Research-based Information on Diverse 21st Century Students & Resources to Help Them Thrive in SBS

Guests:

- **Chris Cash**, IBP Director of Student Assistance Programs
- **Dr. J. Theodore Repa**, Touro College & New York University Graduate School of Education (retired)
- **David Siegfried**, IBP Director of Assessment Processes
Recent trends in undergraduate enrollment reflect the growth and changing composition of the U.S. college-age population. Most notably, underrepresented minorities are an increasing fraction of undergraduate students, and whites are a decreasing fraction. Among all racial/ethnic groups, more women than men enroll in college.
Underrepresented minorities—blacks, Hispanics, and American Indians—shares of science and engineering bachelor’s and master’s degrees have been rising over the two decades since 1991, with shares of doctorates in these fields flattening well below 10% after 2000.
Since 1991, the greatest rise in the share of science and engineering bachelor's degrees earned by underrepresented minorities has been in psychology, the social sciences, and computer sciences. Since 2000, underrepresented minorities' shares in engineering and the physical sciences have been flat, and participation in mathematics has dropped.
Underrepresented minority women, like women in general, earn higher proportions of bachelor's degrees in psychology and the social sciences than in engineering, computer sciences, and mathematics.
The science and engineering workforce is largely white and male. Minority women comprise about 1 in 10 employed scientists and engineers.
The share of full-time, full professorships held by underrepresented minorities is lower and has risen more slowly than the share held by women, shown here as "W" (<10% in 1993 and just over 20% in 2010).
Shifting Job Market

**Number of Jobs:**
- **20th Century:** 1 – 2 Jobs
- **21st Century:** 10 – 15 Jobs

**Job Requirement:**
- **20th Century:** Mastery of One Field
- **21st Century:** Critical Thinking Across Disciplines

**Teaching Model:**
- **20th Century:** Subject Matter Mastery
- **21st Century:** Integration of 21st Century Skills into Subject Matter Mastery

Linda Froschauer, National Science Teachers Association  (via Jay Labov, National Research Council)
21st Century Skills

We can help you to include these skills in your courses!
Larger SBS Cohort Might Benefit from Group-based "Active Learning"

<table>
<thead>
<tr>
<th>Types of active learning with feedback</th>
<th>Examples of studies that demonstrate enhanced learning</th>
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<tbody>
<tr>
<td>Small group discussion and peer instruction</td>
<td>Anderson et al. (2005); Armbruster et al. (2009); Armstrong et al. (2007); Beichner et al. (1999); Born et al. (2002); Crouch and Mazur (2001); Fagen (2002); Lasry et al. (2008); Lewis and Lewis (2005); McDaniel (2007a, 2007b); Rivard and Straw (2000); Tessier (2004 and 2007); Tien et al. (2002)</td>
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<td>Testing</td>
<td>Steele (2003)</td>
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<td>One-minute papers</td>
<td>Almer et al. (1998); Chizmar and Ostrosky (1998); Rivard and Straw (2000)</td>
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<td>Clickers</td>
<td>Smith et al. (2009, 2011)</td>
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<td>Problem-based learning</td>
<td>Capon and Kuhn (2004); Preszler et al. (2007)</td>
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<td>Case Studies</td>
<td>Preszler (2009)</td>
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<td>Analytical challenge before lecture</td>
<td>Schwartz and Bransford (1998)</td>
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<td>Group tests</td>
<td>Cortright et al. (2003); Klappa (2009)</td>
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<td>Problem sets in groups</td>
<td>Cortright et al. (2005)</td>
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<td>Concept mapping</td>
<td>Foncesca et al. (2004); Prezler (2004); Yarden et al. (2004)</td>
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<td>Writing with peer review</td>
<td>Pelaez (2002)</td>
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<td>Computer simulations and games</td>
<td>Harris et al. (2009); McDaniel et al. (2007); Traver et al. (2001)</td>
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<td>Combination of active learning methods</td>
<td>Freeman et al. (2007); O’Sullivan and Cooper (2003)</td>
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Note: All studies cited compare treatment and control groups.
With this Info in Mind, What's Next?

• Instructing Students with Diverse Backgrounds (Ted) – 20 min.
  – Clear expectations (written and oral)
  – Strategic & effective group work to break down barriers & enhance learning

• Mentoring Students from Diverse Backgrounds (Sieg) – 20 min.
  – Influencing diverse students' learning both inside & outside of the classroom (over the semester)

• Online Resources for Students & Faculty (Chris) – 15 min.
  – Walkthrough of IBP web-based resources
  – Demonstration of searching for specific resources & opportunities

• Facilitated Activity (All) – 15 min.
  – Choose one topic, Do a search, Ask a question or make a comment:
    • Partnership Directory
    • Mentorship Manuals
    • Student Searches for Resources
Resources

• NSF's "Women, Minorities, and Persons with Disabilities in Science and Engineering"

• President's Council of Advisors on Science and Technology (PCAST): Engage to Excel
  – www.whitehouse.gov/sites/default/files/microsites/ostp/pcast-engage-to-excel-final_2-25-12.pdf

• Institute for Broadening Participation
  – www.ibparticipation.org

• 21st Century Skills: Preparing Students for Their Future

• Many Learning Pathways in the Ocean Sciences – Webinar Series
  – cosee.umaine.edu/programs/webinars/mlpios/