A Systematic Outcomes Assessment Plan for a Non-traditional EET Program

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Introduction

The value of regional and professional accreditation is well established in the educational community. Establishing an effective outcome assessment plan has been an important part of the accreditation process for virtually every educational institution. The outcome assessment process is a very crucial source of input to the institution’s continuous improvement program. It provides a metric against which the institution can assess its performance. It helps assure all stakeholders, students, faculty, and prospective employers, of the value of this form of education. Most importantly, it provides a continuing reminder to the faculty of the professional goals of technology education, and provides a guidepost for the degree of rigor needed in coursework.

Accreditation is perhaps even more valuable at a non-traditional institution such as Excelsior College (EC). The ABET-accredited BS in Electrical Engineering Technology (BSEET) degree program offered by EC is designed for adult learners who want to improve career prospects and expand individual horizons but need a flexible learning format that enables learners to study at an individual pace and rate. This model of education equips successful students to further their careers through enhanced knowledge, understanding, and application of what was learned to their work environments. The differences among the credit sources recognized by EC are:

- Credits from regionally accredited institutions
- Credits for ACE/PONSI approved courses
- Credits through Exams - CLEP, DANTE, EC
- Credits through assessed certifications, training, and examinations
- Credits through Extra Institutional Learning process
- Credits through EC portfolio assessment for prior learning
- Credits from not regionally accredited institutions
- Credits earned through online courses at EC and preferred providers

The ease of integration of credits earned from various sources, absence of residency requirements, along with non-punitive transcripts might be misconstrued to mean that EC is an easy place to gain a degree. In order to avoid any misconception, EC has developed a system of checks and balances in the form of appropriate and robust policies, procedures, and mechanisms that make EC an outstanding alternative education provider. [1]

This paper describes the evolving assessment plan used by the School of Business and Technology at Excelsior College to assess student performance and graduate attainment in three areas: program educational objectives, program outcomes, and TAC of ABET Criteria. Multiple assessment tools consist of a capstone course, used as the direct measure of student learning outcomes, as well as, post-graduation surveys, and a supervisor survey. Assessment results and
lessons learned will also be presented in this paper.

**Description of the Plan**

*Excelsior College in Perspective*

Excelsior College in Albany, New York, was founded in 1971 by the New York State Board of Regents, and was originally known as Regents College. In 1998, it was granted a charter to operate as a private, independent college and changed its name to Excelsior College in 2001. Currently, it has approximately 33,000 enrolled students. Recognizing that there are many adult learners who have acquired their knowledge and capabilities through experiences other than formal classroom learning, at the center of the Excelsior College mission and strategic plan is the idea of “What you know is more important than where or how you learned it.” To that end EC has designed a model that is student centered and responsive to the needs of career-oriented adult learners at a distance. EC has a diverse student population, with 89% of the student body located outside of New York where the College is headquartered. The average student age is 39, with a large number of students drawn from the military.

The accreditation process is a crucial source of input to the institution’s continuous improvement program. The College is accredited by the Commission on Higher Education of the Middle States Association of Colleges and Schools. All its programs are approved by the New York State Education Department and its examinations are recognized by the American Council on Education (ACE). The School of Business and Technology at EC offers a variety of degree programs, two that are accredited by TAC of ABET. They are the baccalaureate degree programs in Electrical Engineering Technology (BSEET) and in Nuclear Engineering Technology (BSNET). (Note: ABET is a non-profit organization that accredits postsecondary degree programs worldwide in applied science, computing, engineering, and technology).

This paper concentrates on the BSEET program, but many of the descriptions, observations and conclusions apply as well to that of the BSNET program.

*Outcomes Assessment of the Engineering Technology Programs*

The academic progress of each individual student is subject to a periodic review. Per Excelsior College Program Evaluation Policy, each academic program at EC undergoes a 5-year review cycle. In supporting this systematic review process, this annual assessment plan is developed to track and document results pertaining to the program level student outcomes. Ongoing review procedures related to the assessment of student learning are documented in the Institutional Assessment Plan of Student Learning (IAPSL).

Under the College’s assessment framework, the School of Business and Technology developed an assessment plan that incorporates a systematic process to measure the achievement of three interrelated categories of student learning outcomes and graduate achievement: program educational objectives (PEOs), TAC of ABET Criterion 3 Program Outcomes, and BSEET program outcomes (POs).

