SENCER SUMMER INSTITUTE 2004
Notes on the Program

ARRIVAL, TRANSPORTATION, REGISTRATION, AND THE SSI 2004 OFFICE

After you check in at the Fairmont Hotel, the Concierge will have information on options for getting to the Santa Clara University campus. Probably your best option will be to use the buses (Royal Coach Tours) SENCER has chartered. They will depart from the front of the Fairmont Hotel to the Santa Clara University campus starting from 11:00 a.m. on Friday and starting from 6:30 a.m. on Saturday and Monday. This trip takes about 15 minutes. Information on the return charter buses will be found in each day's schedule. There will be no buses on Sunday or Tuesday, as all SENCER sessions (including the Post-Institute workshops) will be held in the Fairmont Hotel.

Registration for SSI 2004 will take place at the Fairmont Hotel in the South Tower Foyer on Thursday evening, August 5th from 5:00 to 8:00 p.m. and on Friday, August 6th from 8:00 a.m. to 1:00 p.m.

SENCER will maintain a campus office on the Santa Clara University campus in O'Connor Hall, room 208 on Friday (August 6th) from 12:00 noon to 6:00 p.m. and on Saturday and Monday (August 7th and 9th) from 8:00 a.m. to 6:00 p.m. On Sunday, August 8th, the campus office will be closed. The SENCER staff office for Sunday, August 8th in the Paseo Room of the Fairmont Hotel will be open from 8:00 a.m. to 12:30 p.m. On Tuesday, August 10th, the staff office in the Paseo Room will be open from 8:00 a.m to 6:00 p.m. Staff, identifiable by the t-shirts that say SENCER STAFF, will be present to assist participants. Just ask for any help you need.

THURSDAY, AUGUST 5, 2004

- **Special ACAD Leadership Workshop**
  Sacramento Room *(Fairmont Hotel)*

  Note: This is a special two-part 6-hour workshop. Participants will be awarded an ACAD certificate. The workshop carries a supplemental registration fee of $40.00. For more information, call (202) 884-7419.

  Workshop Times:
  Thursday, August 5th, from 1:00 to 4:00 pm and
  Friday, August 6th, from 8:30 am to 12 noon

  The American Conference of Academic Deans (ACAD) has nurtured academic leaders for 60 years, focusing on the ethics and practice of academic leadership. As a longstanding supporter of SENCER ideals and reform efforts, ACAD will offer a pair of workshops on leadership development at the SENCER Summer Institute. These workshops are being developed in response to specific needs identified by SSI alumni.

Part I *Laying the Groundwork: Building and Managing Working Teams*
How to understand different leadership styles, identify and nurture team players, and foster creativity and innovation. This workshop will help participants identify effective ways to sow the seeds of effective leadership.

Part II *Getting There from Here: Strategic Planning*
How to approach the strategic plan, begin to address budgeting issues, and sustain innovation. This workshop will give participants the opportunity to integrate lessons learned into a realistic framework for strategic planning.

Coordinated by Roland Smith, SSI 2003
Rice University

FRIDAY, AUGUST 6, 2004

9:00—12 NOON PRE-INSTITUTE WORKSHOPS

This year, in addition to the special ACAD Leadership Workshop (above), six Pre-Institute workshops are being offered. They are described below.

Note: You must be pre-registered for these sessions. If you are interested in participating in one of these workshops, and have not registered as yet, check with Patti Simon at simon@aacu.org prior to August 1st or consult the SENCER Registration Desk on August 5th or 6th at the Fairmont Hotel in San Jose.

- **Critical Thinking**

California Room *(Fairmont Hotel)*

Faculty across the spectrum of academic disciplines strive to develop students' critical thinking (CT). Throughout the country, colleges and universities assert that critical thinking is one of the outcomes of their core curriculum or campus general education requirements. Research from Pennsylvania State University finds that policymakers, educators, and employers identify critical thinking as one centrally important deliverable for higher education. How are we, in higher education, doing at this? What do we know about how to engender CT in students through general education course work in the sciences and the humanities? More importantly, how can we measure the development of students' CT skills and CT habits of mind?

By analyzing videotape, through small and large group classroom simulation exercises, by interactive Q&A, and by using actual professors' assignments and students' work products as case examples, this workshop engages participants in CT pedagogical strategies and CT assessment exercises.

The definition of "critical thinking" presented is research-based, robust, and useful in the full range of academic disciplines. The sessions emphasize both the skills dimension and the dispositional dimension of critical thinking. Research findings on college students' CT skills and dispositions, based on data gathered from across the nation, provides interesting material for faculty interpretation.

Pete Facione
Loyola University-Chicago

- **Designing Service Learning Opportunities in the Sciences**

Terrace Room *(Fairmont Hotel)*

This workshop will focus on the basics of designing service-learning opportunities, with special attention to the challenges and opportunities of linking service learning to improved learning in the sciences. The interactive format will include a presentation of service-learning definitions, service-learning models, and discussion of how to utilize campus resources and develop partnerships with local nonprofit organizations. Techniques for reflection and guidelines for assessment will also be discussed. Samples of essential paperwork, such as service-learning agreements and risk release forms, will be provided.

Participants will have time to work in small groups to begin developing learning objectives that incorporate service-learning into existing or new courses and to share ideas about reflection and assessment techniques. In addition, participants may begin generating ideas about where students can engage in service-learning connected to course learning goals.

Lynn H. Leavitt
George Mason University

- **SENCER and Teacher Preparation**

Plaza Room *(Fairmont Hotel)*

High quality K-16 Science education for teachers is the responsibility of science faculty and faculty in colleges of education. Experienced SENCER alumni will describe two approaches to using SENCER ideals in connection with improving teacher education. The relationship of the SENCER approach to developments in state-mandated standards for science education will be explored. The relationship of these approaches to national initiatives in improving teacher education and K-12 schooling will be used as a framing context for discussions.

Cindy Klevickis, SSI 2002
James Madison University

Sharon Sherman, SSI 2003
The College of New Jersey

Jay Labov
National Research Council

- **Fostering Civic Engagement: Integrating the Sciences with other Disciplines in Learning Communities**

Empire Room *(Fairmont Hotel)*

An understanding and application of multiple perspectives and disciplines encourages teachers and learners to embrace holistic approaches when seeking solutions to complex, intractable, societal problems. This workshop will provide an overview of

the learning community (LC) pedagogy and then introduce LC models from three institutions (Wofford College, Wagner College, and Fairmont State University). Two of the programs have been funded by the National Science Foundation's DUE-CCLI program, and the other grew from an institutional restructuring of the curriculum. The LC models at all three schools integrate science courses with other disciplines (humanities, social sciences) to bring broader understanding to common themes. The presenters will discuss challenges and benefits of their LC programs, and the impact of the programs on their students, faculty, and institutions (two private, one public). Workshop participants will also have the opportunity to work interactively to develop their own LC model to share.

Ellen Goldey
Wofford College

Don Stearns
Wagner College

Phil Mason
Fairmont State University

- **Active Learning Techniques in Large and Small Classes**

Valley Room *(Fairmont Hotel)*

For more than a decade, national leaders in STEM education, including the National Research Council and the National Science Foundation, have been extolling the value of teaching science through active learning. Most of us who teach in the sciences appreciate the value of hands-on learning, and incorporate active learning in our courses through laboratory experiences. But there has been less incorporation of active learning in the "lecture" portions of our classes. This session will demonstrate a number of techniques that foster active learning in science classes. Ways to adapt the techniques to different sized classes will be discussed. Participants will experience a number of the techniques, and have the opportunity to reflect on how they could be used in their own classes.

Laurie Fathe
George Mason University

- **Assessment: For and By Faculty**

Garden Room *(Fairmont Hotel***)**

This workshop will focus on classroom and course assessment as well as "real time" techniques to uncover what students know. We will explore several embedded assessment tools used by faculty as well to develop an overall course evaluation strategy. Some questions we will be asking together include: what are our obligations after uncovering what students know (or don't know?) and what should we do to match our expectations (and those of students) to our objectives and our teaching focus?

In this workshop we will work towards embedding a variety of assessment tools in a typical traditional class syllabus in step-wise increments. Working in small groups,

participants will be provided a syllabus to build from. Better still, bring your own syllabus to work on.

Faculty:

Karen Kashmanian Oates
Harrisburg University of Science and Technology

Terry McGuire
Rutgers University

Assessment Professionals:

Sue Lottridge
James Madison University

Tim Weston
University of Colorado

THE SENCER SUMER INSTITUTE 2004

12 NOON **LUNCHEON**
Mission Gardens Tent (Santa Clara University Campus)

Participants are invited to an opening buffet luncheon. All dining at SSI 2004 will include vegetarian and non-vegetarian selections. A special effort has also been made to include "protein" items. If you have any special dietary requirements, please inform Patti Simon at simon@aacu.org by July 27th and we will do our best to accommodate you.

1:30—2:00 **HOMEROOMS**
Rooms as assigned

All participants have been assigned to a "homeroom" and "homeroom teachers"—members of the SSI 2004 core faculty.

Homerooms are the basic organizing structure of SSI 2004. We'll use them for communicating schedule and other changes, arranging for team consultations, providing direct feedback to SSI 2004 organizers ("real-time formative evaluation"), checking on team progress and working on team projects, pursuing issues raised in the plenary sessions and other sessions, and, generally, for "taking stock."

Homerooms are where we will begin most days. There will be a brief SSI 2004 agenda for each day. Homerooms will provide a space for all participants to set their own agendas, as well. From this first homeroom, we'll proceed to the opening plenary.

Your "homeroom teachers" will also be responsible for follow-up with you after the Institute. They will be in touch with you throughout the year to learn of your progress, help you stay connected to the SENCER National Office, and respond, as best they can, to any needs you have as you work on SENCER courses and programs or develop new areas of interest.

The locations for the homerooms are noted in the Day-by-Day Schedule.

2:15—4:00 **OPENING PLENARY**
Science Education for New Civic Engagements and Responsibilities
Recital Hall

David Burns and Karen Oates, presiding

This opening general session will feature official welcomes. Aims and aspirations for SSI 2004 will be reviewed and a general overview of the program will be provided. Key staff and logistics support people will also be introduced.

The opening plenary will feature a talk by Dr. Jay Labov, a senior staff member in the National Research Council's Center for Education. Jay will locate SENCER within the complex and growing "web" of national aspirations and programs for improving science learning, including the Bio 2010 report and recent meetings on introductory courses in science and mathematics.

