

References and Links from Bioscience Education for TPSE panel

The major national agendas in biology education:

Brewer, Carol A., and Dianne Smith. (2011). *Vision and Change in Undergraduate Biology Education: A Call To Action*: Final Report of a National Conference (July 15–17, 2009; Washington, DC) Organized by the American Association for the Advancement of Science with Support from the National Science Foundation Directorate for Education and Human Resources Division of Undergraduate Education and the Directorate for Biological Sciences, 100 pages.

<http://visionandchange.org/files/2013/11/aaas-VISchange-web1113.pdf>

Smith, Dianne, Editor. (2015). *Vision and Change in Undergraduate Biology Education: Chronicling Change, Inspiring the Future*. Final Report of a National Conference (August 28 –30, 2013; Washington, DC) Organized by the American Association for the Advancement of Science with Support from the National Science Foundation Directorate for Education and Human Resources Division of Undergraduate Education and the Directorate for Biological Sciences, 80 pages.

http://visionandchange.org/files/2015/07/VISchange2015_webFin.pdf

Build a community of practice of colleagues who value and respect good teaching:

Kezar, Adrianna, and Sean Gehrke. (2015). *Communities of Transformation and Their Work Scaling STEM Reform*. (A study of the impact of four national undergraduate STEM education communities: PKAL, SENCER, BioQUEST, and POGIL.) Pullias Center for Higher Education. University of Southern California, 88 pages.

<http://www.uscrossier.org/pullias/wp-content/uploads/2016/01/communities-of-trans.pdf>

Singer, Susan R., Natalie R. Nielsen, and Heidi A. Schweingruber, Editors. (2012). *Discipline Based Educational Research: Understanding and Improving Learning in Undergraduate Science and Engineering* Copyright © National Academy of Sciences Press: Washington, D.C.

https://crpde.ou.edu/sites/crpde.ou.edu/files/DBER_Report.pdf

Society for the Advancement of Biology Education Research (SABER)

<https://saber-biologyeducationresearch.wikispaces.com/>

Need for mathematics in biology education:

Lucas, H.L. (Ed.). (1962). *The Cullowhee Conference on Training in Biomathematics*. The Institute of Statistics of North Carolina State University, Raleigh, North Carolina. (Unfortunately, much of what was said 54 years ago still resonates.)

Bio 2010: transforming-undergraduate-education-for-future-research-biologists. (2003). National Academies Press. Authors: Committee on Undergraduate Biology Education to Prepare Research Scientists for the 21st Century, National Research Council.

<http://www.nap.edu/catalog/10497/bio2010-transforming-undergraduate-education-for-future-research-biologists>

Need for mathematics in biology education (continued):

cbeLife Science Education special issue of mathematics in biology education:

<http://www.lifescied.org/content/9/3.toc>

Mathematical Modelling of Natural Phenomena special issue of mathematics in biology education

(a pdf of the table of contents is at

<<http://journals.cambridge.org/action/displayIssue?jid=MNP&volumeId=6&seriesId=0&issueId=06>>).

Biology Investigative Labs: An Inquiry-Based Approach. (2012). The College Board: New York. (This has a new chapter on mathematics. The link below is to publicly available material aimed to give teachers pragmatic help in implementing quantitative thinking into their curricula and labs.)

http://media.collegeboard.com/digitalServices/pdf/ap/AP_Bio_Quantitative_Skills_Guide-2ndPrinting_1kd.pdf

AAMC_Scientific_Foundations_for_Future_Physicians (Claudia Neuhauser, a mathematician, was a leader in this initiative that stressed the role of modeling rather than simply a calculus course)

<https://www.aamc.org/download/271072/data/scientificfoundationsforfuturephysicians.pdf>

Bringing primary research experiences into first year STEM courses:

Integrating Discovery-Based Research into the Undergraduate Curriculum. (2015). Committee for Convocation on Integrating Discovery-Based Research into the Undergraduate Curriculum; Division on Earth and Life Studies; Division of Behavioral and Social Sciences and Education; National Academies of Sciences, Engineering, and Medicine.

<http://www.nap.edu/catalog/21851/integrating-discovery-based-research-into-the-undergraduate-curriculum-report-of>

C.R.E.A.T.E. (Consider, Read, Elucidate the hypotheses, Analyze and interpret the data, and Think of the next Experiment). (Multiple publications at web site below; here is the title of one: Hoskins, S.G. and Stevens, L.M. (2014). The CREATE Strategy for Intensive Analysis of Primary Literature Can Be Used Effectively by Newly Trained Faculty to Produce Multiple Gains in Diverse Students. CBE Life Science Education 13 (2224-242); doi: 10.1187/cbe.13-12-0239.)

teachcreate.org/

Singer, Susan R. (Editor). (2012). America's Lab Report: Investigations in High School Science. National Academy Press, 235 pages.

