Strategy for ABET Self-Study and Re-Accreditation

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Abstract

The University of South Alabama Department of Electrical and Computer Engineering (ECE) is currently in a self-study year prior to seeking a comprehensive review of undergraduate programs in Electrical Engineering and Computer Engineering by ABET's Engineering Accreditation Commission (EAC). USA was the first university in the state of Alabama to successfully receive six-year accreditation of programs under the ABET EC 2000 criteria. The ECE Department has developed a strategy for streamlining the process of self-study by systematically organizing and compiling information for program review. It is essential that the necessary information be collected without omission, but there was much unnecessary and redundant information that was collected in the previous accreditation cycle. In this paper, the process of preparing for an ABET review and some useful strategies for deciding what is and what is not important are discussed.

Introduction

The University of South Alabama (USA) was founded in 1964 in Mobile, Alabama as a regional educational institution. The Electrical Engineering program in the USA College of Engineering received its first six-year accreditation by the Accreditation Board for Engineering and Technology (ABET) in 1978.

In 1999, USA opted to seek accreditation under ABET's Educational Criteria 2000 (EC 2000) program. The required one-year self-study was performed in 1998 and an ABET site visit was conducted in October 1999 to evaluate the Batchelor of Science in Electrical Engineering and Batchelor of Science in Computer Engineering programs. In August 2000, the ABET Engineering Accreditation Commission identified weaknesses in both programs, requiring an Interim Report (IR) after a two-year period. The weaknesses were successfully addressed and both programs were fully accredited with a Next General Review (NGR) action in August of 2002. Significant lessons were learned in the process of correcting the weaknesses, resulting in constructive program changes.

Preparation for EC 2000

Preparation for the first visit was a challenge. The ABET Engineering Criteria (EC 2000) had to be interpreted in the absence of many good examples of EC 2000 accredited programs, particularly for universities of USA's size and student demographic. The University of South Alabama was the first university in the state of Alabama to seek accreditation under EC 2000.

The now well-know criteria included (1) Students, (2) Program Educational Objectives, (3) Program Outcomes and Assessment, (4) Professional Component, (5) Faculty, (6) Facilities, (7) Institutional Support & Financial, (8) Resources, (9) Program Criteria.[1] Criterion 1 and Criteria 4 through 8 are similar to the older ABET program criteria. The main differences in EC 2000 and earlier evaluation criteria are Criterion 2, Program Educational Objectives, and Criterion 3, Program Outcomes and Assessment.

The first major task was the establishment of clear program educational objectives for the electrical engineering (EE) and computer engineering (CpE) programs. After verifying that the objectives of both programs were consistent with the mission of the College of Engineering and the mission of the University of South Alabama, they were approved for publication in the University Bulletin and on the College of Engineering website.[2]

The second major task was to determine program outcomes and credible methods for measuring program outcomes. This initially required a critical analysis of each course in the EE and CpE curricula to determine if the course objectives contributed to the eleven (a-k) outcomes listed for Criterion 3. In some cases, revision of course content was necessary to ensure that all of the program outcomes were addressed.

The third major task was to determine instruments of assessment to ensure that program objectives and outcomes were met. The result was a set of assessment tools that included both surveys and numerical instruments of evaluation. These included a mid-semester survey, a survey of student opinions of teaching and an end-of-semester survey for each course; a questionnaire for graduating seniors at the conclusion of each semester; and annual surveys for alumni (limited to first through fifth year after graduation), and employers of graduates. The numerical tools included the subject-specific Fundamentals of Engineering Exam results (USA graduates are required to take the FE exam, but are not required to pass the exam), and the annual performance of USA's EE and CpE students in the IEEE SoutheastCON Hardware Competition.

