

Greetings from the SENCER National Office! It's hard to believe the holidays are nearly upon us and the year is almost over. We'd like to take this close-to-the-end-of-the-year opportunity to look back on the semester just past and to look forward to new projects under development for the spring and summer.

In this issue of the E-Newsletter, we are pleased to share with you some exciting news about plans for SENCER Fastlane (see below) and a helpful activity called, "9 Steps to Designing a SENCER Model in About an Hour". Tim Weston and Sue Lottridge provide an assessment update (Page 2) and The College of New Jersey offers a report on their work (Page 4). Plus the SENCER Model of the Month (Page 3), a "SENCERious" that asks "Is SENCER Too Sexy?" (Page 7), and more.

SENCER Developing Online Instrument to Simplify Communication and Reporting

SENCER Fastlane Available in Spring 2005

For many years, the NSF has used Fastlane, an interactive real-time system to submit progress reports and apply for supplemental funds online. Through FastLane, authorized users are also able to check the status of pending proposals, submit final project reports, request disbursement of funds, and receive announcements of recent awards.



For a history on the development and dissemination of NSF FastLane, visit:

https://www.fastlane.nsf.gov/a0/about/fastlane_history.htm



Using the NSF FastLane as a model, SENCER plans to create the SENCER FastLane, an online reporting tool for SENCER institutions. SENCER plans to roll-out version 1.0 of SENCER FastLane in Spring, 2005

At the initial introduction of SENCER FastLane, SENCER institutions will be able to access and edit their project information, submit financial and final reports, request no-cost extensions, and access special announcements. Ultimately, SENCER FastLane will also feature a searchable archive of past and present projects and publications. The archive will be available to both SENCER institutions and visitors of SENCER.net. This will enable networking opportunities among past and present SENCER institutions and encourage dissemination of SENCER courses and activities to interested visitors.

Future issues of the e-newsletter will feature updates on the development of SENCER FastLane, an announcement when the site is "live", and instructions on how to use SENCER FastLane.

**See Page 7 for a Special
Announcement
Regarding International
Applications to
SSI 2005**



Uranium mill (no longer in existence) near Mount Taylor in New Mexico (See page 3.)

SENCER Assessment News

SENCER Students Show Significant Gains in Scientific Literacy Results from Spring 2004 SALG

Tim Weston, University of Colorado-Boulder

During spring 2004, the SALG was completed by 32 courses and nearly 1400 students. Students enrolled in SENCER courses were majority female (62% to 38% male), mostly of traditional college age (61% between the ages of 18 and 21), majority white (80%) with 9% African American, 5% Hispanic and 3% Asian. Eighty-five (85%) percent were non-science majors, undecided or planning on becoming a non-science major.

Overall, SENCER students rated activities such as “*Focus on addressing real world issues*” and *Focus on science facts* the highest as course elements that helped them learn. Lecture was rated as the most helpful course activity. It was also the most frequently used in courses.

The largest gains from pre-post for SENCER students were on items asking about scientific literacy such as “*I am confident I can determine the difference between science and pseudo-science,*” and “*I am confident I can think critically about scientific readings in the media.*” Larger gains were also found for science interest items such as reading about science, and taking additional science classes

All student responses to survey items were compared between SENCER courses and non-SENCER courses. The SENCER group had significantly higher pre/post gains on the five “scientific literacy” items about reading scientific literature, critical thinking and understanding the difference between science and pseudo-science than non-SENCER courses. They also showed greater gains on science interest items for discussing science with family or friends, reading articles about science and its relationship to civic issues, and reading about science in magazines and taking additional science courses. Additionally, SENCER students who reported never engaging in civic activities said they were more likely to engage in some activities after taking the course than Non-SENCER students. These activities included writing a letter to a public official about a civic issue, talking to a public official about a civic issue, debating or offer comment about a civic or scientific issue, and writing letters to the editor about civic or scientific issues.

SENCER SALG Update: Math SALG Developed

Susan Lottridge, James Madison University

The Fall 2004 semester has brought a lot of activity with regard to the SENCER SALG. Aside from a large number of faculty using the instrument this fall, a version for mathematics was developed.

Fall 2004 PRE-SENCER SALG administration

The PRE-SENCER SALG was used this past semester by 28 faculty from 24 colleges and universities in the United States. These 28 faculty administered the instrument in 47 courses to 3088 students. A total of 1843 students completed the instrument, which resulted in an overall response rate of 60% (SD=19%, min =17%, max =93%).

