AC 2012-4218: CIVIL ENGINEERING PROGRAM EVALUATOR REFLECTIONS: THE MOST RECENT LESSONS LEARNED

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Civil Engineering Program Evaluator Reflections: The Most Recent Lessons Learned

Abstract

For the 2011-2012 ABET accreditation cycle, a number of changes across the criteria have impacted the way in which programs must approach their accreditation efforts.[1] The most significant change is related to the reporting of assessment activities and their use for program improvement. For the first time this year, assessment results of program educational objectives and student outcomes are reported in Criterion 4, Continuous Improvement. Additionally, there have been changes to the former Criterion 9, Program Criteria. The Program Criteria is no longer numbered, but more importantly, contains some fairly significant changes impacting the assessment of student performance. The changes include no longer requiring programs to specifically incorporate the program criteria in their student outcomes and no longer requiring programs to assess the degree to which students are achieving the program criteria. The purpose of this paper is to capture the experiences of three Civil Engineering Program Evaluators who have visited programs with differing characteristics during this accreditation cycle. It takes the reader from initial contact with the program chair through review of the self study and student transcripts to the on-site visit and offers lessons learned on how to best meet the current ABET Criteria and prepare for an ABET visit.

Introduction

Preparation for an ABET accreditation visit is a complex, difficult, and time-consuming project—for both the program chair and the ABET Program Evaluator (PEV) assigned to visit. From the program chair's perspective, if approached proactively and systematically, the magnitude of preparation can be reduced to a point where the impact on the faculty is not as burdensome. There are many keys to success, but the ones that outweigh all others are to establish effective systems and maintain them on a continuous basis and to establish the proper mindset within the program. Systems established shortly before an ABET visit will be obvious to a PEV and will be cause for additional scrutiny from the very start. ABET PEVs look for evidence of established and functioning systems that assess the required aspects of the program with the goal of continuous improvement in mind. And, there must be evidence that the systems will continue to function after the ABET team departs your campus. Establishing the proper mindset requires the program chair to create an atmosphere in which the primary goal of the process is to continually improve the program, not satisfy ABET requirements. The bottom line is that preparation for an ABET visit should be a coordinated process that begins well in advance of the visit and has all the key players striving to achieve a rating of "Next General Review."

You Only Get One Chance to Make a Good First Impression

As a PEV, the typical first contact with the program being evaluated is receipt of the self study. While evaluating the quality of the self study is not a formal aspect of the ABET accreditation process, a poorly written self study will result in one of two possibilities. One possibility is that the PEV will have to work much harder and spend more time interpreting the document in

completing the evaluation. This will likely result in significantly more questions from the PEV and thus additional effort will be required from the program chair and those supporting the visit. Additionally, the potential that requests for additional information will occur during the visit is greatly increased; such requests will not always result in the highest quality responses since the timeframe of an ABET visit is so constrained. The other possibility is that the PEV will become frustrated trying to read the self study and not have the time required in advance of the on-site visit to fully understand and evaluate the written report. During the on-site visit, instead of concentrating on the clarification of minor points and talking to students and faculty, the PEV will have to focus more on determining whether the program is in compliance with the ABET criteria. In the end, neither possibility sets the conditions for an "enjoyable" on-site visit.

In some cases, student transcripts accompany the self study, but not always. Many PEVs prefer to have the transcripts early such that they can learn about the program's curriculum before digging more into the self study. Program chairs that send transcripts without also providing notes to explain variations from the established curriculum are setting themselves up for additional questions. The best practice is to attach Table 5.1a to each transcript clearly showing how each course on the student's transcript satisfies the established curriculum, especially for elective courses. This can be particularly helpful for a practitioner PEV who does not deal with transcripts on a daily basis. In cases where there is a variation from the established curriculum, attach a waiver or memorandum which acknowledges the variation and explains the reasoning behind it.

Finally, it is very important to remember that PEVs are volunteers. They give of their time to serve the profession on top of already busy schedules. As a courtesy among professionals, it is important that programs put forth their best effort via high quality and well written self studies, promptly answered inquiries from PEVs, and cooperation throughout the evaluation process.

