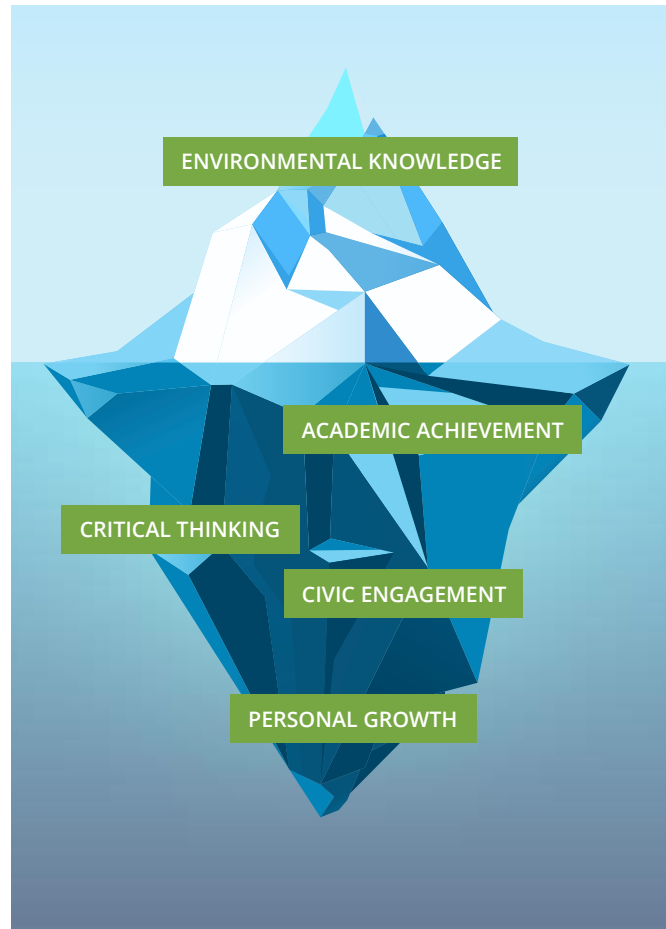
Key Findings: K-12 Students

Environmental knowledge is just the tip of the iceberg

Experts at Stanford University systematically searched the academic literature and identified 119 peer-reviewed studies published over a 20-year period that measured the impacts of environmental education for K-12 students.¹ The review found clear evidence that environmental education programs provide a variety of benefits. Not surprisingly, the studies clearly showed that students taking part in environmental education programming gained knowledge about the environment. But the studies also showed that learning about the environment is just the tip of the iceberg.



Studies in the review demonstrated that environmental education has led to a number of positive impacts, from improving academic performance, to enhancing critical thinking skills, to developing personal growth and life-building skills, including confidence, autonomy, and leadership. In addition, a number of the studies showed that environmental education increased civic engagement and positive environmental behaviors.

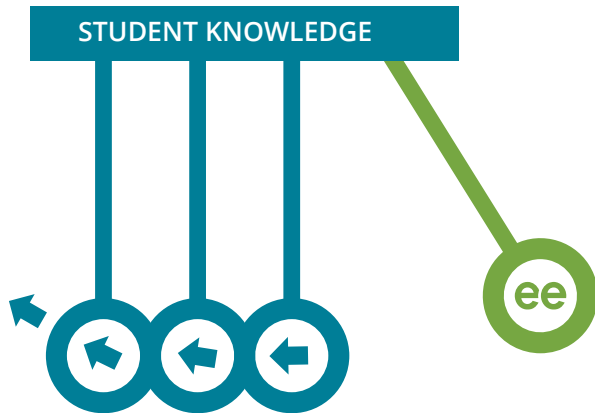


There is a mountain of evidence that suggests EE is a powerful way to teach students. Over 100 studies found that it provides transformative learning opportunities. There is no doubt that environmental education is one of the most effective ways to instill a passion for learning among students."

