Competencies: A cure for pre-med curriculum

Winston A. Anderson
Howard University

Richard M. Amasino
University of Wisconsin-Madison

Manuel Ares
University of California, Santa Cruz

Utpal Banerjee
University of California, Los Angeles

Bonnie Bartel
Rice University

See next page for additional authors

Follow this and additional works at: https://digitalcommons.lsu.edu/chemistry_pubs

Recommended Citation

This Letter to the Editor is brought to you for free and open access by the Department of Chemistry at LSU Digital Commons. It has been accepted for inclusion in Faculty Publications by an authorized administrator of LSU Digital Commons. For more information, please contact ir@lsu.edu.
Authors

This letter to the editor is available at LSU Digital Commons: https://digitalcommons.lsu.edu/chemistry_pubs/2558
Competencies: a cure for pre-med curriculum

Winston Anderson
Richard Amasino
Manuel Ares
Utpal Banerjee
Bonnie Bartel

See next page for additional authors

Follow this and additional works at: https://openscholarship.wustl.edu/bio_facpubs

Part of the Biology Commons

Recommended Citation

Anderson, Winston; Amasino, Richard; Ares, Manuel; Banerjee, Utpal; Bartel, Bonnie; Corces, Victor; Drennan, Catherine; Elgin, Sarah C.R.; Epstein, Irving; Fanning, Ellen; Guillette, Louis; Handelsman, Jo; Hatfull, Graham; Hoy, Ronald; Kelley, Darcy; Leinwand, Leslie; Losick, Richard; Lu, Yi; Lynn, David; Neuhauser, Claudia; O'Dowd, Diane; Olivera, Toto; Pevzner, Pavel; Richards-Kortum, Rebecca; Rine, Jasper; Sah, Robert; Strobel, Scott; Walker, Graham; Walt, David; Warner, Isiah; Wessler, Sue; Willard, Huntington; and Zare, Richard, "Competencies: a cure for pre-med curriculum" (2011). Biology Faculty Publications & Presentations. 184.
https://openscholarship.wustl.edu/bio_facpubs/184

This Article is brought to you for free and open access by the Biology at Washington University Open Scholarship. It has been accepted for inclusion in Biology Faculty Publications & Presentations by an authorized administrator of Washington University Open Scholarship. For more information, please contact digital@wumail.wustl.edu.
Authors

This article is available at Washington University Open Scholarship: https://openscholarship.wustl.edu/bio_facpubs/
Editorial Expression of Concern

THE REPORT “COPING WITH CHAOS: HOW DISORDERED CONTEXTS PROMOTE STEREOTYPING AND discrimination” by D. A. Stapel and S. Lindenberg (1) reported the effects of the physical environment on human stereotyping and discriminatory behavior. On 31 October 2011, Tilburg University held a press conference to announce interim findings of its investigation into possible data fraud in the body of work published by Stapel. The official report in Dutch (translated into English using Google software) indicates that the extent of the fraud by Stapel is substantial. Pending further details of the Tilburg Committee’s findings, Science is publishing this Editorial Expression of Concern to alert our readers that serious concerns have been raised about the validity of the findings in this Report.

BRUCE ALBERTS
Editor-in-Chief

Competencies: A Cure for Pre-Med Curriculum

IN 2009, THE ASSOCIATION OF AMERICAN Medical Colleges (AAMC), in collaboration with the Howard Hughes Medical Institute (HHMI), reviewed the educational prerequisites for admission to medical school in the United States. Because a large fraction of undergraduate students enroll in science courses to meet the requirements for admission to medical school, courses satisfying these requirements dominate the undergraduate science curriculum. The prescribed course structure has impeded educational innovation, particularly the development of new, multidisciplinary courses.

To address this situation, the AAMC-HHMI report (1) recommends that scientific competencies replace specific courses as requirements for medical school admissions. They recommend that students “demonstrate both knowledge of and ability to use basic principles of mathematics and statistics, physics, chemistry, biochemistry, and biology needed for the application of the sciences to human health and disease; demon-

