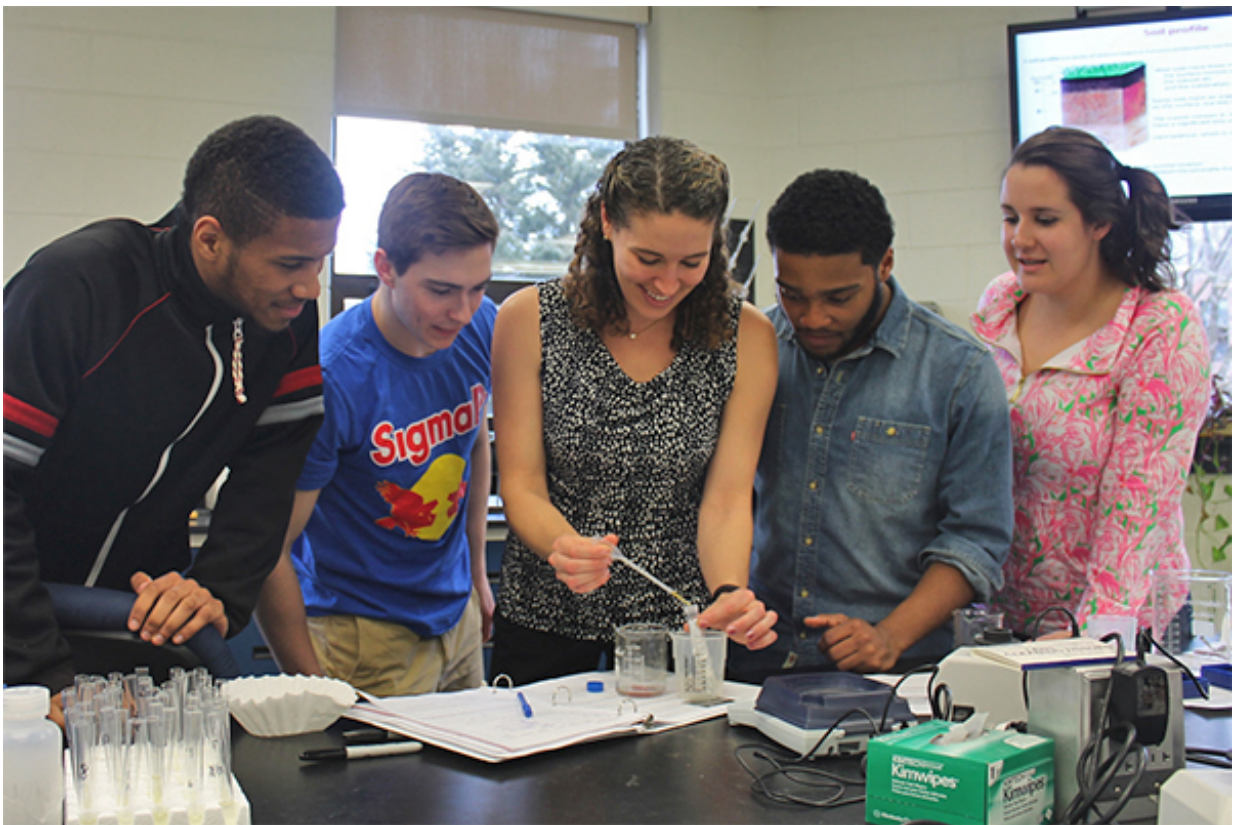


# New study examines undergraduate understanding and misconceptions of climate change

July 1 2015, by Caren Fitzgerald And Karen Roberts

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UD alumna Joanna Huxster (center) instructs students in her environmental science class for non-majors at St. Joseph's on soil analysis.

The human brain is a factory—new perceptions and experiences are

passed along a mental assembly line, shaped by prior knowledge and molded and connected to form conclusions, which then drive actions. This conveyor-belt shaping and molding is known as a mental model.

People use mental models to form everyday decisions, both large and small. A person decides to flip a switch because he knows it will produce light; an athlete takes a drink because she understands that it will solve her thirst.

But what if the problem that needs to be solved is bigger and more difficult to understand? How can people understand, process and take action to solve a problem for which their brains may not have an accurate model?

## **What if that problem is climate change?**

University of Delaware alumna Joanna Huxster reports new findings about the mental models undergraduates use to understand, process and draw conclusions about [climate change](#), and the actions that can be taken to combat it, in the Journal of Environmental Education.

## **Science versus non-science majors**

Huxster investigated the mental models undergraduate students hold regarding climate change, and how these models vary among students based on their education in [science](#) or non-science fields, and their participation in environmental groups.

