

Faculty Development Plan – Final Report

2017 – 2018

Course Development Project – Final Report

Course Background:

PSYCH 381 – Behavioral Neurobiology is a required course for psychology majors that is taught in multiple sections. It is an upper-division course students take after they have been exposed to basic and intermediate principles in psychology that reflect human behavior. It is often cited as a challenging course for students as it differs from general psychology themes given the strong emphasis on neuroscience. There is also a significant amount of content for them to learn.

The purpose of the course is to introduce principles of neuroscience by developing foundational knowledge in the basic physiological, anatomical, and chemical bases of behavior. By the end of the course students will be able to explain how the brain influences the way we think, feel and act by describing the functions of these systems. An important overarching goal for the course is to generate enthusiasm for the application of brain science on the broader human experience.

Learning Outcomes:

1. The brain, experience, and behavior

Students will develop their understanding of how the brain influences one's experience of the world and one's behavior in it. *Measurement:* In-class quizzes and/or exams on assigned textbook reading, lectures, and class discussions and written reports and/or in-class presentations of self-selected articles from the scientific literature.

2. Scientific methods and behavioral neurobiology

Students will identify scientific methods, especially those of cognitive neuroscience, that are valuable in behavioral neurobiology. *Measurement:* In-class quizzes and/or exams on assigned textbook reading, lectures, and class discussions and written reports and/or in-class presentations of self-selected articles from the scientific literature.

3. Diseases, trauma, drug usage, hormones, and genes

Students will extend concepts and research findings to diseases, trauma, drug usage, hormones, and genes. *Measurement:* In-class quizzes and/or exams on assigned textbook reading, lectures, and class discussions and written reports and/or in-class presentations of self-selected articles from the scientific literature.

The Learning Outcomes originated from the Department Undergraduate Curriculum Committee and were designed to prepare students to be familiar with the most important elements of neuroscience that relate to psychology. While this does not provide much flexibility for the individual professor, it does allow for their own unique approach to implementing them. Overall, I found that getting students excited about brain science by helping them see how it fit into their daily world, aided in the successful completion of the outcomes. These learning outcomes support programmatic outcomes by integrating and reinforcing the importance of brain structure and function on human behavior, which is part of the expectation of a psychology graduate.

Regarding course activities, students were required to read textbook chapters, attend and participate in lectures, write and discuss “Thought Questions” throughout the semester, research and write “Neuroscience in the News” assignments, take exams and participate in extra credit seminars if so desired. These enhanced learning through repetition of the material (reading and listening to lectures), as well as independent learning through research and investigation of relevant topics areas (e.g., how drugs affect

the CNS). Guidance and feedback was provided in class during discussion of probing Thought Questions. Some examples of topic areas included the integration of cultural folklore and neuroscience (e.g., Caribbean ‘zombies’), the legalization of marijuana from a neurobiological perspective, and how culture frames mental health categorization and treatment. In addition, in-class demonstrations of brain anatomy came through the use of cadaver brains. The process of learning complicated brain regions and functions was modeled as I described my experiences learning this material as a student. These activities enhance the acquisition and development of the learning outcomes by: discussing content that connects brain and behavior; involving them in methodology for neuroscience investigations (research reviews); and writing about current controversies/provoking ideas that integrates neurobiological theories. The field of neuroscience is rapidly changing, and part of keeping current is being acquainted with the latest research. To accomplish this I required the Neuroscience in the News articles/write-ups to come from legitimate sources and be within the past 3 years. Thought questions also revolved around current theories/issues that typically evoke some opinion which requires them to be grounded in current thought.

