

Hoskins—April 9 2010 Teaching Workshop

Here are some papers that might provide a useful starting point for looking at both the current state of college science education and “best practices” for learning science, based on education research. All of the reform documents (e.g. Bio 2010, Glenn commission) agree that bio education needs reform. There is less consensus on exactly what/how to change

Alberts, B. (2005) A Wakeup Call for Science Faculty. *Cell* 123, 739-41 (2005).

Becker, D. (2005) A case for nonsurvey introductory biology courses. *Cell Biology Education* Vol. 4, 131-132.

Bransford., J., Brown, A., R..Cocking, eds. *How People Learn: Brain, Mind, mkjExperience, and School: Expanded edition.* National Academy Press, (1999).

Brooks, J.G. and Brooks, M.G. (1993) *The Case for Constructivist Classrooms*, Alexandria VA, Association for Supervision and Curriculum Development.

Cech, T., Kennedy, D. Doing More For Kate. *Science* 310, 1741 (2005).

Chickering, A.W., and Gamson, Z. F., (1987) Seven principles for good practice. *AAHE Bulletin* 39:3-7.

Freeman, S., O’Connor, E. Parks, J.W., Cunningham, M., Hurley. D., Haak, D., Dirks. C;. amd Wemderoth, M.P. (2007) Prescribed Active Learning Increases Performance in Introductory Biology *CBE—Life Sciences Education* Vol. 6, 132–139

Glenn Commission (2000) *Before It’s Too Late: A Report to the Nation from The National Commission on Mathematics and Science Teaching for the 21st Century.* U.S. Dept of Education, Washington, D.C.

Hoskins S.G. , Stevens L.M., Nehm R.(2007) Selective use of primary literature transforms the classroom into a virtual laboratory. *Genetics* 176: 1381-1389 *This outlines the CREATE approach—you might find the student interview excerpts interesting*

Hoskins S. (2008) Using a paradigm shift to teach neurobiology and the nature of science—a C.R.E.A.T.E.-based approach. *Journal of Undergrad. Neurosci. Educ.* 6: A40-A52, 2008.

Hoskins, S.G. and Stevens. L.M. (2009) Learning our L.I.M.I.T.S.; less is more in science teaching. *Adv. Phys. Edu.* 33: 17-20.

Klymkowsky, M.W. (2007) Teaching without a Textbook: Strategies to Focus Learning on Fundamental Concepts and Scientific Process. *CBE—Life Sciences Education* Vol. 6, 190–193.

National Academy of Sciences, National Academy of Engineering, Institute of Medicine (2005). *Rising Above the Gathering Storm: Energizing and Employing America for a Brighter Economic Future*, Washington, DC: Committee on Prospering in the Global Economy of the 21st Century.

National Research Council (2003) *Bio2010: Transforming Undergraduate Education for Future Research Biologists.* Washington DC, National Academy Press.

Siebert, E.D., and McIntosh, W., (2001) *College Pathways to the Science Education Standards*. Arlington, VA, National Science Teachers Assoc. Press.

Steitz, J. (2003) Commentary: Bio2010--New Challenges for Biology Educators *Cell Biology Education* 2: 87-91

Tanner, K., and Allen, D., (2003) Approaches to cell biology teaching: Mapping the journey—concept maps as signposts of developing knowledge structures. *Cell Biology Education* 2: 133-136. There is a lot of info online about concept mapping, including free software

*The journals **Cell Bio Ed/Life Sciences Ed** and **Journal of Undergraduate Neuroscience Education** and **Evolution Education and Outreach** are also worth scanning from time to time—they are free online and often publish “how to do it” articles on methods that have been tested in the college classroom. CBE/LSE also has an ongoing series of articles by Deborah Tanner and Kimberley Allen that I have found quite useful*