SENCER SUMMER INSTITUTE 2003
Notes on the Program

ARRIVAL, TRANSPORTATION, REGISTRATION, AND THE SSI 2003 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 from 11:00 a.m. until 2:00 p.m. on Friday, and from 6:45 a.m. until 8:15 a.m. Saturday-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 Tuesday, as all SENCER sessions (including the Post-Institute Workshops) will be held in the Fairmont Hotel.

Registration for SSI 2003 will take place at the Fairmont Hotel in the South Tower Foyer from Thursday evening (5:00 p.m. until 8:00 p.m.), August 7th and on Friday, August 8th (from 8:00 a.m. until 3:00 p.m.).

SENCER will maintain a campus office on the Santa Clara University campus in the Arts and Sciences building (across the drive from O'Connor), room 232 on Friday (August 8th) from 1:00 to 6:00 p.m., Saturday and Monday (August 9th and 11th) from 8:00 a.m. until 6:00 p.m. On Sunday, August 10th, the campus office will be open from 8:00 a.m. until 2:00 p.m. Staff will be present to assist participants.

FRIDAY, AUGUST 8, 2003

PRE-INSTITUTE WORKSHOPS

This year, four 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 simon@aacu.org prior to August 6th or consult the SENCER Registration Desk on August 7th at the Fairmont in San Jose.

Critical Thinking

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

This workshop will focus on the basics of designing service-learning opportunities. 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

Pre-Service Science Education

High quality K-16 Science education for teachers is the responsibility of science faculty and faculty in college of education. In this hands-on workshop participants will explore and grapple with content, pedagogy, and process/skills issues that encompass K-16 education. The purpose of the workshop is to instill a better understanding of the complexities of K-16 education, define challenges and opportunities for improving K-16 education, and relate the goals of SENCER to high quality teacher education.

Spencer Benson and Deborah Roberts
University of Maryland-College Park

Jay Labov
National Research Council

Developing Civic Engagement: Integrating the Sciences into Learning Communities

Students and faculty in effective learning communities (LCs) work together in a socially supportive environment that fosters active learning, civic engagement, and disciplinary integration. In this session, we will provide a very brief overview of the general LC pedagogy and how it is used at various types of institutions, then introduce you to the LC models at our institutions. Wofford College's NSF-funded model integrates two general education courses (a laboratory science course for non-science majors and a humanities seminar) around a common theme (e.g., water, cosmology, etc.). Each LC is team developed and team taught by two faculty members and two undergraduate "preceptors" and incorporates K-12 educational outreach, experiential learning, and enhanced use of information technology. As part of The Wagner Plan at Wagner College, each first-year student completes an LC. LC cohorts are enrolled in the same two lecture courses that examine that LC's theme from different disciplinary perspectives (e.g., biology and English literature) plus a third, non-lecture, reflective course that includes relevant experiences in the surrounding community. The third course provides a venue for open discussion that integrates all LC components. In this interactive workshop session we will describe the "nuts and bolts" of the particular LC that we teach, the fun we have doing it, and the challenges and successes of this type of innovation.

Ellen Goldey
Wofford College

Don Stearns
Wagner College

12 Noon **LUNCHEON**
Tent in Mission Gardens

Participants are invited to an opening buffet luncheon. All dining at SSI 2003 will include vegetarian and non-vegetarian selections. If you have any special dietary requirements, please inform Marc Fierro (fierro@aacu.org) by July 29th and we will do our best to accommodate you.

1:30—2:15 **HOMEROOMS**
Rooms as assigned

All participants have been assigned to a “homeroom” and “homeroom teachers”—a member of the SSI 2003 core faculty.

Homerooms are the basic organizing structure of SSI 2003. We’ll use them for communicating schedule and other changes, arranging for team consultations, providing direct feedback to SSI 2003 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 each day. There will be a brief SSI 2003 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 we can, to any needs you have as you work on SENCER courses and programs or develop new areas of interest.

Your homeroom assignment is on the back of your registration binder. The locations for the homerooms are noted in the Day-by-Day Schedule.

Suggested Attendance: All participants are expected to attend their homeroom sessions.