4:15—5:30 **INTRODUCTION TO THE SENCER MODELS AND THE PEOPLE WHO CREATED THEM**

An essential feature of the SENCER national program is the dissemination of models that embody the SENCER ideals. The models we feature at SSI 2004 are offered "heuristically"—that is, for what we can learn from them. As you will see, they are models of more than just the "topics" around which they are organized. There are common features, among them being the ingenuity and hard work that is evident. These are courses that make room for substantial engagement by students, just as they require extraordinary teaching. The success of these courses recommends them to us as SENCER models.

Over the life of the SENCER project, we will be adding models for dissemination. Last year, for the first time, we featured what we called "an emerging model," a set of courses that had been created by participants in SSI 2002. This year, we are delighted to add six models, four developed by SENCER alumni, and one by a founding

member of the SENCER core faculty (Cathy Middlecamp of the University of Wisconsin-Madison).

This year's featured models expand our offerings in three key areas:

- Two models (Fairmont State's and Wagner's) represent SENCER learning communities—linked courses treating complex, civic themes and issues.
- One model (Vassar's) represents a "planned encounter" between science and "non-science" that is "modular"—fitting within existing courses, and
- Another model (Greenfield/Rutgers') adds a second mathematics offering to the SENCER featured model portfolio on the important contemporary topic of "secrets."

We'll be featuring several new models next year, as well. We're especially interested in topics that help students learn mathematics and that improve students' knowledge of engineering and technology.

If you have a course or program you would like to nominate, please e-mail Eliza Reilly (eliza.reilly@fandm.edu), or better still, talk with Eliza at SSI 2004 during the concurrent session she will be offering on "How Campus-Based Work Becomes a Nationally Featured Model."

All 19 models are posted on the SENCER Web site. CD-ROMs with all models will be provided to all Institute members at registration. Paper copies of the models (abridged versions of the CD-ROM) will be available at registration and at the SENCER Summer Institute Office. Supplies are limited, though one complete set per team will be provided and the model developers will have copies to distribute at their sessions.

Model developers will host individual sessions to describe their work. There will be one "formal" model development presentation time (Friday, August 6th at 4:15).

Note: Professor Sharon Anthony of The Evergreen State College, co-creator of the model on Global Warming, is unable to attend SSI 2004. She's just given birth to her first child and, at present, has other priorities!

Note**:** SSI 2004 members who have laptops with CD-ROM drives are strongly encouraged to bring them to the Institute. The CD-ROMs work best with Word 2000 in a PC environment.

Consultations: Many of the model developers will be on hand throughout the Institute to consult with individuals and teams who would assistance in developing or refining a course, module, or set of courses. If possible, please bring a list of people with whom you (and/or your team, if applicable) would like to consult with to the first homeroom meeting. As things develop, you may bring a list of additional names to your homeroom on Saturday and Monday. The

SENCER staff will help arrange times for model developers to meet with individuals and teams during team times or at other times of mutual convenience.

Most model developers will be available for in-depth follow up, problem-solving, technical assistance, and consultation throughout the Institute and may be "scheduled" (by you personally with the developers directly or through homeroom teachers) to participate in team time and or to meet with you at other points in the Institute.

The 2004 SENCER Models

Chemistry and Ethnicity: Uranium and American Indians
Cathy Middlecamp and Omie Baldwin
University of Wisconsin-Madison

Chemistry and Policy: A Course Intersection
Christopher Smart, Pinar Batur, and Stuart Belli
Vassar College

Coal in the Heart of Appalachian Life: A Learning Community
Phillip J. Mason
Fairmont State University

Forensic Investigation: Seeking Justice Through Science
Gregory Miller
Southern Oregon University

The Mathematics of Communication: Keeping Secrets
Stephen Greenfield
Rutgers University

Sustainability and Human Health: A Learning Community
Donald E. Stearns and Kim Worthy
Wagner College

The 2003 SENCER Models

Brownfield Action
Peter Bower, Barnard College (Columbia University)

Chance
Nagambal Shah, Spelman College

Environment and Disease
Michael Tibbetts and Colleagues, Bard College
(Professor Matthew Deady, SSI 2003, will give the presentation at SSI 2004 on the Environment and Disease Model.)

Global Warming
Sharon Anthony and Sonja Weidenhaupt, The Evergreen State College

Nutrition and Wellness/The Iowa Environment
LaRhee Henderson and Charisse Buising, Drake University
(Professor David Courard-Hauri, SSI 2002, with give the presentation at SSI-2004 on the Nutrition and Wellness Model.)

The 2002 SENCER Models

Energy and the Environment
Trace Jordan, New York University

Geology and Development of Modern Africa
Barbara Tewksbury, Hamilton College

Human Genetics
Kim Finer, Kent State University-Stark Campus

Tuberculosis
Richard Fluck, Franklin and Marshall College

The 2001 SENCER Models

Biomedical Issues of HIV/AIDS
Monica Devanas, Rutgers University

Chemistry and the Environment
Amy Shachter, Santa Clara University

Mysteries of Migration
Tom Wood and Elizabeth Gunn, George Mason University

Science, Society, and Global Catastrophes
Theo Koupelis, University of Wisconsin-Marathon

Suggested Attendance: In prior years, teams found it useful to spread members among the formal sessions so that, as a team, they could benefit from knowing several models.

5:30—8:30 **RECEPTION AND GALA WELCOME DINNER**
Mission Gardens Tent

This will be a pleasant opportunity to relax, get to meet one another, and dine in the gardens of the old mission church on this beautiful campus.

(Shuttle buses from Santa Clara University to the Fairmont Hotel will run from 6:00 to 9:00 pm.)

SATURDAY, AUGUST 7, 2004

(Shuttle buses from the Fairmont Hotel to Santa Clara University will run from 6:30 to 8:00 a.m.)

7:00—8:00 **FULL BREAKFAST BUFFET**
Mission Gardens Tent

8:00—9:00 **HOMEROOMS**
Same room assignments as on Friday

9:15—10:30 **PLENARY SESSION**
Using Learning Research to Transform the Way We Teach Science
Recital Hall

Karen Oates, presiding

Shouldn't we use what we know about how people learn to develop courses and programs of study? It turns out that we know quite a bit about learning and the challenge of transferring knowledge gained in one context to another. This plenary will summarize the salient findings of national studies and reports as they apply to science learning. Then, through a group participation activity focusing on some simple physics concepts, we will model how learning research can be applied to teach science in ways that actively engage the learner. The session will conclude with a summary of the implications of learning research to instruction, especially for the non-science major and for students whose first college science course might very well be their last.

José Mestre
University of Massachusetts-Amherst

10:30—NOON **TEAM TIME**

Each team comes to SSI 2004 with work it wants to accomplish. (Excerpts of each team's aspirations/expectations are included in your notebooks.)

Team time is the time reserved for groups to work on your projects. You may sign up for a room to work in or use the tables under the big tent in Mission Gardens. (Your homeroom "teachers" can help arrange this.) Homeroom teachers will be available to teams during the team time and can help coordinate team contacts with other faculty for individual consultations.

Team time is scheduled in order to allow it to blend into lunch time. This means there is a total of eight hours of scheduled time dedicated

to teamwork. There is no team time officially scheduled for the afternoon of Sunday, August 8th, though in past years, many teams have used that time for important work.

Scheduled morning team time reflects the recommendations of Institute members who asked for team time early in the day for two reasons: they wanted to work while they were "fresh" and they wanted to be able to schedule additional team time at the end of the day, on their own, as they saw fit.

Special Note: We need teams to complete a fairly simple action plan that they will submit on diskettes that we will provide. We would like each team to complete the template, as best you can, by Monday, August 9th and turn it in to a SENCER staff member as you enter the final plenary session on Tuesday morning, August 10th.

10:30—NOON **ADVANCED REPRESENTATIVES/ALUMNI WORK SESSION**
Mission Gardens Tent

This will be the first of three sessions designed to bring together people who are new to the SENCER program with those who have been engaged with SENCER, some since its inception. We will use the first session to identify interests and needs. As special areas of focus are identified plans will be made to organize the second session (Sunday) to allow for the topics to be pursued in greater depth. Advanced representatives who would like to have "alumni mentors" will have an opportunity to initiate such opportunities. The sessions will be facilitated by SENCER staff.

NOON—1:00 **LUNCHEON**
Mission Gardens Tent
Note: Please use this time to set up your poster or display.

1:00—2:15 **POSTER PRESENTATIONS AND RESOURCE FAIR**
Mission Gardens Tent

The poster session is an opportunity for members to share their work, display reports on work accomplished or underway, and connect with colleagues who may have similar interests/projects. It's a kind of "academic mixer," you could say. Abstracts of all poster presentations can be found in your SSI 2004 binder.

The resource fair offers similar benefits. We are fortunate to have among our faculty and members people who are working closely with national organizations whose projects and programs provide resources and opportunities to advance SENCER's goals and the improvement of science education, generally. The Resource Fair is an informal way to connect with these resources and some of the SENCER people associated with them.

Posters will be displayed on panels and tables will be set up under the big tent in Mission Gardens to enable SSI 2004 members to "shop around" and become more familiar with the resources available. Handouts will be available.

As of this writing, organizations represented at the resource fair include:

- Association of African Universities (AAU)
- Association of American Colleges and Universities (AAC&U)
- American Chemical Society (ACS)
- BioQUEST
- ChemConnections (ChemLinks Coalition and Modular Chemistry Consortium)
- Council on Undergraduate Research (CUR)
- Earth Charter
- International Women in Science and Engineering (IWISE)
- National Research Council (NRC)
- National Science Foundation (NSF)
- National Society for Experiential Education (NSEE)
- Peer-Led Team Learning (PLTL)
- Project Kaleidoscope (PKAL)
- Sigma Xi

Note: To make any special arrangements—or if you have questions—please contact Patti Simon (simon@aacu.org) or on-site. (If you are thinking about handouts or materials to be distributed, please keep in mind that there will be ~31 full teams and ~75 alumni and advance team representatives attending SSI 2004. At this writing, total registration is at 300.)

A NOTE ON CONCURRENT SESSIONS

SSI 2004 offers a variety of concurrent sessions. Over the course of the Institute, there will be five sets of concurrent sessions. In keeping with our SENCER "traditions," many of these sessions are designed to simply give space to members to bring their own expertise, as well as their particular needs, to a group gathered together around similar interests and concerns. Others are more formal "workshops," where participants will engage in a process lead by the workshop leader. One is a two-session workshop; some others are one-session events that will be offered more than once. Still others are "information" sessions, where participants will have the opportunity to become acquainted or briefed on strategies, opportunities, and other program efforts. We've asked all session leaders to keep the sessions interactive and lively.

