

In The Spotlight: Steven J. Fifield, Ph.D., Studies of Science Education

May 2001 -- From a very young age, Dr. Steven Fifield knew that he was interested in various aspects of biology. His boyhood home in suburban Minneapolis was surrounded by a variety of habitats: woods, fields, ponds, and creeks. He spent his spare time looking at different types of plants, collecting rocks and bird watching. By the time he graduated from high school, however, those habitats were gone, as much of the area had been developed into houses. In looking back, Fifield says, "it made me realize how easily natural areas can disappear."



Fifield

Dr. Fifield's interests in ecology and botany were the origins of a long journey that led to science education as a field of scholarship. After earning a bachelor's degree in biology, he entered a Ph.D. program in ecology at the University of Minnesota. At the end of his first year there he decided to work towards a teaching certificate in high school biology, while continuing in graduate school. After he completed the coursework for a Ph.D. in plant ecology and had started his dissertation research, Fifield switched over to a Ph.D. program in science education. "I finally found the place I could pursue my interests in research that focuses on science education using perspectives from the history, philosophy and social studies of science," says Dr. Fifield.

Dr. Fifield explains that how science is taught fosters widespread images of scientific knowledge, as well as images of the kinds of people who know about and can do science. "We can see how these different images play out in contemporary and historical debates over science education as groups with different goals, values, and interests contend for control over science education," he says. Today, many scientific organizations, including the American Association for the Advancement of Science, the National Science Foundation, and the National Research Council, are deeply concerned about the state of science education in schools and universities. According to Fifield, these organizations want to see science education reinvigorated by a greater emphasis on engaging students in complex, real-life problems; placing increased value on understanding concepts; critically examining the nature of the sciences as social and cultural phenomena; and making science classrooms more empowering places for all students.

Dr. Fifield's research and teaching are closely associated with current discussions about science education reform. He teaches a methods course (SCEN 491) and supervises student teaching for senior secondary science education majors who are preparing to teach science in middle and high schools. In the methods course students take on the hard work of learning to think about science like teachers. "My job is to help future teachers learn to think critically about science teaching and how to translate what they know about science into engaging learning experiences that are effective for diverse student populations," explains Fifield. "Becoming a teacher is a tremendously complex process that often involves reassessing what you think you know about science and how you make sense of yourself as someone who knows about science."



Listening to a student's classroom experience during SCEN 491

A central focus of Dr. Fifield's research is to "study the sites, texts, and activities of science education to examine how teachers and students come to understand themselves in relation to science, how they shape science through their understandings and how science shapes them." BISC 104, a biology course for non-majors, is one site for this research. Fifield is principal investigator of National Science Foundation-funded project, called the Science Semester, in which Elementary Teacher Education majors will enroll in three science courses, including BISC

104, and a science education methods course all in one semester. "The purpose of the Science Semester project is to study how to better integrate innovative science and pedagogy courses for future elementary teachers," says Fifield. "In the process, we can study how students come to understand themselves and science in relation to an interdisciplinary, problem-based learning science curriculum."

In another research project that focuses on the intersections of knowledge and identity in science teacher education, Dr. Fifield studies "how lesbian, gay, bisexual, and transgendered (LGBT) science teachers manage their identities in the face of heterosexism in schools, and how this impacts the nature of teaching and learning science in their classrooms." He explains, "As components of our broader culture, the natural sciences and science classrooms are loaded with claims and assumptions about gender and sexuality. I am interested in how LGBT teachers and students make sense of themselves and science in the context of dominant cultural influences concerning gender and sexuality, and how their experiences can inform efforts to make science education more enlightening and affirming for all students and teachers."

Looking to the future, Dr. Fifield has many plans for his work at the University of Delaware. He and Dr. Deborah Allen are working with undergraduate students on biology education research projects and they welcome other students who want to do research in biology education. Dr. Fifield expects that opportunities for undergraduate research in biology education, a science education journal club, opportunities for peer facilitation and teaching, and perhaps a course on current topics in science education will enhance the department's biological sciences education major by linking existing biology courses to research and practice in secondary science education. He and other faculty in the department are also interested in attracting graduate students to study biology education in a variety of educational settings, including schools, universities, museums and zoos. Finally, he plans to begin a project on the cultural factors that shaped science education in the United States in the 20th century. Fifield says, "This study will add a historical dimension to my research and offer new ways to look at the history of science education."



(Left to right) Dr. Fifield, Dr. Allen, Kati Sandlin, and Joe Guarino. Sandlin and Guarino are undergraduate Biology majors working on Science Education research projects.

In the long run Dr. Fifield hopes his research will "contribute to a broadening of science education to include the study of science as a human activity that must be critically examined in its historical and cultural contexts." "In my research and teaching," says Fifield, "I explore ways to interpret, expand and enrich what we science teachers mean when we say we want our students to 'understand' science."



SCEN 491 class