Dr. Nicole Ardoin², Stanford University Graduate School of Education and Woods Institute for the Environment

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The peer-reviewed literature from the last decade-plus demonstrates that good environmental education programs can positively influence students' academic performance, knowledge, skills, confidence, motivation, and behavior."

Dr. Marc Stern³, Virginia Tech University
School of Forest Resources and Environmental Conservation



The most important thing environmental education provides for students is passion and interest in learning. Environmental education creates meaningful learning experiences and engages students in ways that help them grasp and retain new information more effectively than conventional curricula."

Dr. Doug Knapp⁴, Indiana University Department of Recreation, Park, and Tourism Studies

- **Knowledge gains** across multiple disciplines, including environmental issues, science, mathematics, and more
- **Emotional and social skills**, such as self-esteem, character development, team work, and leadership skills
- **Environmentally friendly behavior**, such as reducing water use, increasing recycling, and participating in community cleanups
- **Academic skills** (21ST Century skills), such as critical thinking, oral communication, analytical skills, problem solving, and higher-order thinking
- **Motivation to learn**, including **enthusiasm** for and interest in school
- **Civic interest and engagement**, including feelings of civic responsibility, feelings of empowerment, and ability to take action

Dozens of peer-reviewed studies found environmental education has a positive academic impact. Because children are often naturally interested in and curious about the environment, environmental education can be an effective tool to teach an array of topics. Studies documented that students gained knowledge in a variety of areas, including the environment, mathematics, chemistry, biology, ecology, and more. In various studies, students and teachers reported that the students enjoyed taking part in environmental education activities, and that the "fun" factor enhanced motivation to learn.

Environmental education imparts more than knowledge. It has been shown to develop academic skills, such as critical thinking, decision making, and synthesizing complex information. Environmental education has helped produce effective problem solvers, lifelong learners, and thoughtful community leaders and participants.

A dozen peer-reviewed articles found environmental education had positive civic outcomes, such as instilling a sense of personal responsibility and motivation to address community and environmental issues.

The emotional and social skill-related benefits that a number of studies in the review documented include self-esteem, autonomy, character development, maturity, empowerment, verbal communication, leadership, poise, and the ability to collaborate with others.



Environmental education helps teachers meet standards across multiple disciplines, and it can be integrated into existing curricula.⁸



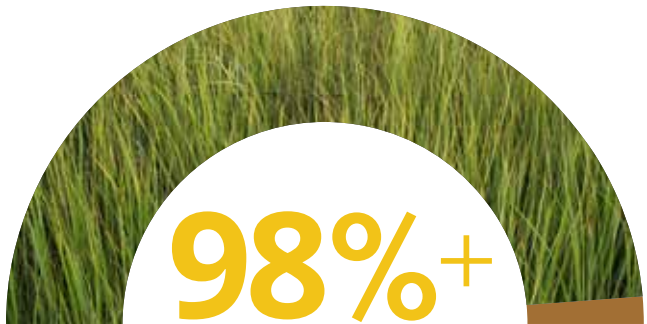
Environmental education helps students gain much more than knowledge. They gain skills in making a differences and an intrinsic belief that they can. That confidence and empowerment can spill over into other aspects of their lives.”

Dr. Martha Monroe⁷, University of Florida Department of Forest Resources and Conservation



A high school in Illinois successfully used environmental education to develop critical 21ST Century skills. Students in the program significantly outscored their peers in applying knowledge from science, technology, engineering, and math, and in mastery of critical thinking, environmental literacy, leadership, and communication skills. One instructor noted, ‘I realized I could increase students’ knowledge, skills, and attitudes/beliefs in STEM subjects while increasing their environmental literacy at the same time.”

Dr. Farah Vallera⁹, Lehigh University Department of Teaching Learning and Technology



knowledge gains

A tremendous 98% of studies that examined whether students gained knowledge from environmental education saw a positive impact.¹⁰

In their comprehensive review of the literature, Stanford researchers found a number of trends that demonstrate environmental education has a very positive impact on learning, motivation, skill-building, and empowerment. And the impact on both students and teachers is impressive.