The Continuing Saga – Program Educational Objectives versus Student Outcomes

The discussion of Program Educational Outcomes (PEOs) versus Student Outcomes (SOs) seems to be a continuing saga over which there is much debate. According to the ABET Criteria for Accrediting Engineering Programs,[1] PEOs are defined as:

> *"broad statements that describe what graduates are expected to attain within a few years of graduation. Program educational objectives are based on the needs of the program's constituencies."*

The same document defines SOs as:

> *"describing what students are expected to know and be able to do by the time of graduation. These relate to the skills, knowledge, and behaviors that students acquire as they progress through the program."*

It is not uncommon for PEVs to note shortcomings stating that a program's PEOs are written such that they look like SOs and vice versa. At the 2011 Civil Engineering Department Heads Meeting at the University of Wisconsin, Madison, there was significant discussion on this topic

with the apparent belief stated that in order for PEOs to meet ABET standards, they have to be very generic to the point of being applicable for almost any engineering discipline. We regret that there is no universal solution to this saga. Our experience dictates that program chairs should keep the ABET definitions in mind and be able to articulate what the PEOs and SOs indicate for their given program. This discussion is far from over.

Criterion 3, Student Outcomes

Criterion 3 of the ABET Criteria for Accrediting Engineering Programs[1] specifies that:

> *The program must have documented student outcomes that prepare graduates to attain the program educational objectives. Student outcomes are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.*

There is a common misperception among program chairs and many academicians that the statement "Student outcomes are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program" dictates that programs "must" adopt the ABET 3 (a) through (k). This was never the intent of ABET and is not a standard being enforced during evaluations. The intent is that each program must cover the content of 3 (a) through (k) in their SOs and must demonstrate the coverage through a mapping. There is also no longer a requirement for programs to specifically incorporate the program criteria in their SOs meaning there is not a requirement to assess the degree to which their students are meeting the program criteria as required in Criterion 4. If however, the program does include elements of the program criteria in their SOs, there is an expectation that they be assessed.

Criterion 4, Continuous Improvement

For the 2011-12 accreditation cycle, Criterion 4, Continuous Improvement, now includes assessment results of PEOs and SOs and how they contribute to continuous improvement in the program. It is very important for the program chair to realize that establishing a mindset of continuous improvement within the program will drive the need for a sound assessment system and help the faculty to understand why the system is necessary and why they should be involved in implementing it. The key aspect to realize is that having a sound assessment system by itself is not sufficient. There must be a positive connection between the assessment system and steps to improve the program.

Programs that attempt to implement continuous improvement without participation of all faculty members will have limited success. The requirement for faculty participation leads to several other questions that focus on time required and priorities. Without question, a sound assessment system that leads to program improvement does require faculty time and must be a priority within the program. It is possible to conduct meaningful assessment activities in a manner that takes minimal faculty time while still meeting the ABET standard. To execute assessment efficiently, program chairs must understand the standard. This may require sending a faculty member to a seminar to learn about assessment best practices or enabling a faculty member to train for and become a PEV.[2,3] Either technique works, but without knowledge of the standards and best practices, a program can waste a significant amount of time conducting poor assessment

or not implementing changes suggested by assessment results. Program chairs should not feel constrained to configure their assessment system in a given manner—the ABET criterion does not dictate specific assessment methods or techniques. PEVs realize that the system in place must meet the needs of the program but that those needs can differ greatly between institutions.

The Civil Engineering Program Criteria

Criterion 9 was previously listed as the Program Criteria and was specified for each discipline by its parent professional organization—the American Society of Civil Engineers (ASCE) for the civil engineering discipline. Criterion 9 no longer exists and is now listed simply as "Program Criteria." As mentioned relative to Criterion 3, the Program Criteria are now listed in the third part of the overall criteria meaning that "assessment and evaluation of the degree to which students have attained the skills described within the program criteria are not generally required." If the program chooses to incorporate elements of the program criteria in their SOs, they must then assess and evaluate the degree to which their students are meeting the criteria.[1]

The best way to ensure a clear understanding of the CE program criteria is to read and be very familiar with the Commentary for Civil and Similarly Named Programs published by ASCE.[4] We are unique in that other parent professional organizations do not publish such a definitive guide to assist in ABET accreditation activities. Ensure to use this resource to your advantage.

