Continuous Improvement Initiatives

The Engineering Technology programs in the School of Construction underwent a 6th year ETAC-ABET accreditation visit in fall 2010. From that visit, it was apparent that the program objectives in WeaveOnline did not provide adequate resolution from course level to program level. The organization of supporting materials and student samples of work was also extremely difficult to collect and organize in a meaningful manner. It was decided then to reorganize the program learning outcomes to exactly map to the ETAC-ABET general and program specific criteria with direct linkages from each course in the program that supported a particular criterion. For the Architectural Engineering Technology program, these criteria are:

General Criteria for all programs

For baccalaureate degree programs, these student outcomes must include, but are not limited to, the following learned capabilities:

a. an ability to select and apply the knowledge, techniques, skills, and modern tools of their disciplines to broadly-defined engineering technology activities,

b. an ability to select and apply a knowledge of mathematics, science, engineering, and technology to engineering technology problems that require the application of principles and applied procedures or methodologies,

c. an ability to conduct standard tests and measurements; to conduct, analyze, and interpret experiments; and to apply experimental results to improve processes,

d. an ability to design systems, components, or processes for broadly-defined engineering technology problems appropriate to program educational objectives,

e. an ability to function effectively as a member or leader on a technical team,

f. an ability to identify, analyze, and solve broadly-defined engineering technology problems,

g. an ability to communicate effectively regarding broadly-defined engineering technology activities,

h. an understanding of the need for and an ability to engage in self-directed continuing professional development,

i. an understanding of and a commitment to address professional and ethical responsibilities including a respect for diversity,

j. a knowledge of the impact of engineering technology solutions in a societal and global context, and

k. a commitment to quality, timeliness, and continuous improvement.

Criteria Specific to Architectural Engineering Technology

Associate degree programs (and our corresponding lower-division) must demonstrate that graduates are capable of:

a. employing concepts of architectural theory and design in a design environment;

b. utilizing modern instruments, methods and techniques to produce A/E documents and presentations;

c. conducting standardized field and laboratory testing on construction materials;

d. utilizing modern instruments and research techniques for site development and building layout;

e. determining forces and stresses in elementary structural systems;

f. estimating material quantities for technical projects;

g. calculating basic loads and demands in mechanical and electrical systems;
h. utilizing codes, contracts and specifications in design, construction and inspection activities; and
i. employing productivity software to solve technical problems;

Baccalaureate degree programs must demonstrate that graduates, in addition to the competencies above, are capable of:

a. creating, utilizing and presenting design, construction, and operations documents;
b. performing economic analyses and cost estimates related to design, construction, and maintenance of building systems in the architectural engineering technical specialties;
c. selecting appropriate materials and practices for building construction;
d. applying principles of construction law and ethics in architectural practice;
e. applying basic technical design concepts to the solution of architectural problems involving architectural history, theory and design; codes, contracts and specifications; electrical and mechanical systems, environmental control systems, plumbing and fire protection; site development; structures, material behavior, foundations; construction administration, planning and scheduling; and
f. performing standard analysis and design in at least one recognized technical specialty within architectural engineering technology that is appropriate to the goals of the program.

Criteria Specific to Construction Engineering Technology

Associate degree programs (and our corresponding lower-division) must demonstrate that graduates are capable of:

a. utilizing modern instruments, methods and techniques to implement construction contracts, documents, and codes;
b. evaluating materials and methods for construction projects;
c. utilizing modern surveying methods for construction layout;
d. determining forces and stresses in elementary structural systems;
e. estimating material quantities and costs;
f. employing productivity software to solve technical problems

Baccalaureate degree programs must demonstrate that graduates, in addition to the competencies above, are capable of:

a. producing and utilizing design, construction, and operations documents;
b. performing economic analyses and cost estimates related to design, construction, and maintenance of systems in the construction technical specialties;
c. selecting appropriate construction materials and practices;
d. applying principles of construction law and ethics;
e. applying basic technical concepts to the solution of construction problems involving hydraulics and hydrology, geotechnics, structures, construction scheduling and management, and construction safety; and
f. performing standard analysis and design in at least one recognized technical specialty within construction engineering technology that is appropriate to the goals of the program.

Criteria Specific to Industrial Engineering Technology

a. Graduates must demonstrate the ability to accomplish the integration of systems using appropriate analytical, computational, and application practices and procedures.

b. Graduates at the baccalaureate level must demonstrate the ability to apply knowledge of probability, statistics, engineering economic analysis and cost control, and other technical sciences and specialties necessary in the field of industrial engineering technology.