One session is required for a designated member of all full teams. As you will recall, a condition of participation in SENCER is using the SENCER-SALG—an on-line assessment instrument. Sue Lottridge and Tim Weston will be offering "Using the SALG Website to Implement the SENCER-SALG Instrument," a SENCER-SALG orientation during concurrent sessions I and III. We are asking each team to send at least one representative to the SENCER-SALG orientation. Your homeroom teachers will help you choose a person for

this session. The sessions are open, so more than one person from a team may attend, but at least one designated person must attend.
In terms of aims, you could say that the sessions fall into one of five general categories:

- sessions devoted to focusing on the SENCER project, including special assessment strategies connected to SENCER,
- sessions devoted to focusing on promising pedagogies, teaching and learning strategies that seem especially suited to SENCER programs,
- sessions devoted to issues and challenges in implementation of science education reforms, with emphasis, of course, on SENCER reforms,
- sessions by SENCER alumni on their experiences in implementing SENCER programs, and
- sessions that provide opportunities for learning about related projects (with special emphasis on our African and Georgian partners) and other national programs whose resources have proven to be especially useful.

2:30—3:45 **CONCURRENT SESSIONS—I**

- **Leading Change: Critical Thinking, Cognitive Heuristics, and Academic Decision Making I**
  (This is the first session in a two-session workshop.)

  How do the things we teach students about critical thinking apply to our decision making as faculty and academic administrators? This participatory two-part workshop uses example situations to stimulate and simulate problem solving and professional judgment in an academic setting. In addition to, or perhaps in spite of, our refined skills and practiced habits of mind as teachers and scholars, as human beings, our decisions can be significantly influenced by cognitive heuristics. This workshop describes a number of heuristics that can affect how we define problems and how we consider, or fail to consider, our options when we are negotiating with others and when making decisions about things that are important to us. Understanding better how people actually think, and not just how people ought to think, gives one the opportunity to engage more successfully and respectfully in negotiating and group decision-making.

  Pete Facione
  Loyola University-Chicago

- **Service Learning and the Sciences**
  (This session will be repeated.)

  With a renewed emphasis on active, collaborative environment for learning and with the awakening interest in community, country and civic engagement, service learning has found a prominent place amongst progressive pedagogies. In this session we will discuss the basic components needed to design a successful service learning project in the sciences. We will discuss best practices for

the integration of theory and practice to support students' learning. Participants will receive several models that have been used to help assess "learning" in service learning, as well as examples of projects that have worked successfully in the past. We plan this session to be one in which participants can share their experiences and help others overcome anticipated barriers.

Lynn H. Leavitt
George Mason University

- **Using the SALG Website to Implement the SENCER-SALG Instrument**
  (This session will be repeated)

  In this session, participants will be shown how to collect their SENCER-SALG pre- and post- data through the SALG website. The purpose of the SENCER-SALG will be described and participants will be given an introduction to the overall structure of the website. The presentation will afford participants and opportunity to "walk through" the process of using the site. Participants will be able to see the data for all students collected through the SALG site, as well as other data they can access from the site. Lessons learned from previous usage will be discussed. As the SENCER-SALG is still being developed and improved, input into the development process will be solicited and discussion will be encouraged

  Sue Lottridge
  James Madison University

  Tim Weston
  University of Colorado, Boulder

- **Civic Engagement: The Classroom and the Campus as a Civic Space**
  (This session will be repeated.)

  What do we mean by civic engagement? The SENCER ideals will be used and a model for organizing SENCER courses will be presented as a springboard for discussing the many possibilities and ideas that are contained in the idea of "civic engagement." Confronted with the job of organizing a course and a classroom, how can we think about how our choices can determine what kind of civic space we create? This loosely-moderated session is designed to solicit members' experiences, thoughts, and recommendations for how we can make SENCER courses "models" of the kind of civic engagement we desire in the larger world. Also open for discussion is the somewhat more challenging question of how to make campuses authentic civic spaces, a matter

of special relevance to SENCER aspirations, given SENCER's emphasis on issues that can be said to cause "multidisciplinary trouble." What are the cultural practices and norms that we need to consider, well beyond C.P. Snow's still thorny dichotomies?

David Burns
SENCER National Office

- **Implications of Learning Research for Teaching Science to Non-Science Majors: A SENCER Backgrounder Discussion**

  This session will provide participants with an opportunity to discuss the SENCER Backgrounder, prepared by Professors Mestre and Etkina, focused on the implications of contemporary learning research on how science should be taught, especially to those students who have no current interest in pursuing a STEM major. Particular attention will be paid to the problem of the "transfer of learning"—that is how knowledge learned in one context is applied successfully to a new one.

  José Mestre
  University of Massachusetts-Amherst

- **Mathematics, Mathematical Modeling, and Decision-Making**

  Mathematical models are used on a daily basis to help "decision makers" make choices regarding complicated health, environmental, intelligence, and safety issues. In fact, many of the seminal questions that SENCER projects address have mathematical underpinnings. For example, understanding HIV or tuberculosis requires knowledge of epidemiological models for the spread of disease and effect of resistance to drugs. To be a well-informed citizen, one must not only be able to deal generally with mathematical relationships, but one must also understand that a model may give an inaccurate prediction because assumptions are faulty or because the model is used for an inappropriate purpose.

  In this talk, two cases in which the US Government has requested recommendations on the appropriate use of models will be described and discussed. In one on-going National Resource Council study, the EPA has requested guidance on how to assess the validity of mathematical models. In another, the Defense Modeling and Simulation Office is requesting advice on how to pair together military models of different types. Real life examples at the undergraduate level on the difficulties of using mathematical models in policy decisions will also be discussed.

  Jennifer Slimowitz
  Board on Mathematical Sciences and Their Applications
  National Academies of Science

- **Active Learning Techniques for Large and Small Classes**

  While most science and mathematics faculty members have long used active learning techniques in their labs, they often don't employ these techniques in the lecture portion of the course, where class sizes may not be in the 20s or 30s, but can be well above 100. While approaches need to be modified for the sheer numbers of students and the physical limitations of large classrooms, active learning can still be a meaningful part of a large class.

  This session will present techniques proven to be successful in large and small classes, and discuss the attributes of techniques that make them applicable in large classroom settings. It will address the reasons for wanting to use active learning approaches, the benefits of doing so, the need to structure these activities, and some of the adjunct and usually unanticipated benefits.

  Laurie Fathe
  George Mason University

- **The Intellectual Challenge of Diversity**

  Here is how the presenter, a SENCER model developer and Senior Associate, describes her rationale and aims for this session:

  "What do race and ethnicity have to do with teaching thermodynamics? Ten years ago, this question surprised me when a colleague posed it. At the time, I had never before heard the word thermodynamics used in the same sentence with the words race and ethnicity. But this question marked the beginning of a journey into examining my own teaching practices. For me, bringing together science and ethnicity posed several intellectual challenges. The first was rephrasing this and other questions.

  In this session, I will explain how I asked new questions and in the process met the challenge of moving ethnicity from the margins of the textbook to the center of my course. Together we will explore a model for teaching "through" issues that affect people, especially people of color.

  Catherine Hurt Middlecamp
  University of Wisconsin—Madison

- **Community Colleges, STEM Education and SENCER**

  Community colleges are playing an increasingly important role in providing affordable access to quality education for almost half of all students attending public institutions of higher education. Quality teaching is the primary responsibility of faculty in community colleges, and thus the community college maintains a strategic position at the forefront of educational reform. Despite

the opportunity to be a catalyst for change, community colleges are often forced to work under the administrative rules created by four-year institutions, a system in which community colleges provide little to no input. Course transferability is but one of the many issues involved in efforts to successfully revitalize the STEM curriculum; other issues include workload hours, reward structure and compensation, support for innovative efforts, availability of teaching and laboratory resources, and assessment. Regardless the limitations, community colleges can provide an integral foundation for engaging students in STEM education, and faculty can provide leadership through developing innovative, inquiry-based, civically-oriented, STEM curriculum.

In this session community college faculty members will introduce the subject by briefly sharing their own experiences both as STEM faculty and as participants in SENCER. The bulk of the session, however, will be devoted to an open discussion among participants on the key issues facing community colleges, especially related to STEM education and SENCER. The discussion will enable the creation of a set of suggested practices and policies that can act as a catalyst to support and sustain future innovations in STEM education and SENCER at community colleges.

Theo Koupelis
University of Wisconsin—Marathon

Brian Hagenbuch
Holyoke Community College

- **International Women in Science & Engineering (IWISE) Roundtable: Accomplishments & Future Prospects Around the World**

  This roundtable will provide an opportunity to hear about IWISE's international activities, development of regional organizations such as AWSE and IWISE, and the newest organization, IWISE-Georgia. IWISE fellows will present opportunities for U.S. academics to partner on IWISE projects, participate in up-coming conferences and workshops, find out about how their universities can be active partners in existing IWISE projects, and suggest new collaborations.

  Moderated by Ardith Maney
  Iowa State University and IWISE

- **HIV/AIDS and the State of the World: A Discussion of Two SENCER Backgrounders**

  The SENCER ideals were "hatched" many years ago when an evaluation of a course that taught "to" biology "through "HIV" designed and taught by Monica Devanas at Rutgers University

showed that students seemed to really grasp the science and remain interested in the subject. Now, more than 10 years later, the topic of that course, HIV, looms even larger on the world stage as perhaps the greatest threat to public health and economic development and security of all time.

In this discussion, the authors of the two SENCER Backgrounders on HIV, one focused on the scientific challenges of HIV and the other on the particular effects of HIV on African educational systems, will review what's new and identify the next set of challenges to be faced by those who wish to focus on HIV.

Debra Meyer
Rand Afrikaans University (South Africa)

Richard P. Keeling, MD
SENCER National Office

- **Community Partnerships: Working with Museums, Libraries and Other Institutions**
  (This session will be repeated.)

  In this session we will discuss the development of academic relationships between degree-granting organizations and non-traditional partners. Recognizing the mutual benefit to the institutions and students, we will identify ways to develop and implement appropriate credit-bearing learning opportunities in environments and venues beyond higher education. The presenters' experiences with Columbia University and the American Museum of Natural History and with George Mason University and the Smithsonian Institution will be used as case studies.

