Illinois Wesleyan University Student Learning Assessment

THE ASSESSMENT REPORT (approximately 5 to 9 pages) - due on the final Monday in September at the close of the academic unit's 1-3 year reporting cycle. Academic units are asked to address six topics (1-6, listed below) and to also submit a separate summary of the Assessment Report. As with the Strategic Assessment Plan, throughout the report there should be a strong interlocking narrative among the parts. In other words, each piece should connect conceptually with every other piece—goals with mission, measures with goals, and feedback mechanisms with learning outcomes. Please refer to the Guidelines for the Assessment of Student Learning for a fuller description of each topic required in the Assessment Report.

Department Name: Neuroscience **Assessment Liaison** Abigail Kerr

1. ***Recounting the Assessment Cycle.***

This assessment cycle covers 2019-2022. During these years we developed our Strategic Assessment Plan and several assessment tools including our senior and sophomore surveys, senior exit interviews, and learning outcomes rubric. These tools were used to assess learning student learning outcomes in 2020-2021 and 2021-2022. We also assessed learning goals using specific questions on exams in Psyc 213, the common introductory neuroscience course for all majors. In the future we will embed questions into Psyc 213 specifically for assessment purposes as opposed to using existing questions.

2. ***Describe assessment measures that were used.***

Our learning goals are assessed through direct and indirect measures. As a direct measure, we use a learning outcomes rubric developed for assessment of student writing and oral presentations. This rubric includes a number of learning goals that are scored on a scale of 0-5 for level of mastery of a given skill/goal (0 = absent, 5 = mastery). We also analyze exam questions related to our learning goals from our introductory neuroscience course (Psyc 213). As indirect measures, we assess students early in the major (sophomore year) and at the end of their undergraduate career (senior year) with annual Qualtrics surveys (anonymous surveys completed by students) that are shared with students via email. Finally, we conduct exit interviews with our graduating seniors to ask about specific learning goals. Below the measure used for each learning goal is specified along with relevant data.

3. ***Summarize the data/results from your measures.***

Learning Goal 1: Develop and Understanding of the interdisciplinary nature of neuroscience. Our first learning goal was assessed through student surveys conducted at the end of the sophomore and senior years and senior exit interviews. Data are presented from spring 2021 because the data from spring 2022 have not been evaluated by neuroscience faculty. The data were collected and will be evaluated in our annual assessment debrief meeting in the fall of 2022.

The sophomore survey functions as a bit of a pretest (students are new to the major), while the senior survey functions as a posttest. In 2021 a total of 2 students (28% of total possible responders) completed the sophomore survey. On a scale from 1-5, with 1 being very little and 5 being very much, both students responded with a 4 to the question "to what extent have your neuroscience classes helped you to understand the interdisciplinary nature of neuroscience." In the same year, a total of 4 seniors (80% of possible responders) completed the survey. In response to the same question, 75% of students indicated a 5 (very much), while 25% (1 student) indicated a 3 (neutral).

During senior exit interviews, all students interviewed in 2021 (4 of 6 graduating seniors) and 2022 (5 of 6 graduating seniors) indicated that at least two of their courses highlighted the interdisciplinary nature of neuroscience. Many students noted that this learning goal was embedded in nearly all of their 300-level courses and the design of the major itself. Specific courses that were highlighted by students included Psyc 313 (Behavioral Neuroscience), Psyc 321 (Brain Injury and Recovery, Psyc 314 (Advanced Human Neuroscience) and Biol 375 (Cellular Molecular Neuroscience).

We recognize that we lack a direct measure for this specific learning goal. A question related to the interdisciplinary nature of neuroscience will be embedded in Psyc 213 exams in the future to address this issue.