Documenting compliance with other program criteria was more straightforward. Since there were many similarities to the older ABET criteria for self-study, the requirements were much more clearly understood. Samples of student coursework were compiled, all advising procedures and transfer policies were updated, and student files were all reviewed for completeness. Compliance with professional component requirements and faculty qualifications were ensured. All laboratory equipment was determined to be functional and up-to-date. Documentation of adequate facilities and institutional support was updated and made available. It was ensured that all discipline-specific program criteria were met.

Outcome of the EC 2000 Accreditation Visit

The ABET site visit in October 1999 identified two weaknesses: one under Criterion 2 (Program Educational Objectives) and one under Criterion 3 (Program Outcomes and Assessment). ABET granted provisional accreditation of the Electrical Engineering and the Computer Engineering programs through September 30, 2002, pending an Interim Report (IR).

As stated in ABET's August 2000 report,[3]

Criterion 2 (Program Education Objectives)
"The weakness remains pending documentation of progress and actions taken on the following items: the procedures for selection of constituent representatives and obtaining input from constituencies, and results of constituent participation in establishment and review of program objectives."

Criterion 3 (Program Outcomes and Assessment)
"The weakness remains pending documentation of progress and actions taken on the following items: revised procedures for program assessment, constituent acceptance of the revised procedures, method of evaluating the assessment tools, program revisions resulting from assessment procedures, and effectiveness of program revisions or modifications resulting from the assessment evaluation."

The USA ECE Department provided documentation that the weaknesses were remedied in a report submitted in January 2002.[4] ABET accepted the report and extended accreditation of the Electrical and Computer Engineering programs to September 30, 2006, the date of the Next General Review (NGR).

ABET's primary concerns involved procedures for the selection of program constituent representatives, evidence that the constituents were helping to establish program objectives, and how the programs are revised as a result of assessment, again with evidence of constituent participation. An Annual Retreat, held in January of each year, provides a multipurpose forum for obtaining input from constituents and for reaching a consensus on program evolution. At the retreat the program objectives, outcomes, and assessment tools are reviewed, discussed, and if necessary, modified.

What was learned in the first EC 2000 cycle

The main lesson learned from the first round of accreditation is not to complicate the documentation for Criteria 2 and 3. USA's selection of assessment tools and a larger number of outcomes caused some confusion to the program reviewers. ABET is adamant that it is not sufficient to just demonstrate achievement of educational objectives and program outcomes. Programs must evolve and become better in response to the results of assessment. George Peterson, ABET's Executive Director states that ABET "…requires each engineering program seeking accreditation or re-accreditation to establish its own internal assessment process, a commitment to which in turn will be assessed by ABET".[5] He also admits that: "No one expects that the outcomes assessment component of EC 2000 will be easy to implement. Establishing measurable objectives and evaluating their outcomes are sophisticated activities with which most engineering educators have had little or no experience".[5]

Many individual courses either had too many objectives associated with them, or had objectives that were poorly phrased. One of the assessment tools was an end-of-semester survey that asked students, on a 1-10 scale, how well the objectives were met in a particular course. Unless the

objectives closely match what is actually taught, the survey is an unsatisfactory indicator of compliance.

It was also clear from ABET's Draft Report that the ECE Department could have done a better job of listening to constituents. As mentioned above, the report identified significant program weaknesses in this area. ABET must be sure that constituents are providing input that is actually utilized to improve and evolve programs. There should be evidence that constituents are not merely providing a rubber stamp to policies implemented by the department faculty. The establishment of a formal Annual Retreat to address the problem of obtaining and acting on constituent input is an important first step toward fulfilling the spirit of EC 2000. However, just because this action satisfied weaknesses found in the previous visit doesn't mean that the process is complete. There must be evidence that the results of constituent input and the results from the assessment tools actually result in changes to improve the programs.

