Department: Chemistry

Assessment coordinator: Gerry Prody

Department Assessment Activity Responsibilities

The department has an assessment committee. For the past 1.5 years the assessment committee has consisted of Emily Borda and Steve Gammon. Emily is going on Maternity leave until 2011 and Steve Gammon (Chair) will be on leave until the start of the 2011-2012 academic year. George Kriz, the Interim Department Chair, will serve on the assessment committee with Gerry.

Summary of Department Assessment Activities

The bulk of the work done in the chemistry department over the past two-year period has been in the following areas.

- Formation of an assessment committee.
- The development of an assessment plan.
- Creation of course outcomes for every course in the department.
- Piloting the data gathering of assessment data at the course level.

The department continues to collect enrollment data that directs the allocation of instructional resources. This data also impacts the creation of new courses to better serve WWU students. We also continue to collect data on our graduates via exit surveys. This data allows us to determine the quality of our instruction and how well we are serving our students.

Chemistry Department Recent Assessment Activity

Example 1: Organic Chemistry Course Revision (Creation of Chemistry 356 Laboratory Course). Note: Chemistry 355 was the only second quarter organic laboratory course offered by the department.

Assessment of current program limitations

1. Chemistry 355 serves as an advanced organic chemistry laboratory that provides students with technical skills to prepare them for graduate school or a career in chemistry. The majority of life sciences majors enrolled in this course were required to perform experiments that were not relevant to their fields of study.
2. Chemistry 355 was recently changed to be a writing proficiency course (WP1). The number of sections required each year to meet enrollment demand placed a huge burden on the faculty striving to ensure that students were instructed in scientific writing. Due to the overwhelming number students enrolled in Chemistry 355, the chemistry majors were not receiving the needed report writing instruction.
3. High course demand for Chemistry 355 (for chemistry, pre-healthcare and life sciences majors) typically resulted in waiting lists for this course. Because of the over enrollment many students were taking Chemistry 255 much later than the corresponding lecture course (Chemistry 353). Rather than have the lecture and laboratory course reinforce each other, students are typically trying to remember material from the lecture up to two years in the past.
Addressing the Limitations

1. Chemistry 356 (Organic Chemistry Laboratory II for Life Sciences Majors) is has been designed as a separate course that would involve experiments geared specifically to life sciences majors. Many of the experiments will be bio-organic and will be more appropriate preparation of these students for future studies.

2. The addition of Chemistry 356 to the curriculum limits the number of Chemistry 355 courses from 4 to 2 sections. The reduced number of chemistry 355 sections reduces the frequency and quantity of students that any instructor will be asked to teach the chemistry 355 laboratory. This change will improve our ability to make meaningful changes in the scientific writing proficiency of our majors. It also removes the arbitrary requirement for life sciences majors learn to write chemistry specific reports.

3. By replacing 2 section of chemistry 355 with 3 sections of chemistry 356, faculty teaching loads have not increased, but many more students are accommodated each year. Instead of 96 available seats (from 4 sections of 355), we now have 120 seats available (from 2 sections of 355 and 3 sections of 356).

Example 2: Revision of Chemistry 101

Emily Borda has been using student learning data to revise the curriculum for chemistry 101 as part of an NSF-CCLI project since the summer of 2008. In the summer of 2009, Dr. Borda met with the co-PI’s on this grant for 2 weeks. The following data sources informed our work during the 2-week session:

• Responses to the two assessment instruments (Chemical Concept Inventory and Student Understanding of Science and Scientific Inquiry) administered at the beginning and end of every course using the curriculum
• Samples of student responses to selected portions of the curriculum
• Suggestions from the implementation of the curriculum in the Seattle Public Schools Institute, recorded by the teachers themselves and also by myself on the basis of their interaction with it
• Research on common student misconceptions in chemistry and teaching the concept of bonding

Using these data and suggestions, we collaboratively brainstormed, grouped and prioritized initiatives for improvement and ultimately decided on the following four goals:

• Improve the curriculum’s development of energy concepts and their application to chemical and physical phenomena.
• Improve the curriculum’s development of chemical bonding concepts, including the driving forces for bonding, the energy involved in bond formation and dissociation events, and the differences between inter- and intramolecular bonds.
• More explicitly introduce the idea of scientific models and help students learn how to use and evaluate them.
• Help students build the skill of metacognition, or thinking about one’s thinking. This is a skill that is known to be essential for meaningful learning and that students are often not very good at.

Although revisions spanned the entire curriculum, three of the most obvious products of our work were:
• Rewritten and added sections of an inquiry-based classroom activity (ICA) and lab activity that deal explicitly with metacognition
• A new inquiry-based classroom activity (ICA) on scientific models
• A new ICA on energy and bonding

Example 3: Revision of Biochemistry Courses (Chemistry 471 and 472)

The biochemistry, cell molec, and molecular biology faculty performed a careful analysis of the course content in Chemistry 471 and 472. The intent of this analysis was to determine if the content in these courses was serving students majoring in biochemistry, molecular biology, and cell molec. These two courses are the foundational, prerequisite biochemistry courses that support these majors in their more advanced studies. Analysis of the course content indicated that there were significant omissions in the current courses that would severely hamper students when they moved into additional courses within their respective majors and when they entered the workforce or graduate school. Analysis also indicated that the content of the current courses was all critical. Based on this data, the faculty proposed that the course be expanded to have more class meetings per week.