Faculty then mapped each of their course objectives to the ETAC-ABET criteria using a listing of the assessment tools/methods for assessing each objective/criterion. This provided evidence of which courses in the program inventory were supporting any given ETAC-ABET criterion and also provided a simple index system for staff to organize supporting materials by criteria for inspection. And, while ETAC-ABET only requires summative evidence, this approach easily supports formative inspection of the curriculum.

WeaveOnline Objectives reflect the exact ETAC-ABET criteria with two measures for each criterion: one direct and one indirect. The direct measures are the aggregated assessments for all student work samples (projects, exams, quizzes, papers) as determined by the faculty in their mapping exercise. The indirect measures will be the graduate exit surveys and alumni surveys rewritten to also reflect the ETAC-ABET criteria; these have not yet been implemented for this cycle.

Faculty then reported their findings for each section of their courses for fall 2010 and spring 2011. At the course level, it was decided to begin this process using targets of 80% of students would achieve 70 (out of 100) on the assessments. The findings were separated by program area the course might serve; for example, a course might have Architectural Engineering Technology (ACT), Construction Engineering Technology (BCT), Industrial Engineering Technology (IET), or other (OTHER) students. These findings were organized in a master spreadsheet organized so that the findings for each criterion for each program by semester and by delivery type (online or face-to-face) could be summed. This provides the total number of student samples for each criteria meeting the performance target versus total number of students being assessed. The findings for each criterion were then entered in WeaveOnline as annual summation values as well as being reported by semester and by type of site or delivery method. This system allows the program faculty to see the impact of their courses as a whole and individually on each criterion.

Beyond the reporting system for SACS, ETAC-ABET and ACCE, the faculty now have a systematic approach to evaluate each of their course objectives using the defined performance target levels to look at weaknesses in each course, develop action plans at the course level, and “close the loop”.

Closing the Loop ACT

At the program level, all performance targets were met. In the Architectural Engineering Technology (ACT) program, this is represented by 8,863 student work samples (out of 10, 130) that were evaluated as better than or equal to 70 (out of 100). The percentage of samples better than or equal to 70 is 87% which exceeds our stated level of performance of 80%. These findings were derived from 15 of 23

courses in the curriculum; the findings from the remaining eight courses are still being pursued but were courses taught by an adjunct and an instructor that lost all data from hard-drive failure. (These two issues will lead to an improved reporting system).

Since the data is driven from the ground up (that is, from the faculty), the value of this assessment approach is that all faculty are involved rather than a select few as previously. The faculty are able to review their course level findings with respect to either the ETAC-ABET criteria or the course objectives (which are generally more important to them). Although we have met all performance targets at the annual program level, there are findings (also reported in WeaveOnline) where the semester based report for either face-to-face or online might not have met the performance target. It is a simple matter to drill back down to the course level and determine which assessment tools the students were having difficulty with.

When the faculty submitted their findings, they were asked to provide an assessment of any finding that went below the 80% threshold and develop action plans as needed. In some cases, the issue was too few students in a section; these sections did not require an action plan but would be monitored. Sections with significant student numbers that had assessments below targets were added to the action plan section in WeaveOnline.

Closing the Loop BCT

At the program level, all performance targets were met. In the Construction Engineering Technology (BCT) program, this is represented by 22,123 student work samples (out of 24,768) that were evaluated as better than or equal to 70 (out of 100). The percentage of samples better than or equal to 70 is 89% which exceeds our stated level of performance of 80%. These findings were derived from 21 of 22 courses in the curriculum; the findings from the remaining course is still being pursued but was taught by an instructor that lost all data from hard-drive failure. (This issue will lead to an improved reporting system).

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Closing the Loop IET

At the program level, all performance targets were met. In the Industrial Engineering Technology (IET) program, this is represented by 4,645 student work samples (out of 5,354) that were evaluated as better than or equal to 70 (out of 100). The percentage of samples better than or equal to 70 is 88% which exceeds our stated level of performance of 80%. These findings were derived from 11 of 13 courses in

the curriculum; the findings from the remaining two courses will be captured for the next cycle since they were not offered last year (due to two-year cycle of offering).

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When the faculty submitted their findings, they were asked to provide an assessment of any finding that went below the 80% threshold and develop action plans as needed. In some cases, the issue was too few students in a section; these sections did not require an action plan but would be monitored. Sections with significant student numbers that had assessments below targets were added to the action plan section in WeaveOnline.