Table 1 lists four ranges of responses rates and the number of courses in each range.

Table 1. Ranges of response rates to Fall 2004 PRE-SENCER SALG administration

Range of response rates	Number of courses
0-25%	2
26-50%	12
51-75%	21
76-100%	12
Total	47

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The SENCER Model of the Month

Environmental Chemistry and Ethnicity: Uranium and American Indians

Catherine Middlecamp and Omie Baldwin
University of Wisconsin—Madison

In 2002, Environmental Chemistry & Ethnicity (3 credits) was created as a new course in the Department of Chemistry, the first in the department to meet the new Ethnic Studies requirement at UW-M. In both 2003 and 2004 the course was taught with a focus on “Uranium and American Indians” by a chemist and a clinical social worker/health professional who is also a member of the Navaho Nation. The course explores the connections between the presence of uranium and the native peoples of the Southwest who lived (and still are living) on the land where the uranium was extracted. Two key issues are addressed: how policies (public health, occupational safety, environmental protection & cleanup) are established when national security, corporate interests and the needs of a community come into conflict, and how indigenous groups in the United States faced and continue to face challenges with respect to both their land and their culture.

The scientific and the cultural, historical, and policy strands of the course are equally weighted and woven together to the extent possible. The science topics covered include the composition of ores and naturally occurring isotopes, mining and milling technology, radioactivity and radioactive decay, radium and radon, ionizing radiation, and nuclear fission and fusion. The cultural and historical issues include the history of the Navaho, their role as workers in radium-based industries, cancer incidence in the population. The policy questions through which the cultural and scientific factors intersect include the role of the Federal Government in Navaho tribal life, the importance of nuclear weapons and testing in national defense and national security, and environmental and public health problems related to radium. The course is organized around lectures, class discussion, guest speakers and individual projects that students present at the end of the course.

What Students are saying about Environmental Chemistry and Ethnicity “Uranium and American Indians”

In 2003 and 2004, Middlecamp and Baldwin collected written comments by students via the SALG and/or submitted comments on the written chemistry department instructor evaluation. Here’s what they had to say:



Cathy Middlecamp and Omie Baldwin on site at a uranium mill in New Mexico
(this mill now has been taken down and the site restored)

“I think that the most important part of learning chemistry is learning why it matters to people.”

“Finally, an interesting ethnic studies class that actually will carry benefits after the course is over.”

“I really enjoyed this class. When registering for classes, Chem 201 caught my attention because it was a science class but at the same time I learned about the Navajo and their struggle for miner compensation due to radiation exposure in the mines. It was the perfect combination of culture and how science impacts it.”

“I think that this is a good example of how classes should be taught so that students permanently retain the information and you can test their knowledge appropriately.”

For information on nominating a model go to <http://www.sencer.net/nominatemodels.cfm>.

If you would like a copy of the SENCER Models on CD-ROM, please contact patti.simon@sencer.net.

Severe Weather Phenomena and Cancer, Genes, and the Environment Courses at The College of New Jersey

Professors Marty Becker, Danielle Dalafave, Bonnie Dixon, Marlene Kayne, Sharon Sherman and Dean Gail Simmons

The College of New Jersey

The College of New Jersey professors believe that in today's increasingly technological society there is a great need to raise scientific literacy in the general public. This calls for established standards in science education, so that today's students can assume their future roles as informed citizens. Science should be taught at all levels with appreciation of relationships among various scientific disciplines and the needs of society.

After attending the SENCER Summer Institute in 2003, faculty at The College of New Jersey applied this model in the development of science courses that integrate civic engagements and responsibilities. These courses encourage development of critical thinking skills regarding science topics, making decisions by analyzing data, understanding the nature and complexity of scientific problems, and articulating clearly ideas and reasoning.

Professors of science and education met regularly throughout the '03 – '04 academic year to plan the SENCER courses. Initially the courses would be offered to teacher education candidates preparing to teach students in elementary, early childhood or special education classrooms as well as students who are deaf and hard of hearing. In order to be highly qualified, these candidates need strong science backgrounds and must study physical, life and earth and space science topics.



