Tipping Towards a New Normal in Undergraduate Biology Education

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MODERN BIOLOGY AS A BRANCH OF EDUCATION

A glance at our higher educational institutions to-day shows a tendency toward an increase in the importance of biological science. Everywhere biology is being separated as a distinct department, and at least one school is founded for the express purpose of pursuing this study. An increasing stress is being placed upon this science as a part of a liberal education, and its number of students is growing rapidly. We wish, in a few words, to show why this is so, and to give the grounds upon which biology is every year demanding more recognition.

Science

MODERN BIOLOGY AS A BRANCH OF EDUCATION
H. W. Conn

Science 1887

1958

Sputnik

- Biological Sciences Curriculum Study
- NSF Undergraduate Research Participation Program

bscs.org

1998

Professional Societies and the Faculty Scholar: Promoting Scholarship and Learning in the Life Sciences

2011

2015
Vision and Change: Accelerating to the tipping point
Accelerated change in biology education coupled with accelerated change in biology and technology
Biology Education Research & the DBER ecosystem

DBER is located in the relevant disciplinary school, e.g. medicine, physics.
2012 Beginning to Tip

Research + Policy + Funding →
Improving STEM Undergraduate Education

Spring 2012 release of two key reports and “Year of the MOOC”

National Academies of Science, Engineering, and Medicine

President’s Council of Advisors on Science and Technology

(REPORT TO THE PRESIDENT ENGAGE TO EXCEL: PRODUCING ONE MILLION ADDITIONAL COLLEGE GRADUATES WITH DEGREES IN SCIENCE, TECHNOLOGY, ENGINEERING, AND MATHEMATICS)

Executive Office of the President
President’s Council of Advisors on Science and Technology

FEBRUARY 2012

(V&C 2011)
Spring 2013 Policy

https://obamawhitehouse.archives.gov/sites/default/files/microsites/ostp/stem_stratplan_2013.pdf

Finding archived materials: Replace “whitehouse.gov” in URL with “obamawhitehouse.archives.gov”
2nd Federal STEM Education 5-Year Strategic Plan (December 2018)

➢ Build Strong Foundations for STEM Literacy

➢ Increase Diversity, Equity, and Inclusion in STEM

➢ Prepare the STEM Workforce for the Future

https://images.nasa.gov/details-GSFC_20171208_Archive_e000084.html.
Spread of Course-Based Research
CBE—Life Sciences Education

ISSN (online): 1931-7913
Frequency: Quarterly with Continuous Publication | Published by American Society for Cell Biology
Courses

- Anatomy-Physiology
- Biochemistry and Molecular Biology
- Bioinformatics
- Cell Biology
- Developmental Biology
- Ecology
- Evolution
- Genetics
- Immunology
- Introductory Biology
- Microbiology
- Neurobiology
- Plant Biology
- Science Process Skills
PULSE Framework for Change: The PULSE Fellows have developed the PULSE Framework using a Transformation Cycle and a customized set of tools that assist departments at each stage in the transformation process. Departments that are just learning about Vision and Change will find resources to help them raise awareness and build a capacity for change. Other departments that are further along will find resources for taking action, supporting implementation and assessing changes.

The Online Toolkit is intended to put Life Sciences departments in touch with key resources relevant to their efforts to learn about and implement Vision and Change recommendations. The list of resources is not intended to be comprehensive, but rather to provide starting points for departmental discussions about V&C transformation. It may be useful to consult the PULSE Framework for Change prior to beginning such discussions.

Online Workshops provide you with information and vetted resources that you can use to transform your lessons, courses, and department using the principles provided in the Vision and Change document. The resources are clustered in units that provide an introduction to the topic, discipline based educational research to support its use and examples and handouts so you can begin to use it in your own classroom. You can use the units as an online workshop or to develop face-to-face workshops for your department. While you can work through each unit/lessons on your own, you may find it beneficial to work with the faculty development/teaching and learning staff, or departmental faculty leaders on your campus.

PULSE Vision & Change Snapshot Rubric is designed as a tool for faculty and administrators to gain a quick overview of the alignment of their life science program with some of the major elements of the recommendations of the Vision and Change (V&C) report (2011). The PULSE Vision Change Snapshot Rubric includes components of the five separate rubrics that make up the complete PULSE Vision Change rubrics: 1) Curriculum Alignment, 2) Assessment, 3) Faculty Practice/Faculty Support, 4) Infrastructure, and 5) Climate for Change. Departments can submit their Snapshot rubrics results to the PULSE Portal. The complete set of rubrics is designed as a diagnostic tool to be used in a self-study to evaluate the full extent of implementation of the recommendations of the Vision and Change (V&C) report (2011) and is used in the PULSE Recognition program.

- Networking
- Recognition
- Ambassadors Program
Expanded Focus:
Towards Diversity, Equity, and Inclusion

Economic Gap

Estimates of Bachelor's Degree Attainment by Age 24 for Dependent Family Members by Family Income Quartile: 1970 to 2016

Expanded Focus: Holistic Approach to Student Success

• **T-shaped individuals**
  • Deep disciplinary knowledge and skills
  • Ability to work across disciplinary domains
  • Strong intrapersonal and interpersonal skills
    • Communications
    • Problem solving
    • Team skills
    • Critical thinking
    • Growth mindset
    • Sense of belonging
Questions?

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