  Eleanor Sterling
  American Museum of Natural History and Columbia University

  Tom Wood
  George Mason University

- **CONSULTATIONS**

  Note: During each concurrent session time slot, a cohort of model developers and SENCER core faculty will be available for specific consultation with individuals and teams. A list of consultants available during Concurrent Session I will be distributed in the homeroom sessions.

4:00—5:15 CONCURRENT SESSIONS—II

- **Leading Change: Critical Thinking, Cognitive Heuristics, and Academic Decision Making II**
  (This is the second session in a two-session workshop.)

  Pete Facione
  Loyola University-Chicago

- **Making the Case for SENCER**

  The SENCER initiative introduces a framework of science education reform that connects science and civic engagement by teaching "through" complex, capacious, and unsolved public issues. But some science educators and others may not share the view that this is an approach worth pursuing. What might you do if you think SENCER is a good idea but you need to promote it to other faculty? How would you support your view that SENCER is a good idea if other science faculty members argue that it is not science? Or, perhaps you are charged with responsibility for the curriculum but you're not a scientist: how do you evaluate competing claims about what should be taught? Or maybe you have doubts about all this yourself. These and other issues of implementation will be the topics of this session. The facilitators will lead a discussion, solicit similar experiences from participants, and help the group work together to develop strategies for building support for SENCER courses back at your home campus.

  Monica Devanas
  Rutgers University

  Richard P. Keeling, MD
  SENCER National Office

- **Issues in Undergraduate STEM Education—Perspectives from the National Research Council**

  This session gives participants an opportunity to follow up on the opening plenary and to learn more about the work of the National Research Council (NRC). NRC serves as the operational arm of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The Committee on Undergraduate Science Education (CUSE) is one among several NRC standing boards and committees that focus on improving policy and practice in post-secondary education. Recent NRC reports have discussed important findings about learning, assessment, and instructional strategies. What is the scientific basis for such research? How have these findings influenced national

policies? What changes are needed in institutions of higher learning to improve practice: in departmental organization? in incentive structures? at the classroom level?

Jay Labov
National Research Council

- **Writing in Science Courses: Mission Possible**

  When writing assignments are included as part of your new (or old) course, several questions naturally arise: What might you keep in mind when designing your writing assignments? Once students turn in their papers, how do you respond to them? What are the ups and downs of peer review? Based on five semesters experience teaching an environmental chemistry course as "writing intensive," this workshop will give lots of practical examples of what worked ... and what didn't.

  Catherine Hurt Middlecamp
  University of Wisconsin-Madison

- **The Challenge of Reaching Minority Students—"Pipeline Issues"**

  This session will explore successful strategies for increasing the participation of minority students, especially African Americans, in STEM fields, as a civic challenge and educational imperative.

  David Ferguson
  Stony Brook University

- **Learning Research and Science Teaching—Challenges in Implementation: A Follow-up Seminar with José Mestre**

  This seminar style session will encourage participants to follow-up on issues raised by Professor Mestre in the morning plenary. Though the seminar is open to all SSI participants, especially welcome are SENCER alumni who, having tried to incorporate some of the learning research presented by José at past SSIs, may now wish to provide real challenges/problems/successes from their experience. Participants will be encouraged to discuss issues related to their own needs as their projects are developed or planned. A problem-solving approach will be taken in this very "practical" (clinical) session.

  José Mestre
  University of Massachusetts – Amherst

- **Assessing Experiential Learning**

  Experiential learning is a form of "learning by doing" that integrates theory with practice and requires faculty to use new tools to assess what students have learned and applied. In this session, we will discuss a variety of experiential learning approaches and the various ways by which learning can be assessed. Participants will have the opportunity to review and modify a variety of assessment tools for their specific use and needs.

  Karen Oates
  SENCER National Office

- **Partnering with Scientists Abroad: Perspectives from The Republic of Georgia and Africa**

  SENCER's new collaboration with three universities in the Republic of Georgia will be described. U.S./International research and teaching collaboration possibilities will be explored.

  A panel of presenters will discuss their experiences developing and managing international projects, including workshops, applications to international foundations, working with international partners, and benefits of such cooperation for research institutes, universities, and other similar organizations.

  Participants will be encouraged to discuss benefits and lessons learned from international collaborations in which they have participated.

  Ardith Maney, moderator
  IWISE and Iowa State University

- **Financing SENCER and Other Science Reforms**
  (This session will be repeated.)

  The session will provide an overview of NSF programs and funding opportunities, including the new programs on assessment. The current status of application success rates will also be discussed.

  In place of the usual approach of offering a "catalog" of program possibilities, the presenter will ask participants to identify specific ideas they have for projects requiring support. With that sense of "need" in mind, the presenter will identify specific program support possibilities, where they exist.

  Particular emphasis will be paid to how NSF programs can be accessed to support SENCER campus innovations. SENCER has a

goal of increasing assistance in adaptation and innovation at the campus level, with the view to disseminating local innovations as part of the continuing national program of SENCER.

Myles G. Boylan
National Science Foundation

- **The ABC's of Classroom Assessment in Higher Education**

  This session reviews basic concepts in classroom assessment for university and college instructors. The presenters will discuss learning and performance objectives in the context of actual courses, and will then examine different methods for assessing these objectives. Different functions of assessment will be examined, as well as the differing domains and constructs commonly encountered in assessment contexts. Case studies of best practices in classroom assessment will also be presented.

  Tim Weston
  University of Colorado, Boulder

  Sue Lottridge
  James Madison University

- **How Do You Know What Your Students are Learning?**
  (This session will be repeated.)

  Do you use active learning, cooperative learning and peer teaching in your classes? Have you incorporated on-line discussion, or computer-based problem sets, or other technology-assisted activities into your classes? Do you wonder if these approaches have made a difference? Most students and faculty agree that these changes have improved education. But sometimes we have not considered how these different approaches have changed what students are learning.

  This session will explore the scope of learning, from acquiring content to building skills, to shifting attitudes, fostered by the new approaches. More importantly, it will offer proven ways to measure the richness of learning that accompanies these varied approaches to education.

  Laurie Fathe
  George Mason University

- **Why Should You Care About Biodiversity: How to Use this SENCER Backgrounder in Classroom Situations**

  Several SENCER alumni who have used last year's SENCER backgrounder on Biodiversity have written to its author about their

classroom use of the backgrounder. They also provided specific examples of materials and assignments that they found successful.

In this session, the author of the backgrounder will briefly summarize the paper and then quickly turn to a practical/"hands on" discussion of her own specific teaching materials, exercises and assignments, as well as those who have used the backgrounder in their own classes.

Participants will come away with a set of strategies to use the paper along with materials to support this learning.

Eleanor Sterling
Columbia University

- **CONSULTATIONS**

Note: During each concurrent session time slot, a cohort of model developers and SENCER core faculty will be available for specific consultation with individuals and teams. A list of consultants available during Concurrent Session II will be distributed in the homeroom sessions.

5:30—7:30 **RECEPTION: Meet the SENCER Senior Associates**
Mission Gardens Tent

This will be an informal event with hors d'oeuvres and a cash bar following a pretty full day. It will also be a time to meet our SENCER Senior Associates and SENCER staff, and your fellow SSI 2004 members.

(Shuttle buses from Santa Clara University to the Fairmont Hotel will run from 6:30 to 8:30 p.m.)

SUNDAY, AUGUST 8, 2004

(Today's sessions will be held in the Fairmont Hotel.)

7:00—9:00 **BREAKFAST/TEAM TIME**
Fountain Restaurant *(Lobby Floor, Fairmont Hotel)*

9:15—10:30 **PLENARY SESSION**
Designing a SENCER Course:
Don't Just Beat It to Fit and Paint It to Match
Club Regent

Eliza Reilly, presiding

This plenary will cover the fundamentals of effective and innovative course design, with an emphasis on how these principles can specifically support and improve the design your SENCER courses and programs. Topics to be addressed include, 1) setting goals (what do you want your students to be able to do when they are done with the course?), 2) selecting content and activities to achieve those specific goals, and 3) developing an evaluation scheme for student performance that is consistent with the goals of the course.

Barbara Tewksbury
Hamilton College

10:45—Noon **TEAM TIME**

Teams arrange their own meeting places

10:45—Noon **ADVANCE REPRESENTATIVES/ALUMNI WORK SESSION**
Club Regent

Following the plenary advance representatives and alumni will continue their work sessions. SENCER staff will facilitate the session.

Noon **Buses leave for the Monterey Aquarium Field Trip**
There are no other scheduled SENCER activities for Sunday afternoon and evening.

MONDAY, AUGUST 9, 2003

(Shuttle buses from the Fairmont Hotel to Santa Clara University will run from 6:30 to 8:00 am.)

7:00—8:00 **FULL BREAKFAST BUFFET**
Mission Gardens Tent

8:00—8:45 **HOMEROOMS**
Same rooms as assigned on Friday.

9:00—10:15 **PLENARY SESSION**
What's Science Got to Do With It: Science, Technology and Human Nature and the Electoral Process
Recital Hall

David Burns, presiding

Suppose you were charged with making national elections—arguably the cornerstone of the democratic process—fair, efficient, accurate, and respected by all contestants and participants. What science would you need to know? What mathematics? What would you need to know about technology and engineering? And, beyond all that, what would you need to know about human nature? What help, if any, could you use from colleges and college students?

These are just a few of the issues being considered by our speaker, the chairman of the United States Elections Assistance Commission., as he and his colleagues on the Commission confront a complex, capacious, unsolved civic challenge that involves all of us.

The Reverend DeForest "Buster" Soaries, Jr.
Chairman, Elections Assistance Commission

10:15—11:45 **TEAM TIME**

Teams meet as they choose.

10:15—11:45 **ADVANCE REPRESENTATIVES/ALUMNI WORK SESSIONS**
Mission Gardens Tent

The session concludes the series. SENCER staff will facilitate.

11:45—1:00 **LUNCHEON**
TABLES AND TOPICS: INFORMAL CLUSTER SESSIONS
Mission Gardens Tent

Signs identifying clusters will be placed on tables. You are encouraged to join the table of your choice.

A NOTE ON SENCER CLUSTERS

Clusters are one of the five basic elements in the SENCER "system" for national dissemination (the other four are: the SENCER Summer Institutes, the SENCER models for dissemination, the SENCER virtual community, and SENCER's efforts aimed at creating a national climate supporting science education reform).

At the most fundamental level, Clusters are intended to serve as vehicles of affiliation. They are designed to invite participation in SENCER and to stimulate and help sustain durable networks that can continue SENCER's work. At present, two kinds of Clusters exist: "Disciplinary Clusters" and "Interest Clusters."

