

Study suggests exploring values can enhance science education

March 1 2018, by Phil Roth

New research from UT Dallas indicates that values should play a bigger role in the study of science in schools.

The research, which appears in the journal *Science & Education*, found that students typically do not explore predetermined values or evaluate whether they are appropriate to the particular issue they are examining.

Dr. Matthew Brown, an associate professor in the School of Arts and Humanities, and director of the Center for Values in Medicine, Science, and Technology, said the research shows the importance of teaching science in a way that helps students engage their knowledge of science with social questions.

"You can get students to regurgitate facts, and you can get them to work problems. But getting them to connect what they know about the scientific method or particular areas of science to [social issues](#) or policy decision-making is rare," he said.

Working with Dr. Eun Ah Lee MS'16, MA'16, the UT Dallas research associate who initiated the project, Brown built on arguments espoused by John Dewey, an American philosopher and psychologist who contended that [scientific inquiry](#) should include value judgments and that conducting inquiry can improve the ability to make good value judgments.

The researchers said previous studies of secondary school-age students'

decision-making in socio-scientific issues showed that students made decisions using preconceived values, but they did not explore or deliberate those values.

"On the one hand, there's scientific background knowledge and the process of scientific inquiry, and on the other hand there are your values, wherever they come from, political, cultural, personal, ethical," Brown said. "The way it's taught now, they don't really seem to have relevance to each other.

"What has been found is that when it comes to social issues, people make decisions based on their values," he said. "So what we are arguing for—and this is what philosophers of science have been arguing for a while—is that there is actually an interaction between the science and the values."

Exploring how values inform student decisions

Lee and Brown looked at previous studies investigating students' argumentation and decision-making about socio-scientific issues. These classroom examples showed that students use personal, social and cultural values to make decisions about socio-scientific issues.

In one case, researchers examined a controversial socio-scientific issue in Norway—the possible danger of increasing leukemia among the children who lived near [power lines](#) due to low-intensity electromagnetic radiation from the power lines. Although there was no scientific consensus about the alleged danger, it ignited heated discussions to stop building power lines.

During the discussion about this issue, students showed five different types of arguments using values and scientific knowledge, from a simple "small risk argument" saying that "risks are a natural part of life" to a

more advanced argument weighing the pros and cons of different consequences.

In making arguments, students who had different values regarded different scientific knowledge as relevant. The knowledge that was considered relevant to make arguments depended on what students valued.

Brown said critical response skills are useful for making judgments about whether or not to accept a factual claim, and decision-making requires more than factual claims. Such skills help evaluate the use or misuse of supporting evidence, the language used and the logic of the argument.

"Values are involved in making every decision," he said. "Without considering values, accepting a certain factual claim does not automatically justify a decision."

According to Brown, high school teachers should engage students in inquiry-based learning to teach socio-scientific issues. He said students can learn [scientific knowledge](#) that is related to socio-scientific issues and practical value judgment, while also developing arguments or making decisions based on their inquiry and value judgment.

"For many science teachers, this is not a familiar way to teach socio-scientific issues," he said. "So it's important that districts provide teacher education programs that can help teachers experience an inquiry-based, value-judging exploration of socio-scientific issues, and to practice how to plan and implement inquiry-based teaching of socio-scientific issues in the classroom."

More information: Eun Ah Lee et al. Connecting Inquiry and Values in Science Education, *Science & Education* (2018). [DOI:](#)

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