

# SCIENCE EDUCATION FOR NEW CIVIC ENGAGEMENTS AND RESPONSIBILITIES

# SENCER

## Improving Student Learning

I have seen first-hand the impact that SENCER courses, and the SENCER ideals have had to both student learning and on faculty practices, leading to richer, more engaging science education for students of all abilities and interests. I strongly believe that the SENCER approach can work in virtually any educational context to improve the quality of college science instruction.

– *Gail Simmons, The College of Staten Island, CUNY*

SENCER courses help students integrate the experience and learning across domains of knowledge, science and humanities and policy. Integrating and connecting education is the critical objective of a good bachelor's degree.

– *Peter Facione, Loyola University, Chicago*

The SENCER course that I've developed is a two-semester genetics course for genetics majors at Rutgers. The course is highly regarded and the students have become involved in their own education. [The students] formed an undergraduate genetics society so [they] can stay together and help the new majors. They are going to my colleagues and saying...“We want to look at more complex material.” And my colleagues are beginning to change their teaching not because I said it was good, but because the students are demanding it and giving them good reasons why it should work.

– *Terry R. McGuire, Rutgers University*

SENCER has improved teaching and learning at Wartburg College in many ways. The program has increased science literacy, reasoning skills, and the understanding of the importance of science in civic decisions for nearly a quarter of our students. It has inspired our mathematics department to incorporate civic engagement components into several beginning courses. It has promoted cross-disciplinary and intra-college discussion around issues of science and civic engagement.

– *Mariah Birgen, Wartburg College*

Through the SENCER philosophy, students develop the ability to think critically and make decisions based on a critical thought process. The way we were teaching before SENCER [was] by providing facts and [more] facts, and...we're not pleased with the product we've put out there. [Through SENCER] we're now producing students who have the ability to think critically and through a logical process, and their decisions for themselves and their communities will be better than what we have today.

– *Emmet Davis, Rutgers University*

### **Creating a Community of Scholars**

While participation in the SENCER program greatly aided us in our curricular development of the environmental science program, we found especially significant the SENCER-fostered opportunities for collaboration and support among institutions serving similar student populations [other HBCUs and MSIs].  
– *George Middendorf, Howard University*

Before I found out about SENCER, I was teaching in a very traditional way – which is basically how someone else taught me. And from SENCER I learned different approaches. You can use team-teaching. You can use community involvement, by giving students projects to do in the community. And what that did for the course is that it highlighted the fact that the students could see how science is applied. They realize now that they're not just memorizing, and forgetting it after the exam. But that this is valuable for their lives. Plus they can share the information they gain with people in their family, with their friends, and with their community.

– *Debra Meyer, University of Johannesburg, South Africa*

One of the things that SENCER has provided is a network of individuals who share this common interest, but come at it from the perspective of a variety of disciplines and the perspective of a variety of institutions. So really what I think we've been creating here is [what you would call] a teaching commons, a space where faculty members can get together and share ideas, experiences, evidence, questions, and work together to contribute common resources, in this case, ideas, evidence, understanding related to undergraduate learning and science and technology and engineering and mathematics.

– *Matt Fisher, Saint Vincent College*

The SENCER Summer Institutes provide an important professional development opportunity for individuals and teams from educational institutions throughout the nation and from overseas, giving them the resources and the focused time to develop or revise courses on their home campus.

– *Trace Jordan, New York University*

I came to SENCER [Summer Institute 2006] unsure of what to expect and uncertain of how I would be able to contribute to my team as a student. SENCER was a valuable experience for me, even though I am not planning on teaching any courses for decades at least, on many levels. I was able to see for the first time how passionate faculty and administrators can be about teaching and revamping their courses. I met many like-minded people. I walked away with a number of ideas – things I could do as a student to help align our campus with the SENCER ideals.