2:30—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 an official welcome from Caryn McTighe Musil, acting president of AAC&U.

Aims and aspirations for SSI 2003 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 panoply of national aspirations and programs for improving science learning and address some of the challenges that those working to improve science education and stimulate civic engagement face.

Suggested Attendance: All participants are expected to attend plenary sessions.

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 2003 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. This year, we are featuring what we are calling "an emerging model," that is a set of courses that have been created by participants in a last year's Summer Institute. Over the life of the project, we expect that new models will be developed by SSI 2001, 2002, and 2003 members. We'd like to consider your work for our "emerging model" series. If you have a course or program you would like to nominate, please use the SENCER Web site, or e-mail Eliza Reilly (reilly@aacu.org), or better still, talk with Eliza at SSI 2003.

Five new models have been added this year. All 13 models are posted on the SENCER Web site. CD-ROMs with all 13 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.

Note: Due to prior commitments, Barbara Tewksbury and Peter Bower will not be at the Institute on Friday in time for this session. Bower will be present for the "Nuts and Bolts" sessions on Saturday afternoon. "Make-up" sessions for Bower will be held during Concurrent Session I on Saturday afternoon and for Tewksbury on Monday afternoon, Concurrent Session V.

Note: *SSI 2003 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*.

Model developers will host individual sessions to describe their work. There will be one "formal" model development presentation time (Friday, August 8th at 4:15 p.m.).

Special New Feature: In response to suggestions from last year's members, we have planned "Model Developers' 'Nuts and Bolts' Sessions" in the first two concurrent sessions on Saturday. During these sessions, model developers will be present for further discussion, consultation, and for specific help on a series of "how to" dimensions of their work. The 'nuts and bolts' issues and the developers interested in speaking with you about them are displayed in the grid in Concurrent Sessions I and II. These sessions will be held in the tent in Mission Gardens.

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 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

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

Nutrition and Wellness/The Iowa Environment
LaRhee Henderson and Charisse Buising, Drake University

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: To the extent possible, we have booked room sizes to accommodate your first choice "interest" in models (as expressed in your registration materials). Thus, you should plan to

attend today's (Friday's) session dedicated to the formal presentation of the topic/model that was your first choice. For tomorrow's (Saturday's) sessions, you'll be able to meet all the model developers and spend time chatting with them. 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

We hope 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 p.m. to 9:00 p.m.)

SATURDAY, AUGUST 9, 2003

(Shuttle buses from the Fairmont Hotel to Santa Clara University will run from 6:45 a.m. to 8:15 a.m.)

7:00—8:45 **BY SPECIAL INVITATION ONLY: LEARNING ASSESSMENT TEMPLATE ORIENTATION BREAKFAST**
Garden Room, Fairmont Hotel

Note: This will be a breakfast meeting for two representatives from each full team, to be designated by the team. The session will be held at the Fairmont Hotel. Busses for special participants will be provided to insure that you will be at Santa Clara in time for the morning plenary session.

This workshop is for newcomers to the SENCER Institute, team members from the 2003 full teams. Two members from each team are invited to work with the evaluation team in clarifying their course learning objectives and developing learning assessments that explore student learning for each objective. Participants will work to align their course objectives, learning activities, and student assignments/learning assessments with each other into a coherent whole. This is a hands-on session working in groups facilitated by members of the evaluation and assessment team. The "template" course development process can be applied to new courses or courses under revision.
(Useful for participants to bring to the workshop: laptop computers and any SENCER course development information you have developed so far.)

Elaine Seymour
University of Colorado-Boulder

7:00—8:00 **CONTINENTAL BREAKFAST**
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

A committee convened by the National Research Council released a report in 1999 titled, "How People Learn: Brain, Mind, Experience, and School," that not only synthesizes learning research from the last 25 years, but also presents exemplars of how this research can be applied to teach mathematics, science, and history. This talk will summarize the salient findings from that report 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.

José Mestre
University of Massachusetts-Amherst

10:30—Noon **TEAM TIME**

Each team comes to SSI 2003 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 lunchtime. This means there is a total of 7.5 hours of scheduled time dedicated to teamwork. There is no team time officially scheduled for Sunday, August 10th, when the formal Institute program ends at 11:45 a.m. and box lunches are provided at noon.