By its very nature, however, SENCER's work is multidisciplinary. Complex, capacious, civic questions have a hard time respecting disciplinary boundaries. Indeed, we have argued that to understand such problems from a singular disciplinary perspective might be equivalent to systematically misunderstanding the phenomenon. We have also pointed out that to fail to grasp what the STEM disciplines have to teach us about these problems would lead to still another form of misunderstanding.

So why do we have Disciplinary Clusters? Three reasons are worth noting:

- People identify with their disciplines and there are discipline-specific considerations that need to be respected,
- The organization of learning is largely accomplished within departments and disciplines, and any reform that is to succeed, will need to have the understanding, assent, and the support of disciplinary colleagues, and
- We hope that, through participation in clusters, SENCER-affiliates may be able to join together in efforts to take SENCER reforms to disciplinary societies and associations.

The "Cluster Tables" are intended to be informal, "birds of a feather" opportunities. If most of you leave the lunch table wanting to stay connected to a cluster, we will have accomplished our modest short-term goal.

Here are the cluster options:

Disciplinary Clusters	Cluster Convener
Mathematics and Computer Science	David Ferguson
Physics	Theo Koupelis
Chemistry	Amy Shachter
Biology and Life Sciences	Carl Huether
Environmental Sciences	Garon Smith

Interest Clusters	Cluster Convener
Integrated/Interdisciplinary Sciences	Brian Hagenbuch
Learning Communities	Ellen Goldey
Health	Marion Fass
Pre-Service Teacher Education	Cindy Klevickis and Sharon Sherman
Conservation Sciences	Tom Wood

Sign-up sheets will be available in homeroom to provide the staff with some advance notice of interest. Of course, you are welcome to join a table even if you hadn't signed up in advance.

1:00—2:15 CONCURRENT SESSIONS—III

- **Community-Based Research**

  This session will explore the basic tenets and practices of undergraduate Community Based Research for both science and non-science and majors alike. Together we will discuss the practice as it relates to the National Research Council's guidelines for best practices in science teaching as well as the missions of many of our colleges and universities. We will review the aims and objectives of this experiential learning practice and provide time to work on connecting curriculum to authentic discovery-based research practices and assessment.

  Amy Shachter
  Santa Clara University

- **From Science to Global Engagement: Teaching Science through Social Controversies**

  Scientific understanding underlies the ability to act effectively in the face of many of the major social crises facing the world today, from the fight for oil and water to the value of biological diversity to the spreading AIDS pandemic. When controversy and social context are used to teach science, students forge personal connections with the material, have enhanced learning, and develop an intellectual interest in the topic that continues after the course ends. Including social relevance in science courses also leaves students with the desire to "do something" outside the classroom. In this workshop we will explore different models for using the controversy and social context of the AIDS epidemic in the United States, Africa and the island nations of the Caribbean, to develop opportunities for civic engagement and global action by US college students

  The presenters representing institutions of different sizes and with different student populations we have adapted the SENCER model to reach goals of student engagement and global understanding. Presenters will share strategies for developing local and global contexts to enhance science learning and to encourage students to remain committed after the courses have ended.

  After a brief review of model courses and assessment data, presenters use small group methods appropriate for the classroom

to discuss challenges and share strategies for creating communities of knowledgeable and engaged students.

Sherryl Broverman
Duke University

Marion Field Fass
Beloit College

John Mecham
Meredith College

- **Quantitative Reasoning and Civic Engagement**

  Quantitative reasoning, whether done well or poorly, has a significant impact on public policy decisions. Furthermore, effective participation in public discourse hinges on the citizen's ability to deal with the current information/data explosion and the increasing reliance of politicians, strategists, and policy makers on a variety of quantitative models.

  This interactive session has the aim of generating ideas for infusing quantitative reasoning into SENCER-type courses. First, we will look at some examples of the uses and abuses of quantitative reasoning in public policy discourse and decision making. Secondly, we will explore SENCER-type experiences that might better prepare students to participate in and/or critique the quality of the quantitative reasoning used in discourse on important public policy issues.

  Mariah Birgen
  Wartburg College

  Jacqueline Dewar
  Loyola Marymount University

  David Ferguson
  Stony Brook University

- **Integrating the Sciences and the Humanities in Learning Communities: The Model at Wofford College**

  Many students perceive science as irrelevant to their academic and civic development, and science professors often find it frustrating that their own love of science fails to infect such students in their courses. These same students often find their humanities courses deeply engaging, but would rarely consider how the sciences and humanities fit together in their liberal education.

Wofford College's learning community (LC) program originated with a NSF CCLI/A&I grant, and integrates freshman science and humanities courses around a theme. Faculty and students combine their diverse disciplinary interests to form a richer and more stimulating learning environment. This interactive session will describe the development of the NSF grant proposal (highlighting the ideas we adapted from other LC programs), the intellectual merit of the program, the elements of our model (including student preceptors, summer development workshops, educational outreach/service learning, and program assessment), the broader impact of our program, and the issues involved in extending and sustaining the initiative.

Ellen Goldey
Wofford College

- **Tuberculosis: A SENCER Backgrounder Discussion**

TB is not only old news; it is a leading cause of death worldwide and a growing cause for concern in the United States. Its history tells us a good deal about science and how science and enlightened public policy can work together to liberate people from the tyranny of unnecessary suffering and pain. And TB also tells us a lot about what happens when science and public policy (and public health) go in separate ways. The author of the SENCER course model on TB and the author of this year's SENCER Backgrounder will give a presentation and lead a discussion on tuberculosis. Here's one reviewer's comment on Dr. Fluck's backgrounder:

"Dick Fluck has done outstanding work; the paper is an elegant, articulate, and complete exposition of the problem of tuberculosis (in, as the name of it suggests, both historical and current contexts). It provides an interdisciplinary introduction to the related fields of microbiology, human/medical infectious disease, public health (with a superb description of case-finding in action), all seen through the lens of TB. Dick engages a variety of important topics with SENCER significance, such as the differential rates of TB according to race/ethnicity in the US, conflict over the most effective and economical strategies for international control of TB, the epidemiological (and pharmaceutical and genetic) elements of drug resistance, and the intersecting elements of education, advocacy, and public policy. The tone, tenor, and detail of the manuscript are appropriately scientific (the paper would, in fact, serve nicely as an introduction to TB for medical, nursing, and public health students); from the perspective of using backgrounders as key resources for classrooms and research projects, then, it would work extremely well. It also adds weight and substance to the corpus of SENCER work."

Richard Fluck
Franklin and Marshall College

- **Nanotechnology: Small Stuff with Large Civic Implications**

  The author of the SENCER Backgrounder on Nanotechnology will offer a brief presentation on the current status of developments in nanotechnology with emphasis on the challenge of introducing students to this growing field of science and technology. Participants will have an opportunity to discuss the backgrounder and identify how a focus on nanotechnology can be used to organize a SENCER course that uses nanotechnology (and the contemporary popular fictional accounts of its perils and promises) as a way to teach science and further understanding of this complex civic issue.

  Kristen Kulinowski
  Rice University

- **Sci Tech High Schools, Pipeline Issues and SENCER: An Exploratory Discussion**

  The growing movement to create "sci tech" high schools, especially focused on preparing traditionally underserved and minority students for college level work, is encouraging, especially in connection with encouraging more students to major in STEM fields. How relevant is the SENCER approach to high school science teaching? To the sci tech schools in particular? What are the challenges of departing from traditional preparation strategies to encourage consideration of "context," situation, and science as a social system? Does the SENCER approach help or harm students selected for these special learning opportunities? What do we know about strategies to increase access, especially for the traditionally underserved? Are there opportunities for collaboration between SENCER projects at colleges and the sci tech schools?

  This session will feature brief presentations about two sci tech high schools and a review of research on access. Following that introduction, the session is designed to provide an opportunity for conversation about how linkages with such schools—and others—may be forged and towards what specific goals and ends these linkages might be put.

  Melvyn Schiavelli
  Harrisburg University of Science and Technology

  Ellen F. Mappen
  New Brunswick Health Sciences Technology High School

  Heather Wathington
  Lumina Foundation for Education

- **Using the SALG Website to Implement the SENCER SALG instrument**
  (This repeats an earlier session.)

  In this session, participants will be shown how to collect their SENCER SALG pre- and post- data through the SALG website. The purpose of the SENCER-SALG will be described and participants will be given an introduction to the overall structure of the website. The presentation will afford participants and opportunity to "walk through" the process of using the site. Participants will be able to see the data for all students collected through the SALG site, as well as other data they can access from the site. Lessons learned from previous usage will be discussed. As the SENCER-SALG is still being developed and improved, input into the development process will be solicited and discussion will be encouraged

  Sue Lottridge
  James Madison University

  Tim Weston
  University of Colorado, Boulder

- **How Do You Know What Your Students are Learning?**
  (This repeats an earlier session.)

  Do you use active learning, cooperative learning and peer teaching in your classes? Have you incorporated on-line discussion, or computer-based problem sets, or other technology-assisted activities into your classes? Do you wonder if these approaches have made a difference? Most students and faculty agree that these changes have improved education. But sometimes we have not considered how these different approaches have changed what students are learning.

  This session will explore the scope of learning, from acquiring content to building skills, to shifting attitudes, fostered by the new approaches. More importantly, it will offer proven ways to measure the richness of learning that accompanies these varied approaches to education.

  Laurie Fathe
  George Mason University

- **Service Learning and the Sciences**
  (This repeats an earlier session.)

  With a renewed emphasis on active, collaborative environment for learning and with the awakening interest in community, country and civic engagement, service learning has found a prominent

place amongst progressive pedagogies. In this session we will discuss the basic components needed to design a successful service learning project in the sciences. We will discuss best practices for the integration of theory and practice to support students' learning. Participants will receive several models that have been used to help assess "learning" in service learning, as well as examples of projects that have worked successfully in the past. We plan this session to be one in which participants can share their experiences and help others overcome anticipated barriers.

Lynn H. Leavitt
George Mason University

- **Financing SENCER and Other Science Reforms**
(This repeats an earlier session.)

  The session will provide an overview of NSF programs and funding opportunities, including the new programs on assessment. The current status of application success rates will also be discussed.

  In place of the usual approach to offering a "catalog" of program possibilities, the presenter will ask participants to identify specific ideas they have for projects requiring support. With that sense of "need" in mind, the presenter will identify specific program support possibilities, where they exist.