The College of New Jersey

The team decided that goals for the professor would include establishing a learning environment that supports engagement and inquiry, using discrepant events as a strategy for motivation, and creating an environment where questioning is encouraged and valued. Other goals include communicating science concepts to a diverse audience, employing strategies that foster communication among students, and using multiple assessment methods to improve teaching and learning.

The team decided that student goals would include understanding the nature of science and scientific thought, developing an understanding and working knowledge of science concepts, identifying and clarifying misconceptions about science, and recognizing that scientific theories develop over time, depend on the contributions of many people and reflect the social and political climate of their time. Using reference and research, exploring case studies from literature, reading and critiquing relevant scientific publications, making decisions, weighing evidence, and recognizing the merit of arguments are also important goals.

In the Fall of 2004 Professors Marty Becker and Danielle Dalafave from the Physics Department team taught a course titled "Severe Weather Phenomena: Thunderstorms, Tornadoes and Hurricanes", which they designed. Weather influences daily lives of millions of people worldwide. Severe weather phenomena, such as thunderstorms, tornadoes, and hurricanes can have devastating economic, health, and social effects.

The "Severe Weather Phenomena" course is geared toward prospective K-8 teachers. Through increasing proficiency in physics and meteorology, the course is designed to help future elementary school teachers to become motivators of children in science. Besides its scientific content, this course teaches the lab safety and fosters curiosity, open-mindedness, and honesty when collecting and interpreting findings.

The "Severe Weather Phenomena" is a one semester course with three lecture hours per week and two lab hours every other week. Selected topics in mechanics, optics, thermodynamics, and electromagnetism are used to elucidate phenomena in the meteorology. The course covers the following meteorology topics: weather, economy and society; earth shape; seasons; atmospheric stability; winds; air masses and fronts; thunderstorms; tornadoes; and hurricanes.

Designed and team taught by Professor Bonnie Dixon of the Chemistry Department and Professor Marlene Kayne of the Biology Department, "Genes, Cancer and the Environment" is another SENCER course being offered this semester.

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9 Steps to Designing a SENCER Model in About an Hour *

Ellen Goldey, Associate Professor of Biology
Wofford College

This exercise is to help teams imagine and design courses, learning communities (LCs), and/or other curricular programs that foster civic engagement by teaching “through” multidisciplinary, complex, civic issues. Funded by the National Science Foundation, SENCER seeks to develop an active curiosity and deeper understanding of both the efficacy and limitations of science and mathematics in dealing with such issues.

1. **OVERVIEW** (*TIME: About 5 minutes*):
The facilitator(s) will summarize the directions provided below.
2. **FORMING GROUPS** (*TIME: About 5 minutes*):
“Sort” into interdisciplinary groups of 3 or 4 people. Please be willing to quickly move your chairs, etc. to form your group. **CHOOSE** a timekeeper who needs to start keeping track of time **NOW**. Each person should have a stack of sticky notes and a marker and each team should have a sheet or two of flip chart paper for your final poster.
3. **BRAINSTORM POSSIBLE THEMES** (*TIME: About 5-10 minutes*):
Take some time to **SILENTLY** brainstorm in response to the following question: If you had the opportunity to teach about a capacious civic issue, which **ISSUES** might intrigue you **AND** your students? Put **EACH** of your ideas on a separate sticky note. Be sure to write large enough for others to read your note from a distance of a few feet. **DON'T** comment (verbally or non-verbally) on each other's ideas now. Consider issues that you think are important for all students (i.e., citizens of this locale, region, nation, and/or planet) to understand and engage in, and try not to be constrained by your own expertise in identifying these themes.
4. **CHOOSE YOUR TARGET AUDIENCE AND ONE THEME TO DEVELOP.** (*TIME: About 5 minutes*):
As a group, decide on your target audience (e.g., first-year, developmental, non-science majors, seniors, etc.), and come to consensus on one theme/civic issue that you will develop as your group's SENCER model. If your group members have widely divergent interests, simply take a leap of faith and settle on one of the themes.
5. **ESTABLISH YOUR DESIRED LEARNING OUTCOMES** (*TIME: About 10 minutes*):
Given an imaginary quarter, semester or year in which your group was teaching around this theme, brainstorm and settle on 3-4 primary learning outcomes (each) for: a) your students to achieve, and b) you and your faculty colleagues to achieve. Try to move beyond “gaining broader content knowledge” as a learning outcome.
6. **IDENTIFY RESOURCES** (*TIME: About 5 minutes*):
Will your team use a single course, LC, or other type of program to implement the theme? Brainstorm courses, disciplines, faculty members, staff members, undergraduate preceptors, external/internal experts, and community resources that might contribute expertise/passion to engaging in the theme, and write down your ideas.
7. **ENVISION THE PROCESS** (*Time: About 10 minutes*):
Brainstorm ideas for implementing your model. Think of field experiences, concepts, authors, literature (of various types), films, dramatic performances, research projects, and novel teaching methods that might **ACTIVELY** engage students in the theme (don't let limited budgets constrain your ideas). **Put EACH idea on a separate sticky note** to later arrange them for the poster.
8. **MAKE A SUMMARY POSTER OF YOUR MODEL** (*TIME: About 10-15 minutes*):
Use your markers and a sheet of flip chart paper to distill out and summarize some of the key ideas and/or activities in your design that might underpin a real opportunity for students. Make sure your poster includes at least some of the following: a title that portrays your theme, the target audience, learning outcomes, basic model structure (course, LC, or program?), embedded disciplines, resources, and proposed activities for implementation.
9. **SHARE YOUR POSTER WITH THE LARGER GROUP** (*TIME: 2-3 minutes!*)
Any member of your group is free to take your poster home.