Institute members 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.

Note to Advance Team Representatives: We will continue to meet as a group during "Team Time." We will use this time to develop strategies for your campus initiatives in the coming year and cover issues like assessment and program development. Initially, at least, the Advance Team group will meet in its homeroom location. On Monday, a joint, Alumni-Advanced Rep meeting will be scheduled.

Note to SENCER Alumni: We will meet as a group on Saturday to plan how this time will be used and follow up on the year's activities. On Monday, we will meet with the Advanced Rep group.

Special Note: We need teams to complete a fairly simple action plan that they will submit on diskettes that we will provide. We'll want each team to complete the template, as best you can, by Monday, August 11th and turn it in to a SENCER staff member as you enter the final plenary session on Tuesday morning, August 6th.

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

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

SENCER is fortunate. We have had the benefit of the advice of our SSI 2002 advance team representatives, and all our SSI 2002 Institute members, to use in planning SSI 2003. Holding the SENCER poster session and resource fair near the beginning, as opposed to on the last full day of the Institute, is but one of several innovations we are making this year based on participant feedback. 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 "mixer," you could say.

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.

Tables will be set up on "under the big tent" in Mission Gardens to enable SSI 2003 members to "shop around" and become more familiar with the resources available. Handouts will be available.

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)
- Multi-Initiative Dissemination Project
- National Research Council (NRC)
- National Science Foundation (NSF)
- National Society for Experiential Education (NSEE)
- Peer-Led Team Learning (PLTL)
- Preparing Future Faculty (PFF)
- Program for Health and Higher Education (PHHE)
  National Leadership Resource Database (NLRD)
- Project Kaleidoscope (PKAL)
- Sigma Xi
- The Washington Center

Note: To make any special arrangements—or if you have questions—please contact Charles Bashara (bashara@aacu.org) or on site. (If you are thinking about handouts or materials to be distributed, please keep in mind that there will be approximately 32 teams, and 60 alumni and advance team representatives attending SSI 2003. At this writing, registration is at 260.)

2:30—3:45 **CONCURRENT SESSIONS**

SSI 2003 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. Some are in two sequenced parts; 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 Daffinrud will be offering a SENCER-SALG orientation during the evaluation and assessment track in the concurrent sessions II and V. 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 four general categories:

(1) sessions devoted to focusing on the SENCER project, including special assessment strategies connected to SENCER,
(2) sessions devoted to focusing on promising pedagogies, teaching and learning strategies that seem especially suited to SENCER programs,
(3) sessions devoted to issues and challenges in implementation of science education reforms, with emphasis, of course, on SENCER reforms, and
(4) 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.

Here are the options for the first set of concurrent sessions:

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

- **Brownfield Action (Make-up Session)**

  This session focuses on the 2003 SENCER Model, "Brownfield Action," and is offered for people who would like to learn more about the model, receive an overview of the course, and discuss the course's logistics and rationale with its creator.

  Peter Bower
  Barnard College (Columbia University)

- **"Nuts and Bolts"—What the SENCER Model Developers Have Learned and How Their Experiences Can Help You**
  (This session will be repeated.)

  We've always said that the SENCER Models were models of many things. In the first instance, of course, they are models of "complex, capacious topics" through which science can be learned. But they are also models of many other things (many varieties of pedagogies, logistics, assessment strategies, and various forms of institutionalization). Last year's participants asked that, in addition to focusing on the subject matter of the models, we provide opportunities to discuss specific planning and implementation matters, what some SSI members called "nuts and bolts."

  To develop this session, Eliza Reilly surveyed the model developers and asked them to list the elements of their courses and experience that they felt most qualified to discuss with SSI 20003 members. The results of that survey are shown below.

  At this session—and the repeat session to follow—you are invited to gather with each developer at his/her table under the big tent to hear responses to your questions ("How did you do it?") and to explore the "nuts and bolts" material that interests you.

  Note: Professor Bower is giving a "make up" session on the Brownfield Action course during this time period. He will be available for the second "nuts and bolts" session. Professor Tewksbury is not able to be at SSI 2003 until Sunday.