90%

REPORTED
INCREASED SKILLS

86%

REPORTED
POSITIVE CHANGES

83%

REPORTED
ENHANCED ENVIRONMENT
RELATED BEHAVIORS

Also noteworthy was the range of environmental education programs being conducted with students. The review suggests that the versatility of environmental education can contribute to a number of different outcomes across a broad spectrum of learning styles.

Here are a few highlights:

- A two-year study of high school students in Florida found that, “When controlling for factors like GPA, gender, ethnicity, and socioeconomic status, **students who participated in environmental education programs scored significantly higher on measures of critical thinking skills** and demonstrated significantly more likeliness to apply those skills in the future.” A 9th grade student explained, “This program has changed the way I feel about school. Now I realize that I can pretty much do what anybody else can do. I have a better view of what I can be in the future.”
- “In my 20 years of teaching before using the environment-based approach, I heard, ‘Why are we learning this? When are we going to finish?’ And now when we are out in the field and sorting macro-invertebrates, for example, I have to make them stop after four hours for lunch. And then they say, ‘We don’t want to!’”¹¹
- A year-long study of New York-based middle school teachers integrating EE into their traditional learning curriculum noted that, “**The hands on aspect [of environmental education] is an equalizer...[for] students with a variety of learning styles and learning abilities.** The kids who have trouble learning, and the kids who are super advanced—they’re all having the same discussions.”¹²
- An ethnographic study of high schools across the Northeastern U.S. concluded that **EE’s participatory methods can increase students’ participation and engagement in class.** “EE provides a unique opportunity to help students practice their argument assessment skills, critically reflect on their own views, and encourage an open-minded assessment of new information.”¹³
- A two-year study of a middle school EE program in Ohio reported that **teachers are using significantly more innovative teaching practices as a result of participation in the program** (including using more inquiry-based and interdisciplinary methods). Further, teachers reported feeling more confident in their abilities to be effective teachers as a result of using EE’s well researched and designed curriculum guidelines.¹⁴
- A five-year study of middle schools in Hawaii observed the **benefits of integrating EE into their curriculum from both the teachers’ and learners’ perspectives.** As one teacher notes, “I think I’m a better teacher because of environmental education. It has kind of completed the ‘whole package.’ The framework unified all my best approaches and it made my instruction much easier.” A second teacher explains, “EE forces me to facilitate rather than dictate...watching 25 young minds start to make their own discoveries...you must sit back and watch the magic work.” The magic is clear from the words of one of her 6th grade students who said the program, “helped me achieve my goals. I can be what I want to be.”¹⁵

Endnotes:

- ¹ Experts at Stanford University began their systematic review in 2013 and explored peer-reviewed literature published between 1994 and 2013. Click here for a summary of the review's methodology, analysis, and limitations as well as a link to the full academic journal article.
- ² Primary study author: Ardoin, N. M., Bowers, A. W., Roth, N. W., & Holthuis, N. (2016). Environmental education and K–12 student outcomes: A review and analysis of research. Manuscript submitted for publication.
- ³ Co-author of a systematic review on best practices in environmental education: Stern, M.J., R.B. Powell, & Hill, D. (2014). Environmental education program evaluation in the new millennium: What do we measure and what have we learned? *Environmental Education Research*, 20 (5), 581-611.
- ⁴ Co-author of the reviewed study: Farmer, J., Knapp, D., & Benton, G. M. (2007). An Elementary School Environmental Education Field Trip: Long-Term Effects on Ecological and Environmental Knowledge and Attitude Development. *The Journal of Environmental Education*, 38 (3), 33-42. doi:10.3200/joe.38.3.33-42.
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- ⁷ Co-author of the reviewed study: Ernst, J. A. & Monroe, M.C. (2004). The effects of environment-based education on students' critical thinking skills and disposition toward critical thinking. *Environmental Education Research*, 10 (4), 507-522. doi:10.1080/1350462042000291038.
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