

## EDITORIAL

# Teach Local, Think global: Best Practices in Neuroscience Education Without Big Budgets

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The papers presented in this new issue of *JUNE* and my recent experience teaching a faculty workshop at the University of Ibadan in Nigeria reinforces for me the FUN philosophy that best practices in neuroscience teaching do not require extensive resources. This *JUNE* issue contains a selection of interesting articles on lab exercises that are straight forward, low cost, and contain sophisticated intellectual content. In Nigeria teaching and research resources are astoundingly limited compared to most colleges and universities in the U.S. Faculty there still manage to teach effectively and creatively, and publish neuroscience research.

The editorial section of this *JUNE* issue starts with a celebration of a quarter century of FUN (Ramirez), honoring the FUN co-founders and others responsible for FUN initiatives. These including Nu Rho Psi, the equipment loan program, the FUN SfN booth, and of course, *JUNE*. This editorial reminds us that the best teaching practices initiated through FUN were done by dedicated educators without big budgets. José-Edwards et al. present a thoughtful guide for undergraduates to get the most out of and survive a SfN meeting. Savory and Gifford discuss their experience using easily available, web-based student/audience response systems in large introductory courses and in smaller, public science cafes.

Most of the main articles in this *JUNE* issue continue the theme that creative teaching, especially in the student laboratory, is only limited by our lack of imagination. These lab teaching articles address the following topics: 1) adaptation of neurogaming technology to create an affordable EEG lab exercise that has student research potential (de Wit et al.); 2) using publicly available fruit fly lines that are engineered to display a variety of behaviors for student observation (McKellar and Wytenbach). The supplemental videos for this article will be an important resource to teach students behavioral analyses. We continue with: 3) teaching taste memory processing in the context of a survival-based evolutionary perspective; 4) using the rat fetal alcohol syndrome model for students to study the behavioral deficits caused by early alcohol exposure (Kehrberg et al.), 5) constructing simple neural circuits with modular, electronic neuron simulators (NeuroBytes) (Petto et al.); 6) examining the role of an identified insect neuron in the escape response to looming stimuli with an open-source and low-cost electrophysiology rig (Nguyen et al.); 7) introducing students to theoretical models of neural information processing and techniques for analyzing neural data in an introductory computer lab course. This course does not require experience in

calculus and computer programming (Fink); 8) improving student motivation in a large neuroscience laboratory class, and coming to the conclusion that faculty teaching objectives can be subverted by disengaged teaching assistants (Tu and Jones). The full articles are rounded out first by a critical thinking exercise through which students analyze fictional data sets to identify major characteristics of drug tolerance (Cammack). The last article describes an analysis of student preferences for learning styles, and the impact of an active, case-based structure on teaching evaluations (Nagel and Nicholas).

Our "Case Studies" feature, which uses clinical themes to teach basic neuroscience content, continues with two new case presentations. The first is centered on a fictitious patient with neurological symptoms caused by a brain lesion (Lemons). Consideration of the patient's symptoms lead students to predict which brain anatomical pathway may be damaged. The second presents the study cases used in the non-majors neuropharmacology course described in the full article by Nagel and Nicholas mentioned above.

We present two reviews in this *JUNE* issue: The first summarizes creative methods for integrating primary literature into the classroom (Hartman et al.). The second reviews a Spanish language article written by Dr. Jose Delgado which was obscurely published in 1981 in an encyclopedia on bull fighting (Marzullo). This manuscript is the source of the famous photograph seen in text books of Dr. Delgado stopping a bull in mid-charge by wireless stimulation of implanted brain electrodes (for example, see Watson and Breedlove, 2016). The context of this and other Delgado experiments on "mind control" are colorfully described. With the Delgado family's permission, the original Spanish text of the manuscript is presented as Supplementary Material for the first time in an easily accessible format.

That brings me to the book end of the editorial theme on creative best teaching practices with small budgets. Over Cornell's Spring break I had the honor of being an instructor in a faculty workshop sponsored by the Grass Foundation at the University of Ibadan. This workshop was focused on inexpensive models for teaching principles of cellular neurophysiology. The host professor was Dr. James Olopade and the other instructor was Dr. Rhonda Dzakpasu from Georgetown University in Washington, D.C. The workshop participants were either junior faculty from universities in Nigeria or Ph.D. students finishing their dissertations and applying for faculty or post-doc positions (Figure 1). They all had in common a passion for



Figure 1. Dr. James Olopade lecturing to junior faculty and advanced graduate student participants in the Ibadan Grass Foundation Neurophysiology Workshop, March 30 to April 1, 2017.

neuroscience teaching and research. We brought low cost AC amplifiers from Backyard Brains (<https://backyardbrains.com/>) and Neurons in Action simulation software (Moore and Stuart, 2000) to teach the cockroach sensory spine and earthworm giant axon lab exercises. The participants took the equipment and software back to their home universities. We also gave background lectures on neuron excitability and synaptic transmission. Physiology teaching and research resources are severely limited by a variety of political, social, and economic constraints in sub-Saharan Africa (Sofloa, 2014), but I was not prepared for the stark contrast between our teaching resources and theirs. I was deeply inspired, by

the dedication of Dr. Olopade to his “children,” the creative, can-do approach to solving technical issues, the excitement and insightful questions about lab and lecture material, and the constructive suggestions for teaching without all the support of a first world economy. I soon stopped being bothered by the electricity going off frequently and seeing small mammals running around on the floor between lab benches. I enjoyed the atmosphere of smart, creative and ambitious young scientists/educators enjoying their craft. In the Fall issue of *JUNE*, Drs. Olopade, Dzakpasu and I will report more detail on this workshop.

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