Improving STEM Education with the SENCER Summer Institute

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Abstract

Science Education for New Civic Engagements and Responsibilities (SENCER) aims to both improve science education and increase the civic capacity of students by teaching basic scientific content through complex, unsolved civic challenges. SENCER helps educators apply the science of learning to the learning of science by offering tools, resources, and programs grounded in the current research on student learning, effective assessment, and the scholarship of teaching. One of the ways that SENCER supports faculty and administrators is by hosting an annual Summer Institute for those interested in applying SENCER ideals and methods to their work. This intensive learning opportunity is designed to provide a broad professional development experience for educators interested in the civic implications of science education and science policy, improving and assessing student learning, and leading change in academic institutions.

The Challenge: Science Education in Today’s Society

Our society, at all levels, faces challenges which require detailed knowledge of science, technology, engineering, and math to solve, and which will demand policy makers and citizens with a high level of STEM literacy. From local problems—such as mass transportation in growing cities, water quality, and food safety—to global challenges, such as the HIV/AIDS pandemic, new solutions will have to come from concerned young people, both in college and beyond, who have both the desire and the knowledge to address them effectively.

We now know that traditional approaches to teaching STEM disciplines fail to engage many students, who do not complete study in these fields, or take the minimally-required amounts and levels of these courses. How can we stimulate greater interest in—and reduce the fear of—science and mathematics? How can we empower both students and community members for effective civic engagement?

The Solution: SENCER and the SENCER Summer Institute

The National Center for Science and Civic Engagement (NCSCE), of which SENCER is the signature initiative, offers programs, services, and resources to colleges, universities, schools, and community organizations designed to make STEM education real, relevant, rigorous, and responsible, and support student success and achievement.

Our Center’s programs emphasize attention to students, not just as candidates for college degrees, but as citizens who contribute to the essential work of creating, applying, and disseminating knowledge — the knowledge we need to make our democracy.

This year marks 15 years of support from the National Science Foundation for SENCER, an occasion which will give us the opportunity to collectively reflect on where we have been and on the direction of SENCER as we go forward. The past 15 years have yielded important accomplishments. More than 2,500 educators and students from over 500 institutions, 45 states, and 9 countries have participated in our annual Summer Institutes and Washington Symposia. Our efforts have resulted in 50 SENCER
model courses and programs, 16 backgrounders, (syntheses of the issues we use to teach science,) and nearly 100 articles in our International Journal. All of this activity is in the service of the many thousands of students, faculty, and communities impacted by the work of the educators who work with and through the National Center.

The SENCER Summer Institute (SSI) is one of NCSCE and SENCER’s main instruments for faculty development. The Institute is a 5-day residential, intensive learning opportunity for educators interested in engaging students with more effective pedagogies and more durable learning experiences that teach STEM content through compelling civic issues of immediate interest. Though the focus of SSI is on improving education in STEM disciplines, we welcome and have attracted participants interested in improving undergraduate learning from almost every discipline.

The Summer Institutes have always provided opportunities for participants to connect learning to matters of real world significance. While elucidating what we call “the SENCER approach,” the SSI core program includes attention to what contemporary cognitive science tells us about how people learn. Effective curriculum design, goal setting, and meaningful assessment are overarching aims. SSI also provides strategic advice and assistance for achieving reform goals, building partnerships, and making new collaborative connections.

SENCER treats all participants as leaders and learners. Those who plan SSI 2015 are learners as well. We hope to cultivate our capacities as natural scientists and to use our observations—what we learn from working together—to shape and re-shape what we do. We will have some special help in this work from invited scholars and leaders, including several SENCER fellows and senior associates, who have served as "faculty" for our previous SENCER Summer Institutes

Solution: How can the SENCER Summer Institute help you and advance your career?

A survey of our community found that 44% of program participants acquired internal funding for SENCER work, 33% cited SENCER as a contributor to their tenure and promotion, 31% acquired external grant funding to amplify their SENCER activities, and 11% had obtained new positions or employment through their involvement with us. The structure of the Institute program ensures that each participant will have access to precisely the useful new knowledge and techniques which they will be able to apply in their own institutions and courses. The Institute features a rich mix of several session and activity types which serve the needs of each segment of our community.