  ***Pedagogies**:*

  Quantitative Literacy: Bower, Henderson and Buising, Koupelis, Shah

  Learning Communities: Anthony and Weidenhaupt, Wood

  Multi-media/New Media: Bower

  Active Learning (Large Classes): Bower, Devanas, Jordan

  Undergraduate Research: Devanas, Shachter

Writing Intensive: Fluck

Case Studies: Finer

Course Logistics:

Team Teaching: Anthony and Weidenhaupt, Koupelis, Tibbetts

Field Trips: Anthony and Weidenhaupt, Wood

Laboratory: Jordan, Shachter, Tibbetts

Large Lecture Class: Devanas, Jordan

Instructional Technology: Devanas

Students Working in Teams: Bower, Finer, Fluck

Outside Speakers: Devanas, Shah

Seminar Format: Fluck

Assessment Strategies:

Student Presentations: Anthony and Weidenhaupt, Koupelis, Shah, Shachter

Pre-Post Test: Devanas

Portfolios: Finer, Wood

Institutionalization:

Credit for Team Teaching: Henderson and Buising, Koupelis

Departmental Approval: Devanas, Henderson and Buising

Satisfying General Education Requirements: Henderson and Buising

Funding: Devanas

Wrap-Around Courses: Devanas

- **Service Learning and the Sciences**

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

- **A Report on SENCER's Evaluation Program**

  This session will provide a summary report of the evaluation work that has been completed thus far on the SENCER project including: development and use of the online student post-course survey--SENCER SALG (Student Assessment of Learning Gains), recommendations developed from the interview study of a sample of participants conducted at the 2002 Institute, and analysis of the team course development data received from the 2001 and 2002 teams. This session will also preview the evaluation and assessment work planned for the coming year, including the launching of the SENCER SALG instrument with a pre-post course format and the faculty post-course online survey. The session will introduce new members of the evaluation and assessment team, and solicit participants' help with the evaluation process in the coming year.

  Carolie Coates, Tim Weston, and Heather Smith
  University of Colorado-Boulder

  Sue Daffinrud
  University of Wisconsin-Madison

- **Civic Engagement: The Classroom and the Campus as a Civic Space**

  What do we mean by civic engagement? This session will provide an opportunity to discuss the many possibilities and ideas that are contained in the notion, especially as civic engagement relates to SENCER. 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
AAC&U

- **Active Learning Techniques for Large 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 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

4:00—5:15 CONCURRENT SESSIONS—II

- **Assessment and Evaluation: An Introduction to the SENCER SALG**
  (This session will be repeated.)

  Presentation on the evolution of the SALG (Student Assessment of Learning Gains) instrument to its latest online format for use in the SENCER evaluation. Plans for the next set of improvements to the instrument and assessment process will be discussed. If a computer lab is available, participants will be able to actually access the current SALG student online instrument for themselves.

  Sue Daffinrud
  University of Wisconsin-Madison

- **"Nuts and Bolts"—What the SENCER Model Developers Have Learned and How Their Experiences Can Help You**
  (This repeats an earlier session. Please consult Concurrent Sessions I for a program description.)

- **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**
  (This session will be repeated.)

  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.

  Spencer Benson
  University of Maryland

  Richard P. Keeling, MD
  AAC&U

- **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

- **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

- **Using Real World Data for Teaching**

  Participants will have the opportunity to work through several collaborative data analysis exercises from the ChemConnections modules: Why Does the Ozone Hole Form?, Soil Equilibria: What Happens to Acid Rain?, and What Should We Do About Global Warming? Each of these modules, which have been used in interdisciplinary environmental courses as well as introductory chemistry classes for majors and non-majors, includes a rich data base (CD/Web) of regional and global data. The data are presented in provocative visual ways that encourage student exploration, which is supported by carefully structured exercises using an inquiry-based approach to critical data analysis. Alternative examples of exercises for in- and out-of-class use will be included, as well as ways to assess student learning from the exercises.

