2006-2384: FIRST-TIME ACCREDITATION: LESSONS LEARNED FROM THE ABET ACCREDITATION PROCESS

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First-Time Accreditation: Lessons Learned from the ABET Accreditation Process

Abstract

As the faculty from the new Industrial Engineering Program at Texas A&M University-Commerce (TAMUC) prepared for its *first-ever* program accreditation assessment from the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET), the self-study team was able to create a thorough and effective plan to assess the processes used in the new IE Program. The internal assessment team, comprised of three tenure-track faculty members and assisted by various internal and external stakeholders, was able to create a well-structured self-study document which helped us better understand the need for continuous improvement processes across the educational system and to identify sources of data needed to verify the progress being made toward our stated goals and objectives. Another element of the self-study and site visit preparation process was to document results from various program constituents to help insure that Program Educational Objectives (PEOs) were being satisfied, as required by the accrediting body. Several tools were used throughout the self-study to identify course-level competencies (IECCs) that were then mapped to IE program-level outcomes (IEPOs) and finally to the stated program PEOs. Throughout the self-assessment process, feedback was collected and information was solicited from four basic sources, specifically: 1) Internal Informal sources, 2) Internal Formal sources, 3) External Formal sources, and 4) External Informal sources. This paper describes the processes used and corresponding results of the ABET Site Visit completed in October. A sample of the graphical tools used to identify, track, collect, analyze, and report various outcomes as they relate to recent graduates of our new IE Program will also be provided.

Background

The Industrial Engineering program at Texas A&M University-Commerce was established by the Texas Legislature with an effective operational date of August 2002. At that time, the initial projection was to have 30 students enrolled in the IE program when classes began in the Fall. As it turned out, over 70 students enrolled for classes leading to a Bachelor of Science degree in Industrial Engineering at TAMUC. In each of the successive three years, enrollment in the IE Program at TAMUC has grown by 25 to 35 students per year. Current enrollment, after three years, is approximately 125 students, with more expected when classes begin in Fall 2006. Six students have graduated with a BS in Industrial Engineering from TAMUC and all six hold competitive positions in the IE discipline.

With this level of proven success so early in the program history, the next logical step was to submit a request for an accreditation assessment visit to the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET). This request began with a completed *Request for Evaluation (RFE)*, followed by a detailed self-study document, leading to an on-site visit by an accreditation assessment team. Once the site visit was concluded, the university had 14 days to submit any errors in fact to the chair of the visiting team, which would be used to prepare a draft statement to the institution. Once the draft

statement was received, the *due process response period* of the accreditation cycle began. This document will chronicle some of the processes followed and activities completed by the Industrial Engineering & Technology faculty at Texas A&M University-Commerce in preparation for the ABET accreditation process. A select number of *Lessons Learned* from the process will also be addressed.

Initial Preparations for the ABET Assessment Process

After the decision had been made to seek initial ABET accreditation for the Industrial Engineering Program at Texas A&M University-Commerce, the faculty members of the internal assessment faculty team met as an accreditation committee to begin the research needed to understand the scope of the effort and the associated timeline needed to achieve all the milestones and publication deadlines leading up to the site visit. This process began in August 2004, approximately 13 months before the actual site visit was to be scheduled. The initial requirement for the accreditation committee was to review and analyze the existing ABET assessment guidelines as contained in 1) *Criteria for Accrediting Engineering Programs* and 2) *The Accreditation Policy and Procedure Manual*. At that time, the criteria were unofficial for the upcoming accreditation cycle, so the team had to assess the impact (if any) that the new procedures would have on the program assessment process. Once the new criteria were approved (typically in November of the new cycle), the committee members could define actual developmental criteria for each of the topics defined in the ABET criteria.

In order to understand the assessment process, the accreditation committee held weekly meetings to discuss the internal and external assessment procedures used in the current program. These procedures included communications with internal and external stakeholders, such as students, industry sponsors, faculty members, administrators, Industry Advisory Board Members, and other interested parties that interface with each of these constituent groups. As the committee began their research, it became apparent that changes to our existing system had to be made, in order to comply with the expectations of the ABET assessment team. The Industrial Engineering curriculum at TAMUC was fundamentally sound, since it was modeled after a number of existing IE programs during the initial academic and legislative review processes, however, operational issues needed to be refined in order to improve the feedback and assessment portions of the ABET accreditation process.

