Mechanical Engineering Technology

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Degree Program(s) Assessed	Assessment Methods	Number of Individuals Assessed
B. S. Mechanical Engineering Technology	Fluid Power Society Capstone Design Course Embedded Assessment Industrial Advisory Council Review Alumni Survey (OSU/OUA) Mini Baja Competition Car	25 27 260 8 NA at this time 8

Analysis of Findings:

External evaluators from project sponsors of our Capstone Design Course and paid jurors provided excellent input in regards to the technical content and the oral and written reports prepared by the students. Videotapes were made of all the projects. The quality of both the written and oral reporting has been maintained. The paid jurors provided improved feedback that was lacking when only volunteer/peer review was used. The faculty assigned to this course for this time period has significant industrial experience and a history of successful design work.

The performance of students on embedded assessment consists of taking questions from the Fundamentals of Engineering exam and including them in regular testing exams. The number of students taking the FE remains small and consists of only the best students. The new procedure of using FE exam questions tests a majority of the MET student body and is much more representative. Testing which does not involve graduation implications has not been as successful such as the Fluid Power Certification test.

The Mini-Baja team competed in Provo, Utah and Troy, Idaho. Significant improvements were made on required reports submitted by the student team members. This competition is time consuming for the students and tests all activities from fund generation to testing and competition. There is continual concern over inadequate funding and the students spending too much time on this activity and performing poorly on their academic programs. Also, the competition is scheduled during finals week which is difficult for all parties involved.

In the Student Exit Interview, students were asked about the adequacy of the computer labs and software. The results were strongly positive with over 90 percent answering yes. Also, the students were asked about the appropriateness of the Math, Chemistry, and Physics sequence for their degree. Again, the response was strongly positive.

Fluid Power Society (FPS)

Twelve students took the job performance test (Hydraulic) on April 12, 2003, and all of them passed the test. Twelve students took the written test (Industrial Hydraulic Technician) on April 26, 2003, and four of them passed the test. Students need to pass both written and job performance tests in order to get certified. The low pass rate on the written test according to the professor in charge can be attributed to students prematurely taking the test and/or not taking advantage of the review sessions made available to them.

Fundamentals of Engineering Exam

Two professors continue taking questions from the FE and have reported that their students performed well on these exam questions. Performance of most students on the FE Exam questions was quite similar to their performance on the other test questions on the examinations. The specific courses were: GENT 3433 Basic Thermodynamics, GENT 4433 Heat Transfer, MET 3313 Applied Fluid Mechanics, and MET 4453 Applied Thermodynamics. Each test given in the 2002-2003 Academic Year in the courses listed above included four typical Fundamentals of Engineering Examination questions. In most cases, some small but significant fundamental calculation was needed to choose the most correct response. Each question involved the application of one or more fundamental essential concepts. Success rates of 75% have been reported.

In Fall 2001, MET 2103 Industrial Materials students (40 students) were given an exam with a total of 41 questions, 15 of which were from the Fundamentals of Engineering (FE) exam. Success of students on the FE questions correlated well with the student's success on the overall exam. The test score average was 73.6 and the FE score average on the 15 exam questions was 72.0. In Fall 2002, MET 2103 Industrial Materials students (53 students) were given comparable exam with a test score of 79.4 result. The average score on the FE questions was 66.4. In both semesters, students were mixed in their appraisal of which was harder, the FE questions or the instructor questions. From the distribution of the scores, their appears to be no significant problem with the performance of our students based on national norms.

Mini-Baja Competition Car
Student teams designed, fabricated and competed in two Mini-Baja off-road vehicle contests. Students are required to design and build a competition car and compete with other major universities. Students are required to schedule their activities, build the car, arrange transportation to the competition site and compete. Two races were competed with reasonable success. Reports are written and a senior faculty member supervises activities.

Capstone Design Course (MET 4123 Senior Design Projects)
(Fall 2002, 9 students, 4 project teams; Spring 2003, 18 students, 6 project teams)
In the senior design project or capstone course, students work in teams of two or three to develop a mechanical design, which integrates their knowledge and skills acquired in their previous courses. Each student asks local industrial contacts for potential projects, formulates a suitable problem with the industrial sponsor, develops a project proposal, and presents the proposal to the class. Students, with guidance from the instructor, form teams to work on a subset of available projects. Each team develops a design, writes a report, and gives an oral presentation of their design to an audience of industrial sponsors, faculty, and students. Feedback to the instructor from industrial sponsors and other faculty members verify that the technical content and creativity of the student designs are consistently at a baccalaureate level or higher.

Paid jurors were used in both the Fall 2002 and Spring 2003 presentations. Their specific comments included:

- Student projects should be narrower in scope with more definitive requirements detailed by the sponsor, the instructor and the team.
- There is a need for more departmental faculty involved in the student team projects. Calculations without units, spelling, etc. needs attention.
- Presentation mechanics were good. Presentations were well rehearsed and reports were available.
- Some formalized method of selection of the projects should be discussed.

Uses of Assessment Results:
Academic Program
Machine Design Curriculum Changes
CEAT Common Lab Concept
Provided ANSYS software
Students get better value on Lab Fees
FEA Course
Provides "New Technology Transfer" to MET students
Applied focus allows coverage of high-level analysis techniques industry needs
OSU-MET
Adequate student enrollment and faculty with proper skills to sustain regular offerings of two electives in each specialty area
Certification and State of the Art Technology
- AutoCAD, ProE, Rapid Prototyping, ANSYS
- Hydrasim, Designer, 3 or 4 Fluid Power Technician Certifications
- Strain Gage, MathCAD, Fast Fourier Transform
- MasterCAM, CMM, Injection Molding, Liquid Plastic Molding

Industrial Advisory Board

The Industrial Advisory Board was tasked to concentrate on those activities which support our TAC/ABET2K accreditation. Specifically, the following action items were identified:

1. Provide more input to them on the new ABET 2000 accreditation
2. Graph A-K for IAB to look at before the next meeting
3. Provide information on how IAB members can become ABET Evaluators
4. Develop objective statements for each course
5. Identify advisory board members that could be trained as TAC/ABET Evaluators

Results:

February 18, 2003 IAB meeting

[redacted] of Halliburton Corporation attended a TAC/ABET Program Evaluator Training workshop in New Orleans. He stressed to the faculty that all course syllabi should have objectives and outcomes statements and demonstrate how A-K is covered in class. Also, we should have a file on each course with documentation of A-K.

ABET Assessment Workshop highlights presented to departmental faculty. Specific tools that can be used to measure expected accomplishments of the students are: 1). Employer feed back surveys – there is no need to do this every year, maybe every 2-3 years. 2). Videotaping students throughout their college career to show progress students are making, also having students keep a portfolio of their work.

May 14, 2003 IAB meeting

The IAB committee reviewed the program objectives and recommended changes be made. The Program Objectives were developed for review by the appropriate university administration.

The IAB reviewed course objectives submitted by the faculty and made the following recommendations:

Faculty must have proof that they are doing what their course objectives state.
Course objectives must not be too general so that measurements can be made.
Coverage of A-K must be assured.

Tasks to be completed by the next IAB meeting include:

1). Course objectives for all courses should be completed.
2). Course matrix completed.
3). One sample per instructor of a course evaluation form should be prepared.
4). One sample per instructor of home-work/test/report – that document A-K.