Plenary sessions on each day of the workshop focus on issues of broad significance to the SENCER community. One of the SSI 2014 plenary sessions was delivered by Dan Kahan of Yale University and focused on the relationships between education, opinion, public policy choices, and democracy. Plenary sessions planned for 2015 will focus on the ways in which faculty can show leadership in the accreditation process, workforce development, collaborations between formal and informal science, and the relationship between science and public policy.
Workshop sessions offer the opportunity for hands-on, intensive engagement with a specific aspect of SENCER work. Previous workshops have addressed the Scholarship of Teaching and Learning, art, science and civic engagement, and writing successful grant proposals to support teaching and learning.

Concurrent and work sessions feature reports from campus projects and and/or enable participants to address topics related to teaching, goal setting, design, and assessment. A signature SSI 2014 concurrent session by Stephen Carroll of Santa Clara University instructs participants on how to use the Student Assessment of Learning Gains to evaluate their SENCER courses. SSI 2014 also featured a work session by partners in the SENCER-Informal Science Education initiative about cross-sector civic engagement partnerships.

The Institute also hosts poster sessions, another opportunity for teams and individuals to present the work being done on their campuses with SENCER.

Scheduled consultations with experienced leaders in the SENCER community are offered for groups (2-3 people) and teams (4 or more people). Matches are based on the group or team's specific needs and interests and allow teams the opportunity to receive customized advice from a SENCER leader who has dealt with the same challenges faced by the group or team.

More broadly, the team time during which these consultations take place offers structured time and space for teams to work together on their collaborative projects. Evaluations of this past year’s Institute repeatedly mentioned team times as among the most valuable aspects of the program.

In addition to the individual and team opportunities for professional growth, networking opportunities across the SENCER community of practice have also been cited by participants as particularly fruitful. To this end, we will also be offering a second year of the SSI New Participant Orientation, to ensure that new members of our community will be able to experience the full benefit of SSI’s offerings.

Following the Institute, NCSCE awards merit-based, competitive Post-Institute Implementation Awards of $3,000. These sub-awards, supported through a grant from the National Science Foundation, are intended to promote the institutionalization of SENCER projects on campus, particularly those that emphasize measurable and achievable goals, and innovative evaluation strategies.
Next Steps: Attending the 2015 SENCER Summer Institute

The 2015 SENCER Summer Institute will be held at Worcester Polytechnic Institute from **July 30 - August 3, 2015**.

Participation in the Institute is by invitation following submission of an application which is reviewed by SENCER staff. We welcome participations by individuals, groups of two or three people and teams of four or more people. The application is available at: http://www.sencer.net/Symposia/SSI2015/SSI2015participation.cfm

**Applications for participation are due on March 13, 2015, and acceptance decisions will be delivered on March 27, 2015.**

Registration Fee

Thanks to support we receive from the National Science Foundation, we are able to cover a majority of costs of the program. As a result, our registration costs are kept at a low price, and we are able to offer invited participants the following reduced registration fees for 2015:

- **$700** for new participants,
- **$650** for SENCER Summer Institute alumni, and
- **$650** for new or returning undergraduate or graduate students.

The registration fee includes:
- Meals during the Institute,
- Enrollment in Institute sessions and workshops,
- Team/group consultations,
- SSI new participant orientation,
- Individual participant sessions,
- Materials, and
- Shuttle bus transportation between the WPI campus area and any SSI 2015 Institute activities taking place off-campus.

More information on paying the registration fee will be provided to invited participants in April 2015, following application reviews.

Lodging Options

Details on lodging options, and how to reserve a room at the conference rate, will be provided to SSI 2015 invited participants in the spring. Participants will be able to choose from on-campus and nearby hotel housing.

Contact Us

For further questions about the 2015 SENCER Summer Institute, please contact Kyle Simmons, NCSCE's Faculty Development Events Coordinator by email at kyle.simmons@ncsce.net or by phone at (202) 483-4600.