Assessment of student learning took the form of weekly quizzes, two research articles, in-class thought question discussions and 3 exams that covered content directly related to the 3 Learning Outcomes. Assessments provided sufficient opportunities for students to demonstrate achievement of the learning outcomes in the following ways: Quizzes provided multiple opportunities for students to demonstrate they had completed readings and were involved in classroom lectures. Research articles were aimed at the integration of what they were learning in class with content from the media, write-ups encouraged interpretation of findings from this perspective. Thought questions accomplished something similar in that it required forming an opinion of the topic, consider it in light of what they had learned in the course at that point (whether this was a brain-behavior topic, methodological conundrum, or how various influences alter normal brain development and functioning), and then “think on their feet” when adapting and integrating new theories during discussion. The exams were in multiple-choice format and a formal investigation of what they had learned and whether they could adequately learn upper-division material and retain it over the course of the semester.

Determining whether students were able to achieve learning outcomes was determined primarily through course exams and weekly quizzes, which directly related to the readings and lectures. Given the course requires a degree of rote memorization of structures, physiology, methodology and environmental factor influences, exams were deemed the most appropriate estimate of proficiency. Quizzes were modeled after the exams and prepared the students for the format and level of depth required. Exam performance was the best indicator of whether Learning Outcomes were achieved; mean performance ranged from 70% to 77%, with upper quartile performance in the 85% to 93% range. There was also a high degree of consistency in exam performance among those who excelled in the course. Overall, students described the course as challenging, yet satisfying in that they were surprised at how much neurobiology affects the overall human experience. The average score for the class was an 86%, indicating students tended to do well as a group. By in large, the most prominent theme in the feedback provided from the course evaluations included concerns for the sheer amount of information that they were required to learn. This has been a challenging concern to address, and I have spoken with other colleagues who teach the same course about how to adapt. The difficulty lies in that the Learning Outcomes clearly outline that “much is required” from this upper division course. It may be helpful on the front end to prepare student with the expectation that the course will differ from other psychology courses in that it is relatively more rigorous and will approach the basis of behavior from a different angle. I have also considered finding more opportunities to demonstrate the application of various frameworks described in the course readings (e.g., “real world” examples with discussion). Finally, I also am attempting to incorporate more ways to model how learning can occur with this kind of material.

Scholarship Strategies Project – Final Report

Goals:

(from the original Scholarship Strategies Project)

1. Begin recruitment of psychosis subjects by collecting data on at least 2 subjects for all protocols (imaging, clinical and cognitive)
2. Submit 2 manuscripts for publication, at least one of which is 1st author
3. Have students present their research (or accepted to present) at a conference

Regarding the above goals, I have been relatively successful in their completion. I have had 3 manuscripts as a coauthor submitted for publication since this goal was set. One is now in print, and the other two are accepted and in press. However, none of these are 1st author publications. The primary 1st author manuscript I wanted to submit is still in development but has made significant progress with the help of a student. We have added some analysis, which will strengthen the article and make it more likely to get accepted into a top journal. The other challenge is I was recruited to write two chapters in different books, by different editors. Some of them are on a tight timeline, which makes focusing on other manuscripts difficult, especially since I have two other students working on other manuscript drafts as well. I anticipate more publication success in the coming year given how many works are “in the hopper.” Another success is that my first graduate student presented her first poster at a recent international conference for our discipline. She constructed the poster, presented during the session and was also able to attend several lectures and symposia. Overall, this was a great experience for her and also aided in her professional development.

The one challenge I did experience was getting recruitment underway for a collaborative clinical research program with the Utah State Hospital (USH). I presented my idea to USH administration back in October, which was well received, but now am in the midst of developing a research and IRB protocol for both BYU and the state of Utah so that recruitment and collection of imaging/cognitive data may begin. I have a student assisting me in the process, but it will still take time and effort to develop and pass the IRB committees. It is anticipated this will become a long-standing endeavor that will ultimately benefit the community and the field in general.

Regarding my proposed strategies, as described above, I was able to meet with USH staff to propose my project, but am still working on my protocol. I was variably successful in dedicating 30-60 minutes of writing time, this is an area of future focus. Instead of reviewing material from the Tara Gray writing workshop, I read the book, “How to Write A Lot,” by Paul Silva, which describes a writing program very similar to the Gray workshop. I found some of those strategies helpful and will begin to implement those into my daily routine. I was also able to secure some internal grant funds to recruit more students into my lab. Finally, I was quite successful at meeting individually with my students to train on imaging methodology, statistical analysis, and manuscript drafting. It took quite a bit of time out of my schedule, but has advanced several of my projects.