– *Kim Kido (student), University of Hawai'i, Mānoa*

Very few opportunities exist for the more sophisticated STEM educators to enhance their knowledge and skills. SENCER provided that opportunity, by assembling a team of experienced, knowledgeable innovators in a setting that both fostered interaction and challenged those people to move forward.

– *Laurie Fathe, George Mason University*

### **Encouraging Curricular Innovation**

As the influence of science and technology in our lives increases, it is becoming more obvious and urgent that we need to educate students on the power and limitations of science, on the possible abuses and positive applications, on the importance of dialogue in scientific inquiry, and on the value of an education based on creativity, invention, and cross-disciplinary fertilization. The SENCER project, through its intense Summer Institutes and "model" courses...provides an extremely fertile ground and support system for curricular innovations aimed at creating an active, intensive, and engaging learning experience that prepares students for life-long learning.

– *Theo Koupelis, University of Wisconsin-Marathon*

With the...SENCER strategy in science education, we have been able to facilitate the development of a number of other general studies science courses that employ civic engagement in the process of helping students better understand the relevance of science in their lives and the need for personal action and responsibility.

– *Phillip Mason, Fairmont State University*

I think the thing that appealed to me, when I first heard about SENCER, was that it harks back to the sorts of things that got me very interested in science when I was in junior high school. There was so much hands on stuff -- we had an unusually large amount of laboratory, and the teachers were really focused on connections with the real world. It was those things that just made it so exciting. It was never dry. Much later I came, as an educator, into a college setting and realized that a lot of what we were teaching, especially in non-majors courses, was relegated to the dusty corners of the department. So when I encountered SENCER I thought, "Yes, [this] crystallizes what I've always thought was the way you needed to communicate this material."

– *Gail Simmons, College of Staten Island, CUNY*

### **Engaging Students Inside and Beyond the Classroom**

Through a better science education, these citizens [non-science majors] will develop an attitude that will foster inquiry and activism and remove indifference when it comes to our environment and our society. Creating respect, admiration and basic understanding of the scientific enterprise in the general population will in turn increase the number of people who will choose careers in science.

– *Maria Curtin, Stonehill College*

I continue to be amazed at the huge disconnect that many students have between science and their everyday life...Programs like SENCER increase our awareness of new complexities that arise as well as offer ways to better connect science learning to vital issues in our society.

– *Woody McKenzie, Lynchburg College*

Since we are so technologically based, so science based at this particular point in time, the needs for future generations will rely upon the generation of new technologies to solve energy issues. If we don't begin to raise the level of awareness and understanding of scientific issues for all individuals, then we're [going to] be left with a situation where we have an elite group of scientists that really understand what's happening and what we need to do for the future, and basically an illiterate group, that is the general public, who is primarily responsible for making the policy decisions.

So we need to integrate into our undergraduate curriculum with much more education and science and technology so that the next generation of students is better prepared for what the 21<sup>st</sup> and 22<sup>nd</sup> centuries will bring.

– *Amy Shachter, Santa Clara University*

I have been involved in lots of efforts over the years to teach math and science to non-science majors. In the past, a lot of these students just saw math as being a requirement. They take the course and when they're done with the course they feel like they don't have to utilize this knowledge later on. So the important thing to me about the SENCER approach is that it connects mathematics and science to contemporary issues/problems that students are confronting. I have them do special projects that integrate math where they use data, they manipulate data, they analyze data, et cetera, so that the math becomes a more integral part of what they do. I think that that's really what attracted me to SENCER – this notion that complex mathematical ideas can emerge in the context of trying to solve real problems.

– *Dave Ferguson, Stony Brook University*

What I like about the SENCER approach is two things really. One is this paradigm shift in pedagogy away from delivering content and more towards trying to show students or teach students how to think critically and how to analyze information, and the other thread is of course the civic engagement thread. I'm trying to get students to take what they've learned and what they've discovered and apply it to their own lives and their own communities and the larger society. So I think these are two very important things, which simply don't show themselves in traditional teaching methods.

– *Story Project Interviewee 2007*