Learning Goal 2: Develop a broad understanding of the structure and function of the nervous system with a depth of knowledge in cellular/molecular or behavioral/cognitive perspectives. This learning goal is assessed via questions embedded in Psychology 213 exams. This direct measure allows us to understand students' learning during the common introductory course for the major. In 2021, there were a total of 6 questions across 4 exams used to assess this learning goal. The vast majority of students correctly answered all of these questions (84% of students for the lowest correct response rate and 97% for the highest correct response rate). A total of 32 students were enrolled in the course; the distribution of majors and non-majors is unknown. In future assessment reports we will distinguish between majors and non-majors during data collection and limit our report to majors only. Results from spring 2022 will be evaluated and discussed in fall 2022 as per our StrAP.

We also assess this learning goal in the junior/senior year in the capstone course (offered every other year) using the learning outcomes rubric (direct measure). The rubric was applied to capstone papers in spring 2021 (the last time the course was offered). A total of 7 papers were scored using the rubric, which included a 0-5 Likert scale ranking from not present (0) to mastery (5) of the skill. In terms of demonstrating a broad understanding of the structure and function of the nervous system, all papers but one scored between 4-5 on the scale (the other paper scored a 3), with an average score of 4.3 across all seven papers.

Learning Goal 3: Understand how the interaction of cells and neural circuits leads to higher level activities such as cognition and behavior. This learning goal is also assessed with the direct measures of questions embedded in Psyc 213 exams as well as students' capstone papers (Learning outcomes rubric).

In Spring 2021, a total of 4 questions were identified across 4 exams to assess this learning goal. As above, a vast majority of students answered the questions correctly, with correct response rates ranging from 83%-90%. A total of 32 students were enrolled in the course; the distribution of majors and non-majors is unknown. In future assessment reports we will distinguish between majors and non-majors during data collection and limit our report to majors only. Results from spring 2022 will be evaluated and discussed in fall 2022 as per our StrAP.

We also assess this learning goal in the junior/senior year in the capstone course (offered every other year) using the learning outcomes rubric (direct measure). The rubric was applied to capstone papers in spring 2021 (the last time the course was offered). As mentioned above, 7 papers were scored. All papers scored between 4-5 on the Likert scale, with an average score of 4.9.

Learning Goal 4: Generate testable scientific hypotheses and develop research plans to test these hypotheses. Student papers from the capstone course were assessed using the learning outcomes rubric

developed for assessment purposes. In 2021, all of the 7 papers assessed with the rubric were rated between 4-5 on the Likert scale, with an average score of 4.9.

We also look to the number of our senior students who participate in research activities in faculty-directed labs in their time at IWU. We have also found that a majority of our students participate directly in research activities in faculty labs on campus. Over the last 3 years we have had 100% (2020), 67% (2021), and 56% (2022) of our seniors participate in faculty-directed research projects. We expect the decline over the last two years to be largely due to the interruption of research activities caused by COVID-19, though we are still pleased that more than half of our graduating students are participating in research in faculty labs.

As an indirect measure, students are also asked about their understanding of the scientific method in their senior exit interviews. In 2021 and 2022 all students interviewed (67% of graduating seniors in 2021 and 80% of graduating seniors in 2022) indicated that they believed themselves to have developed skills related to scientific inquiry through their neuroscience courses. Specifically, students mentioned the ability to develop research questions, design experiments appropriate to those questions, and evaluate their own and other peoples' findings as valid. Most students indicated that their upper-level seminars were most valuable in developing these skills. Several students in 2022 commented that they would have expected to learn more of these skills in Research Methods, but they did not. All of these students took Research Methods online during the COVID-19 pandemic, and this may explain their comments. No student in 2021, all of whom took Research Methods in person prior to the pandemic, mentioned Research Methods as a place where they received less of this instruction than expected.

Learning Goal 5: Develop scientific literacy, demonstrated through the evaluation and discussion of primary research literature and evaluation of the validity of hypotheses generated about others. Student papers from the capstone course were assessed using the learning outcomes rubric developed for assessment purposes. All of the seven papers scored fell between 3-5, with only paper scoring the low of 3. The average score for all seven papers was 4.6.