  Brock Spencer
  Beloit College

  Sharon Anthony
  The Evergreen State College

- **Technology-Assisted Active Learning in Large and Small College Classes**

  Classroom communication systems (CCS), which are a combination of software and hardware that allows the collection and display of students' answers to instructor-generated questions during the course of instruction, have come of age over the last ten years. CCSs allow instructors to run classes interactively with students being actively engaged in the learning process rather than being passive listeners to the instructor's lectures. This presentation will: 1) review the technical capabilities and pros/cons of two different CCSs (Classtalk and Personal Response System) that have been used to teach large and small physics courses interactively, 2) discuss the logistics of running a class in ways that resemble a workshop format, 3) engage participants in a few activities to illustrate the approach, and 4) suggest how the approach can be used across other disciplines.

  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
  George Mason University and AAC&U

5:30—7:00 **RECEPTION: Meet the Cluster Coordinators**
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 when our SENCER Cluster Coordinators will host round tables where people with similar interests may gather. It will be a chance to meet the Cluster Coordinators as well as other members in your discipline, or people with interests in some of the special topics that our clusters represent. And it will be a place where, if you'd like to meet people who share similar interests, you can "host" a table as well.

(Shuttle buses from Santa Clara University to the Fairmont Hotel will run from at 6:30 p.m. to 8:15 p.m.)

SUNDAY, AUGUST 10, 2003

(Shuttle buses from the Fairmont Hotel to Santa Clara University will run from 6:45 a.m. to 8:15 p.m.)

7:00—8:00 **CONTINENTAL BREAKFAST**
Mission Gardens Tent

8:00—9:00 **HOMEROOMS**
Same rooms as assigned on Friday.

9:15—10:30 **PLENARY SESSION**
Science and Student Experience: Redeeming Understanding and Recovering Curiosity
Recital Hall
David Burns, presiding

In this session, we explore the parallel questions: (1) how can reform in science education liberate students' concepts of citizenship and

prompt their greater engagement with complex social questions? (2) how can new views of learning, and an emphasis on its integrative, synthetic character, improve education in the sciences? and (3) how can renewed relationships with students – and partnerships with them as investigators and creators of knowledge – strengthen learning and improve students' experience in college? Using pressing, unsolved public concerns (such as HIV/AIDS, genomics, hunger, biotechnology, or nanotechnology) as examples, we will consider ways in which the perspectives, philosophy, and epistemologies of science can improve students' capacity as both citizens, learners, and analytical thinkers. The session itself will illustrate ways of redeeming understanding and recovering curiosity that enlist the ways of knowing of the sciences in the service of democratic and civic ideals.

Richard P. Keeling, MD
AAC&U

10:45—11:45 CONCURRENT SESSIONS—III

Here are the options for the third set of concurrent sessions:

- **Discussing The SENCER "Backgrounders" and Complex, Capacious, Unsolved Civic Issues**

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, science education, and Africa.

This year we have two new draft documents in the "backgrounder" series. They are "Nanotechnology" and "Biodiversity." All backgrounders have been added to the SENCER Web site. Limited numbers of hard copies are available at registration.

SSI 2003 members with interests in these topics are invited to discussions with the authors in these "re-view" and "pre-view" sessions. In addition to presentations on formal backgrounders, this year we are holding two other discussion sessions on topics where future backgrounders are being contemplated, these topics are "global warming" and "obesity."

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.

These sessions are intended as opportunities for SSI 2003 members with interests in these issues to gather together in discussions based on the papers, but open to areas members want to pursue.

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.

Backgrounders and their Authors:

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

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

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

Hunger, Science, and Public Policy
Raymond Hopkins
Swarthmore College

Nanotechnology
Kristen Kulinowski
Rice University

Biodiversity
Eleanor Sterling
Columbia University

Nora Bynum
American Museum of Natural History

Discussion only…

Global Warming
Sharon Anthony
The Evergreen State College

Obesity
David Burns
AAC&U

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

  This session reviews basic concepts in classroom learning assessment for university/college instructors. The presenter will discuss learning and performance objectives in the context of actual courses, and will then examine different methods for

assessing these objectives. Possible barriers to implementation and available resources will also be discussed.