PEV Recommendations

The following is a collection of recommendations based predominantly on three PEV visits this year, but also reflective of visits done in previous years. The recommendations are not in any specific priority order and are all important in successfully achieving ABET accreditation.

1. Establish an assessment system early and link it to continuous improvement. Start well in advance of an ABET visit. Ensure you have an expert on your faculty who is familiar with best practices and able to establish or refine an assessment system. An efficient assessment system will help gain faculty support of the process. Document the process and keep good records. In a six year period, there will inevitably be a number of changes in a given program. Try to link these changes to the assessment results that caused them to occur. The changes may not be tied to the direct assessment of outcomes and objectives, but hopefully there was synthesis of data and collaborative consultation that caused a change to be made. Remember that accreditation of your program is important so give assessment the priority it deserves.

2. Maintain a Robust External Advisory Board. The value-added by a robust external advisory board is significant. A properly formed board that contains members who represent the program's constituencies is a clear demonstration of connection to those constituencies. Don't be afraid to include minutes from advisory board meetings in the self study. At a minimum, have them available for review during the on-site visit. As part of the advisory board meetings, have the board review PEOs and SOs and make positive comment about them in the board minutes. In response to the board minutes, demonstrate that the board results are being reflected in the continuous improvement process. This will also impress the board and make them realize that their comments are important and being acted upon. PEVs are very interested in advisory

board comments and will likely read them in detail. Do realize, however, that including board minutes can be problematic if the board does not understand its role.[5]

3. Prepare a self study that is clear, concise, and well referenced. A longer self study is not a better self study—it just takes more time to read. Always remember that PEVs are volunteers; time is of the essence. If you provide your PEV with a self study that is not easy to read and in which it is not easy to locate content, you are making a poor first impression and making the PEVs job more difficult. Prepare the self study like you would a technical report with sections, figures and tables numbered. Follow the format on the self study questionnaire to make the self-study easy to follow.[6] Download the PEV Worksheet from the ABET website and use it to develop the self study.[7] The PEV worksheet is a checklist that an evaluator uses as he or she reads a self-study. Provide a table of contents as well as a list of figures and tables. Ask yourself the question: would I like to read this self study?

4. Maintain good communication with your PEV prior to and during the visit. Good communication prior to and during the visit is absolutely vital. As the program director, you should endeavor to answer all the PEV's questions in advance of the visit. The PEV will develop an opinion of the program director and the program long before arriving on campus. The evaluation schedule is very tight and affords evaluators very little, if any, discretionary time. By providing as many answers to the PEV's questions in advance as possible, you are effectively reducing stress on both the program and the evaluator during the on-site visit. Ideally the evaluation is about 90% complete before the PEV arrives on campus and the visit presents no surprises. The PEV who shows up at your campus with significant information requirements yet to fill will not likely begin the visit on a good note. Refer back to the section "You Only Get One Chance to Make a Good First Impression."

5. Don't include raw data with no explanation of what it means. Page after page of assessment data mean nothing unless they are explained. Don't include large volumes of data to prove you have done assessment. Assessment includes evaluation of the data and a presentation of results. Provide a summary page of the results of your assessment and tell the PEV where to look for further information as required.

6. Efficiently Collect and Present Examples of Student Work. During an ABET visit, perhaps the most daunting task a PEV must perform is examining documentation. We recommend communicating with the PEV in advance of the visit and explaining the plan for presentation of student work and course materials. If the PEV has specific needs, identify them early and be prepared. With only about three hours available at most to review documentation, the PEV will need to focus on specific areas to answer questions raised during review of the self study. We recommend the following as an efficient way to present documentation:

- One notebook for each CE student outcome containing samples of student work (good, average and poor) from each embedded indicator mapping to that particular outcome.
- One notebook for each course containing course information and course assessment documentation since the previous ABET evaluation.
- CD-ROM with electronic copies of all student work (good, average and poor) from all CE program courses.

