Standardizing ABET-Related Processes

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Introduction

Engineering teaching institutions (ETIs) differ from engineering research institutions (ERIs) in many regards. ETIs tend to focus primarily on the education of bachelors and masters level students, while ERIs also focus on PhD level education and research. As a result, the faculty at ETIs generally carry heavier course loads and there tends to be fewer institutional resources available for administrative support. At the same time, the engineering departments at both types of institutions are accredited by ABET and therefore must perform the same processes to pursue and maintain accreditation. The administrative overhead associated with ABET accreditation – including collecting data, meeting with various constituencies, benchmarking, and assessing outcomes – can strain the engineering departments typical of ETIs with their smaller faculty and limited administrative support.

In this paper, we relate our experiences at pursing and maintaining ABET accreditation at an ETI. Our goal in writing this paper is to provide suggestions for departments at similar ETIs for streamlining and minimizing the work processes associated with ABET accreditation. In this regard, what we relate in this paper can be described as best practices for ETIs, and in most cases these practices are easily transferable to ERIs.

Why Standardization

Our institution, Grove City College, in Grove City, Pennsylvania, is a highly selective, comprehensive college with an undergraduate enrollment of approximately 2500 students. The College has ABET-accredited programs in Mechanical Engineering and Electrical Engineering, with Computer Science applying for accreditation in the near future. Grove City College’s engineering and computer science student population is roughly three hundred taught by 16 full-time equivalent faculty. In addition to teaching four courses per semester, many faculty pursue scholarly research with students. ABET accreditation is valuable for Grove City College, and is supported by the faculty who see the benefits of well-defined curriculum assessment. One drawback of accreditation, however, is that adds substantial overhead. It is difficult for most faculty to devote significant time to accreditation activities given the typical teaching loads, and we do not have many administrative assistants who can aid us in our efforts. Thus, for us to successfully realize the continuous improvement brought about by accreditation, it became necessary to streamline as many tasks as possible.
Toward this end, we have spent considerable effort over the past year standardizing our ABET processes and related documents across the three departments (mechanical engineering, electrical engineering, and computer science), using technology where possible for data collection and workflow management. This standardization has made it easier for administrators to manage the ABET activities, and has made it easier to train new faculty in the accreditation process. In addition, this standardization made it easier for faculty to develop best practices across all three departments. An unexpected benefit is that the standardization has also facilitated the educational process for the students: all courses in engineering and computer science now use a common template for syllabi that uses the same layout and identical language for College policies that are common to all courses.

Furthermore, as we build the database of student performance, we now have data to conduct longitudinal assessment of student performance. One of the important enablers for automation is the Tablet PCs; as we describe later in the paper, tablets allow us to keep in digital form much of the material that is normally handwritten. As this information, such as homework assignments, is digital, it is a simple matter to store it in a database and index it. In the following sections we discuss specifically what has been standardized with respect to the ABET accreditation process and the benefits of standardization from the perspective of both the students and the college administration.

**Standardization – How and What**

Documents, policies, and procedures that we have standardized across all three departments include the following:

- **Syllabus:** *All* courses in engineering and computer science use the same syllabus format. General course information is followed by a listing of how the ABET program outcomes apply to the specific course and how each course outcome is assessed. In addition, all syllabi have the same layout. Office hours are listed on the first page and the course calendar is at the end.

- **Policies:** Where it is appropriate, policies are standardized. These policies include intellectual honesty, grading scales (“curving” practices are not standardized), final exam policies, course attendance, and appropriate use of technology in the classroom. Since these policies are the same across all engineering and computer science courses, there are fewer burdens on the students in coping with different policies for different classes. There is, however, variation in how some of the policies are applied in the different classes. For example, collaboration in homework assignments may be permitted in one class, but not in another.

- **Course-management systems:** All our courses have standardized on the same WebCT organization, as shown in Figure 1. While some faculty may make minor additions or deletions, the majority of the information remains the same across classes. The benefit of using course-management systems to facilitate ABET processes has already been recognized.1
• **Student Course-Evaluation forms**: All courses in engineering and computer science (as well as courses in the other department at the College) are evaluated by the students at the end of the semester using a standard evaluation form.

• **ABET-related forms**: End-of-term course evaluation memos, alumni surveys, spreadsheets for recording student evaluation relative to course outcomes, and similar forms are shared among the departments. This is particularly helpful for comparing data across departments. For example, we recently compared rubrics for student performance relative to course outcomes. This exercise was greatly facilitated by using a similar spreadsheet across departments.

• **ABET evaluation procedures**: As we have standardized the forms we use, we also standardized our evaluation methods, including the processes for evaluating student surveys, external advisory boards, year-end reviews, and student interviews. For example, all departments interview their senior and sophomore students in spring in a focus-group setting, and collect similar information on student perceptions of the curriculum, facilities, and faculty-student interaction.
To further help reduce the overhead associated with ABET processes, we use the technology infrastructure available at Grove City College. Examples of this include the following:

- All syllabi are submitted electronically by the faculty, and these syllabi are stored in folders on the Grove City College computer network. The engineering and computer science faculty have access to view all syllabi, which facilitates coordination of outcomes between related courses and provides our departmental ABET coordinators with easy access to the syllabi.

