TRACY LARSON | Teaching Philosophy

My experiences as a mentor of a very diverse group of students and staff in the laboratory, as a teaching assistant, as a behavioral neuroscientist, and as a dedicated practitioner of scientific inclusion and outreach initiatives have instilled in me a teaching philosophy and a set of goals that I will continue to refine as a tenure-track assistant professor. Here I describe my well considered, evidence-based and empirically supported teaching style. I also highlight my commitment to my own development as an educator, incorporating and evaluating novel teaching methods within and outside my classroom. In particular, I will implement an active learning environment to support student education[1] through:

Encouraging responsible, active participation in the learning process

During our initial interaction, I tell my students – in the classroom and the laboratory – that I will respect them as autonomous adults but that, in return, I expect them to demonstrate a respect towards their development as an emerging scientific professional and life-long learner. My practice of an "authoritative" teaching style – enforcing limits and setting high academic expectations while being responsive to students' opinions and needs[2] – improves students' interest, persistence, confidence, and rates of completion in problem-solving activities[3]. By directly informing my students about my expectations for mature behavior and my respect for their autonomy, I create a predictable and consistent environment that is conducive to learning and rich with opportunity to practice independent thought: an environment in which students are inspired to take ownership of their education. In the classroom and laboratory, I further promote ownership through active participation in group discussions of case studies and primary literature, opportunities for writing and reflective evaluations of writing samples, and exercises to practice the foundations of scientific experimentation, among other activities.

Real-time presentation of concepts

All organisms are inherently capable of modulating the rate of information transfer to a pace appropriate for a receiver to process and integrate that information[4]. Likewise, humans naturally converse at a pace that is appropriate for the person(s) with whom we are conversing to understand the information that we are attempting to transfer. Yet, from my own observations, one of the greatest hindrances in modern teaching is the difficulty in optimizing speed of information transfer so as not to provide too much information, too quickly, when using digital slide presentations. I do not intend to use a computer when I teach. Rather, I will come to class each day with well-organized notes that I will discuss and transcribe using a white board, projector, or iPad. I will hand-draw diagrams for illustrating examples and fundamental principles. Likewise, I will encourage students to record their own notes with pen and paper, a method experimentally tested and shown to be more effective for information transfer and retention as compared to typing notes into a computer[5]. With this approach, information transfer in my classroom and laboratory will happen at a pace natural both to the sender, me the instructor, and to the receivers, the students. This will allow a fuller appreciation of content and fundamental concepts.

Integrating information into 'concept maps'

One major challenge to teaching modern biology is that new information often comes from integrative, multidisciplinary research and does not fit within the boundaries suggested by classical course titles

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[1] Harris, Mack, Bryant, Theobald, & Freeman. (2020) Reducing achievement gaps in undergraduate general chemistry could lift underrepresented students into a "hyperpersistent zone" *Science Advances.* 6:24

[2] Baumrind (1978) Parental disciplinary patterns and social competence in children. *Youth and Society.* 9: 239-276

[3] Walker (2010) Looking at teacher practices through the lens of parenting style. *The Journal of Experimental Education.* 76 (2): 218-240

[4] Bradbury & Vehrencamp. (2011) *Principles of Animal* Communication. 2^{nd} Ed. Sunderland, Connecticut: Sinauer Associates.

[5] Mueller & Oppenheimer (2014) The pen is mightier than the keyboard advantages of longhand over laptop note taking. *Psychological Science.* 25(6):1159-1168
Askvik, van der Weel, & van der Meer (2020) The Importance of Cursive Handwriting Over Typewriting for Learning in the Classroom. *Frontiers in Psychology.* 10.3389/fpsyg.2020.01810

(e.g., “Physiology,” “Neurobiology,” “Behavioral Ecology”). Some would argue that all science curricula face this same problem. Proposed as a potential solution is the "Curriculum Prerequisite Network” – a graph theory based network model of a university’s academic curriculum as a complex system of prerequisite course nodes and bridges[6]. Visualizing the science curricula as a network rather than a list of courses in the course catalog increases coherence across disciplines and helps students identify information flow and course connectedness[5]. Network modeling theory could be applied similarly to the design and teaching of concepts within single biology courses. Although I am neither a mathematician nor a modeler of information networks, I can nevertheless organize my course content into a “concept network” rather than linear list of topics. To teach students how to organize their own knowledge around “concepts hubs,” I will regularly highlight meaningful connections and patterns within the course content and I will place each new concept into a continuously growing network during lectures. I will also encourage students to design their own concept networks, incorporating content from my courses but also concepts from past courses (and where they might expect future courses to lead them). Using a network structure for organizing my courses and my teaching will help students grasp the coherence of course information and critically analyze the content and scope of the topics.

And, supporting the synthesis of new ideas

By fostering a responsive, adaptable, and active learning environment in combination with self-reflections on experiences from my personal background, I will structure my teaching style to benefit diverse populations of students including, but not limited to, transfer students who often struggle to make the transition from small courses, personalized in pace, to the larger, faster-paced courses typical of high calibre four-year institutions like the University of Virginia. Through the creation of a consistent setting in which students are taught at an ideal pace to integrate complex concepts, I will provide students a setting in which they will be able to synthesize new ideas using concepts, information, and skills learned previously. I will continue to dedicate myself to serving as a role model for my students by maintaining a passion for the study of science, by critically evaluating my abilities, goals, and philosophies, and by continuously growing as a mentor, teacher, and life-long learner.

Potential Courses

I am enthusiastic about teaching or co-teaching in the introductory levels courses, in which my pedagogical approach would have the greatest long-term impact for many students. I would also be thrilled to teach an introductory course in neuroscience or physiology or to develop an upper level undergraduate course focusing on adult neural plasticity with topics including, but not limited to, neurogenesis. A new course such as this would logically follow *Intro to Neurobiology* and would complement *Neural Development Laboratory, Developmental and Regenerative Biology*, *Intro to Animal Behavior*, *Genetic Basis of Behavior*, *Signal Transduction*, *Cellular Mechanisms*, *Sensory Neurobiology,* and *Biology of Aging.*

Having a strong interest as well as academic background in research law and ethics, I would also be very excited to teach a course that I have previously designed while completing a Law Certificate in International Bioethics, Social Justice and Health at the University of Washington School of Law. The course, *Ethics and Emerging Law in Science*[7], would provide students an introduction to legal, ethical, and social issues arising in genetic and neuroscience research and clinical medicine. Through a series of lectures and problem-based case studies, students would learn to identify legal, ethical, and social potential concerns associated with or highlighted by genetic and neuroscience research and medicine, while applying a multidisciplinary approach to problem solving. Formal opportunity for education and discussions of the laws and ethics governing and guiding emerging technologies such as CRISPR-based therapeutics and personalized genomics would be synergistic and additive to the courses already offered to undergraduate and graduate students through the Biology Department and beyond.

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[6] Aldrich. (2015) The curriculum prerequisite network: Modeling the curriculum as a complex system. *Biochemistry and Molecular Biology Education.* 43(3):168-180

[7] See supplemental syllabus designed as a student at the University of Washington, School of Law