

KEY STRATEGIES

# University of Florida Study Reveals Key Strategies for Effective Climate Change Education

Researchers find climate change’s complexity and controversy provide opportunities for deeper learning and action.



Educators are faced with many challenges when teaching about climate change. Navigating deeply held differences in public opinion, and even scientifically misleading or disproven reports, requires careful thought and attention. There may also be disagreement among educators, parents, and community members about if and how climate change should be taught in schools or other learning environments.

To understand the most effective strategies for climate change education, researchers at the University of Florida conducted a systematic review of the peer-reviewed literature that explored the methods used in effective climate change education.<sup>1</sup>

The review revealed six primary strategies with a track record of enhancing and improving climate change education. While some of these approaches build on the established principles for effective science and environmental education, others present new opportunities for using the complexity and controversy of climate change as an opportunity for deeper learning and critical skill-building.

WHAT THE RESEARCH SAYS

## Six Strategies for Enhancing and Improving Climate Change Education

High-quality climate change education builds on what we know about high-quality **environmental education**, effective science education, and the social and psychological aspects of **navigating uncertainty and disagreement**. The systematic analysis of climate change education studies revealed six strategies for enhancing climate change education programs. The analysis also suggests that these strategies can **be strengthened using community resources** (field data, partnerships, community surveys, etc.), **engaging teaching materials** (creating interactive, relevant activities, etc.), and **educator training** (navigating misconceptions, facilitating discussions about complex and controversial issues, conducting action projects, etc.).



### 1. It is personally relevant and meaningful.

By studying impacts in students’ local communities or neighboring ecosystems, the impact of climate change can become more relevant to learners.

**Example:** Eastern Canadian teens studied and mapped local beaches, the wildlife and plant species there, as well as the impacts of recent weather events. Applying their knowledge of the expected impacts of climate change, they created maps to predict how the beaches could change over time. The students also came up with ideas about how to mitigate the effects of the climate crisis.<sup>2</sup>



## 2. It engages learners.

Engaging teaching methods can take many forms, including debates, small-group discussions, hands-on labs, or field trips. These experiential, learner-driven approaches are proven to enhance learning, improve conceptual understanding, increase environmental literacy, change behavior, and help participants understand how complex systems interact.

**Example:** Sixth-grade students used computer visualizations to study the relationship between the atmosphere and global climate changes. Based on what they learned about carbon dioxide emissions, the students compared and debated the benefits and drawbacks of potential solutions.<sup>3</sup>

## 3. It enables learners to experience the scientific process.

When learners actively participate in scientific inquiry, they often feel more connected to science and how it impacts their lives. Whether they are working with real world data, collecting their own data, interacting with scientists, visiting a lab or using new technologies to visualize changes, students and adults will feel more invested in climate change if they can explore and test their own ideas.



**Example:** University students used Geographic Information Systems (GIS), remote sensing, and satellite data technology to map snow cover and deforestation. They not only gained a deeper understanding of global climate change, but were also able to transfer the technological skills they developed to explore other environmental issues that interested them.<sup>4</sup>

## 4. It uses school and community projects to build skills.

When educators meaningfully connect participant learning to projects that improve their local school or community, students are inspired to take action and are more hopeful about addressing climate change.



*“Climate change education has changed my identity, it’s changed my daily outlook, what I buy, how much I buy when I go to stores, it’s changed my transportation, my daily living habits ... We had the responsibility to be the spark that would start ... the fire of change and we were all now experienced enough ... We could speak at length on the subject and we felt empowered. I think that empowerment really did make a difference and all this has shifted our habits toward a more eco-friendly lifestyle.”<sup>5</sup>*

—Colin, high school student

**Example:** In the United Kingdom, middle and high school students played a key role in reducing their school’s energy use by learning about energy resources, collecting data, monitoring energy use in classrooms, as well as planning and implementing changes within the school. After introducing several no-cost projects, the schools reduced their electrical usage by an average of 35%.<sup>6</sup>

## 5. It uses deliberative discussion.



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*“In order to process, make sense of, and learn from their ideas, observations, and experiences, [people] must talk about them. Talk, in general, is an important and integral part of learning ... Talk forces [people] to think about and articulate their ideas.”*

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When learners are able to better understand ideological differences and how they impact behavior, they can begin to make sense of the controversy and recognize that there are many varied concerns about climate policy options and economic choices. Through a robust debate, students can begin weighing the risks and benefits of different strategies for mitigating or adapting to climate change.