What ABET has learned

In a very enlightening presentation entitled *EAC Orientation for Institutional Representatives and Team Chairs* presented on 15 July 2004 in Baltimore, a critical analysis was done of what was learned in the 2003 accreditation cycle. The presenters included Pat Daniels - EAC Chair 03-04, Dave Holger - EAC Chair 04-05, and Bob Laurenson - EAC Chair Elect. The presentation slides are available on ABET's website, www.abet.org. In the summary below, some of the points made in the presentation are consolidated for reference.[6]

An interesting finding is that the ABET statistics for the percentage of programs with shortcomings prior to due process for 2003-04 indicate that over 50% of the programs evaluated either had concerns, weaknesses, or deficiencies in Criterion 3. In addition, almost one third of the programs evaluated had concerns, weaknesses or deficiencies in Criterion 2. The EAC team went on to clarify some of the problems they had seen in programs and to give some useful input on what constitutes deficiencies and weaknesses under Criteria 2 and 3.

Possible Issues for Criterion 2

- Educational objectives not published or readily accessible to the public
- Limited or no constituency input
- No evidence of constituency input in objective setting or periodic valuation
- Lack of faculty buy-in or support
- No systematic process for evaluating achievement of objectives
- Little or no evidence of evaluation of achievement of objectives
- Processes not fully implemented
- Processes not defined or documented; mostly ad hoc
- Little or no evidence of continuous improvement
- No systematic process of on-going evaluation
- Improvements made on an ad hoc basis rather than by a systematic process
- Little data available to demonstrate achieving educational objectives

Consider a deficiency if the general intent of Criterion 2 is not met. Contributing factors may include:

- No involvement of constituencies
- No process-oriented approach to achieving objectives (links to curriculum)
- No process-oriented approach to evaluate achievement of objectives
- No data that demonstrate the extent to which objectives are met
- No evidence of program improvement based on evaluative processes

Consider a weakness if the general intent of Criterion 2 is met to some extent, but not fully met Contributing factors may include:

- Objectives are published but are not accessible to constituencies and potential students
- Limited or ad hoc involvement of constituencies
- Incomplete process to achieving objectives (links to curriculum are not clear)
- Incomplete process-oriented approach to evaluating achievement of objectives
- Evidence of program improvement based on ad hoc processes

Possible Issues for Criterion 3

- No evidence demonstrating one or more outcomes
- Outcomes not assessed objectively
- Anecdotal versus measured results
- Reliance on course grades as assessment of outcomes
- Over-reliance on self-assessment (e.g. surveys)
- No systematic assessment process
- No process or process not documented
- Plans developed but not implemented
- Little or no faculty support for the process
- No evidence that assessment results are being applied to improve program
- Changes are ad hoc; assessment results not used
- Assessment & improvement cycle not complete

Consider a deficiency if the general intent of Criterion 3 is not met. Contributing factors may include:

- No documented working process(es) to produce outcomes
- Loop not closed on any outcomes
- Absence of defined goals and documented assessment results
- No assessment evidence that outcomes are achieved by students
- No evidence of efforts at program improvement based on assessment

Consider a weakness if the general intent of Criterion 3 is met to some extent, but not fully met. Contributing factors may include:

- Absence of a working process(es) to produce some outcomes
- Loop closed on some outcomes
- Defined goals and documented assessment results for some outcomes
- Absence of assessment evidence for a small number of outcomes
- Incomplete or ad hoc evidence of efforts at program improvement based on assessment

It is clear that ABET in general and the EAC in particular are committed to fulfillment of Criteria 2 and 3. For Criterion 2, program objectives must be clearly defined, formulated with constituent input, and objective achievement must be systematically evaluated. A documented process for continuous program improvement in response to the evaluation must be in place. For Criterion 3, programs must address all outcomes, which must be objectively measured. Assessment results must be used to make program improvements. It is also clear that all faculty must support the accreditation effort and must facilitate the process. This includes ensuring that assessment tools are used, course syllabi are regularly updated and course objectives are periodically evaluated to ensure that all program outcomes are covered.