Tim Weston
University of Colorado-Boulder

- **SENCER, Science, and Teacher Education**

This is a discussion session for participants interested in using a SENCER approach in teacher education. The presenter will review some of the issues in K-16 science teacher education and describe some of the approaches that he and others have taken to better integrate pre-service teacher education into general education science courses at a large Research 1 university. The expectation is that this will then lead to a discussion of challenges and opportunities in other sectors, as well as to provide a basis for new activities to increase the capacity of teachers to contribute to improved science education.

Spencer Benson
University of Maryland-College Park

12:00—1:30 **TEAM TIME, BOX LUNCHES AVAILABLE**
Mission Gardens Tent

Advance and Alumni Reps lunch with your homeroom teachers. Tables will be available for those who wish to remain on campus.

(Shuttle buses from Santa Clara University to the Fairmont Hotel will run from at 1:00 p.m. to 2:00 p.m.)

MONDAY, AUGUST 11, 2003

(Shuttle buses from the Fairmont Hotel to Santa Clara University begin running at 6:00 a.m.)

7:00—8:00 **CONTINENTAL BREAKFAST**
Mission Gardens Tent

8:00—9:00 **HOMEROOMS**
Same rooms as assigned on Friday.

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

10:30—Noon **TEAM TIME**

Teams meet as they choose. Alumni and Advance Reps will have a group meeting in Arts and Sciences 129.

Noon—1:00 **LUNCHEON**
Mission Gardens Tent

1:00—2:15 **CONCURRENT SESSIONS—IV**

- **Assessment and Evaluation: Assignments/Assessments that Reflect the SENCER Approach**
  This session will cover both classroom and departmental or program assessment and will focus on aligning assignments with assessment strategies. Examples of assignments and study designs that promote SENCER learning objectives will be provided.

  Tim Weston
  University of Colorado-Boulder

- **Making the Case for SENCER**
  (This repeats an earlier session. Please consult concurrent sessions—II for a program description.)

  Spencer Benson
  University of Maryland

  Monica Devanas
  Rutgers University

  Richard Fluck
  Franklin and Marshall College

  Richard P. Keeling, MD
  AAC&U

- **Students as Partners in Change: A Student Panel Presentation**

  A feature common to the SENCER models and the SENCER approach, in general, is the key role students have played in the development and implementation of exemplary courses. A student

panel will share their experiences in innovating the curriculum at each of three institutions (Wofford College, George Mason University, and Santa Clara University). They will reflect on how they have contributed their energy, creativity, and intelligence to enhance courses, programs and undergraduate research. Short presentations will be followed by discussion. It is hoped that the group might make recommendations for how the SENCER program can be modified to expand the role students play in our national projects, as well as campus-based efforts.

Amelia Snider
Wofford College

Nesha Oates
George Mason University

Eliana Strode, Lindsey Lockwood, and Chris Farrell
Santa Clara University

Moderated by Ellen Goldey, Wofford College

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

The 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. Using an interactive format, the panel will also ask participants to discuss benefits and lessons learned from international collaborations in which they have participated.

Debra Meyer
AWSE and Rand Afrikaans University
(South Africa)

Ardith Maney
IWISE and Iowa State University

Ia Zhvania
I. Beritashvili Institute of Physiology
(Republic of Georgia)

- **Quantitative Reasoning**

Quantitative Reasoning: What is it? How can we plan for students to acquire it? Why does it seem so hard to find SENCER models in mathematics, statistics, computer science and other "quantitative" areas, especially when so much of the public discourse is dominated by claims that are mathematically or

statistically inflected? How can faculties determine what they and their students need in the way of quantitative reasoning skills/capacities? What should SENCER be doing about this? What can we learn from others? What do you need?

This session will be convened with a few opening remarks and some hands-on activities, but will quickly move to a discussion of the questions posed above. Summaries of the discussions will be produced and made available through the SENCER Mathematics Cluster Web site.