**This exercise, modified for use at the SENCER pre-conference workshop of the Association for Integrative Studies conference in October 2004 (contact Ellen Goldey at goldeyes@wofford.edu), is modeled after the Designing a Learning Community in an Hour heuristic developed by Jean MacGregor and Barbara Smith (see <http://www.evergreen.edu/washcenter/LCHour.shtml>).*

Weather Phenomena and Cancer Courses (cont.)

The course covers concepts of chemistry, biology, biochemistry and genetics and consists of lecture and laboratory. In the laboratory students put scientific principles into practice. Laboratory reports give students a chance to work on clearly defining the results of several integrated experiments and discussing their findings in light of modern scientific principles. Students learn about various forms of cancer, attend community meetings and glean information for a pamphlet they create that has the newly-diagnosed patient in mind. They work in groups to write a case study focusing on a topic that can be categorized into one of the five areas of cancers being studied: colon; skin; lung; breast and prostate. The drug discovery paper ensures coverage of the topic remains positive as students research the popular literature for a new cancer treatment option. Professionals from The College of New Jersey's Municipal Land Use Center provide links to community resources, including guest speakers. The local branch of the American Cancer Society also provides resources for students.

The course covers the following topics: elements and bonding; three-dimensional structure of molecules; reactivity of organic molecules; metabolism and nutrition; DNA; structure and function of proteins; enzymes; cell cycle topics and genetics.



On The College of New Jersey campus

Currently a student in the Severe Weather Phenomena course, freshman Jenna Gnade says, "I feel as though I have been given the opportunity to expose myself to two divergent areas of science that are, in many ways, interrelated. It is within this course that I have learned a wide array of concepts ranging from severe weather conditions to the physics of everyday life. Not only do I consider myself more knowledgeable in the subject matter, but I find it easier to understand how and why how these natural occurrences take place in our own environment. Overall, my experience within the classroom has been a positive one. As a future teacher, I truly believe that it is essential to grasp a strong insight of the curriculum we teach. I am confident in saying that this course will have prepared me to introduce various scientific issues in an effective manner within my own classroom."

We are always interested to hear about the progress of our SENCER colleagues, especially news of grant support for increased SENCER work. We are happy to help support your efforts in any way that we can. Please let us know of developments in your work and we will share your news with the SENCER community. You may e-mail Patti Simon at patti.simon@sencer.net with your reports and requests.

SENCER SALG Update (cont.)

Development of MATH SENCER SALG

The team from Loyola Marymount University requested that a MATH SENCER SALG be created to better suit SENCER mathematics courses. The team worked with Tim Weston and Sue Lottridge to modify the SENCER SALG, and by replaced references to science with references to mathematics and statistics. Both pre and post instruments were developed, and can be viewed at:

POST: http://work.wcer.wisc.edu/salgains/view/MATHSENCERSALG_FALL04_POST.htm

PRE: http://work.wcer.wisc.edu/salgains/view/MATHSENCERSALG_FALL04_PRE.htm

So far, one faculty member has administered the MATH PRE-SENCER SALG in two courses to 400 students. The response rate to these administrations was 56% (224 students responding).

