Summit on the Future of Undergraduate Geoscience Education

Sponsored by

Held at
Jackson School of Geosciences
University of Texas at Austin
January 10-12, 2014
Summit on the Future of Undergraduate Geoscience Education

Goals:
• Begin developing a collective vision for undergraduate geoscience education

Topics:
• What do undergraduates need to know to be successful in graduate school and the future workforce?
• What are the best ways of teaching and using technology for student learning?
• How can we broaden and increase participation in the geosciences?
Summit

• ~200 educators representing broad spectrum of undergraduate geoscience education community
  – R1 research universities with undergraduate programs, 4-year and 2-year colleges
  – Faculty, heads & chairs, education researchers
  – Industry & professional society representatives
  – Working in small groups with collective presentations

• 1st step in development a high-level community vision for the geosciences
  – Surprising collective agreement

• Community Survey: 407 respondents so far
  – 345 were not participants; 62 were
  – 338 academics; 69 not
  – ongoing community process
• What are the most important issues in terms undergraduate geoscience education?

• Survey Responses:

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<th>Important Issues</th>
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<tr>
<td>Concepts/skills/competencies</td>
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<td>Broadening participation</td>
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<td>K-12 teacher preparation</td>
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<td>Pedagogy/use of Technology</td>
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Concepts, Skills, Competencies

• Major conclusion of Summit
  – Developing competencies, skills, and conceptual understanding
  – More important than taking specific courses

– Survey: 314 Yes, 75 no
Effective Ways of Developing Skills/Competencies

• Experiential learning
  – Collaborative, integrative team projects
  – Interdisciplinary projects
  – Exercises using and analyzing real data
  – Fieldwork
  – Internships or REUs
  – Research experiences/projects
  – Flipped classrooms
  – Integration and interactive use of technology
    • Visualization, simulation, modeling, use of real data
Use of Technology in Teaching

- Passive Visualization
- Interactive Visualization
- Integrated Google Earth with maps
- Modeling and simulation
- Student investigation by technology
- Use of large datasets
- Virtual fieldtrips
- Student investigation w/'real-time' feedback
Pedagogy & Use of Technology

• Use proven active learning methods and pedagogy
  – Disseminate information, encourage use
  – Illustrate benefits
  – Increase current knowledge base

• Find ways to remove barriers
Barriers & Obstacles:
New Pedagogies & Use of Technology

- Lack time/support start new methods
- Financial Resources
- Instructional space design/infrastructure
- Lack info research-valid methods
- Annual performance/P&T evaluations
- Research-focused academic culture
- Concern about student evaluations
- Teaching-focused academic culture

Legend:
1 - Very imp
2
3
4
5 - not
Preparation of Future K-12 Teachers

• Integrate Next Generation Science Standards into undergraduate curricula
  – Prepare future teachers to do the same

• Integrate math & basic sciences into introductory course content
  – Provide geologic examples that can be used in teaching those subjects

More information on outcomes in report
Broadening Participation of Under-represented Groups

• Emulate & develop successful recruiting programs
  – Provide financial support
  – Reach out to students in their communities
  – Involve members of the community (families, high school teachers, guidance counselors)
  – Incorporate role models
  – Include mentoring

• Address geosciences image
  – Emphasize societal relevance & career prospects

• More information on outcomes in report
Next Steps

• Disseminate Summit Outcomes
  – Increase awareness of Summary Report & Survey results
  – Obtain more community input through survey
    • Wider audience: Industry, Government, less traditional geological sciences
    • Further refine community vision
  – Advocate for a community vision for undergraduate geoscience education – encourage participation

• Follow-up workshops
  – Industry, government agencies, geoscience societies
    • Define and assess needs from demand side
  – Geoscience academic administrators
  – Earth Educators Rendezvous workshops

Develop plan for implementation of community vision
• **Sustained change in geoscience undergraduate education**
  
  – Combined, coordinated efforts of departments and programs
  – Administrators, individual faculty innovators
  – Geoscience professional societies & future workforce employers

• **Affect culture change** - administration down to student level
Outcomes:

Links on http://www.jsg.utexas.edu/events/future-of-geoscience-undergraduate-education/

- Summary Report
- Survey,
- Archived Summit webcasts,
- AGI/AGU Heads/Chairs Webinar

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