Mariah Birgen
Wartburg College

Jacqueline Dewar
Loyola Marymount University

David Ferguson
Stony Brook University

- **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

- **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

- **Community Partnerships: Working with Museums, Libraries and Other Institutions**

  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
  American Museum of Natural History and Columbia University

  Tom Wood
  George Mason University

- **Learning Communities: Team Teaching and Integrative Methods**

  Knowledge acquisition, understanding, and action are at the heart of comprehensive science learning communities. Have you ever wondered why or how faculty decide to work together to develop syllabi collaboratively? How they agree on the materials and the activities and share the classroom space with students? In this session, a seasoned, learning community scholar and leader will discuss team teaching with all its complications and rewards.

  Sharon Anthony
  The Evergreen State University

- **How Do You Know What Your Students are Learning?**

  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, and are even less certain how to capture it.

  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

2:30—3:45 CONCURRENT SESSIONS—V

- **Assessment and Evaluation: An Introduction to the SENCER SALG**

  (This repeats an earlier session. Please consult concurrent sessions II for a program description.)

  Sue Daffinrud
  University of Wisconsin-Madison

- **Lessons Learned: A SENCER Alumni Roundtable**

  Have you wondered what roadblocks and potholes may await your SENCER reform efforts once back on campus? Have you been asked if this is real science? How will we "cover" what needs to be covered? What department will get the credit? Will students like the work entailed in doing this work?

  Join the SENCER Alumni in an informal problem-solving session that takes advantage of their experiences, successes, and frustrations. Learn how they have struggled with and solved many of the problems you may be facing.

  Moderated by Woody McKenzie
  Lynchburg College

- **Geology and the Development of Modern Africa (Make-up Session)**

  This session focuses on the 2002 SENCER Model, "Geology and the Development of Modern Africa," and is offered for people who would like to learn more about the model, receive an overview of the course, and discuss the course's logistics and rationale with its creator.

  Barbara Tewksbury
  Hamilton College

- **Structural Reforms to Support Innovation**

  This seminar-style session will find us discussing how we 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, AAC&U and George Mason University

- **Financing SENCER and Other Science Reforms**

  The session will provide an overview of NSF programs and funding opportunities, including the new programs on assessment. 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

- **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

- **Program for Health and Higher Education: Future Directions on Engaging Student and Institutional Power in the Effort for Our Common Health**

  Since 1995, with support from the U.S. Centers for Disease Control and Prevention (CDC), PHHE has mounted a national program to increase the likelihood that students will engage the complex issue of HIV disease (and other preventable diseases) in the course of their academic pursuits. Over the years, PHHE has developed partnerships with campuses to promote learning by focusing on health and to promote health by strengthening learning.

New and expanded initiatives of the PHHE consider the following:

1. How can the power and energy of students be engaged in solving pressing health problems on campuses and in communities? (Sumner Symposium and Sumner National Network Initiatives);

2. Can campus action lead to major advances in the global struggle against HIV? (Strategic Planning Initiative); and

3. How can high school and college collaborations raise awareness of, and engagement with, critical health and health-policy issues in high school and college students and in their communities and improve the transition of high school students to college by engaging them in college-level work? (High School/College Partnerships—Project PITCH Initiative)

This session will provide a briefing on the Sumner project, the Strategic Planning Initiative and the High School/College Partnerships Initiative.

William Bennett, Richard P. Keeling, MD, and
Patti Simon, AAC&U

Ellen Goldey
Wofford College

- **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

- **IWISE/AWSE Roundtable: International Women in Science & Engineering: 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: Mabel Imbuga, Jomo Kenyatta
  University of Agriculture and Technology and AWSE

  Ardith Maney
  Iowa State University and IWISE

4:00—5:30 **CLUSTER MEETINGS**

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.

As with last year, this year's SSI gives Cluster Coordinators more prominent roles in the Institute, as presenters, homeroom teachers, and consultants and we have arranged the reception on Saturday, August 9th to be an opportunity for participants to get to know one another.

In this, the final series of Concurrent Sessions, we devote all the sessions to the Clusters. We do this with the expectation that you will have decided on one that closely or most closely reflects your interests.

We have some specific expectations for the Clusters, including the development of a rudimentary plan for communicating with one another in the coming year, accomplishing a needs and assets assessment and inventory, and assessing interest in engagements with disciplinary societies and associations.

The Cluster meetings are intended to be informal, "birds of a feather" sessions. If most of you leave the brief session wanting to stay connected to "your" Cluster, we will have accomplished our modest short-term goal.

