The perception of what assessment is has expanded from practices that surround grading to a broader view that includes the use of assessment information for management and instructional improvement purposes. Additionally, assessment is currently recognized as occurring on at least three levels: classroom, department, and institution. In the 1970s, a form of departmental assessment emerged in which students anonymously evaluated their instructor for the purpose of providing feedback to improve future instructional efforts. Poor results on student evaluations are often explained by faculty members as being a result of unmotivated students, heavy teaching loads, or an invalid rating system. In other words, the outcomes of the evaluation are explained in a manner that allows the instructor to ignore the information that students provide. A well-designed departmental assessment can encourage faculty members to use assessment information for improvement purposes. The purpose of this article is to use the experiences of the Mathematical and Computer (MCS) department at the Colorado School of Mines (CSM) to illustrate several aspects of the development and implementation of a departmental assessment plan.

**CONSISTENCY BETWEEN LEVELS**

At each level within a given institution, as well as across individual professors, there is likely to be a different set of ideas as to what students should know and be able to do. Courses are also designed to support diverse student outcomes. External organizations, such as accreditation boards, place further demands upon institutions concerning what students should know. The careful construction of a set of departmental goals and objectives can bring unity to what at first appears to be a set of inconsistent ideas.

Goals are broad statements of expected student outcomes and objectives break the goal down into circumstances that suggest whether a given goal has been reached. Careful thought should be given to the university mission statement and to the requirements of any appropriate accreditation board when developing departmental goals and objectives. All of CSM’s undergraduate engineering departments are accredited by the Accreditation Board for Engineering and Technology (ABET). Although the MCS
department is not ABET accredited, one role of our department is to act as a service department to the other departments. In other words, we have a responsibility to assist other departments in the accreditation process. ABET’s list of student outcomes as well as the university mission statement were considered in the development of our departmental goals and objectives.

**FACULTY SUPPORT**

Faculty support for departmental assessment efforts should be sought before departmental goals and objectives are drafted. In the MCS department, each member of the full-time faculty was interviewed about what they felt students should know and be able to do. They were asked (1) What competencies do you think students should have after completing the mathematics core courses? (2) What competencies do you think students should have after completing their major courses in mathematics? and (3) What competencies do you think students should have after completing their major courses in computer science?

A departmental subcommittee was formed that consisted of the head of the department, a mathematician, a computer scientist, a mathematics education expert, and an assessment specialist. Based on the faculty responses to the interview, the requirements of ABET, and the university mission statement, the subcommittee drafted a set of departmental goals and objectives and presented them at a faculty meeting. By the end of the academic year, the faculty had approved a revised version of that draft. The current list is available at [http://www.mines.edu/Academic/assess/Goals.htm](http://www.mines.edu/Academic/assess/Goals.htm).

**REEXAMINE THE EFFECTIVENESS OF CURRENT INSTRUMENTS**

CSM has in place a student evaluation instrument. The purpose of this instrument is to provide useful feedback to instructors concerning the effectiveness of their courses. The student evaluation instrument begins with a set of structured response questions and concludes with a request that students provide additional comments on the back. Many faculty members complained that the information acquired through this instrument was received too late. Since the students completed the student evaluation at the end of the semester, their suggestions could not be used to improve the current course. In response, the department has developed an electronic student feedback form that may be anonymously submitted at any point during the semester.

Another expressed concern of faculty members with regard to the student evaluations was that the majority of students did not explain the ratings that they provided.
The rating alone left the course instructors with very little information on how to improve the course. In response, a set of short response questions has been added to the survey:

- What aspects of instruction did you find effective for promoting your learning?
- What recommendations would you make that would improve the instruction that you received in this course?
- If you have any additional comments, please write them in the space below.

Another change is that the student evaluation is now administered at the beginning rather than the end of the class period. When students are aware that they will have to remain in class until their instructor returns, experience shows that they are more likely to complete the short response questions.

**SLOWLY INTRODUCE NEW INSTRUMENTS**

After reexamining the current departmental instruments, we determined that new assessment instruments would be needed to adequately address our goals and objectives. Many faculty members were concerned that the time required to develop instruments, collect evidence and analyze results would be too great. In reaction to these concerns, a three-year plan was developed that supported the gradual introduction of new assessment instruments.

The first instrument that was introduced was the faculty survey. This survey asked the faculty members to report the objectives that they assessed and the methods that they used for assessment in each of their classes. In order to simplify the process of survey completion and data entry, an electronic version has since been created. A demonstration of this survey can be found at [http://www.mines.edu/Academic/assess](http://www.mines.edu/Academic/assess). Next, the student survey, which asks students to report which goals and objectives were addressed within a given class, was developed. The information collected through this survey is used to validate the information reported on the faculty survey. Since the majority of mathematics classes do not meet in a computer lab, the student survey is administered in a paper format, a copy of which can be found at [http://www.mines.edu/Academic/assess](http://www.mines.edu/Academic/assess).

**SHARE THE RESPONSIBILITY WITH OTHER DEPARTMENTS AND THE INSTITUTION**

One method for reducing the time demand of assessment is to share the responsibility with other departments and the larger institution. For example, a broad goal of CSM is to prepare the students for
their future careers. Companies that hire our students can provide valuable feedback with regard to our success in this area. However, if each department contacts the same company with a different survey or interview, these companies will become reluctant to respond. CSM is currently developing a centralized process for acquiring feedback from the companies that hire our students.

Another difficulty with regard to departmental assessments is that students frequently change majors. Students who leave a given program are different from the students who graduate from that program. If departments collect data on their entering freshman and their existing seniors, they may find that the populations are not comparable. At CSM, all entering freshman complete the Engineering Practices Introductory Course Sequence (EPICS). Efforts are currently underway to collect baseline data in this course. Departments will be able to request from the EPICS department baseline data that was collected on their graduates when they were freshman.

**USING ASSESSMENT INFORMATION**

Faculty and students will not value the assessment process unless they recognize that the collected information is being used in a productive manner. The MCS department has made an effort to both use and track the use of the information that we have acquired through assessment. A record of how the information that has been collected through our assessment efforts can be found at [http://www.mines.edu/Academic/assess/Feedback.htm](http://www.mines.edu/Academic/assess/Feedback.htm). By maintaining this information in a public forum, both faculty and students are reminded that their efforts are providing information that is being used. This knowledge has resulted in less resistance on the part of faculty members to the time that is necessary for assessment efforts.

Faculty members are also encouraged to read and use the feedback that students provide on the student evaluation. At the end of each term, all faculty members are asked to submit a written response to the following questions.

- What information did your students provide in response to the evaluations that may be useful for improving future classroom instruction?
- What changes in instruction do you anticipate making in response to your students’ feedback?
- What changes did you make this semester based on your student feedback from previous evaluations that you found to be effective for improving instruction?
The faculty members’ responses are submitted and discussed with the head of the department. Both the written response and the discussion are maintained as confidential.

**CONCLUSION**

The purpose of this article is to provide a brief summary of some of the issues that should be considered when developing and implementing a departmental assessment plan. The efforts described here are part of an ongoing process of assessment reform at CSM. For further information concerning our assessment efforts, visit the department’s assessment web page at [http://www.mines.edu/Academic/assess](http://www.mines.edu/Academic/assess). Hyperlinks are also available to assessment information that is available at other institutions at [http://www.mines.edu/Academic/assess/Resource.htm](http://www.mines.edu/Academic/assess/Resource.htm). (Note: The authors would like to thank Teri Woodington for the construction and maintenance of many of the web sites referenced in this article.)

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