The first area of improvement was the need to establish an Industrial Engineering Industry Advisory Board (IAB) and have these leaders from industry meet to establish a organizational charter and to define their leadership structure. The faculty committee defined criteria for inviting individuals to become charter members of the Industrial Engineering program IAB. Six members were invited to join the IAB and five of these members attended the inaugural IAB meeting in November 2004. This meeting provided the IAB members with an overview of the existing IE Program at TAMUC and helped them understand their role in improving the engineering curriculum over time. This meeting also served as a forum to define and discuss their critical role as our link to industry as engineering needs evolve. The IAB held their second meeting during the National Engineers Week celebration in February 2005, thus serving a dual role: 1) to meet with students currently enrolled in the IE program and 2) to refine their organizational structure. Two new members were invited to join the IAB as a result of this

meeting because of the insights and input of the IAB members relating the direction of IE and the composition of the board. The critical role of these industry leaders in providing a real-world foundation for faculty and students cannot be overemphasized. The IAB also served a central role during the on-site visit. Members of the IAB participated in a private discussion with the Program Evaluators (PEVs), followed by a joint luncheon with the entire ABET visiting team, faculty members, select students, alumni, and administrators.

Preparing the ABET Self Study Document

The next step in the ABET assessment process was to begin developing the self-study document, which would serve as the primary review document, leading up to the site visit itself. This document had to be submitted to ABET not later than July 1st, to enable the Program Evaluators (PEVs) and Team Chair to review the program prior to their site visit, typically scheduled during the September through December timeframe. The TAMUC Industrial Engineering self study document was modeled after the Engineering Self Study Questionnaire template provided by ABET, after several attempts to open the file using the "Open and Repair" feature of Microsoft Word 2003 (Download Forms and Criteria, 2006). In order to complete the self study document, several information components had to be obtained or created. Much of the self study document can be filled in using catalog descriptions and other institutional database information. Syllabi for each course in the curriculum had to be provided, but they were restricted to two pages per course. The full course syllabi were made available to the PEVs during their on-site visit. Editing the multi-page syllabi into a two-page format was a time consuming process that could be resolved more easily if the department or the college had adopted a policy to limit the essential course syllabi information to two pages from the start. Supplemental course information could then be provided to the students in whatever level of detail the instructor desired, without adversely impacting the accreditation procedures.

Additional self study sections included descriptions about the strategic plan for the institution and the outcomes/objectives that are being assessed in order to insure those plans are being followed. In an attempt to simplify and standardize the different levels of assessment, the faculty committee decided to create standard terms and acronyms for the each of the three assessment levels needed for our academic program (see Figure 1). The top level objectives or Program Educational Objectives (PEOs) form a vision of skills that students should possess after they have been in the workforce for three to five years. These quality indicators identify skills, knowledge, and abilities (SKAs) that graduates of individual academic programs should demonstrate to their employers. The second-tier defines the knowledge each graduating student should possess as they "walk across the stage to receive their diplomas". In our program, we defined these assessment components as Industrial Engineering Program Outcomes (IEPOs). The third-tier assessment is found embedded within each course syllabus. The individual course competencies were defined within each course as part of a college-wide embedded assessment program. These Industrial Engineering Course Competencies (IECCs) are used as a baseline for course-level assessment of student work, consistent with many course assessment models. The value added component in this system is the mapping of these IECCs to our curriculum IEPOs which then map to the long-range PEOs. Table 1 provides an example of the result of this mapping. The committee should analyze the table to be sure that each a-k criterion is covered by at least one educational objective, and that each education objective serves to satisfy at least one

criterion. Stakeholders who were responsible for each assessment tier are also shown in the right-hand column of Figure 1, but the definition, composition, and duties assigned to each of these stakeholder groups is beyond the scope of this paper.