  Particular emphasis will be paid to how NSF programs can be accessed to support SENCER campus innovations. SENCER has a goal of increasing assistance in adaptation and innovation at the campus level, with the view to disseminating local innovations as part of the continuing national program of SENCER.

  Myles G. Boylan
  National Science Foundation

- **An "International Journal for Science and Civic Engagement"?—An Interest and Planning Session**

  This informal session is designed for those interested in meeting to discuss the possibility of establishing a new electronic journal that would provide a venue for communicating international developments that employ the SENCER and related approaches to improving science learning and encouraging engagement with important civic issues. Participants will explore potential aims and purposes, strategies for implementation, and suggestions for areas of focus and development.

  Trace Jordan
  New York University

Richard P. Keeling
SENCER National Office

Giorgi Chighladze
Georgia Technical University

- **CONSULTATIONS**

  Note: During each concurrent session time slot, a cohort of model developers and SENCER core faculty will be available for specific consultation with individuals and teams. A list of consultants available during Concurrent Session III will be distributed in the homeroom sessions.

2:30—3:45 CONCURRENT SESSIONS—IV

- **Planning Session: SENCER-SALG and Course Assessment**

  This session will gather a group of invited instructors who will discuss how assessment is conducted in their courses with the objective of participating in a validity study of the SENCER-SALG. The validity study involves matching course assessment data such as tests and grades with the student responses on the SALG. Establishing the relationship between these two measures is vital for the continued use of the SENCER-SALG and will help greatly in understanding and interpreting the results of the instrument.

  Participants preparing to use the SENCER-SALG who are interested in the validity study are invited to attend. Following SSI-2004, the SENCER evaluation and assessment team at the University of Colorado will want to continue to work with interested faculty as the SENCER-SALG is refined and further developed.

  Sue Lottridge
  James Madison University

  Tim Weston
  University of Colorado, Boulder

- **Taking Your Work to the Rest of Your Institution: A Faculty-Focused Session**

  Faculty who do curricular innovation associated with projects like SENCER are smart, insightful educators. However, this generally implies they are also significantly ahead of their colleagues and their administration in their approaches. If they do not consciously and actively work to inform, engage, and enlist the people who

influence academic decisions in their departments, units, and on their campuses, then the potential broader impacts of their work will never be realized.

This session will help faculty members design a plan to help others on their campuses learn about and adapt/adopt aspects of their SENCER courses. Topics will include effective ways to communicate, enlisting administrative support, using external validation to help influence your peers, and gathering and presenting data to document the success of your project.

Laurie Fathe
George Mason University

- **Structural Reforms to Support Innovation: An Administrator-Focused Discussion**

  This seminar-style session will find us discussing how administrators can support innovations and science reform on our campus. We will ask and discuss the following questions: What were some of the successful strategies administrators have used to support the faculty who are innovators? How can the P&T system—as well as other aspects of the recognition and reward system—be structured to encourage faculty (including new faculty) to try new approaches? How can we earn support from chairs and senior faculty who help set the tone in a department? What's the role of assessment and evaluation in all this? How can SENCER help?

  Using the experience and ingenuity of the participants, we will develop a set of recommendations and practices that would encourage, support, and sustain the energy and enthusiasm required for innovation.

  Convened by Karen Oates
  Harrisburg University of Science and Technology

- **Our Students as Partners in Change**

  Where do we find the creativity, energy, and fresh insight to revitalize our courses and programs? What expertise can we turn to when many of our students just don't understand the science lecture that seemed perfectly clear to us? Who will help us adopt more active teaching methods? Who will be the role models for our students to become more active learners? The answer to all of these questions should be obvious, but it is often overlooked. Our students represent a pool of varied, and often un-tapped, talents, and if we are willing to partner with them in the educational process, the results can be amazing.

In this session, a panel of faculty members will describe how their partnerships with students have enriched their courses in particular and their pedagogy in general. The panelists will provide specific examples from their experiences and generate a forum for a lively exchange of ideas with attendees (we hope to get a good number of students to participate with the faculty in these discussions!).

Ellen Goldey, moderator
Wofford College

Dick Fluck
Franklin and Marshall College

Barbara Tewksbury
Hamilton College

- **Introductory Science Courses: "End of the Road" or "Beginning of a Beautiful Friendship"?**

The National Academy of Science recently convened a meeting to explore a series of questions that could benefit from the answers that research could provide centered on the complex problem of introductory courses. A panoply of issues present policy-makers and educators as they face the issue of designing, assessing, aligning and improving the "first" and all too often "last" experience college students will have college level work in the sciences and mathematics.

The presenter, who organized the planning meeting, will discuss the problem, the issues presented, the preliminary research agenda, the "policy drivers" affecting the challenge of improving science learning, and the options for next steps. Participants will be encouraged to engage the discussion helping to shape the agenda for the study. Materials—including background reports, state and other standards—will be distributed.

Jay Labov
National Research Council

- **The "Ideal" Department: Some Strategies for Creating One**

In this session, a seasoned academic administrator will discuss strategies for organizing departmental work so that institutional missions in research, teaching, and service can be maximized and departmental members are encouraged and rewarded for employing their strengths in the service of the larger educational mission—the "corporate" responsibility of all educators.

The presenter, drawing on his experiences as a professor of chemistry, chemistry department chair, provost, and president will

review some of the rude awakenings he's experienced as a naïve academic who became a practicing administrator. He'll also try to answer the question: is there anything of intellectual value that can be learned from academic administration?

The session is intended to be informal, highly interactive and fun. Participants will be encouraged to develop a set of ideals and strategies that SENCER can disseminate to assist in program implementation at collaborating campuses.

Melvyn Schiavelli
Harrisburg University of Science and Technology

- **Civic Engagement: The Classroom and the Campus as a Civic Space**
  (This repeats an earlier session.)

  What do we mean by civic engagement? The SENCER ideals will be used and a model for organizing SENCER courses will be presented as a springboard for discussing the many possibilities and ideas that are contained in the idea of "civic engagement." Confronted with the job of organizing a course and a classroom, how can we think about how our choices can determine what kind of civic space we create? This loosely-moderated session is designed to solicit members' experiences, thoughts, and recommendations for how we can make SENCER courses "models" of the kind of civic engagement we desire in the larger world. Also open for discussion is the somewhat more challenging question of how to make campuses authentic civic spaces, a matter of special relevance to SENCER aspirations, given SENCER's emphasis on issues that can be said to cause "multidisciplinary trouble." What are the cultural practices and norms that we need to consider, well beyond C.P. Snow's still thorny dichotomies?

  David Burns
  SENCER National Office

- **Fundamentals of Grant Writing**

  This workshop is really "Grant Writing 101." It will highlight strategies for planning and writing successful proposals for grants. Selected strategies include team building, defining the need, building a budget, and effectively writing in response to the request for proposal. Come prepared with your questions!

  Mary Wiberg
  The Commission on the Status of Women
  State of California

- **Plagiarism in SENCER Courses: Mission Impossible**

  If writing assignments are included as part of your new (or old) course, then plagiarism becomes a possibility. How likely is plagiarism? In many cases, it will be very likely. This workshop will begin with stories about how and why students cheat. The twin topics of how plagiarism can be detected and prevented will also be discussed. But where the workshop goes from there will depend on the participants. If other years at the Summer Institute are any indication, you can expect a lively discussion.

  Catherine Hurt Middlecamp
  University of Wisconsin-Madison

- **Faculty Portfolios**

  The Teaching Portfolio is a document that answers three elementary questions about a professor's teaching:
  1. What do you teach?
  2. Why do you teach the way you do?
  3. What evidence can you provide to show you have been effective in your teaching?

  For faculty who have changed their teaching strategies to include SENCER goals, the Teaching Portfolio provides a forum to describe one's rationale for using these SENCER principles in teaching. Supporting materials, such as syllabi, assignments, exams, as well as commentary from students and peers are also provided to strengthen the case for using SENCER strategies.

  Since the unique qualities of each instructor, their teaching responsibilities, and the evidence of their effectiveness can be showcased with the Teaching Portfolio, hundreds of colleges and universities are using the Teaching Portfolio format for a comprehensive description of a faculty member's teaching for many applications, from strategies to improve teaching, to assessment of teaching effectiveness for personnel decisions. For these reasons, all faculty members should consider using the Teaching Portfolio as a structure to capture their best efforts in teaching.

  The session will help participants begin to create or refine a portfolio.

  Monica Devanas
  Rutgers University

- **Community Partnerships: Working with Museums, Libraries, and Other Institutions**
  (This repeats an earlier session.)

  In this session we will discuss the development of academic relationships between degree-granting organizations and non-traditional partners. Recognizing the mutual benefit to the institutions and students, we will discuss ways to develop and implement appropriate credit-bearing learning opportunities in environments and venues beyond higher education. The presenters' experiences with Columbia University and the American Museum of Natural History and with George Mason University and the Smithsonian Institution will be used as case studies.

  Eleanor Sterling
  Columbia University

  Tom Wood
  George Mason University

- **Turning Teaching Problems into Research Problems**

  What is the scholarship of teaching and learning and how do you do it? The Scholarship of Teaching and Learning (SoTL) differs in some ways from reflective practice and classroom research.

  In the first part of this session the presenter will introduce a framework that highlights the similarities between traditional disciplinary research and SoTL work. The presenter's SoTL project from the past year as a 2003-4 Carnegie Scholar will be used to illustrate the stages of this framework. Her original question (How does math contribute to a liberal education?) was prompted by a teaching problem, a piece of evidence from a former student, and the Carnegie application guidelines. The refined question (What is the trajectory of math majors' growth in understanding of "proof"?) led the presenter and a colleague on an engaging journey through quantitative and qualitative research methods, expertise theory, and typologies of knowledge to a partial answer to the original question.

  In the second part of this session participants will have the opportunity to apply the framework to a teaching problem of their own and begin to take the first steps to transform it into a research question. Resources and tools for continuing this work will be provided.

  Jacqueline Dewar
  Loyola Marymount University

- **How Campus-Based Work Becomes a Nationally Featured SENCER Model**

  In this informal session, the general editor of the SENCER Model Series will meet with participants interested in learning more about how SENCER models are chosen and how to have one's own work considered as a featured model. Suggestions/nominations for models will be solicited and feedback on model format, usefulness, and potential for expanded use will also be welcome.

  Eliza Reilly
  SENCER National Office and Franklin and Marshall College

- **CONSULTATIONS**

  Note: During each concurrent session time slot, a cohort of model developers and SENCER core faculty will be available for specific consultation with individuals and teams. A list of consultants available during Concurrent Session IV will be distributed in the homeroom sessions.