Here are the Cluster options:

Disciplinary Clusters	Cluster Coordinator
Mathematics and Computer Science	David Ferguson
Physics	Theo Koupelis
Chemistry	Amy Shachter
Biology and Life Sciences	Carl Huether
Environmental Sciences	Trace Jordan

Interest Clusters	Cluster Coordinator
Integrated/Interdisciplinary Sciences	Brian Hagenbuch
Learning Communities	Sharon Anthony
Health	Marion Fass
Pre-Service Teacher Education	Spencer Benson
Conservation Sciences	Tom Wood

5:30—7:30 **FAREWELL DINNER—A California Barbeque**
Mission Gardens Tent

Join fellow SSI 2003 members in an informal farewell dinner, preceded by a cash bar.

(Shuttle buses from Santa Clara University to the Fairmont Hotel will run from 5:30 p.m. to 8:00 p.m.)

TUESDAY, AUGUST 12, 2003

(All sessions held in the Fairmont Hotel)

7:00—9:30 **CONTINENTAL BREAKFAST AND TEAM TIME**
Club Regent

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

Panel: Science, Civic Engagement, and Global Connections
SSI 2003 Members
Moderated by Marion Fass (SENCER Visiting Scientist 2002-2003) and Debra Meyer (Rand Afrikaans University and AWSE)

Open Microphone:
Members of SSI 2003

Concluding Comments

11:30 **INSTITUTE ADJOURNS**

POST-INSTITUTE WORKSHOPS

NSF Grant Writing

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 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

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.

Chuck Gahun, AAC&U

BioQUEST Curriculum

The BioQUEST Curriculum Consortium has produced activities and computer simulations to enhance student learning. BioQUEST modules are based on the philosophy that students learn science best when they are able to behave like scientists, exploring complex and multi-layered problem sets. Students are encouraged to develop strategies for experimental design, analysis of large data sets, and effective peer persuasion as they carry out real and simulated scientific investigation.

BioQUEST simulations are available to address problems in genetics, ecology and evolution, and most recently in microbiology. In this workshop, participants will use BioQUEST simulations to explore questions about the environment, using *Environmental Decision Making and Ecobeaker***,** and problems in microbiology using *Epidemiology, Tuberculosis, and Bioinformatics***.** We will discuss how to adapt these activities for short term and long-term projects in SENCER course.

Marion Fass and Yaffa Grossman, Beloit College

ChemConnections

This workshop will explore ChemConnections Modules developed for general chemistry by the ChemLinks Coalition and the ModularCHEM Consortium, two of the National Science Foundation systemic change initiative projects, and published by W.W. Norton & Co. These 2-4 week modules begin with relevant real-world questions and develop the chemistry needed to answer them. The modules feature student-centered active and collaborative classroom activities and inquiry-based laboratory projects rather than relying primarily on traditional lectures, exams, and verification laboratories. In the process, students learn more effectively and model

how chemistry is actually done. To gain experience with the modular materials and approach, we will do exercises from *"Would You Like Fries With That? The Fuss About Fats In Our Diet,"* as examples of how to use a current societal issue to teach chemical structure, bonding, intermolecular forces, and thermochemistry in a relevant and engaging manner. We will also explore a few exercises from the environmental modules about Global Warming and the Ozone Hole, as well as provide ample opportunity for discussion of issues arising for students and faculty from the use of modules and other innovations in curriculum and pedagogy.

Brock Spencer, Beloit College

Sharon Anthony, The Evergreen State College

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*.[1] 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)

AAC&U's own Greater Expectations initiative has developed a forum to "research and share powerful methods that lead to better student performance from high school through college." Four key areas are identified: "inquiry-based learning, global awareness, civic engagement, and integrative learning."[2]

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.

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[1] Steen, Lynn Arthur. Mathematics and Democracy: [Princeton, NJ] National Council on Education in the Disciplines, 2001. The Cuban chapter may be found on pages 87-91.

[2] FROM a pamphlet, *Greater Expectations—The Commitment to Quality as a Nation Goes to College*, published by the Association of American Colleges and Universities, 2002.