

NeuroVisions: Teaching Neuroscience with Neuroimaging Data

This poster presentation describes development and testing of an e-Learning module for advanced undergraduate instruction: *Seeing GABAA Receptors at Work: Quantifying Radioligand Binding and its Modulation by Endogenous Signaling Molecules*. In the module, students investigate allosteric regulation of GABA_A receptors through image analysis of in vitro receptor autoradiography. A video review of the module is available on YouTube.com at http://www.youtube.com/watch?v=dKzCgy_z0Yc. Developed by Science Approach, a small business, this Moodle-based course is the prototype for a series of six e-Learning modules funded by a Small Business Innovative Research grant from the National Institute of Mental Health (Grant Number 2R44MH070250-02).

Background and Significance

The scientific merit and significance of this presentation derive from the process and theory utilized to create the prototype (1); the scaffolded pedagogical structure that guides undergraduate students through understanding and replicating neuroscience research conducted by Miles Orchinik, Ph.D. (2); online implementation of a sophisticated Java-based image analysis tool (ImageJ-A) used by students to gather data from research images; online implementation of “R,” the statistical package used by students to analyze the imaging data; and research methods employed to pilot test the prototype with faculty, scientists, and undergraduate students at professional meetings.

Methods

For the research summarized in this presentation, approximately 200 neuroscience faculty, graduate students, and research scientists were surveyed from a commercial exhibit hosted at two Society for Neuroscience (SFN) meetings. At the 2008 meeting, respondents completed a computer-based survey that included samples of the prototype being developed by the project. At the 2009 meeting, respondents viewed a movie presentation of the prototype and were recruited to complete an online survey at another time. A reasonably representative sample of SFN participants was developed in this manner.

Results and Conclusions

Pilot testing of the prototype module at the SFN meetings indicated that the pedagogical approach, image and statistical analysis technology, visual nature of the module, immersion in real research, and subscription-based system for delivering the e-Learning content were well-received by the respondents. The pilot research revealed that faculty from small undergraduate institutions particularly valued access to imaging technology not available on their campuses. Pilot-test results affirmed the general structure and purpose of the *NeuroVisions* modules and the findings were used to inform development and classroom-testing of all the prototype module.

References Cited:

1. Manduca, Cathryn A., and David W. Mogk. 2002. *Using Data in Undergraduate Science Courses: Report from an Interdisciplinary Workshop*. Arlington, Virginia: National Science Foundation.
2. Orchinik, M., S. S. Carroll, Y. H. Li, B. S. McEwen, and N. G. Weiland. 2001. Heterogeneity of Hippocampal Gaba(a) Receptors: Regulation by Corticosterone. *J Neurosci* 21 (1):330-9.