2009-2010 Grant Proposals

Sharon Ramos Goyette
"Neuroscience Lab Research Project"
SOTL Research Grant proposal

Project Description
This Fall, I will teach a laboratory component alongside my Neuroscience lecture course for the second time. This purpose of this grant is to seek funding to develop a pedagogy and conceptual framework for that laboratory course. For many years I have considered my work in undergraduate neuroscience as scholarly work (1-3, attached).

We (4, attached) and others (5, 6) have demonstrated that students do best when they are able to design and carry out an experiment themselves and when that experiment is an integrated component of the class. Currently, in my Endocrinology class, students perform several traditional lab exercises while developing an experiment that they actually conduct. Students in that class present their findings at the NEURON conference (7, attached, 8). (Students typically include this on resumes and graduate school applications.) An added benefit is that sometimes the work that we carry out is good enough to be considered for publication in scientific journals (9). I would like to use the student-directed experiment as a model for the Neuroscience course.

Because Neuroscience is a young field, there is no standard set of labs that comprise a typical Neuroscience lab course. There is an organization dedicated to undergraduate Neuroscience that publishes a journal on pedagogy, JUNE. I need to learn more about the pedagogy, to figure out how to best engage students in Neuroscience and to learn more about labs that will be appropriate in the new science building.

Research has suggested that an emphasis on the conceptual framework over the details of experimental design enhances knowledge integration (10). The following is a preliminary sketch of how the lab is currently envisioned.

The integrative topic that will tie together concepts in class and lab will be "Hormones and the Brain" and the lab will include three sections: basic neurobiology (membrane potential, action potential, sheep brain neuroanatomy), basic behavior (crayfish aggression and mating) and then the class experiment (cell biology). The first few labs will be "cookbook" labs, which have already been worked out by others and will provide a "hands-on" understanding of basic biological constituents of the nervous system. The next component should show that there are sex differences in behavior and that these sex differences can be altered by hormones (11). The last component of the course will involve adding hormones to cell lines derived from nervous tissue. Students will carry out their own experiments during this section.

Finally, I have been collecting pre-test and post-test data (attached) from my Neuroscience courses with and without lab. In addition to working out what I hope will be a better lab I would like to spend time analyzing these data.

Student Responsibilities
Jackie Ladino, an undergraduate student, took my Neuroscience course without a lab. This year, she worked as my lab assistant in the first Neuroscience lab and she has agreed to continue to work with me next year. She will help analyze the pre/post- test scores from the courses and she will also help write up the paper presenting our conclusions. Because she will have been through all three versions of the course, as a student or lab assistant, her perspective is invaluable.

Benefit
Student Learning: My hope is (1) to help students sequentially build their experimental skills (2) to provide a useful working conceptual framework of neuroscience and (3) to articulate this through measurable learning outcomes.

Department/Program: The addition of an integrated, well-thought out lab will be a valuable addition for the Neuroscience program and also for the Biology department as students from both may take the course. Whatever I may learn through this process should also be reflected in my other laboratory courses.

Campus-wide Initiatives: This project is consistent with campus-wide initiatives and the anticipated growth of the Sciences as indicated in the Strategic Plan.

Professional Development: Once completed, I plan to write up a manuscript to be submitted to JUNE and also hope that the award itself, the completed laboratory and the comparative class data, in addition to other factors, will aid in the procurement of a federal (CCLI) grant.

Community Outreach
Stonehill Community: I would be happy to discuss the process and the lab at a Teaching Roundtable, a break-out session at Academic Development Day or during a SURE lunch for students.
Larger Academic Community: I plan to submit the manuscript detailing the laboratory course to JUNE and also to submit a federal CCLI grant to extend this work. I will also present a poster at a NEURON conference outlining the process.

Budget
$1000.00 Stipend for Sharon Ramos Goyette
$ 700.00 Stipend for student/ Jackie Ladino
$ 500.00 for Lab Supplies (Neuronal cell lines, hormones and growth media)
$ 300.00 for photocopying and books on Neuroscience/Science Pedagogy
$2500.00 = Total