1Department of Biology, Howard University, Washington, DC 20059, USA. 2Department of Biochemistry, University of Wisconsin Madison, Madison, WI 53706–1544, USA. 3Department of Molecular, Cell, and Developmental Biology, University of California Santa Cruz, Santa Cruz, CA 95064, USA. 4Department of Molecular Cell and Developmental Biology, University of California Los Angeles, Los Angeles, CA 90095–1606, USA. 5Department of Biochemistry and Cell Biology, Rice University, Houston, TX 77005, USA. 6Department of Biology, Emory University, Atlanta, GA 30322, USA. 7Departments of Chemistry and Biology, Massachusetts Institute of Technology, Cambridge, MA 02139, USA. 8Department of Biology, Washington University in St. Louis, St. Louis, MO 63130–4899, USA. 9Department of Chemistry, Brandeis University, Waltham, MA 02454–9110, USA. 10Department of Biological Sciences, Vanderbilt University, Box 351634, Station B, Nashville, TN 37240, USA. 11Department of Obstetrics and Gynecology, Medical University of South Carolina, Charleston, SC 29425, USA. 12Department of Molecular, Cellular, and Developmental Biology, Yale University, New Haven, CT 06520, USA. 13Department of Biological Sciences, University of Pittsburgh, Pittsburgh, PA 15260, USA. 14Department of Neurobiology and Behavior, Cornell University, Ithaca, NY 14853, USA. 15Department of Biological Sciences, Columbia University, New York, NY 10027, USA. 16Department of Molecular, Cellular, and Developmental Biology, University of California, Berkeley, Berkeley, CA 94720–3220, USA. 17Department of Molecular Biology and Biochemistry, Yale University, New Haven, CT 06520–8114, USA. 18Department of Biology, Massachusetts Institute of Technology, Cambridge, MA 02139, USA. 19Department of Chemistry, Tufts University, Medford, MA 02155, USA. 20Department of Chemistry, Louisiana State University and A M College, Baton Rouge, LA 70803, USA. 21Department of Botany and Plant Sciences, University of California Riverside, Riverside, CA 92521, USA.

The School of Education at the University of Utah, Salt Lake City, UT 84112–0440, USA. 22Department of Bioengineering, Rice University, Houston, TX 77005, USA. 23Department of Molecular and Cell Biology, University of California, Berkeley, Berkeley, CA 94720–3220, USA. 24Department of Bioengineering, University of California, San Diego, La Jolla, CA 92093–0412, USA. 25Departments of Molecular Biophysics and Biochemistry, Yale University, New Haven, CT 06520–8114, USA. 26Department of Biology, Massachusetts Institute of Technology, Cambridge, MA 02139, USA. 27Department of Chemistry, Tufts University, Medford, MA 02155, USA. 28Department of Chemistry, Louisiana State University and A M College, Baton Rouge, LA 70803, USA. 29Department of Botany and Plant Sciences, University of California Riverside, Riverside, CA 92521, USA.

THE EDUCATION FORUM “DRAWING TO LEARN in science” (S. Ainsworth et al., 26 August, p. 1096) makes a convincing case for placing greater emphasis on the cultivation of student skills in drawing diagrams and other forms of external representations. The authors, however, do not mention the crucial problems that students typically manifest in using diagrams, or the fact that very little research has been devoted to addressing those problems (1).

Students have a strong tendency to use the wrong diagrams for the task at hand and, when they do construct appropriate diagrams, they frequently fail to derive correct solutions or inferences (2–5). Even more troubling, most students do not use diagrams unless explicitly told to do so (1, 6, 7). Student knowledge about diagrams is often insufficient to instigate their use (8).

Our own research in this area suggests that, for students to more readily use diagrams, they need to appreciate the actual benefits of their use. Students also need to overcome hurdles associated with thinking that drawing diagrams is too difficult or too costly in terms of mental effort (1, 8, 9). There are some projects aimed at addressing these problems (10, 11). However, if drawing diagrams is to genuinely take a more central part in science education, we believe that more researchers and educators need to focus on the issues we describe.

EMMANUEL MANALO 1 AND YURI UESAKA 2

References

Letters to the Editor
Letters (~300 words) discuss material published in Science in the past 3 months or matters of general interest. Letters are not acknowledged upon receipt. Whether published in full or in part, Letters are subject to editing for clarity and space. Letters submitted, published, or posted elsewhere, in print or online, will be disqualified. To submit a Letter, go to www.submit2science.org.

*To whom correspondence should be addressed. E-mail: emmanuel.manalo@gmail.com

CORRECTIONS AND CLARIFICATIONS

News Focus: “Particle physicists’ new extreme teams” by R. Cho (16 September, p. 1564). The article missates Maria Spiropulu’s institutional affiliation. She has appointments at CERN and the California Institute of Technology in Pasadena.

News Focus: “Drug developers finally take aim at a neglected disease” by M. Leslie (19 August, p. 933). The story incorrectly stated that Julio Urbina was the director emeritus of the Venezuelan Institute for Scientific Research in Caracas. He is an emeritus investigator at the institute.

Reports: “Three periods of regulatory innovation during vertebrate evolution” by C. B. Lowe et al. (19 August, p. 1019). Affiliation 3 was incorrect. It should read: “Howard Hughes Medical Institute, Chevy Chase, MD 20815, USA.”

Review: “Dyscalculia: From brain to education” by B. Butterworth et al. (27 May, p. 1049). In Figure 2, A, B, and C, the references should be (49), (50), and (51), respectively.

Reports: “p53 controls radiation-induced gastrointestinal syndrome in mice independent of apoptosis” by D. G. Kirsch et al. (29 January 2010, p. 593). The study used “super p53” mice (Figure 4D) that were described as p53-tg with two additional copies of wild-type p53. Further characterization of these mice demonstrates that they are instead p53-tg with one additional copy of wild-type p53. The conclusions of the Report are not affected.
Competencies: A Cure for Pre-Med Curriculum


Science 334 (6057), 760-761.
DOI: 10.1126/science.334.6057.760-b