4:00—5:15 **CONCURRENT SESSIONS—V**
SENCER ALUMNI PRESENTATIONS

- **SENCER: "It's not just for non-majors anymore."**

  There is a pervasive belief that SENCER approaches are incompatible with "information rich" courses for science majors. However, at Rutgers University we have demonstrated that teaching approaches that work for non-majors are also extremely effective in teaching science majors.

  Topics to be discussed include rearranging the textbooks, engaging the students, and soliciting and responding to student concerns. Reinventing the courses increased student achievement much more than "covering the material."

  Terry McGuire, SSI 2002
  Rutgers University

- **Problem-Based Learning for Civic Engagement in Introductory Non-Science Major's Biology at the College of Charleston**

  The focus of this presentation will be to introduce faculty to a teaching methodology known as Problem-Based Learning (PBL).

The principle behind PBL is that the starting point for learning should be a controversial problem or issue that requires the application of scientific concepts and evidence to more completely understand the facets of the problem and find workable solutions. Students engage in collaborative learning, out-of-class research, whole class discussions, mini-lectures, and inquiry activities with the ultimate goal of presenting their recommendations or solutions. We will explore pedagogical techniques used in PBL by participating in the initial stages of solving a real problem. Resources for finding and developing problems, suggestions for facilitating collaborative learning, and common implementation pitfalls will also be shared.

The session will also discuss results of action research that used the SENCER SALG to compare the effect traditional content-driven lecture vs. PBL methods on student learning and attitudes about science. Additionally on-going research into the effect of these teaching methods on students' views about science and technology and their relations to society will also be discussed.

John Peters, SSI 2002
College of Charleston

- **Going Interdisciplinary: Coordinated Studies and the First-Year Experience at Holyoke Community College**

  In 2003, Holyoke Community College piloted a SENCER-initiative for first-year students called a Coordinated Studies Program. These programs are extensions of Learning Communities but encompass a full semester of courses around common themes and a common community of learners. Our effort, entitled "What in the World Are We Doing? An Exploration of Life," combined introductory courses in Biology, Psychology, English Composition, Speech, and a College Success course in a 16-credit sequence co-taught by four faculty members. In this presentation, the trials and tribulations of the college's interdisciplinary efforts, including how the college incorporated these disciplines in a framework to teach through complex and capacious issues will be discussed.

  Brian E. Hagenbuch, SSI 2001
  Holyoke Community College

- **Zero to SENCER in One Year or Less: The Development of an Applied Interdisciplinary Science Course for First-Year Students**

  This session will involve participants in a discussion of our Longwood University case study for development and

implementation of a SENCER-type course. Our interdisciplinary science course supports the campus General Education Program and engages faculty and students in a collaborative teaching and learning community. We will discuss challenges related to implementation of new approaches like this as well as outcomes from our first semester of the course.

Alix D. Fink, SSI 2002
Longwood University

- **Building Upon SENCER Connections to Link Educational Initiatives in Microbiology**

  In this informal session we will discuss how our work in SENCER has facilitated cultural and educational initiatives in microbiology/science education. Microbes are global citizens that impact human lives in a variety of ways that can be beneficial or detrimental. The nature of these human-microbe interactions provides a rich arena for linking science content with human civic interactions and social responsibilities. By building upon the prior work of SENCER on HIV/AIDS we have been able to highlight SENCER work at the American Society for Microbiology's annual general meeting to a large national audience. Locally, one of us (SB) has adopted and adapted HIV/AIDS SENCER model to introducing Asian cultural diversity into a general education science course. The session will conclude with a general discussion of ways to further highlight and link the SENCER ideals and program to national and local audiences.

  Spencer Benson, SSI 2002
  University of Maryland

  Kim Finer, SSI 2001
  Kent State University Stark Campus

  Monica Devanas, SSI 2001
  Rutgers University

  Marion Fass, SSI 2001
  Beloit College

- **ESA21: Environmental Science Activities for the 21st Century**

  This session will discuss the activity modules created by a consortium of institutions (Bowling Green State University, Community College of Baltimore County, Kennesaw State University, and the University of Southern Mississippi) for the ESA21 project. These activity modules engage the students on issues vital to the public (climate change, energy, ground-level

ozone, etc.) through an investigation of their impact upon the environment and their surroundings. The modules are done over a period of several weeks using a combination of hands-on, field, and Internet based activities. Some of the activities provide background information on the issue, while others have the students' research information about themselves and their lifestyles. At the conclusion of each module, the students calculate just how much they impact their environment or the environment impacts them. They then investigate ways that they can change this impact by making changes in their lifestyles.

Assessments of the activity modules have been done in a traditional lab course, a traditional course with no lab, and an online class with no lab at Kennesaw State University. Various instruments have been used for this, including the Student Assessment of Learning Gains survey developed by SENCER. The results of these assessments show that 1) student learning is enhanced, 2) student interest in science and civic matters is increased, and 3) student lifestyles have changed by the use of these activity modules.

John Pratte, SSI 2001
Kennesaw State University

- **A Focus on the Human Body: The SENCER Honors Sequence at the University of Southern Maine**

The session will provide a "case study" in applying SENCER to honors education. In 2003, a team of professors from the University of Southern Maine attended the SENCER Summer Institute to lay the foundations for a new sequence of courses in the Honors curriculum. This sequence focuses on the human body from interdisciplinary perspectives, including the natural and social sciences, the humanities and the arts, applied disciplines and professions. The current course illustrates a commitment to civic engagement within the interstices of these disciplines.

The course developed by the USM team resembles other courses developed by faculty teams from institutions across the U.S., who are designing curricula to encourage scientific learning from the perspective of a responsibly, socially engaged citizenry. We have approached this work by linking it to the USM Plan for regional excellence and national recognition and by situating it within the transformation of general education at USM. It is not clear yet whether this course will appeal to science majors or whether it will be viewed as more appropriately geared to non-science majors. We hope for both of these outcomes, since we wish to recruit and retain more science majors in the honors program. To that end, we have planned for a sequence of three integrated honors courses, open to all honors students, whether science majors or not, and all

addressing the human body. This sequence of courses will be offered parallel to the existing sequence of interdisciplinary courses in the Honors program and will allow students to choose pathways that provide both common coursework and different alternative strands of integrated curricula.

HON201K is the first course in the new Honors sequence. It was designed during the spring semester of 2004, during monthly day-long workshops. In these workshops, we fleshed out the contours of the first course, and we will complete the task of outlining the two remaining courses in the sequence. This curriculum and professional development activity has involved day-long discussions of recommended readings, discussions with an external scholar who helped us sort through some conceptual questions concerning the study of the body, and careful dialogue with each other about what our respective fields or disciplines bring to this task. Our work has also been helped by the contributions of an undergraduate biology major who is also an honors student and by the contributions of a graduate student from nursing.

Robert Sanford, SSI-2003
University of Southern Maine

- **HIV/AIDS Activities and Science Education at Kenyatta University, Nairobi, Kenya.**

  Kenyatta University recognizes the importance of HIV/AIDS civic education and has engaged in a comprehensive curriculum review to addressing the critical challenges posed to higher education by HIV/AIDS. Our presentation will summarize our HIV/AIDS projects and innovations. Topics to be covered include the revision of our HIV/AIDS courses, the development of a compulsory course on HIV/AIDS, responses by students to VCT, integration of HIV/AIDS into the curriculum, and outreach participation by science students. Units tailored for a certificate course in herbal medicine for treatment of opportunistic infections will also be described. Diseases such as Amoebiosis, Typhoid, TB, Asthma, etc., are now being treated at our clinic using herbal medicine. The overall aim of our programs is to produce well-rounded students for civic involvement in community and institutional work. A 35-minute video on the HIV/AIDS situation in Sub-Saharan Africa will be available for viewing.

  Everett Standa, SSI 2003
  Olive Mugenda, SSI 2003
  Philip O. Owino, SSI 2003
  Kenyatta University

- **Raising Students' Environmental Awareness in Communications Classes: The Impact of Interdisciplinary Collaboration**

  To address the need for more environmentally-literate citizens, two professors in Environmental Science and Professional Writing developed an interdisciplinary project involving their students in Environmental Science, Business Writing, and Technical Communication. In addition, they conducted a study to assess the impact of the project on students' environmental knowledge and attitudes. Addressing the statewide issue of mercury levels in South Carolina's freshwater fish, the project required students to research secondary information, conduct audience analyses of potential readers, design and produce multiple documents (including a power point presentation, letters, and a photo essay), and conduct review cycles with formal editorial recommendations.

  Environmental knowledge and attitude surveys administered before and after the project show that students who participated scored significantly higher in knowledge and attitude after completing the project. Control group results were mixed, with environmental science students increasing knowledge and attitude and English students showing no significant change. This study shows that integrating environmental science topics in other courses can help promote environmentally friendly attitudes in students. Some results of the students' research also suggest further study, for example to identify whether minorities and the poor are more affected by mercury than other groups.

  Lisa Pike
  Lynn Hanson
  Francis Marion University, SSI 2001

- **CORE Aspirations: Curriculum Reform at Fairfield University**

  Fairfield University has adopted a new approach to developing, supporting, and reviewing core science courses. This approach has evolved through a multi-year process with grant support from the Hewlett Foundation and SENCER. The process began with a substantive re-write of our Core Science mission statement. This past semester the Natural Science departments (Physics, Chemistry, Biology) debated and approved the new process and we will begin implementing it in the fall. The new approach is summarized by the following set of goals/outcomes:

  Goal: Students should have a solid understanding of the scientific method (i.e., an understanding of how to approach and solve

scientific problems). *Outcomes*: Students can critically evaluate scientific claims, identify reliable sources of information, and generate testable hypotheses (i.e., have a basic understanding of experimental design). Students' anxiety associated with scientific terminology and methodology is reduced.

Goal: Students should be able to work with real data and analyze those data in a meaningful way. *Outcomes*: Students can interpret graphical presentations of data. Students understand how to make measurements. Students have a basic understanding of statistical concepts. Students appreciate factors involved in collecting data.

Goal: Students should be able to acquire some basic science content and connect that knowledge to real issues in society. *Outcomes*: Students gain an appreciation for the role of science in society. Students understand the limits of science and the kinds of questions that science can ask, and answer. Students become comfortable adopting a skeptical approach to examining scientific claims. (i.e., students move from being convinced by authority to being convinced by the evidence). Students can begin to differentiate between good science, pseudoscience, and non-science. Students present well-grounded arguments.