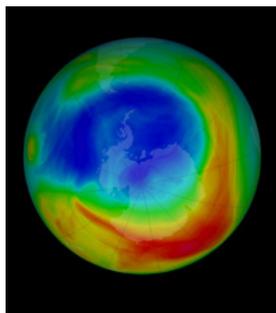
**Example:** An adult program focused on facilitating a productive dialogue between communities with different opinions on climate change. This program helped participants with varying political and social worldviews understand new perspectives and build camaraderie for working together to adapt to local impacts. The participants reported that they were more interested and willing to learn from others because they felt that their own perspectives were respected.<sup>8</sup>

## 6. It addresses misconceptions.

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*“Expressing opposite views, stimulated in group discussions, allows [learners] to transform their personal beliefs into reasoned views.”<sup>9</sup>*

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Given the complex nature of climate change and the prevalence of misleading information, it is important to carefully uncover and address misconceptions with strategies that help learners overcome them.

**Example:** Educators working with a group of teenage students in Germany successfully changed students' inaccurate perception that climate change causes a hole in the ozone layer. To accomplish this, educators

led them in experiments to help visualize and understand faulty lines of reasoning. Educators also used metaphors to clarify concepts. For example, comparing carbon in the atmosphere to a blanket helped students understand its role in trapping heat in the atmosphere. Students also constructed models using light bulbs and containers of carbon dioxide to mimic the mechanisms of the atmosphere and to understand the difference between the greenhouse effect and the ozone hole.<sup>10</sup>

## Conclusion

Well-designed climate change education has the potential to provide people with foundations for understanding complex systems, prepare them to solve real world problems, and empower them to seek plausible solutions. While there is no one-size-fits-all approach for climate change education, the most effective programming is built upon foundational understandings of psychology, social learning, and human behavior.

With a wealth of experience in designing resources that meet curricular needs, build critical skills, and foster behavior change, environmental education professionals can play a crucial role in shaping high quality climate change education. Understanding the research about effective strategies for climate change education can help guide educators as they explore approaches and facilitate impactful climate change education programming.

<sup>1</sup> Monroe, M., Plate, R., Oxarart, A., Bowers, A., and Chaves, W. (2017). Identifying effective climate change education strategies: A systematic review of the research. *Environmental Education Research*, <https://doi.org/10.1080/13504622.2017.1360842>.

<sup>2</sup> Pruneau, D., Gravel, H., Bourque, W., and Langis, J. (2003). Experimentation with a socio-constructivist process for climate change education. *Environmental Education Research* 9(4), 429–446.

<sup>3</sup> Svihla, V., and Linn, M. (2012). A design-based approach to fostering understanding of global climate change. *International Journal of Science Education* 34(5), 651–676.

<sup>4</sup> Cox, H., Kelly, K., and Yetter, L. (2014). Using remote sensing and geospatial technology for climate change education. *Journal of Geoscience Education* 62(4), 609–620.

<sup>5</sup> Ibid

<sup>6</sup> Leigh, Kathryn. (2009). “ENERGY BUSTERS Norfolk Schools Fight Climate Change.” *Environmental Education* 91: 13–14.

<sup>7</sup> Michaels, S., Shouse, A.W., and Schweingruber, H.A. (2008). Ready, set, science: Putting research to work in K-8 science classrooms. Board on Science Education, Center for Education, Division of Behavioral and Social Sciences and Education. Washington, DC: The National Academies Press.

<sup>8</sup> McNeal, et al., (2014).

<sup>9</sup> Mason, L., and Santi, M. (1998). Discussing the greenhouse effect: Children's collaborative discourse reasoning and conceptual change. *Environmental Education Research* 4(1), 67–85.

<sup>10</sup> Niebert, K., and Gropengiesser, H. (2013). Understanding and communicating climate change in metaphors. *Environmental Education Research* 19(3), 282–302.