Using the SENCER SALG or MATH SENCER SALG as a post instrument in Fall 04

Faculty who are interested in using SENCER SALG or MATH SENCER SALG as an end-of-course instrument in Fall 2004 should contact Sue Lottridge (susanlottridge@hotmail.com). The POST SENCER SALG instrument can be viewed at: http://work.wcer.wisc.edu/salgains/view/SENCERSALG_FALL04_POST.htm

SENCERiously Folks: Is SENCER Too Sexy?

Patti Simon

This weekend, I watched a short clip on one of my favorite basic cable channels (I admit it was VH-1) that has me thinking. The clip highlighted college courses with hip, or what one might consider sexy, subjects (And we know that sex sells!) There was an accredited course on hip-hop culture about “The Life and Times of Lil’ Kim” (see www.mtv.com for details on Lil’ Kim and www.syracuse.edu for a course description). A professor of musicology at the University of North Carolina Charlotte is teaching an elective called, “Examining *American Idol* Through Musical Critique”. (See www.idolonfox.com for details on American Idol.) Business schools across the nation, including American University and the University of Washington in Seattle, are taking (another) page from Donald Trump by using NBC’s “The Apprentice” to teach principles in marketing and management courses (for more information on Donald Trump, type “Trump” into Google and hold onto your hat!). Finally, UC Berkeley offers the “Simpsons and Philosophy” course which asks, “Can Nietzsche’s rejection of traditional morality justify Bart’s bad behavior?”

As a bit of a pop culture junkie, I happen to find these courses to be intriguing and creative, even amusing. But are they academically rigorous? Are they pedagogically correct? Can they bring about serious educational reform? They are, in fact, examples of teaching “to” something (e.g. philosophy) “through” something else (pop culture). Sound familiar? It should. And David Burns, SENCER PI and amateur philosopher, has been known to say, “I can start with Bart Simpson and get you to Aristotle’s *Nicomachean Ethics* real quick.”

The VH-1 program implied that these courses might be unserious or too trendy. Some might argue that it is undignified (in higher education—*gasp*) to use Lil’ Kim and Trump to teach anthropology and business. And I wondered if SENCER could be perceived in the same way. Is SENCER too “sexy”? (It’s unlikely that your VH-1 crowd would consider tuberculosis as sexy. I mean, that’s so 19th century!)

My answer is no.

While I can’t speak for the aforementioned courses, I do know a thing or two about SENCER. Some of the SENCER courses may in fact be trendy and fashionable but they are also serious and significant.

For one, I believe that our SENCER course developers have clued into something very important: they are getting students interested in science while simultaneously encouraging students to become more civically engaged. Like my pop culture inspired examples, SENCER courses do a phenomenal job of using what already appeals to students to teach basic science, technology, engineering, and mathematics. And SENCER courses also ask where does the knowledge take us? How do we really use this knowledge?

And, let’s be honest, when one considers what’s “sexy”, Physics 101 probably isn’t the first thing that comes to mind. In fact, the STEM disciplines may be more often regarded as “challenging” or “difficult” or “required.” That’s what I thought when I was an undergrad. But, my college classes didn’t put science into the broader context of the world around me (and then challenge me to change it). My professors didn’t encourage me to learn the basics to tackle the truly complicated. I think that is what SENCER does so well.

Simply put, SENCER courses are trying to sell science. And like any other marketing strategy, we start by responding to our consumers’ (in our case, students) interests. At their best, SENCER courses soon surpass a simple marketing model as the “consumer” starts “producing” him/herself. In this newsletter, you can see examples of how well this is being done at the University of Wisconsin (page 3) and at the College of New Jersey (on page 4).

So, watch your back Trump! SENCER faculty may already have marketing down to a science.

Special Announcement Regarding International Applications to SSI 2005

Participation by individuals and teams from international institutions and organizations has enriched the SENCER Summer Institutes. We welcome applications from individuals and teams abroad. Unfortunately, our NSF grant does not enable us to provide either travel or the \$3,500 award for teams from abroad.

If you are interested in attending SSI 2005, we have a special application and budget form for international participants. Please contact Patti Simon at patti.simon@sencer.net for special international application instructions.