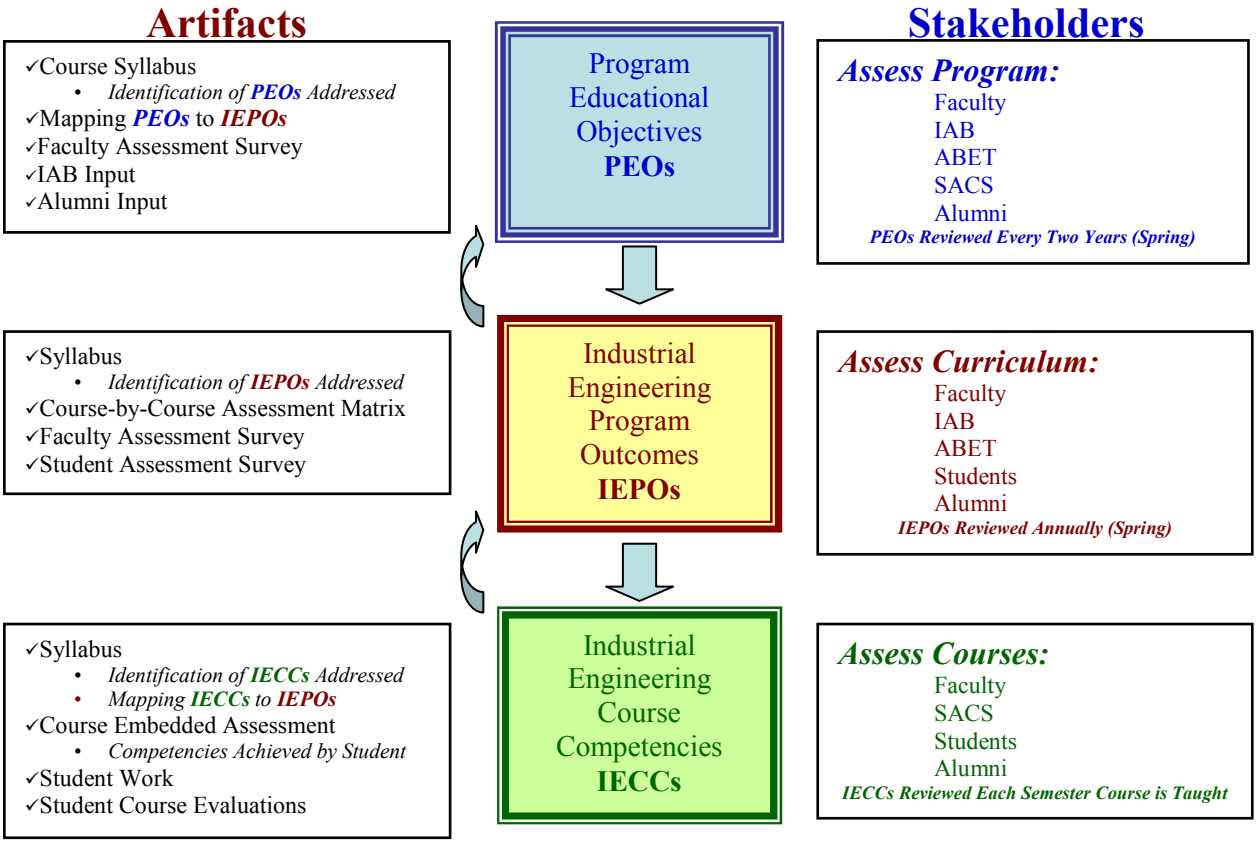

Figure 1. Three-Tier Assessment Model used for the Industrial Engineering Program at TAMUC

In addition to the three-tier assessment model, as series of tables were created to show the relationship of the IECCs to the IEPOs and the IEPOs to the PEOs. This activity alone was a most valuable part of the self study process. First of all, the three-tier assessment model developed by the committee provided a comprehensive look at the entire IE curriculum, including the engineering courses, science and mathematics, and the general studies courses. It helped the committee understand the gaps in coverage between courses in the curriculum and areas for improvement across the curriculum.

Preparing for the Site Visit

After the self study has been prepared, committee attention must turn to the site visit itself. Fight the temptation to *take a breather and relax* until the site visit occurs, since it is still three or four months away. Work should turn to cleaning-up any discrepancies in the documentation and building consistent, professionally styled course-by-course artifacts. Each course should have a separate binder that identifies the course requirements, including: a course syllabus, samples of student work, samples of examinations and other graded activities,

classroom presentations, photocopy of the textbook cover (enabling the team to quickly match the course binder with its associated textbook), and other evidence to document course content and instructional quality. Once the course binders are basically complete, have a faculty member review each binder for consistency, completeness, and quality. Correct any discrepancies before placing the binders in the site visit room for use by the visiting team members. Once this component is complete, the team must turn their attention to the agenda and to the procedures to be used while conducting the site visit.