As an indirect measure, students were also asked about their scientific literacy in their senior exit interviews. In 2021 and 2022 all students interviewed (67% of graduating seniors in 2021 and 80% of graduating seniors in 2022) indicated that they believed themselves to have developed strong scientific literacy through their neuroscience courses. Specifically, students noted feeling more comfortable reading and evaluating journal articles. They also noted specific assignments including one in which they are asked to act as journal editors and review a manuscript for publication in Psyc 314 (Advanced Behavioral Processes) as particularly useful.

In the senior survey conducted in 2021, 100% of respondents (66% of the graduating class) agreed "very much" (i.e., 5/5) that their neuroscience classes helped them to write more effectively through the evaluation and discussion of primary research literature and the evaluation of the validity of the hypotheses and results generated by others. Sophomore students during the same year (2 students total) rated the same question as a 4 or 5 (1 student each).

Learning Goal 6. Develop oral and written communication skills for both specialized and broad audiences using scientific conventions in the field. Student papers from the capstone course were assessed using the learning outcomes rubric developed for assessment purposes. Students' overall written communication skills averaged 4.7, with all students falling between 4 and 5 on the rating scale.

In the senior capstone course, students are required to present their final work in both written an oral format. The 7 students who completed the course in 2021 averaged 91% on their oral presentations, ranging

from 82%-96%. Similarly, the average score for oral skill demonstration on the learning outcomes rubric for the class of 7 students was 4.7.

As an indirect measure, students were asked about their oral and written communication skills in their exit interviews. In 2021 and 2022 all students interviewed (67% of graduating seniors in 2021 and 80% of graduating seniors in 2022) indicated that their writing improved throughout their undergraduate career. Many students noted that they learned about and were able to practice scientific writing conventions in their Psyc 300: Methods course, but they did not feel as though they mastered them until their capstone course or their senior thesis. All students indicated that they felt comfortable expressing complex scientific ideas in both written and oral modes of presentation.

Learning Goal 7. Develop an understanding and appreciation of the ethical issues of human and animal research in neuroscience. In the sophomore and senior exit surveys, students are asked to what extent their neuroscience courses helped them to understand and appreciate the ethical issues of research in neuroscience. In 2021, the sophomore survey indicated a split between little (1 student; 2 on a 5-point Likert scale) and very much (1 student; 5 on the same scale). All students in the senior survey (4 total; 68% of the class) indicated a 4 (1 student) or 5 (3 students) for the same question, indicating that students may not develop a full appreciation for the ethical issues of neuroscience research until they complete our upper-level courses. In their senior exit interviews, students confirmed this conclusion with many students saying that they were aware of ethical issues in lower-level classes, but they did not come to fully understand or appreciate the complexities of animal and human research until their methods course (Psyc 300) and upper-level seminars.

As a direct measure, questions related to the interdisciplinary nature of neuroscience will be embedded in Psyc 213 exams in the future.

4. Describe the process by which you evaluated your data.

Once data were collected, they were summarized by the program director and then shared with affiliated faculty for discussion. Survey data were shared directly with affiliated faculty. As per our StrAP, we devoted a departmental meeting in fall 2021 to reflection on the findings from our measures and the methods and standards used to reach our conclusions. We have not yet had an opportunity to discuss the survey results from 2022 nor the results of Psyc 213 exams from 2022, so those items are not included in the current report. We did discuss the senior exit surveys for this year in our final departmental meeting, hence they are discussed in the current report.

During our departmental debrief, we focused on successes observed, areas for growth and development, and ways to improve our data collection methods. For instance, we are in the process of developing questions to embed in our Psyc 213 exams to more specifically address several of our learning goals for which we would like more direct measures to assess student learning goals. We have also decided to evaluate our senior capstone papers as a department over the course of an afternoon after the conclusion of the semester using a system similar to the writing program's annual assessment. The capstone course will be offered again in Spring 2023, so this assessment will take place in May 2023.