One of the more poignant lessons I learned from this project is the importance of prioritizing and balance. At times I found myself distracted by work that could have been shelved or given to a student to complete. In some cases, my time was better spent developing ideas or deciding on directions to take my work. One other lesson learned, which wraps into future plans for improving productivity, is the importance of daily writing. Like any other skill it must be nurtured daily and cannot truly become effective when used intermittently throughout the week (or month!). Thus, I plan to make a more concerted effort at consistent daily writing that occurs at the same time. I found that my productivity greatly improved when I did this. There is still so much science left for me to do, and I am eager to make the most of my time so discovery can proceed.

Citizenship Project – Final Report

Goals/Activities:

1. **Generate activity and involvement among those involved in the Cognitive and Behavioral Neuroscience Research Area in the Department.** There has been relatively little energy in coming together as faculty with common research interests in this area. My goal as the new chair of this area is to establish regular meetings with focused agendas that will facilitate and advance educational training in neuroscience at BYU. Items will include curriculum development, student recruitment and new faculty hires.
2. **Review 3-4 articles for professional journals per year.** I plan on continuing to review manuscripts for professional journals, but would like to limit them to 3-4 times a year.
3. **Establish 1 new collaborative relationship at BYU.** I will again be attending and presenting at the annual Faculty Networking Event at BYU. My hope is to establish a new collaborative relationship by meeting others and determining whether we have aligning interests or overlapping needs.

Experience implementing above goals:

1. Since the project, I have lead 3 meetings as chair of the Cognitive and Behavioral Neuroscience Research Area. I believe these were a success as we discussed and made some needed changes to the curriculum for graduate students and also made some decisions on how to streamline the undergraduate experience. In addition, we spent a significant amount of time focusing on faculty applicants, and were able to recruit a new faculty member from Harvard to the department.
2. This goal was easily met as I conduct 6 independent manuscript reviews for journals over the past year.
3. This one was more of a challenge, but I did have a couple of collaborative lunches over the past year. Particularly with a faculty member in the Spanish/Portuguese department, who was interested in underlying brain functioning in language acquisition. In addition, I was a co-investigator on an application for the new Interdisciplinary Research (IDR) Origination Award, which focused on bringing together faculty from disparate departments/schools to collaborate on a shared research project.

One of the biggest lessons learned was that sometimes it only takes a single individual to act as a catalyst for collaborative relationships to occur. In particular, I noticed faculty responded well to my initiation of meetings and goals surround the Cog/Neuro Research Area. There appeared to be a lot of energy focused on “getting things done” that enhanced the area and department; the same goes for research collaborations. I also learned that there can be some benefit to saying no to outside demands for professional and society involvement, I may pair back in the future given the number of groups and task forces I am currently involved in.

Appendix

Sample exam questions:

9. The subdivision of the nervous system that controls the gut is called the:

- A) somatic nervous system.
- B) enteric nervous system.
- C) digestive nervous system.
- D) autonomic nervous system.

10. Motor output from the spinal cord travels via the:

- A) dorsal spinal cord.
- B) ventral spinal cord.
- C) medial spinal cord.
- D) lateral spinal cord.

11. _____ is the study of how the environment can influence the expression of genes.

- A) Transgenics
- B) Genotyping
- C) Epigenetics
- D) Prototyping

43. _____ contain the neurotransmitters.

- A) Synaptic vesicles
- B) Ribosomes
- C) Axons
- D) Dendrites

44. Reuptake is accomplished by:

- A) transporter proteins.
- B) glial cells.
- C) enzymes.
- D) calcium channels.

45. The _____ hypothesis of schizophrenia suggests that patients have _____.

- A) norepinephrine; too much serotonin
- B) serotonin; not enough serotonin
- C) dopamine; not enough dopamine
- D) dopamine; too much dopamine