Six program educational objectives (PEOS), which are broad statements that describe what graduates are expected to attain within a few years of graduation, were established for the program by the Dean in consultation with the Industrial Advisory Committee, the faculty, the Academic Advisory Staff, and input from students and alumni. The PEOs are designed to produce graduates who are prepared with the depth of knowledge, breadth of experiences and an attitude of professionalism that will enable them to:

1. Apply general and discipline specific concepts and methodologies to identify, analyze and solve technical problems.
2. Demonstrate an individual desire and commitment to remain technically current with, and adaptive to, changing technologies through continuous learning and self-improvement.
3. Demonstrate independent thinking, function effectively in team-oriented settings, and maintain a high level of performance in a professional/industrial environment.
4. Communicate effectively in a professional/industrial environment.
5. Perform ethically and professionally in business, industry and society.
6. Attain increasing levels of responsibility and leadership in one’s chosen career field.

The thirteen BSEET program outcomes (POs) are primarily drawn from the TAC of ABET ‘a through k’ listing that appears in the TAC of ABET General Criteria as well as the relevant ABET criteria for BSEET programs. The following POs are the skills and knowledge that students are expected to know and be able to do by the time of graduation:

1. Demonstrate a fundamental knowledge of natural sciences, including physics.
2. Demonstrate the ability to measure, and provide quantitative expressions of natural science phenomena, including experimentation, observation, and accurate measurement.
3. Apply the fundamentals of algebra, trigonometry, and calculus to problem solving in electrical engineering technology areas.
4. Make oral technical presentations in English using language appropriate to the audience.
5. Demonstrate proficiency in the written communication of technical information using English.
6. Demonstrate a working knowledge of computer usage, including knowledge of one or more computer languages or documentation of the use of one or more computer software packages for technical problem solving appropriate to the electrical engineering technology discipline.
7. Demonstrate technical competency in electronics, circuit analysis, digital electronics, electronic communications, microprocessors, and systems.
8. Integrate knowledge of the functional areas of electrical engineering technology.
9. Demonstrate the ability to analyze, apply design concepts, and implement systems as appropriate to electrical engineering technology.
10. Participate effectively in groups, and apply project management techniques as appropriate to complete assignments.
11. Demonstrate an ability to understand professional, ethical and social responsibilities, including the impacts of culture, diversity, and interpersonal relations.
12. Demonstrate a commitment and ability to continue to engage in lifelong learning.
13. Demonstrate a commitment to quality, timeliness, and continuous improvement. [2]

The primary direct assessment of program outcomes (POs) to determine the level of achievement is through the Integrated Technology Assessment (ITA) Capstone. The ITA is the mandatory capstone assessment for all students in the program. This assessment requires students to address all of the outcomes of the program in a single coherent portfolio document. In preparing the ITA portfolio, students reflect on past academic and professional experiences and develop written narrative statements related to each program outcome. Documented evidence must be provided to substantiate that program outcomes have been met. This evidence can include term papers, tests, laboratory reports, homework or other class assignments, presentations given, and letters from employers or professors. The ITA is the most significant aspect of ensuring that program outcomes are achieved by all graduates. [3]
The level of achievement of POs is also collected through the six months post-graduation, one year post-graduation and three year post graduation surveys. The aggregate responses for each question are analyzed and those responses below midpoint (3.5 on a 7-point Likert scale) or those that are significantly lower than the others are investigated further.

**Benchmarks and Metrics**
The articulated benchmarks set to evaluate the attainment of each program outcome are:

1. **Metric 1**: The average score for the ITA students’ learning statements and supporting evidence for the related program outcome will be 2.0 (where grading scale is 0-3) or better.

2. **Metric 2**: The mean of the graduates’ perceptions on the surveys of their achievement of the related program outcome will be 3.5 or higher on a 7-point Likert-scale.

The level of achievement of the program outcomes is determined by collecting, analyzing, and evaluating the ITA performance data and the data obtained by the surveys. A School of Business and Technology Continuous Improvement Committee (CIC) is responsible for biannually reviewing the ITA data and annually analyzing the survey data and evaluating how well students are achieving the program outcomes. Recommendations based upon these evaluations are made by the CIC to the program faculty.