5. Describe what you learned as a result of the evaluation process.

As our program is quite new, our assessment practices are still evolving. We recognize the importance of evaluating our assessment measures and adapting our assessment practices as we move forward. We realize

that two of our courses are bearing the brunt of our assessment activities - specially, Psyc 213 and Neur 400. Part of the reason for this is that these courses represent the introduction and culmination of our major, respectively. These are also the only common two courses for all of our majors. However, we recognize that it may be valuable to space our assessment out over several other classes, and we intend to further discuss what other measures we might find valuable to employ in other courses. We are also finding relatively low response rates for our surveys, particularly among sophomore students, and we intend to discuss ways in which we can increase participation on this measure. Despite being an indirect measure, we find the surveys valuable in determining not only how effectively we are meeting our learning objectives for our students but also how well our major is working for our students.

In response to student feedback, we have made several changes to our major. For example, we developed independent studies and thesis courses specifically under the neuroscience rubric based on conversations had with students during their senior exit surveys. One continual theme from our current class of graduating seniors is that they are confused by the fact that they have very few neuroscience courses listed on their transcripts. That is, there are not many courses with the NEUR prefix on their transcripts. In reality, this is because our major is an interdisciplinary major built on existing courses at IWU when it was first introduced in 2018. However, students find this concerning because: 1) they perceive that their transcripts don't accurately reflect their major of study and 2) some graduate programs will not allow them to calculate a good number of their major courses in their science GPA because they have the PSYC prefix. Many graduate programs will count NEUR as a science course but not PSYC. As a result, we have already begun discussions on cross-listing the psychology courses. Similarly, a number of students have asked about a neuroscience minor, which we are also in the process of developing.

Overall, we are pleased with the fact that our students are performing well on our direct measures of student learning outcomes, including Psyc 213 exams and their capstone projects (both written and oral). We are also pleased that students can identify and articulate the skills that they have gained through their neuroscience courses. It is valuable that they recognize their strengths in oral and written communication as well as scientific literacy. Their confidence in approaching academic work, both their own and consuming/evaluating that of others, is at the heart of our program's learning goals. Our assessment efforts indicate that students leave our program with a strong foundation in the scientific method and are able to use that foundation to critically engage with scientific findings.

6. What does your academic unit plan to do with the information it has evaluated?

The results of our assessment processes so far confirm that our program is meeting its learning goals. While we see areas for growth and development in the program, they are mostly related to execution of the program as opposed to achieving learning goals. However, we have found that our response rate to our sophomore survey specifically is quite low (it did improve in 2022, but only to about 50%). As a unit we will focus on ways to improve response rates on this measure in the future.

Changes we intend to make to the program include cross-listing several courses (though further discussion on how this practice may impact program evaluation for home departments is necessary), introduction of a minor, and development of questions to be embedded into the Psyc 213 courses. In our first round of assessment, we were using existing questions from Psyc 213 exams that spoke to our learning goals. In the process of conducting the assessment we found that those questions, while directly related to the learning goals, were overly specific in their scope. We believe the development of new questions that are designed with the purpose of assessing the learning goals will yield richer results. We will also continue to evaluate

the efficacy of our other measures including the senior and sophomore surveys and senior exit interview questions.

Provide a summary of your Assessment Report.

In the first three years of the neuroscience program, we have established our strategic assessment plan and developed various measures for assessing our learning goals. We have completed assessment for all seven of our learning goals and found that we are largely meeting these goals based on both direct and indirect measures. Specifically, students graduating from IWU with a degree in neuroscience demonstrate a clear understanding of the interdisciplinary nature of the field and develop a strong scientific literacy and understanding of the scientific method. Data from direct measures in our introductory behavioral neuroscience course and our senior capstone course indicate that students also develop a broad understanding of the structure and function of the nervous system with a depth of knowledge in cellular/molecular and behavioral perspectives. Students in the neuroscience program also demonstrate oral and written communication skills appropriate to the discipline and develop an understanding of the ethical issues of human and animal research in the neurosciences. Importantly, students are able to identify their own success in meeting the learning objectives established for the major and direct measures of student learning support student self-assessment. While we are pleased that our program is meeting its learning goals, we recognize room for improvement in our assessment process. We will continue to refine our measures and look to embed our direct assessment measures through more of our courses.