IDENTIFY   REVIEW   SHARE

From Anecdotes to Evidence:
Diving into the Research Review Process

What is the impact of environmental education (EE)? What outcomes are important in the field? What do EE programs strive to attain, with which audiences, and in what settings? What existing evidence documents effective approaches related to the range of desired EE outcomes?

Questions like these motivated NAAEE and colleagues, including an expert Advisory Board, to develop eeWORKS, an initiative to coalesce existing research within the field through a series of systematic literature reviews.

The eeWORKS team at NAAEE, along with researchers at collaborating universities, focuses a three-part process to:

1. **Identify relevant outcome areas and themes of interest.** The eeWORKS Advisory Board—which incorporates government, nonprofit, philanthropic, and academic perspectives—identifies and discusses themes of interest. Larger societal trends, persistent discussions across the educational and environmental arenas, conference themes, journal special issues, and other inputs guide topical selection. As of 2020, eeWORKS reviews (either completed or underway) include: EE in K-12 educational settings/age range; climate change education; climate change adaptation; early childhood environmental education; conservation and environmental quality outcomes; community and citizen science; positive youth development; and civic engagement.

2. **Conduct research reviews.** Once topical selections are made, academic research teams pursue systematic, rigorous reviews of the literature. Guiding questions for the past and on-going reviews include: What is the role of EE in achieving conservation and environmental quality-related outcomes and impacts? Under what conditions, and in what kinds of programs, does environmental education help achieve desired civic engagement outcomes? How can education best address climate change? Research teams then undertake a rigorous review process (described below) to address the guiding questions, coalescing and analyzing the existing body of relevant literature. Outputs from this stage include a manuscript for submission to a peer-reviewed journal.

3. **Communicate and share.** Using the resulting journal articles as a foundation and working with the research teams, NAAEE works with communications professionals to develop a suite of tools and professional development strategies for each topical area. This stage aims to inform, enhance, and support practice in programmatic design and development as well as philanthropic decision-making and policy development.

Research Review and Analysis Methods

With input from the eeWORKS Advisory Board and based on accepted practices for systematic reviews, the research teams at Stanford University, the University of Florida, and University of California-Davis developed a common, but flexible, approach for research review and analysis. To date, all reviews have pursued the following five steps:

1. Clarified the research question. Each team refined and clarified the key research question(s) they addressed through the review for their respective outcome areas.

2. Identified publications to include in the review. Using some combination of exploratory database searches, discussion among the research team, and feedback from experts, teams developed a list of keywords used to search specific journals manually or to search an academic search engine (in this case EBSCOhost, which offers a single interface to multiple databases). Teams carefully selected keywords to identify the greatest number of relevant studies that met the identified criteria but also ensured that the resulting returns were a manageable quantity to review. The number of citations identified for screening generally ranged between 300 and 3000.

3. Screened abstracts for eligibility. Research teams developed a decision tree to provide guidance for including and excluding citation records returned in the search process. Initially, team members reviewed the same subset of abstracts to confirm consistent use of the decision tree. Then, one or more team members read each publication abstract identified for screening, and removed ineligible citation records based on the selection criteria. After abstract screening, between 50 and 500 publications were eligible for full review.

4. Selected articles for inclusion. Research team members read each of the full publications for those studies remaining after screening. Using a second, more rigorous set of inclusion criteria, the researchers identified the final set of publications for including in the review. The number of publications in the final reviews ranged from approximately 45 to 120.

5. Analyzed the final set of publications. Each team used a variety of analytic approaches and strategies to analyze the final set of publications, as justified by the various research questions guiding the reviews. Those approaches have included mixed-methods research synthesis and thematic analysis to identify and describe common denominators among the studies in the analysis.

The following table includes additional information on the research process used for each outcome review completed to date. For more details, please refer to the corresponding journal articles.

