Dr. Mike Castellani, Chair
Chemistry
COS

Dear Mike:

The University Assessment Committee and I have completed our evaluation of the BS in Chemistry's assessment of student learning. This letter will provide general comments and suggestions for improvement. Although the scoring rubric we used to evaluate assessment reports was sent to you in April, I will not include numerical ratings in this letter. The reason for this is that the rubric is still relatively new and is continuing to be revised. At this time, I ask that you use it for formative purposes to help improve your assessment plan. We also would appreciate your comments concerning this rubric.

While I acknowledge that you are doing assessments that are useful, e.g. tracking performance on the CHM 211 final exam, on a nationally standardized test, and student research productivity, your assessment report is problematic for a number of reasons. First, you do not specify student learning outcomes. While three of your measures do assess student learning, the outcomes of these measures are holistic. If students do not do as well as you would like on CHM 211, you can try to add more homework or another course, but wouldn't it be helpful to know which outcomes covered in CHM 211 students are especially struggling with? This could be done if you were to determine exactly what you expect students to be able to do in this course and then tagged the exam questions to outcomes and analyzed the results per outcome. This way, you would see which parts of the course itself need to be strengthened. Without outcomes, you are not able to do this.

Does the Organic Chemistry national exam break the results down into areas? If so, do your students score higher in one than in another? Do you have a rubric to score your students' capstone research projects? Such an instrument would allow you to more usefully assess areas of strength and weakness in their ability to conduct and analyze research. Although I'm impressed with the number of your students who publish and present research, it would be helpful to know what % of your students do this each year rather than just the number of students who do so.

Finally, although it is important for students to obtain jobs and/or be admitted to graduate and professional schools this, by itself, is not a good assessment of student learning. The reason for this is that these types of outcomes are influenced by factors often outside your, or the student's, control. Factors include supply/demand in the labor and educational markets.

One of the University Assessment Committee reviewers commented that developing an outcome from the research students do for analysis/synthesis of information gained in the research itself could be a beginning point in developing learning outcomes.
Also, you are using an outdated assessment template. Please refer to http://www.marshall.edu/assessment/assessment_forms.htm for a copy of the current template. During the academic year 2011 – 2012, I plan to meet with all programs to assist with further development of assessment plans and look forward to meeting with you. I will be in touch at the end of the summer about scheduling. If you have questions or concerns, please let me know.

Sincerely,

Mary E. Reynolds

Mary E. Reynolds
Director of Academic Assessment

C: Dr. Charles Somerville, Dean, COS
Dr. Mike Castellani, Chair
Chemistry
COS

Dear Mike:

I have completed my evaluation of the BS in Chemistry’s assessment of student learning. This letter will provide my general comments and suggestions for improvement. Although the scoring rubric we used to evaluate assessment reports is attached, I will not include numerical ratings in this letter. The reason for this is that we used the attached rubric is still relatively new and, as you will see, it raises the bar for what is considered excellent assessment. However, I ask that you use it for formative purposes to help improve your assessment plan. We also would appreciate your comments concerning this rubric.

Your student learning outcomes are appropriate, but I recommend that you write the first (possess foundational knowledge in the discipline) in a measurable way. What will students do to show they possess this knowledge? Will they identify, explain, etc? You identify four measures used to assess outcomes. These are final exams in Chemistry 211 and 212, a nationally standardized exam, student placement following graduation and research productivity. It would be helpful to reviewers (and to you, I think) to connect each measure with its appropriate outcome or outcomes. I assume that the results of final exams in Chemistry 211 and 212, as well as the national standardized exam, assess students’ Chemistry knowledge. However, it may be that they assess more than this. Do they also assess students’ ability to problem solve? If so, conducting a separate analysis of the problem solving questions and the questions that only assess knowledge might give you valuable information about strengths and weaknesses within the program.

Almost without a doubt, students’ research productivity assesses all program outcomes, but again, you need to make this more explicit in your report. Although I completely agree with you that having a research paper accepted for publication in a peer-reviewed journal or for presentation at a national or international professional meeting demonstrates the quality of the work, your data would be more meaningful if you reported what percentage of your students who submitted manuscripts for publication or proposals for presentations were accepted rather than just giving the number of students who published or presented.

