Opportunities and Challenges in Undergraduate Biology Education

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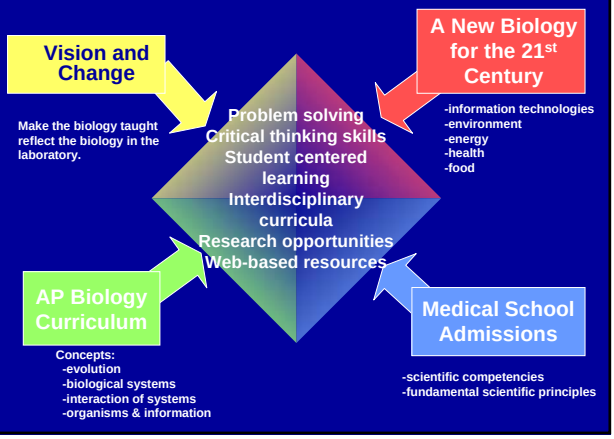
Session Outcomes

- After the session you should:
  - Be informed regarding the Vision and Change meeting, the New Biology for the 21st Century, and upcoming changes to the MCAT and AP Biology
  - Have an awareness of funding opportunities at the National Science Foundation

Converging Efforts to Improve Biology Education



WHY CHANGE? WHY NOW?

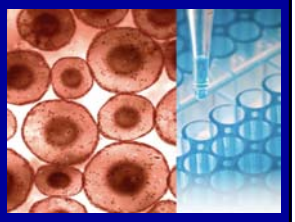
→ Biology is in transition

→ Science education is in transition

→ Society is in transition

→ Great need for biologically literate citizens

→ Education must change to meet the promise of science to society in the future



VISION & CHANGE CONFERENCE: A CALL TO ACTION

Washington, DC July 15 – 17, 2009

544 biology faculty, researchers, administrators, and students from around the country

A Summary of Recommendations From the National Conference

Frederico Unglaub, Student, University of Colorado

What Students Said…

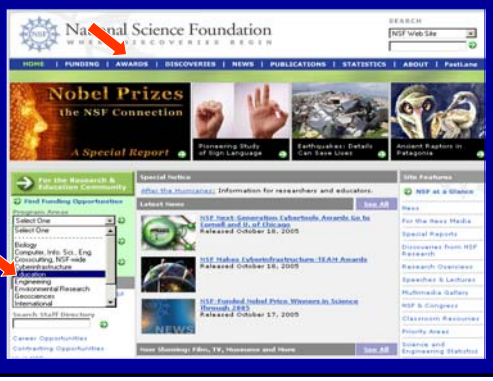
- **Challenge** us
- Help us develop **critical thinking, analytical and communication skills**
- Provide opportunities for **research experiences** and/or designing our own experiments
- Use **analogies**, NOT jargon

… Tie what we're learning into the Big Picture. Why is this important? Where did this come from (i.e., original literature)? Where does it fit in real life? And how does this relate to what we're learning in other classes? ….

NSF Efforts to Improve Undergraduate Biology Education

- Undergraduate Biology Education track of the Research Coordination Network Program (RCN-UBE)
- Transforming Undergraduate Education in STEM (TUES) (formerly CCLI)
- STEM Talent Expansion Program (STEP)
- Interdisciplinary Training for Undergraduates in Biological and Mathematical Sciences (UBM)
- Advanced Technological Education (ATE)

NSF web site (www.nsf.gov)



NSF Funding Sources

- Cross-Directorate Programs
  - Research in Undergraduate Institutions
  - Research Experiences for Undergraduates
- Directorate for Education and Human Resources (EHR)
- Discipline Research Directorates
  - BIO: Research Coordination Networks in Undergraduate Biology Education (RCN-UBE) Program (RCN-UBE awards co-funded by BIO and DUE)

Selected Programs in DUE

	FY2009 (Actual)	FY2010 (Estimate)	FY2011 (Requested)
ATE	$52	$64	$64
TUES/CCLI	$66	$63	$61
STEP	$29	$30	$30
S-STEM	$75-100 /year from H1B visa fees		
NOYCE	$115	$55	$55
MSP	$86	$58	$58

*(in Million)

ATE Program

- With an emphasis on two-year colleges, the ATE program promotes improvement in the education of science and engineering technicians at the undergraduate and secondary school level (7-12) and the educators who prepare them, focusing on technicians for high-technology fields that drive the nation's economy.
- ATE started with the Science and Advanced Technology Act of 1992 (SATA).

ATE Program Tracks

- Projects which focus on:
  - Program Implementation and Improvement;
  - Professional Development for Educators;
  - Curriculum and Educational Materials Development;
  - Teacher Preparation;
  - Small Grants for Institutions New to the ATE Program;
  - Business and Entrepreneurial skills for students within technician education programs;
  - Leadership Capacity Building for faculty.
- Centers of Excellence – National, Regional, Resource: http://www.ATECenters.org
- Targeted Research on Technician Education

ATE

- New ATE solicitation NSF 10-539
  - Preliminary Proposals: April 22, 2010 (optional)
  - Formal Proposals: October 21, 2010
- $64 million
- Resources
  - ATE Centers: http://www.atecenters.org
  - Evalua|t|e Center: http://www.evalu-ate.org
  - ATE Central: http://atecentral.net/

Transforming Undergraduate Education in STEM (TUES): formerly CCLI

NSF 10-544 (new name, same program)

- Vision: Excellent STEM education for all undergraduate students
- Goal: Stimulate, disseminate, and institutionalize innovative developments in STEM education through the production of knowledge and the improvement of practice.

3 Types

- Type 1: Exploratory (proposals due May 26-27, 2010)
  $200,000 2 to 3 years
  + $50,000 with community college partner
- Type 2: Expansion (proposals due Jan 14, 2011)
  $600,000 2 to 4 years
- Type 3: Comprehensive
  $5,000,000 budget reflects scope of project, not to exceed 5 years

TUES

- Supports efforts that

- Create or adapt learning materials and teaching strategies
- Develop faculty expertise
- Promote widespread implementation of educational innovations
- Prepare future K-12 teachers
- Enhance our understanding of how students learn STEM topics
- Enhance our understanding how faculty adopt instructional approaches
- Build capacity for assessment and evaluation
- Have potential to transform undergraduate STEM education
- Produce widespread adoption of classroom practices based on how students learn
- Explore cyberlearning

Science, Technology, Engineering and Mathematics Talent Expansion Program (STEP)

Seeks to increase the number of students (U.S. citizens or permanent residents) receiving associate or baccalaureate degrees in established or emerging fields within science, technology, engineering, and mathematics (STEM).

Budget request based on FTE students, up to $2,000,000 for 5 years

STEP

- *Project Efforts might include:*
  - Bridge programs that enable additional preparation for students
  - Programs that focus on the quality of student learning
    - high-caliber teaching in smaller classes
    - new pedagogical approaches
    - training of teaching assistants
  - Programs to encourage undergraduate research
  - Programs that provide financial incentives to students

Your Participation

- Grant Holder
  - PI
  - Project Team Member, or Coalition, or Advisory Board
  - Test Site
- User of Products
- Workshop and Symposium Participant
- Review Proposals (NSF Merit Review)
  - Email and attach your CV

Key Questions for the Prospective PI

- What do you intend to do?
- Why is the work important?
- What has already been done?
- How are you going to do the work?

Information and Inquiries

- DUE
  - Email undergrad@nsf.gov
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  - Mail:
- Division of Undergraduate Education,
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An Agenda for Change

If not now, when?

If not us, then who?