Huxster, who received a bachelor's degree in geography and [environmental science](#) from UD in 2008, developed the study in pursuit of her doctoral degree in marine studies at UD, which she received in 2013.

Huxster's study built on a 1995 survey conducted by Willett Kempton, professor in the College of Earth, Ocean, and Environment's School of Marine Science and Policy, that investigated public perceptions of climate change. Kempton, Huxster's UD doctoral adviser, and Ximena Uribe-Zarain, education specialist in the Delaware Education Research and Development Center, are co-authors on the new study.

Huxster gathered student testimonies about climate change and developed a survey, which was then distributed to over 400 junior and senior undergraduate students at two U.S. universities. Participants were asked to agree or disagree with a series of statements about climate change, and earned a point each time their answer matched up with the science behind climate change.

In this way, the research team was able to evaluate how participants' mental models align or don't align with the scientific model of climate change—in other words, how people understand and perceive climate change versus how climate change actually works.

They found that students who were science majors, students involved in an environmental group or those involved in both had a higher understanding of the scientific causes and consequences of climate change than students who were not science majors and were not involved in an environmental group.

While this isn't surprising, it's important for identifying how mental models regarding climate change develop, and what it takes to make public thinking and action regarding climate change more accurate.

"The vast majority of university students are non-science majors who aren't involved in an environmental group," Huxster said. "But these students will become voters, work in businesses and some may even promote sustainability. A core understanding of climate change will be

crucial to making responsible decisions in all of these roles."

"Unfortunately," she continued, "the core understanding necessary doesn't exist in this majority."

Huxster found that students enrolled in science majors had a better grasp on the science behind climate change, but that students involved in an environmental organization had a better understanding of the social challenges, needed actions and implications of the issue.

In some cases, the understanding of [environmental group](#) members led to a better overall grasp and stronger mental model of climate change than that of the science majors.

## **Misconceptions persist over time**

The study also identified [mental model](#) factors that might lead undergraduates to draw incorrect conclusions about climate change. For example, participants frequently confused climate change with other environmental issues like ozone depletion. This led some people to mistakenly conclude that aerosols sprays, which did contribute to ozone depletion before the banning of CFCs in the United States, also contribute to [global climate change](#).

According to Huxster, confusion over how climate change works could lead people to take steps they think help the issue, but that are actually unrelated. This means that helping people understand how their actions affect climate change may be more effective than focusing on the nitty-gritty science behind it.

"If a person knows that they should drive less, use public transportation or walk more, and they know their vote on the issue matters, that will probably be more important to the future than their understanding

exactly what a greenhouse gas is and how it works," Huxster said.

Huxster said she hopes that improved education about climate change, both in universities and in other educational contexts, will lead to better understanding of this significant global challenge.

Changing understanding and perception over time, though, may prove difficult. In comparing this survey with earlier studies of climate change understanding, Huxster found that, despite significant scientific advancement and increased media coverage, public understanding of climate change is similar today to what it was in the 1990s.

The Intergovernmental Panel on Climate Change, an international organization of thousands of volunteer scientists from 195 countries, reports with 95 percent certainty that human activity is influencing global climate. Despite this overwhelming scientific agreement, Huxster found that 30 percent of respondents were still unsure about scientific agreement on climate change, and 20 percent of respondents disagreed that there was scientific consensus on the issue.

"The average student who is not studying science doesn't have a better understanding than the average person 20 years ago," Huxster said.

"This is an important set of findings both for environmental education and for communication about climate change," said Kempton. "One might have supposed that today's college students would be graduating with the best current knowledge on an issue as important and as much-discussed as climate change. But this study shows that college students in different majors have different understandings, that the majority still hold the misconceptions of 20 years ago, and that only a minority can produce effective suggestions about action regarding climate change."

## **Climate change education**

Today, Huxster is an adjunct professor at St. Joseph's University, where she teaches environmental science for non-science majors, and a visiting research professor in environmental science and sociology at Drexel University.

She said she believes developing educational programs around climate change could address these misconceptions in undergraduates and ultimately close the gap between the scientific community and the general public. She will begin a postdoctoral program at Bucknell University in the fall, studying public understanding of climate change.

Huxster said that implementing a course on climate change as a core requirement for all students could significantly improve mental models and therefore actions taken to combat climate change.

"Whether or not [students](#) are environmental [science majors](#) or pursuing science careers, they will make decisions that affect our global environmental future," Huxster said. "Students become voters, consumers and community members. We all have a stake in the future of climate change."

**More information:** "Undergraduate Understanding of Climate Change: The Influences of College Major and Environmental Group Membership on Survey Knowledge Scores." *Journal of Environmental Education* [DOI: 10.1080/00958964.2015.1021661](https://doi.org/10.1080/00958964.2015.1021661)

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