What we are doing to get ready for the next cycle

Since the USA ECE Department has a better idea of what to expect in the upcoming accreditation visit, preparation should be easier. USA is currently preparing the required self-study report with emphasis on the weaknesses identified by ABET in the first EC 2000 accreditation.

The tools being used for outcomes assessment represent a revised set from the tools originally proposed in USA's ABET 2000 report. The revision was done to eliminate subjectivity and redundancy, as well as to reduce inconvenience to constituents. It is critical that all constituents take ownership of the continuous improvement of the program and not view the collection of data as merely an exercise. For this reason, assessment tools and procedures are discussed and voted on every year at the Annual Retreat to establish a clear consensus.

The revised program assessment tools, approved by all constituencies, include the following:[7]
End of semester surveys – Conducted each semester for each course taught in the ECE Department. The surveys document the student's opinion of how well the course objectives have been met. The surveys become a permanent part of each course report.
Alumni questionnaires – Conducted once per year.
Employer questionnaires – Conducted once per year.
Course Reports – Include all instructional materials and surveys for each course taught in the department. Course reports are kept on file for six years and are periodically reviewed by the ECE Undergraduate Affairs Committee.
Subject-Specific FE Exam results – Evaluated twice per year.
IEEE Southeastcon Hardware Competition Results – Once per year.

The CpE Coordination Committee and the ECE Undergraduate Affairs Committee are responsible for evaluating assessment tools and making recommendations for changes. The ECE Faculty is responsible for formally reviewing the recommendations of the committees concerning assessment tools and procedures. Program revision recommendations are made by the appropriate department committee(s), with the input and approval of the department chairman. Since many proposed revisions result directly from feedback from constituencies, the improvements are presented to all constituents during the Annual Retreat for discussion and approval.

In addition, the following Top Ten Tips for a Successful Accreditation Visit are suggested (with apologies to David Letterman).

1. Get started early

   The time to begin preparing for the next ABET visit is the day that the ABET review team leaves the campus. The heart of the ABET 2000 philosophy is a process of continuing improvement beginning with the recommendations made in the exit interview. If a department waits until the last minute to begin preparing for an ABET visit, it will be abundantly clear to the reviewers.

2. Get all faculty involved

   A significant time commitment is required by both the department chair and the department faculty. Although normal faculty workloads are always formidable, it should be made clear to the faculty that the time required to fulfill ABET duties is just as important as any other teaching, research or service duty, and adequate time must be allotted in faculty schedules to do a good job.

   Suggestions include linking faculty evaluation to performance in ABET related duties, such as syllabus preparation in ABET format, periodic updating of syllabi, keeping up with course description changes and objective changes, and keeping up with new textbook editions. Some of the harder outcomes to fulfill require the active participation and input from the faculty. Examples include environmental issues, global economy issues, contemporary social issues, and the changing technological environment. Workshops on topics such as ABET documentation procedures, student advising, evaluation of transfer credit, etc. are very helpful in documenting that the department is committed to a continual process of program improvement.

3. Keep up with documentation as you go along

   Collection and review of documentation is a formidable task. It is much easier to do in small increments than to wait until six years have gone by. Keep up with advising records, transfer credit evaluation, degree credit evaluation, course reports, and assessment results Make sure that there is a clear paper trail for changes in response to assessment. Changes include such things as course content revisions, curriculum modifications, modernization of capstone design project requirements, and updating of laboratories. Always keep in mind that the reviewers are going to be specifically looking at the process of program improvement, and the documentation must show that the programs are improving.

4. Find an ABET champion and reward him/her

   Although the entire faculty in the department should be involved in preparing for ABET accreditation, there should be one individual that is responsible for preparing the ABET self-study report. This individual should be conversant with the latest

version of accreditation guidelines and should be the go-to person for any questions concerning ABET.