Regarding capstone research, I strongly encourage you to develop assessment rubrics for these projects. When you do this, think carefully about the qualities the work should have to receive a grade of “A” or “B.” Or, better yet, put yourself in the pace of a peer reviewer. Do you evaluate the strength of the research question, the research design, the comprehensiveness of the literature review, the meticulousness with which laboratory procedures were conducted, the precision and appropriateness of data analysis, the appropriateness of conclusions drawn and discussion of implications? Evaluating
students in each of these areas can be valuable in showing you exactly where student performance is strong and where it is weak, thus providing valuable information for improvement of student learning.

Are there measures you can collect to evaluate outcome 2 (perform laboratory tasks competently) before the students undertake their capstone experiences? A rubric to evaluate performance in laboratory courses might be helpful here.

Finally, placement of students after graduation is, at best, an indirect assessment measure. That being said, I agree that it is useful and something you should continue to track. Remember, though, that there are many factors outside of your control that can affect placement.

I’d also like to comment that I’m impressed with the comprehensive analysis you have undertaken of pass rates in Chemistry 211. Although not tied to specific learning outcomes, it is important for students in your program to experience success in Chemistry 211. Therefore, doing your utmost to help them achieve that success by isolating predictors of success, is an important undertaking.

Please see the attached rubric. If you have questions or concerns, please let me know.

Sincerely,

Mary E. Reynolds

Mary E. Reynolds
Director of Academic Assessment

C: Dr. Charles Somerville, Dean, COS
Dr. Michael Castellani, Chair  
Chemistry  
COS  

Dear Mike:  

The University Assessment Committee and I have completed our evaluation of the BS in Chemistry’s assessment of student learning. This letter will provide my general comments and suggestions for improvement. Although the scoring rubric we used to evaluate assessment reports is attached, I will not include numerical ratings in this letter. The reason for this is that we used the attached rubric for the first time this year and, as you will see, it has changed considerably from the ones used in previous years. It raises the bar for what is considered excellent assessment considerably and, since it was not shared with programs before this assessment cycle, I’m not comfortable using it to give programs a formal rating this year. However, I ask that you use it for formative purposes to help improve your assessment plan. We also would appreciate your comments concerning this new rubric.

Your report shows that you have carefully reflected on the roadblocks to student success in your program and have taken steps to address these. However, if you are going to track final exam scores in General Chemistry, it might be useful to conduct item analyses, or analyses of the exam by content area, to see if there are particular concepts with which students struggle more than with others. Students’ performance on the Organic Chemistry standardized exam might be examined in much the same way, if scoring is broken down by area. Tracking the number of students whose research is accepted either for publication or presentation is a good summative type of assessment and certainly speaks to the effectiveness and rigor of your program.

What I don’t see in your report is specific student learning objectives/outcomes and assessment tools that directly assess each one. I also don’t see specific actions you’ve taken to improve your program as the result of assessment of student learning. Therefore, it’s difficult to evaluate your assessment report using the rubric we currently have.

Please see the attached rubric and letter to Deans, Chairs, and Faculty detailing general suggestions for an effective assessment program. If you have questions or concerns, please let me know.
Sincerely,

Mary E. Reynolds

Mary E. Reynolds
Director of Academic Assessment

C: Dr. Wayne Elmore, Interim Dean, COS
April 1, 2008

Dr. Michael Castellani, Chair
Chemistry
COS

Dear Mike,

The University Assessment Committee and I have completed our evaluation of the annual program assessment report for the BS in Chemistry. This letter will provide feedback in the following manner. First, I will comment generally on each section of your report. Second, I will rate the following areas of the report on a four point scale (0 – 3, with 3 being the highest rating): student learning outcomes, assessment measures, and the feedback loop. Although I considered feedback from committee members, I made the final decision on ratings for all reports submitted. Third, I will offer suggestions for your consideration as you plan your assessment for the 2008-2009 academic year. Fourth, I will include my evaluation using the Primary Traits Analysis rubric and will include reviewers’ comments for your information.