Table 1. TAMUC Industrial Engineering Program Educational Objectives Assessment Matrix

Texas A&M-Commerce IE Program Educational Objectives	Program Educational Objectives [Matched with Criterion 3(a)-3(k)]										
	Criterion 3. (a)	**Criterion 3. (b)**	**Criterion 3. (c)**	**Criterion 3. (d)**	**Criterion 3. (e)**	**Criterion 3. (f)**	**Criterion 3. (g)**	**Criterion 3. (h)**	**Criterion 3. (i)**	**Criterion 3. (j)**	**Criterion 3. (k)**
Students will have the ability to convincingly present their solutions and to do so in the context of written, oral and electronic media.							✓	✓			
Students will be prepared to function effectively and provide leadership with an organization as an IE professional including an ability to select and organize, facilitate, lead, coordinate and participate in teams as well as understand organizational processes and behavior.				✓				✓	✓		
Students will demonstrate an understanding of the need to collect, analyze, and interpret data relevant to problems arising in the IE discipline.	✓	✓	✓		✓			✓			✓
Student will have the ability to approach and diffuse unstructured problems.	✓	✓	✓		✓						✓
Students will demonstrate an understanding of and the need to accomplish life-long growth within the field of industrial engineering profession.					✓				✓	✓	✓
Students will be able to utilize the methodological and computational skills to operate effectively within an IE work discipline.			✓			✓		✓		✓	

✓ - Indicates that individual a-k Criteria have been used to satisfy the specified **PEOs**

During the days and weeks leading up to the site visit itself, the agenda for each of the site visit team members is discussed between the visiting team chair and the institutional points of contact. Once the agenda is confirmed, the institutional team must insure that everyone on the agenda knows when they will be meeting with the visiting team members, where these meetings will occur, and approximately how long their individual meetings are scheduled to last. During our site visit agenda, we were able to use two outstanding Industrial Engineering students throughout the day to help keep the agenda on track and to keep everyone in the process informed as to the status of preceding meetings and adjustments to the schedule, if needed. These students proved to be a valuable resource to the visiting team and to the program faculty members. Additionally, it provided an opportunity for these graduating seniors to interface with academic leaders from other institutions, and an opportunity to hone their coordination and communications skills as entry-level professionals in the discipline.

Lessons Learned During the ABET Preparation

For each of the Industrial Engineering faculty who actively participated in the development of the ABET self study document, several program improvements were discovered, leading to a more effective and productive engineering education program at TAMUC. Each area of concern was assessed by the individual faculty members before recommendations for corrective actions were made to the department chair and the dean of the college. Each area of concern was addressed by the administration or explanations were provided stating why the proposed changes were infeasible at the current time. The faculty who served on the ABET assessment committee are now in the process of compiling a list of *Lessons Learned* which will become a part of the file for future assessment committees. A few of these lessons learned are provided to enable other assessment teams to recognize or avoid some of the same pitfalls that faced our assessment team.

1) Begin preparing for the assessment visit EARLY. Twelve to fifteen months before the planned on-site visit by the assessment team is not too early!

2) Assign a small, but active group of faculty members who will work together to identify sources of information, collect and compile necessary data elements, and generate write-ups of their individual sections. Responsiveness is the key!

3) Collect institutional information early in the process. Be sure to identify sources of requisite information and build a rapport with those who must query the necessary databases for information that will change during the process.

3) Request long-lead items very early in the assessment process. Examples include: a) the audit/internal assessment to determine the appropriate library holdings and circulation information, b) institutional data such as: enrollment statistics, program funding, laboratory and support equipment inventories, classroom, office, and laboratory space allocations, and c) survey results from previous stakeholder groups (e.g. students, alumni, employers, faculty).

4) Hire an ABET assessment consultant who will help the team by *"telling it like it is."* He/she should be knowledgeable about the entire assessment process and be willing to tell the program committee where their self study is deficient and how to correct those deficiencies.

5) Submit the self study for internal review well in advance of the due date (recommend March 15th to April 1st for a July 1st deadline). Insure the turn-around time for this review process is relatively short (recommend two weeks maximum).

6) Submit the self study for external review (Industry Advisory Board and select external stakeholders) as soon as internal stakeholders get a chance to comment on the document.

7) Prepare site visit documentation as if your program accreditation depends on it. ***It Does***!

8) Obtain the commitment and support of faculty members and students who will acknowledge the need to prepare for and conduct a successful ABET assessment. This involves not only professional knowledge and individual competence, but a heart-felt commitment to *do whatever is necessary* to produce a high-quality self study document and to facilitate an efficient and successful site visit.

Summary & Conclusion

The ABET preparation and planning elements cited in this paper are only a few of the components needed to successfully complete the ABET accreditation process. Feedback from both internal and external stakeholders is essential throughout the program. Formal and informal assessment methodologies must be used in order to determine whether a program is meeting the needs of the discipline, or whether curriculum modifications need to be made to satisfy program educational objectives. The question of whether new educational experiences are needed based on evolving technological methodologies must be assessed by the faculty and by the students enrolled in a given program. Only through program assessment and continuous process improvement can we expect to meet the demands of our discipline and society as a whole.

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