- Grove City College students are given computers when they enroll in the college. For the past three years, the students have received Tablet PCs. We are moving to requiring all students to use these computers for homework (since the Tablet PCs are pen-based, writing equations, drawing figures, etc., on the computer is as simple as using pencil and paper) and projects, and we are moving to electronic exams. The faculty use their Tablet PCs to grade the homework. Thus, we can easily keep all graded work in a database for ABET visitors to inspect as they see fit without having to employ the extra step of scanning the documents into the database.

- For those assignments and exams that are paper-based, we have multi-purpose printers that automatically scan, convert to PDF and store copies on network folders. As with Tablet PCs, this greatly simplifies collection and filing of paper-based graded assignments.

This automation has helped tremendously in removing the tedium of culling, copying, and storing tremendous amounts of paper on which assignments and exams are given. One of the added benefits of keeping documents in archived electronic format is that both students and faculty can access these documents as they need. Moreover, the documents can be indexed to support search. So, for example, an advisor can pull up the exams of one of her advisees over the past three years to look for performance trends.

The Administrative Perspective

Two commonly cited best practices of engineering institutions pursuing ABET accreditation are the following:

A committee with representation from each department to coordinate accreditation efforts and share best practices.

A continuous improvement process that leads to documented changes in the curriculum.

The Dean’s office at Grove City College has instituted these practices. A standing committee has been formed with representation from each of the three departments. These representatives have the responsibility of instituting and overseeing the ABET efforts of their respective departments. In recognition of the work involved, the representatives have been given release time equivalent to one course per semester.
This committee meets regularly with input from the Dean’s office. It is this committee that developed the common formats for the syllabi, end-of-term course assessment, and course web pages for all courses. In addition, this committee shares alumni and employer surveys as well as input from departmental advisory boards. This committee, with input from the Dean, has also standardized the continuous improvement process within the departments. While in larger engineering schools it may be possible for the accreditation activities to be self-contained within an engineering department, this is not possible in smaller engineering schools.

In addition, the Dean’s office coordinates the data gathering from the supporting general courses (physics, math, chemistry, humanities, etc.). This office also gathers the information necessary for Appendix II (institutional data).

With limited administrative and secretarial resources, it is imperative that the ABET processes operate as efficiently as possible. The standardization of the processes ensures this, and facilitates access to assessment information at all levels of the administration. The consistency in the accreditation efforts that results from the standardization reduces the overall workload associated with accreditation.

There has been an unexpected benefit of our work for ABET. The College is also preparing for reaccreditation by Middle States. Because this accrediting body has become more focused on outcome assessment, the engineering Dean’s office has been instrumental in guiding College-wide assessment processes that are now required by Middle States. Other departments outside of engineering and computer science can now use these standardized processes to aid in the Middle States accreditation process.

The Student Perspective

The students have also benefited from our emphasis on standardization. In particular, the two areas of most interest to the students are the course webpages, which are generally accessed daily by the students, and the course syllabi.

Grove City College uses two course management systems, WebCT and LMS. Faculty have tended to organize their courses in these systems according to their own interests. For example, in WebCT, faculty can design the layout of the “course site” to include such things as homework, notes, various types of handouts, and so forth. Some faculty, but not all, put their syllabus on the page. Some faculty assign homework using WebCT, while others use course folders on the network for assignments. The course-to-course variations in locations of documents lead to confusion among students as almost all the courses they take have had very different course-site organization.

As a result, we have instituted a consistent course-site layout using WebCT. It is now much easier for the students to find the relevant course information they need. In addition, they have less overhead each semester in learning each faculty member’s course webpage design (e.g., is
homework given under a link titled “assignments” or “homework,” are course announcements emailed to students or posted on the course site, etc.?).

The students have also appreciated the common syllabus format with uniform layouts and policy statements. Indeed, the variation in the design of course sites was less problematic compared to the variation in syllabus designs. Not only were the syllabi organized differently, they also often described different implementations of common policies. Once again, with a standardized syllabus, it is easy for students to find the information about the course they need. In addition, once students understand the intent of a common policy, they only need to be aware of small deviations in the application of a policy to a given course, such as the amount of allowable collaboration and the use of notes during an exam.

**Summary**

Standardization and automation have reduced the amount of work and the tedium of data collection for ABET accreditation. One of the most important secondary consequences of standardization is that it is easier for faculty to understand the accreditation process. In addition, standardization has led to discussion among faculty from different departments about both accreditation and teaching methods.

We have also found that both the administration and the students appreciate the standardization. Standardization had reduced the overall workload associated with ABET accreditation, and the best practices developed have been applied to other accreditation efforts at the College. In addition, since all classes use the same course-management software, use the same syllabus format, and where practical the same course policies, it is easier for them to find the information they need during the term.

Other ETIs can benefit from standardization and automation. There may be some faculty resistance since constraints are placed on their practices and they will need to spend effort to bring their materials and practices into accordance with the agreed-upon standards. However, the reduction in both the effort of and the overhead associated with accreditation will be evident to faculty.

**Bibliography**