The level of achievement of the program educational objectives (PEOs) is determined by collecting, analyzing and evaluating the survey results. The CIC is involved in formulating the assessment tools and in annually evaluating the assessment data. Recommendations based upon evaluation of assessment data are made by the CIC to the program faculty.

**Results and Conclusions**
The results from the students’ performance in the ITA for the Academic Year 2008-2009 indicated that the students had successfully provided evidence to demonstrate their competencies in achieving each of the program outcomes. In reviewing the three surveys, the results indicated that in general, the graduates rated themselves as either having achieved or highly achieved most of the program outcomes, and the supervisors rate BSEET graduates better than their peers on most items related to program educational objectives.

In reviewing the assessment results, the Continuous Improvement Committee has identified the following issues concerning the designing and the administration of these measurements:

- More formalized and precise metrics are needed to enhance the validity of the assessments.
- These positive results, however, also imply that the standards in the assessment plan have been set too low. In order to provide more meaningful information for continuous program improvement, the assessment plan needs to be revised so that appropriate standards for assessing program outcomes are clearly defined.
- In the ITA, rubrics on the expected characteristics with each outcome are needed to enhance the consistency in the grading among the instructors.
- A mixture of the six-month, three-year, and supervisor survey items was used to assess the achievement of the POs. Using this method makes it difficult to obtain an overall rating for each PO.
• This survey is somewhat valid for assessing the program’s POs; however, there were no survey items directly assessing achievement of POs. The survey items pertaining to the POs need to be reworded to enhance the content validity of the surveys.

This has led to a number of improvements for the 2009-2010 year. Recognizing that the assessment processes would benefit from more formalized and precise metrics, a task force was formed to develop, propose, and implement new performance criteria that meet this need. Specifically, the following are the improvements made on the proposed new assessment plan:

• Multiple direct measures: in addition to the designated ITA learning statements, for most of the program outcomes, two course embedded assessments will be selected as additional direct measures of the associated program outcome.
• More precise metrics: percentage data instead of average scores on the designated assignments will be collected to more precisely capture the level of student achievement of each program outcome.
• Well defined level of achievement: In the assessment plan for academic year 2008-2009, only the acceptable level of achievement had been defined. Levels of achievement (e.g., highly achieved, moderately achieved, and minimally achieved) are clearly defined in the assessment plan for academic year 2009-2010.
• Longitudinal Perspective: assessment data collected from previous academic year (i.e., 2008-2009) will also be used and documented in the assessment report to evaluate the effectiveness of the changes made on the programs.

To enhance the delivery of the ITA portfolio assessment course, the following improvements have been made to the ITA after reviewing the outcome results:

• More precise grading rubric: the grading rubric has been modified to incorporate the characteristics of the achievement of each program outcome.
• Enhanced interpersonal interactivities: a series of graded discussion topics were created to increase student-student and instructor-student interactivity and foster community building among all members in the course.

To address the issues related to the survey instruments, the Continuous Improvement Committee met with the EC Director of Outcome Assessment several times and redesigned these instruments in November 2008. Specifically, the following are the changes made on the new survey instruments:

• Restructure the timing of the surveys: in the past, surveys were conducted at six months and three years post-graduation. The three-year survey included a component collecting contact information for employer supervisors for further surveying purposes. The decision was made to revise the surveys for administration at exit, one year, and three years post-graduation.
• Add items for program educational objectives and program outcomes: questions directly addressing students’ perspectives on their achievement of the program outcomes have been added to the exit and one year post-graduation surveys and questions addressing program educational objectives have been added to the one-year and three-year surveys.
• Add items related to program educational objectives to the supervisor survey.
Taken together, these findings and the resulting improvements for Academic Year 2009-2010 and beyond represent an aggressive continuous improvement effort for an already successful program.

Establishing an effective outcome assessment plan has been an important part of the accreditation process for virtually every educational institution. While it is crucial to use assessment data to demonstrate accountability to external accreditation agencies, the assessment data should also be utilized in an ongoing process to guide internal institutional improvement in programs and services. [4]

References
2. Excelsior College School of Business and Technology Catalog, (www.excelsior.edu)