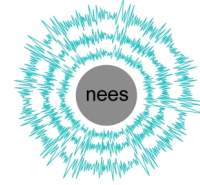




George E. Brown, Jr. Network for
Earthquake Engineering Simulation
NEES Consortium Development Project



**Working Group on Undergraduate and Graduate Education
Dallas, January 17, 2003 Meeting**

Mission of this Working Group

To develop a plan for effective educational uses of the George E. Brown, Jr. Network for Earthquake Engineering Simulation and its associated facilities in undergraduate and masters level education.

Workshop Attendees

1. Acosta, Felipe (University of Puerto Rico – Structures)
2. Anagnos, Thalia (San Jose State University – Structures)
3. Cai, Steve (Louisiana State University - Structures/ Vibration)
4. Frandsen, Janette (Louisiana State University - Wave/Structures interaction)
5. Fratta, Dante (Louisiana State University – Geotechnical)
6. Hoyos, Laureano (University of Texas Arlington – Geotechnical)
7. May, Vicki (Cal Poly San Luis Obispo - Architectural Engineering)
8. McMullin, Kurt (San Jose State University – Structures)
9. Morgan, Jim (Texas A&M – Structures/Education)
10. Schmucker, Doug (Valparaiso University – Structures)
11. Thiagarajan, Ganesh (University of Missouri-Kansas City – Structures/Mechanics)
12. Tufenkjian, Mark (Cal State Los Angeles – Geotechnical)

Additional Interested Working Group Members

1. Herman Fritz (Georgia Tech - Tsunami)
2. Maria del Mar Lopez (Penn State - Structures)
3. Sharon Wood (U. Texas, Austin - Structures)
4. Gerry Pardoen (UC Irvine - Structures)
5. Joann Browning (U. Kansas - Structures)
6. Leroy Hulsey (University of Alaska - Structures)
7. Gary Patterson (CERI-University of Memphis –Geologist)
8. Giovanna Bisontin (Texas A&M Geotechnical/Earthquake Engineering)
9. Sandra Menke (Mid-America Earthquake Center – Education & Outreach)

Summary of Presentations and Discussion

- Introduction and Presentation (T. Anagnos and D. Fratta)
Introduction of the mission of the meeting, discussion of the meeting agenda, and participant self-introduction.
- George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES) Program (D. Fratta)

Presentation of the organization of the NEES program, the NEES Equipment Sites, NEES Grid, and NEES Consortium Development program. Discussion of proposed organization of the NEES Consortium.

- NEES Undergraduate and Graduate Education (T. Anagnos)

Presentation of the Proposed NEES Consortium Education and Outreach Plan, discussion of the Working Group White Paper, and the NEES Equipment Sites proposed educational programs.

- NSF Education Programs and NEES (D. Fratta)

Presentation and discussion of alternative sources of support from NSF educational programs.

- Open Discussion: NEES and University Level Education (all participants)

How NEES can help in Education?

Providing data to allow students to validate or understand the limitations of models

Databases of:

- Images for visualization of design solutions, models, computer simulations, failures, physical tests etc.
- Case studies
- Modules for instruction
- Freshman engineering modules
- Modules for outreach to potential students (open house)
- Visualization - Multileveled studies – excellent quality for K-12, undergraduate, graduate, practitioners, outreach
- NEES curated repository/metadata for teaching? This group wants it to become a place for sharing existing resources
- Model uses of NEES that could be incorporated into research proposals (plans, priorities and specifications of educational uses and needs)
- Guest speakers/experts coupled with the database of case studies (experts could be virtual such as 15 minute clips that could be downloaded)

Proposal for Educational Programs

- In order to develop creative, meaningful and fundable proposals, need to brainstorm about what is really needed in our classes. Representation from school of education would be very helpful. Need to know/develop educational outcomes for NEES.
- REU sites at non-Equipment Site (ES) universities but linked to NEES ES (spend one week of the summer at the ES)
- REU at ES – use the students at the REU to help develop an educational module from the experiment they are working on
- RET - Combine middle/HS teachers with university faculty to develop middle to HS and freshmen engineering modules
- Recommend to NSF that there be NEES related educational RFP or NEES-specific panels for reviewing CCLI and other proposals

- Consider developing two types of educational experiments: those that are piggybacked on scheduled research experiments and stand alone experiments designed specifically for teaching a particular theory
- Build on existing earthquake-Center educational programs
- Carrots for the participants in the NEES effort... NSF-NEES funding...

What can NSF and NEES Consortium do to improve the educational outreach?

- Establish an educational component model in funded research proposal

Alternative Funding Sources for Educational Programs:

- American Concrete Institute (ACI)
- American Institute of Steel Construction (AISC)
- Dept. of Transportation
- Federal Highway Administration (FHWA)
- ASCE
- Board of Regents
- Large construction/engineering companies
- Office of Naval Research (ONR)
- Department of Energy
- Department of Education
- FEMA
- NIST
- US Army Corp of Engineers
- Structural Engineering Associations
- HP
- MTS
- Microsoft

Development of new paradigms in undergraduate/graduate Civil Engineering education?

- Teach non-linear structural behavior from the beginning instead of beginning with linear behavior
- BS or MS in earthquake engineering

Curated NEES repository – Educational needs:

- Completeness in the information
- Foster partnership between research/teaching
- Partnership database for education w/list of case studies

NEES research & NEES Educational needs:

- How do we use NEES to meet the ABET requirements?
- It would be helpful to know what types of experiments are planned so that those who are focusing on education can gain an understanding of what types of data will be available. This could serve as a basis for the development of educational programs/modules.

Other Comments:

- Is there a place for International programs? Could there be an exchange with similar facilities internationally or an effort to adapt and implement modules that have been developed elsewhere?
- Publishers: reward system... Adoption of developed products... lack of incentives... referencing the data owner (Atmospheric Science example)
- Plan, mission: disseminated results,
- How does NEES and education fit into the MSc as first professional degree?
- Very important to have faculty workshops for dissemination: both where faculty go to workshops and workshops that travel to specific campuses.

From Here... to Where?

- Lots of energy to start moving and write proposals
- Need to develop a system to share existing educational modules and resources, similar to the data that is being shared in the NEES curated repository. The system would need to include a method to solicit, referee, organize, specify and prioritize modules. To be successful, there would need to be incentives to place information in the repository. For example a complete module would need at minimum learning objectives, outcomes, homework assignments, how the module fits into the course and assessment.

Initial Steps

With the longer term goal of developing a white paper on specifically how to integrate NEES into undergraduate and graduate education:

- Need to have a common understanding of what is available from NEES
- Need to know what types of visualization tools are planned
- Need to know what types of experiments are planned
- Set priorities for the most needed modules (working group, perhaps develop NSF planning grant to do this)

Once have this could write a series of one page proposals of how a particular type of test could be used in a particular class at a university. The proposals would include

- Type of assignment/project
- How it would be used in course
- What is needed
- Level of student
- Whether course is required or elective
- # of students impacted

Then try to partner researchers with educators to help develop modules.