<http://www.nap.edu/catalog/11311/americas-lab-report-investigations-in-high-school-science>

Some of the biology education journals:

Advances in Physiology Education

American Biology Teacher

Association for Biology Laboratory Education (ABLE): Tested Studies for Laboratory Teaching

Biochemistry and Molecular Biology Education (BAMBED)

Bioscience: Journal of College Biology Teaching

Biology International

cbe Life Science Education

Journal of Biological Education

Journal of Microbiology & Biology Education (JMBE)

Journal of Research in Science Teaching

Green pedagogy; Green curriculum; Green campuses; Green buildings; Green labs:

Vallée, Manuel. (2016). Obstacles to Curriculum Greening: The Case of Green Chemistry. In Walter Leal Filho and Michaela Zint, (Eds.), *The Contribution of Social Sciences to Sustainable Development at Universities: Part of the World Sustainability Series*, Springer, pp. 245-258.

Leal Filho, Walter (Ed.) (2015). *Transformative Approaches to Sustainable Development at Universities: Working Across Disciplines*. World Sustainability Series. Springer.

Scholl, Kathleen G., and Gowri Betrabet Gulwadi. (2015). Recognizing Campus Landscapes as Learning Spaces. *Journal of Learning Spaces* 4 (1):

Bomgardner, Melody. (2014). The Biology in Green Chemistry. Posted in: *Chemical and Engineering News*: (<<http://cenblog.org/cleantech-chemistry/2014/03/the-biology-in-green-chemistry/>>).

Orr, David. (2013). Place and Pedagogy. *The NAMTA Journal* 38 (1): 183-187. Green Campuses/Green Minds: Improving the 'still unlovely human mind',

Andraos, J., & Dicks, A. P. (2012). Green chemistry teaching in higher education: a review of effective practices. *Chemistry Education Research and Practice*, 13, 69-79.

Walter Simpson, Editor and Co-Author. (2008). *The Green Campus: Meeting the Challenge of Environmental Sustainability*. CEM, LEED AP; Former University Energy Officer, University at Buffalo; AASHE Senior Fellow.

Scholl, Kathleen G., and Gowri Betrabet Gulwadi. (2015). Recognizing Campus Landscapes as Learning Spaces. *Journal of Learning Spaces* 4 (1):

Some buildings and classrooms that affect student engagement and retention:

SCALE-UP – North Carolina State University (this has been one of the pioneers in transforming learning spaces in STEM education; its approach has been adopted, adapted, and implemented at many institutions) <https://www.ncsu.edu/per/scaleup.html>

Robert H. Bruininks Hall (Science Teaching & Student Services Building) at the University of Minnesota - Twin Cities

TEAL (TEAL – Technology Enabled Active Learning) Lab – MIT

Interdisciplinary Science and Engineering Laboratories at the University of Delaware

The Project-Based Learning (PBL) Lab at Stanford University

Student persistence:

Snyder, J. J., J. D. Sloane, R. D. P. Dunk, and J. R. Wiles. (2016) Peer-Led Team Learning Helps Minority Students Succeed. *PLoS Biol* 14(3): e1002398.

Therriault, Susan Bowles, and Ariel Krivoshey. (2014). College Persistence Indicators: Research Review. American Institutes for Research

Hernandez, P. R., P. W. Schultz, M. Estrada, A. Woodcock, and R. C. Chance. (2013). Sustaining Optimal Motivation: A Longitudinal Analysis of Interventions to Broaden Participation of Underrepresented Students in STEM. *Journal of Educational Psychology* 105 (1): 10.1037/a0029691. <http://doi.org/10.1037/a0029691>.

Davidson, Cody, and Kristin Wilson. (2013). Reassessing Tinto's Concepts of Social and Academic Integration in Student Retention. *Journal of College Student Retention: Research, Theory & Practice* 15 (3): 329-346.

Presidents' Advisory Council on Science and Technology. (2012). Engage to excel: Producing one million additional college graduates with degrees in science, technology, engineering, and mathematics (pp. 1-130).

Myers, Carrie B., and D. Michael Pavel. (2011). Underrepresented students in STEM: The transition from undergraduate to graduate programs. *Journal of Diversity in Higher Education* 4 (2): 90-105.

Citizen Science:

Janis L. Dickinson and Rick Bonney; (2015). *Citizen Science: Public Participation in Environmental Research*. Comstock Publishing Associates, Ithaca, NY. 304 pages.