The session will provide an overview of how Fairfield plans to (1) review existing courses, (2) facilitate the development of new courses, and (3) organize future workshops and acquire grants to keep the momentum going.

L. Kraig Steffen, SSI 2003
Fairfield University

- **Developing a SENCER Course on Nanotechnology at Rice University**

The author of the SENCER backgrounder on nanotechnology will discuss the process of designing a new SENCER course on emerging technology through the preliminary phases of (1) identifying like-minded people on campus (team building), (2) building a course syllabus (course planning), and (3) finding funding for the course (proposal writing). The course will be offered at Rice University for the first time during the Fall 2004 semester. A course outline with recommended and required readings will be shared along with plans for advertising and assessment.

Kristen Kulinowski, SSI 2002
Rice University

- **SENCER Ideals Seep Into Wartburg's Plan of Essential Education**

  Wartburg started out in 1999 with a new General Education plan and one SENCER-like course, Science for Society. Now we have a four-year-old plan, one "official" SENCER course, and multiple other math and science courses that have been influenced by SENCER ideas and ideals. On the way we have learned valuable lessons including: "don't ask questions the students don't want to know the answer to" and "every new faculty member is just waiting to be indoctrinated into SENCER."

  This presentation will discuss the history of SENCER at Wartburg in the context of the Physics and Mathematics departments. It will include a quick overview of the range of "SENCERization" of various biology, chemistry, physics, and mathematics courses at the moment. Finally, the presenters will lay out our map of the future, including a SENCER course, Finite Mathematics using Elementary Mathematical Modeling, that will replace the current focus-less finite mathematics course.

  Mariah Birgen, SSI 2001
  Brian Birgen, SSI 2002
  Wartburg College

- **Renewable Environments: Transforming Urban Neighborhoods (RETURN)—A Learning Community Focusing on the Redevelopment of a Superfund Site**

  A substantially revised Urban Studies class and a new general science education class were taught as a learning community (LC) during the Fall 2003. The former Alameda Naval Air Station (now Alameda Point) was used as the field site with a thematic focus on environmental and sociological hazards. This site has ongoing environmental cleanup issues including time critical removal actions (TCRA) and redevelopment activities. The courses were enhanced by field trips and speakers from public and non-profit agencies. A video component was integrated into both courses as an instructional tool for the students in studying the community redevelopment. One lab involved soil sampling for hazardous metals on a site slated to become a plant nursery. Students researched critical social aspects of the redevelopment and the information was also displayed as posters. One formal civic engagement component of the LC was providing an educational afternoon, including a lab experiment, for children of the formerly homeless now living in on the former base. Two other civic engagement components were poster presentations at a community partner's site and the collection of video materials to document the community's perspective on various different redevelopment

issues at Alameda Point. The best of the research papers and a senior thesis will be compiled and given to the local library.

Steven Bachofer, SSI 2002
Phylis Martinelli
St. Mary's College of California

5:30—8:00 **FAREWELL DINNER—A California Barbeque**
Mission Gardens Tent

Join fellow SSI 2004 members in an informal farewell dinner, preceded by a cash bar.

(Shuttle buses from Santa Clara University to the Fairmont Hotel will run from 6:30 to 8:30 p.m.)

TUESDAY, AUGUST 10, 2004

(All sessions held in the Fairmont Hotel)

7:00—9:15 **CONTINENTAL BREAKFAST AND TEAM TIME**
Club Regent (and environs)

9:30—11:30 **CLOSING PLENARY**
Club Regent

David Burns and Karen Oates, presiding

Remarks: The View from The National Science Foundation
Myles G. Boylan
National Science Foundation

Plenary Presentation: Remembering the Human and Preserving the Humane in Science Education

In the closing plenary, we draw together the ideals, purposes, and themes of SSI 2004 to envision an integrated approach to undergraduate science education that accounts for, and attends to, both educators and students as whole human beings. How can the findings of cognitive research and the experience of progressive pedagogies help us support student learning and excellence in teaching in the sciences? How can a renewed relationship with students support our efforts both to strengthen science learning and to increase students[1] engagement with unresolved civic, social, and health problems, both on campus and in the world? What have we learned from teachers and students about the ways that focusing on pressing, difficult community problems has revitalized courses and curriculum? What do we still need to learn? What conflicts in concepts, educational philosophy, and commitments must we yet face? Why is it so important to continue our progress? What are our next steps and challenges?

Richard P. Keeling, MD
SENCER National Office

Open Microphone:
Members of SSI 2004

Concluding Comments

11:30 **INSTITUTE ADJOURNS**

POST-INSTITUTE WORKSHOPS

1:00—4:30 **NSF Grant Writing**
Sacramento Room

SENCER aims to encourage a substantial cohort of our participants to successfully apply for NSF direct support for adaptation and implementation of SENCER courses and programs. This workshop responds to interests and needs expressed by faculty and administrators associated with SENCER and is designed to help achieve SENCER's national dissemination goal. Participants will receive a briefing on NSF grant reviewing protocols. Then, using real examples, participants will score CCLI applications. De-briefings will permit a review of salient features of a good application and identify common mistakes. Questions about NSF grant opportunities will be fielded. Participants who are interested in becoming NSF grant reviewers themselves will have the opportunity to learn more about these opportunities.

Myles G. Boylan
National Science Foundation

Special Session on Using NSF's FASTLANE System
Sacramento Room

Immediately following the NSF Grant Writing Workshop, interested participants are invited to attend a demonstration on using NSF's on-line application and reporting system, FASTLANE. This is an especially important session for first-time NSF applicants and institutions that have never applied for NSF support.

Chuck Gahun
SENCER National Office

Forging International Partnerships
Glen Ellen Room

This workshop will offer opportunities to link U.S. and other institutions interested in improving science education through projects focused on particular research topics or problems and cooperative educational programs employing progressive pedagogies.

Beyond the development of bi- and multi-lateral relationships among scholars and institutions, input from this session will be used to shape future program efforts for SENCER.

Facilitated by:

Amy Shachter
Santa Clara University

Monica Devanas
Rutgers University

Marion Field Fass
Beloit College

Debra Meyer
Rand Afrikaans University

Karen Kashmanian Oates
Bill Bennett
David Burns
SENCER National Office

A Note on the SENCER "Backgrounders"

Each year, SENCER commissions and produces two "SENCER Backgrounders"—papers designed to highlight the civic issues and their relationship to the products and process of science. The topics covered in the first two years included: the human genome and race; HIV/AIDS; hunger; and HIV/AIDS and education in Africa. Last year we added two new papers to the backgrounder series, one on "Nanotechnology" and one on "Biodiversity."

This year we are delighted to publish Tuberculosis by Professor Richard Fluck (Department of Biology, Franklin and Marshall College) and Implications of Learning Research for Teaching Science to Non-Science Majors by Professor Eugenia Etkina (Graduate School of Education, Rutgers the State University of New Jersey) and Professor Jose P. Mestre (Department of Physics, University of Massachusetts Amherst.)

All backgrounders have been added to the SENCER Web site. Limited numbers of hard copies are available at registration.
Comments received at these sessions and from other reviewers will be used by the authors to revise the papers for eventual distribution and use by people working on SENCER courses and programs.

Opportunities for SSI 2004 members with interests in these issues to gather together in discussions based on the papers have been provided in the schedule. The authors of the

backgrounders of HIV/AIDS in Science and Society (Keeling), HIV/AIDS and Education in Africa (Meyer), Nanotechnology (Kulinowski), Biodiversity (Sterling), as well as Professors Fluck and Mestre will be attending SSI-2004 and presenting in sessions devoted to the backgrounders.

We are interested in learning if there are topics/issues that you think should be included in the backgrounder series. Please let us know what they are and how useful or not the current set is to you. Please do not hesitate to e-mail your comments, suggestions, and reports on classroom or other use of the backgrounders to David Burns at david.burns@sencer.net.

SENCER *Backgrounders and their Authors:*

2001 Series

Some Social Implications of the Molecular Biological Revolution (The Human Genome Project)
Troy Duster
New York University

HIV/AIDS in Science and Society
Richard P. Keeling, MD
AAC&U

2002 Series

HIV/AIDS and Education in Africa
Debra Meyer
Rand Afrikaans University

Hunger, Science, and Public Policy
Raymond Hopkins
Swarthmore College

2003 Series

Nanotechnology
Kristen Kulinowski
Rice University

Biodiversity
Eleanor Sterling et al.
Columbia University

2004 Series

Tuberculosis
Richard Fluck
Franklin and Marshall College

Implications of Learning Research for Teaching Science to Non-Science Majors

Eugenia Etkina
Rutgers the State University of New Jersey

Jose P. Mestre
University of Massachusetts – Amherst

A Note on "Promising Pedagogies"

Larry Cuban offers two challenges to the case statement for "quantitative literacy" offered in Lynn Steen's important book, *Mathematics and Democracy*. Cuban's challenges emerge from what he calls "historical lessons." The first historical lesson is:

> Curriculum and pedagogy are inseparable. If anything has been established in the history of teaching, it is the simple fact that a teacher's knowledge of content seldom guarantees that he or she can structure and communicate knowledge in ways that enable a diversity of learners (particularly those who are compelled to attend classes) to understand and apply the knowledge that as been learned. How teachers teach matters….Pedagogy, the art and science of teaching, is as essential to learning as fuel is to moving a car. (p. 89)

Cuban summarizes his second historical lesson by writing: "The quest for numeracy is a plea for progressive pedagogy." He later lists progressive methods, as including, for example: "connecting content to real-life situations, lighter coverage of topics, an emphasis on understanding concepts rather than facts, integrating content across disciplinary boundaries." (p. 89)

We think this focus on progressive pedagogy is instructive as far as SENCER goes. You could try to do SENCER work with some traditional pedagogies and it could surely succeed, especially in the hands of a dazzling instructor. But we think there is a much greater chance for success if we employ pedagogies consonant with SENCER ideals—ideals which are, after all, based on the very radical notion that we need the knowledge that students actually produce to accomplish our own intellectual objectives. So, in addition to making opportunities available for intense and continual contact with our model developers, we have arranged to offer a selection of learning opportunities that emphasize promising pedagogies that we think will make SENCER courses and programs more effective.

We've also organized sessions, workshops, and discussion groups on important topics related to SENCER. A continuing goal and function of the SENCER Summer Institutes is to use the collective wisdom of participants in an effort to continuously improve what SENCER can do. We hope these discussion sections will help us in our thinking and planning. We solicit your advice and suggestions for new topics or issues to be included.