For links to the journal articles, please click on the column headers of the table below.

eeWORKS Research Review and Analysis Methodology

Step	K-12 Settings/Youth	Conservation	Early Childhood EE	Climate Change Education (CCE) and Climate Change Adaptation (CCA)
Clarified the research question	What K-12 student outcomes are EE researchers measuring and reporting? What findings are published? What general trends and gaps do we see in EE outcomes research with K-12 students?	In what ways are researchers and practitioners measuring conservation/ environmental quality outcomes of EE? What trends occur in studies that report on directly observed impacts of human behaviors on environmental quality improvement?	What types of programs are the focus? What program outcomes and associated findings have been reported? What practices have been reported?	CCE: What are the educational strategies that contribute to effective teaching about climate change? CCA: How can educators support community planning for climate change adaptation?
Identified publications for screening	*Keyword search terms:* environmental education and student **n = 2,034 citations**	*Keyword search terms:* environmental education, conservation education, education for sustainability, sustainability education, education for sustainable development, climate change, global warming, biodiversity, biological diversity, species richness, species diversity, species loss, nitrogen, agriculture, phosphorus, ozone, chlorofluorocarbons, ocean, freshwater water quality, water supply, water quantity, watershed, land use, forests, urban development, urbanization, pollution, air quality, aerosol **n = 2,239 citations**	*Keyword search terms:* environmental education, conservation education, education for sustainability, education for sustainable development, forest kindergarten, forest school, gardening, nature preschool, nature-based preschool, outdoor classroom, school garden, sustainability education, childcare, daycare, early childhood, early elementary, early primary, infants, kindergarten, nursery school, preschool, primary grade, toddler, young child, young children **n = 1,629 citations**	*Keyword search terms:* CCE: environmental education, education for sustainability, conservation education, climate change education, sustainability education, ecology education, energy education, adult education, community education, non-formal education, informal education, public education, climate change, global warming CCA: climate change, global warming, adaptation, community, extension, informal education, adult, stakeholders, outreach **CCE: n = 959 citations** **CCA: n = 306 citations**

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Step	K-12 Settings/Youth	Conservation	Early Childhood EE	Climate Change Education (CCE) and Climate Change Adaptation (CCA)
Screened for eligibility	*Basic screening criteria applied to abstracts:* • Peer reviewed and used empirical research • Used the term EE or was in an EE journal • Involved K-12 students and included self-reported or directly measured outcomes • Provided clear-cut data to support findings • Provided sufficient description of methods **n = 426 articles**	*Basic screening criteria applied to abstracts:* • Implemented and assessed an educational interventio • Addressed conservation or environmental outcomes **n = 286 articles**	*Basic screening criteria applied to abstracts:* • Focused on early childhood/young children • Reported on an EE experience or program • Designed as empirical research or evaluation **n = 258 articles**	*Basic screening criteria applied to abstracts:* CCE: • Focused on climate change education • Included an assessed educational intervention • Included empirically measured outcomes and reported results CCA: • Focused on climate change adaptation • Focused on ages 18+ • Included some aspect of audience engagement **CCE: n = 66 articles** **CCA: n = 89 articles**
Selected for inclusion	Selection criteria applied to the entire article were the same as screening criteria with a different team member reading the entire article. Final selection based on team discussions. **n = 119 articles for analysis**	The selection criteria applied to entire article were the same as screening criteria with additional questions addressing study quality: • Are research methods described? • Are data provided to support claims? **n = 105 articles for analysis**	The selection criteria applied to entire article were the same as screening criteria with additional questions: • Identified outcomes associated with an EE program. • Sufficiently described research methods and measures, and data collection tools/instruments. • Presented data to support claims. **n = 66 articles for analysis**	CCE & CCA: The selection criteria applied to the entire article were the same as screening criteria with each article read by three different team members who tracked their selections and comments in a spreadsheet. Final selection based on team discussions. **CCE: n = 49 articles for analysis** **CCA: n = 50 articles for analysis**
Analyzed the publications	The team coded and categorized the data and extracted information such as outcomes measured, study characteristics, program and participant characteristics, methods, and findings.	The team coded and categorized the data and extracted information such as type of intervention and outcomes measured, target audience, and geographic location.	The team coded and categorized the data and extracted information such as country, facilitator, participant ages, program length and setting, publication outlet and year, reported outcomes, research type, and overall findings.	Each team member contributed to and discussed an initial list of themes compiled by the lead author. The team then revised the themes to best capture the diversity of programs and findings.