Based on the time available, this provides hard-copy information of specific documentation pertaining to student outcome assessment and also provides the PEV a reference disk for use in the evenings. If possible, send the CD-ROM in advance of the on-site visit. Again, ask the PEV in advance to determine specific needs. If you choose to provide the PEV all documentation electronically, provide a large monitor on which to review the documentation, not a laptop.

7. Remember the Importance of Process. Through all aspects of preparation for an ABET evaluation, the importance of having a process in place is a common denominator. In the final analysis, even if a PEV does not agree with your process, having one in place makes it more difficult to criticize. This is especially important in an initial evaluation for which there will likely be little history. In instances where a process is weak or does not exist, there are grounds for the PEV to identify a concern, or worse a weakness or deficiency. Identifying places in your program where processes are weak or non-existent is a great way to determine where to focus effort in improving the program or preparing for an ABET visit.

8. Involve the Faculty in the Process. There is a delicate balance between involving faculty in the ABET process and having someone in charge who is directing the process. Many faculty members do not want to be included, but there are many ways to involve them in the process. For example, the ABET self-study requires a syllabus for each course in the two-page ABET format and a two page curriculum vitae for each faculty member. Ask each faculty member to prepare their own vitae and divide the duties for syllabus preparation. While most programs have an ABET coordinator, that person can be supported by an ABET committee composed of willing faculty members. Some of the Criterion 5 tables detail the activities of all faculty members where each faculty member can provide their own input. Part of the assessment process for outcomes is to identify the contribution of various courses to the program outcomes and faculty opinion as to how well they are being accomplished. Involve faculty in this process. Even if the ABET committee makes the original decisions, have the faculty at large vote to approve them. Outcome assessment should involve direct measures of student performance though embedded indicators taken from course assignments. Ask faculty members teaching these courses to provide the results. Brief the faculty on the results of the assessment and get their input on how to improve the program. Over time, even the faculty member who believes that he was not involved in the process will be surprised at how much he has contributed. The real measure of success is when faculty members start caring about the results.

9. Take Advantage of the Due Process Time: No program wants to receive any rating less than a Next General Review (NGR) which provides the six year accreditation. Shortcomings in the form of weaknesses or deficiencies will result in at least and Interim Visit (IV) or Interim Report (IR) within two years. The ABET evaluation is conducted in the fall but the final decision on accreditation action is not made until the following July. During that time, many programs fix the shortcomings and make necessary changes to the program that will earn an ultimate NGR rating. Programs are encouraged to work with the ABET team chief to take full advantage of this due process period.[8]

10. Laboratory Safety. There are not a lot of shortcomings in the areas of facilities, resources, or faculty qualifications. One exception to that has been laboratory safety which seems to

generate a lot of attention. Include it in the self-study and be ready to address it during the campus visit when the evaluators are given a tour.

11. Don't embellish. There is a natural tendency for a program to cite its accomplishments and show the program in the most favorable light. This is a good thing, but don't exaggerate. Many PEVs use this experience to learn good ideas from programs similar to theirs and to list some outstanding traits of a program. The evaluator might probe more deeply than expected in this area. If the accomplishment does not live up to its billing, the credibility of the rest of the self study is put at risk.

Conclusion

There is not one right answer to preparing for and successfully negotiating through an ABET evaluation. Preparation starts years in advance and involves establishing and following a well thought-out plan that is based on efficient processes. It is essential to keep current with best practices and to use the resources available from ABET and ASCE. The establishment of appropriate program educational objectives and student outcomes based on program constituencies is vital as is assessing student performance for the purpose of program improvement. Faculty members must understand the processes in place and contribute to them as active participants. And the processes in place must be easy to understand and not require an inordinate amount of effort to maintain. Produce a self study that you would want to read then maintain excellent communications with the PEV throughout the evaluation process. Again, the bottom line is that preparation for an ABET evaluation should be a well-coordinated effort that begins well in advance of the visit and has all the key players working together to achieve a successful outcome.

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