It is much easier to prepare for an accreditation visit if one individual is keeping track of the process. Rewards for the effort should at a minimum include release time to attend workshops to become familiar with ABET criteria and to compile the documentation required. The time spent should be considered equivalent to academic release time for research. It is just as important to maintain program accreditation as it its to secure funding for research and individuals should not be penalized if they are concentrating on getting ready for an ABET visit rather than spending time writing research proposals or performing funded research.

5. Listen to all constituents

   Only using surveys of students and faculty as assessment tools is not enough. It is required that the input from all constituents be used to improve programs. As a specific example, an Industrial Advisory Board meeting should be a dialogue, not just a rubber stamp meeting to implement the wishes of the faculty.

6. Document the fact that you listen to constituents

   At any meeting concerning the input of constituents, there should be a corresponding formal set of minutes approved by all attendants. The attendants should be identified by name and an unapproved set of minutes should be circulated for approval and modification before being formally accepted. When there is informal contact with constituents, the informal contact should ultimately be raised in a more formal context. For example, an alumnus of the EE program might visit the campus to tell his professors that he found a job, and, by the way it would have been helpful if the department had offered a course in programmable logic controllers (PLCs). This suggestion could be incorporated into a formal agenda item for discussion at the Departmental Annual Retreat.

7. Do what your constituents tell you to do

   In as far as is possible and is reasonable, try to implement the wishes of all constituents in the program. Although it is impossible to reach a consensus on every issue, input from a variety of constituents is healthy. There should be a clear procedure and process in place for taking action in response to input from constituents. When no action is taken on a proposed change, there should be a clear reason why.

8. Be honest

   ABET doesn't expect every program to be perfect. There will be strengths in every program and areas that need improvement in every program. Again, ABET

emphasizes that accreditation is a process of improvement. If there is not a process in place, or if weaknesses in the process exist, don't try to cover it up.

9. Be really nice to your reviewers

   The reviewers are there to help. Cooperate in every way with requests for information. Don't use faculty interviews to air personal grievances about department policies or politics. A professional detachment should be maintained at all times. Always keep in mind that it is the job of the department as a whole to insure that the reviewers have access to all of the information that they need to make a good decision on accreditation of a program. Making life harder for the reviewers, or making them privy to irrelevant information is counterproductive at best.

10. Keep everything in perspective

    If an ABET review reveals concerns, weaknesses, or deficiencies, the problems can usually be mitigated. According to ABET, deficiencies are rare, but concerns and weaknesses are not, particularly in Criterion 3.[6] Even if the accreditation action taken is an interim report (IR) or interim visit (IV), ABET is usually very clear about their objections to the way things are being done and are specific about the actions that must be taken to remedy the situation.

Conclusion

The University of South Alabama's experience with the EC 2000 accreditation process was both instructive and constructive. Although weaknesses were identified in the EE and CpE programs, the ultimate result was positive. Many significant improvements in the program curricula have been implemented as a direct result of input from constituents. New technology and educational techniques are being incorporated. Continuous modernization of course content, textbooks, and laboratory exposure is being done, a process in which industrial constituents are particularly important. All of these benefits are a direct result of qualifying for accreditation under EC 2000. Since the process is in place, the next accreditation should be less stressful than the last.

During the first EC 2000 visit to USA in 1999, the process was still very much under development, as can be inferred from the many workshops and presentations that ABET has made available on their website. Hopefully, the effectiveness of the accreditation process is improving with time. As more programs are evaluated, the process becomes more meaningful and comes closer to the intent of ABET that constituents have a greater role in shaping engineering programs.

According to the EAC, the objectives of accreditation are to (1) Assure that graduates of an accredited program are adequately prepared to enter and continue the practice of engineering (2) Stimulate the improvement of engineering education (3) Encourage new and innovative approaches to engineering education and its assessment (4) Identify accredited programs to the public.[6] This being said, the final and most relevant measure of the educational success of graduates from the USA ECE department is a successful career in engineering. All constituents benefit from this outcome.

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