General Comments

No student learning outcomes are listed. Therefore, assessment tools used did not address specific student learning outcomes, but rather general success in the program, defined as successful completion of specific courses in the Chemistry sequence. That having been said, I could not help but be impressed by the level of analysis you completed regarding student success in your program, as measured by the previous definition of success. I’ll address each one of your measures individually.

1. Performance on final exams in General Chemistry. The pluses of using this measure are that most students take the course and successful performance in this course is necessary for a student to progress to higher level courses in Chemistry. In general, we frown on the use of course grades as assessment measures for a number of reasons. First, course grades are often inflated (or deflated) by factors that are not related to student learning. For example, factors such as class attendance and promptness in submitting assignments influence grades in many classes, but are not directly related to student learning. Second, more than one student learning outcome is typically addressed in a class, so course grades become too global a measure to assess specific student learning outcomes. However, in your case grades do not appear to be inflated. Additionally, various analyses you have done show these grades to be related to students’ academic potential, e.g. ACT scores. Also, you have used this information to make additions to your curriculum, which appear to have had a
positive impact on students' success. One suggestion that might help you gain more information from the final exam scores would be to analyze results by type of question. This would reveal relative strengths and weaknesses of students in the various topic areas covered in the course.

2. Performance on the American Chemical Society Exam in Organic Chemistry. It appears that this is a national exam, so gives you a comparison to national norms. This is a good way to objectively assess students' performance in your program. Are no subunit analyses offered as part of this assessment? If they were, you would have valuable information that would allow you to assess the relative strengths and weaknesses of your students.

3. Tracking student status after graduation. Although this is a good measure of overall program necessity and viability, and is therefore an important part of your five-year program review, I would argue that it's not a good measure of student learning. Employment is affected by many factors, such as supply/demand, other than student learning. Admission to professional or graduate school is a better indicator of student learning, but even this is influenced by other factors, e.g. applicant pool, number of slots available, etc.

4. Research presented or published. I believe that this is an indication of student learning. However, I would suggest that you report data such as the percentage of students who completed the capstone in Chemistry who published or presented their research at conferences. Also, if all students are completing research projects, it would be advisable to develop a scoring rubric for these projects. The rubric would allow the projects to be evaluated, perhaps by a team of faculty, in various areas deemed important to the overall quality of the project. Computing means (across areas) in each area would allow you to assess students' specific strengths and weaknesses.

I believe that the level of analysis in which you engaged has helped you to make programmatic changes that have allowed students to experience more success in your program. This is admirable. However, I think it would be advisable for you and your faculty to thoughtfully consider what students should know and be able to do when they complete your program, i.e. develop specific student learning outcomes.

Ratings for Student Learning Outcomes, Assessment Measures, and the Feedback Loop

Student Learning Outcomes = 0. No student learning outcomes were identified.

Assessment Measures = 2. This was difficult to measures using our scoring rubrics. The reason I say this is because assessment measures are supposed to relate to student learning outcomes (at level 1). Since you did not list student learning outcomes, it's impossible for us to know if your assessment measures relate to them. However, you did indicate that you use several assessment measures and tracking graduate school placement rates could be considered an indirect measure, so I am rating you at level 2 in this area.

Feedback Loop = 2. This rating was given because, although you have not identified student learning outcomes, your report showed that you have been making some curricular decisions based on the results of data analysis regarding student learning. Additionally, these curricular changes appear to have had a positive impact on student achievement in your program.
Suggestions to Consider as you plan your assessment strategies for the 2008-2009 academic year

I recommend that you and your faculty develop student learning outcomes for the 2008-2009 academic year. These outcomes should delineate what students should be able to do when they complete the BS in Chemistry. For each outcome, determine which assessment measures can be used to evaluate it. My guess is that you can continue to use the two exams currently in place (General Chemistry final exam and American Chemical Society Exam). Additionally, I have no doubt that the capstone research projects will be valuable assessment tools. I suggest that you develop rubrics to assess the research projects and determine which exam questions assess each outcome. This level of analysis will allow you to determine where specific strengths and weaknesses in students lie. I will be happy to assist in any way I can. I can be reached at 62987 or at reynoldm@marshall.edu.

Sincerely,

Mary Beth

Mary E. Reynolds
Interim Director of Assessment

C: Dr. Andrew Rogerson, Dean, COS