

Preparing for the First ABET Accreditation Visit under Criteria 2000

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Introduction

Many aspects of the preparation for an ABET accreditation visit under Criteria 2000 will be the same as under the traditional criteria. Forms must be filled out; student work must be gathered, organized, and exhibited; course notes and syllabi must be organized for exhibit; the faculty must educate themselves to the process; and the evaluator must be treated respectfully while he or she is on campus. In the traditional process, if a program was well conceived and administered, adhered to a traditional and well established model for its curriculum, maintained well equipped laboratories, and was well funded, the preparation was aimed at showing the evaluator that those things were true. Preparation could be accomplished in a spring and a summer. For Criteria 2000, however, some non-traditional expectations have been added which make the preparation for a visit a bit more demanding. That preparation may now require several years and should be considered to be a continuous process.

Preparation for the visit falls into seven broad categories:

1. Formulate and publish educational objectives.
2. Implement assessment methods to measure how well objectives are met.
3. Revise curricular, administrative, and other processes so that their outcomes meet the objectives.
4. Implement continuous improvement methods for adjusting the processes to better meet the objectives.
5. Demonstrate that the outcomes of the processes established meet the ABET requirements of Criterion 3, the student ability requirements.
6. Demonstrate that the curriculum meets the requirements of Criterion 4, the curricular content requirements.
7. Assure that the faculty, facilities, institutional support, financial resources, and applicable program criteria are met and be able to demonstrate that each is true.

Educational Objectives

As was stated in the Manual of Evaluation Process for 1997-98 Pilot Visits(1):

"The guiding principle of Engineering Criteria 2000 and this process [of evaluation] is to assure that graduates of an accredited program are prepared to enter and continue the practice of engineering."

The formulation of the educational objectives must be done using this "guiding principle". Essentially everything done to design, operate, and continuously improve the educational process is aimed at the overall objective in that statement. The various constituencies of the educational process (students, parents, employers, alumni, professional societies, and faculty) may be consulted for help in formulating objectives, but care should be taken to keep the objectives consistent and true to the guiding principle stated above.

Educational objectives should be simply stated with few qualifying phrases. On the other hand, the objectives must be detailed and consistent with the mission of the institution and the requirements of Criteria 2000(2). It goes without saying that the objectives must first lead the program to meet the general engineering requirements in Criteria 3-7 and the applicable program criteria for the area of study in question. Objectives unique to the program must be consistent with the ABET criteria, even if they involve requirements beyond the ABET criteria.

Each objective must be supplied with a performance criterion which indicates what is required to meet the objective. The performance criteria may be quantitative, as in a minimum test score, or qualitative, as in ability to give a clear, well organized technical presentation.

The objectives written for a program should be constantly scrutinized for revision based on measured results just as are all other parts of the process. The objectives are the guiding principles for the operation of the educational program and must cause those working in the program to strive in the desired directions. If assessment data indicate that the objectives need adjustment, that should be done.

The criteria state that the objectives must be published. This aspect usually requires some lead time well before an ABET visit is requested. The objectives should be clearly stated in the university catalog and in other publications intended for prospective students and supporting institutions.

Assessment Methods

Since the beginning of discussion about the implementation of Criteria 2000, there has been much written about assessment methods, their use, and their interpretation. Typical methods of assessment involve questionnaires(3); portfolios(4,5); standardized tests(6,7); alumni surveys, employer surveys, exit interviews, performance in final design courses, and input from industrial advisory boards(7). Each of the articles referenced has extensive discussion on the pros and cons of the methods and outcome indicators generated by them.

The most important aspect in the choice of assessment methods is that the outcomes measured must support the objectives chosen. If the measures do not indicate clearly whether

success has been achieved relative to the stated objectives, then the assessment has not served its purpose and cannot be used to continuously improve the educational process. A good discussion of a typical development of assessment-outcomes choice was given by McGourty, Sebastian and Swart(8). They finally chose the following main outcome categories for student capabilities: analytical skills, communications, creative problem solving, project management, research skills, self-learning, system thinking, teamwork and technical competence. For each of those a set of measurements and minimum performance requirements was determined. The main assessment tools chosen were portfolios, student surveys, oral presentations, and the Student Developer system of self and team member rating. These probably would not be the right set of outcomes and assessment tools for another program since a unique best combination of outcomes and tools should exist for each program's objectives. The ABET team evaluating a program will judge how appropriate these choices are.

The publication "Stepping Ahead: An Assessment Plan Development Guide" by Rogers and Sando(9) gives a step-by-step process for developing an assessment system based on chosen objectives, outcomes, performance measures, and feed back channels. The guide breaks the process down into manageable pieces so that it does not seem overwhelming.

Revision of Curricula, Administration, and Other Processes

After an outcomes-based assessment system has been in place for a number of years and has been refined to meet the needs of the faculty, there will typically be annual or semi-annual adjustments in courses, sequences, content, expected outcomes, and administrative processes. These usually will be small changes. During the initiation of an outcomes-based continuous improvement process, however, it may be necessary to examine every aspect of the educational process from the ground up. For example, in order to fully support student knowledge outcomes expected at graduation, it may be necessary to examine the content of every course to see whether the information is being taught, if the sequence is correct, and if there are inefficient overlaps. Such an examination can take at least two years and must be done before the final process is put into place.

The main message here is that much time is needed to institute a fully functioning process. Its use in determining improvement measures will develop incrementally over time. The first year or two will not yield much change because the basic time increment in education is one year.

Continuous Improvement

None of the work in developing objectives, assessment methods, expected outcomes, and initial process revisions will be of value if a feed back mechanism for continuous improvement is not effectively implemented. Probably the greatest obstacle to making this happen is faculty resistance to change and to developing confidence in a feed back-based continuous improvement process. An example of an assessment and feed back process is the system of teaching evaluations used by most universities. Even the most cynical professor generally modifies teaching methods to some degree in response to student criticisms or suggestions. A strategy then would be to build on that concept, gradually introducing feed back via various channels with incentives for the faculty individually and as teams to make modifications. Another approach is

the use of brainstorming sessions to develop ideas for the process, thereby developing buy-in by the faculty.

Meeting the ABET Criteria Requirements

The assessment methods chosen must not only be useful in the continuous improvement of the educational process but must also be adequate to demonstrate that all the Criteria 2000 requirements in Criteria 3-7 are met. Many of these requirements are not very different from traditional requirements and are easily demonstrated by the self-study report done before the visit and by observation by the visitor. Such traditional requirements are acceptable faculty qualifications(Criterion 5), adequate facilities(Criterion 6), sufficient institutional support and financial resources(Criterion 7), and minimum curricular content in each required area(Criterion 4).

The student capability outcomes under Criterion 3 are the real challenge. Since all of them (a-k) must be effectively demonstrated, the outcomes indicators must be chosen carefully so that a high level of efficiency is achieved. If a given assessment method yields outcomes that cover several of the requirements, then less work will be required to make the measurements and the students, alumni, and employers will be less inconvenienced by multiple tests and survey forms. The clerical work involved in compiling the data must also be taken into account and minimized where possible, otherwise the assessment work will not be kept at a high enough priority in everyday activities. A mix of institutional administered assessments, such as the FE, GRE, and state mandated general knowledge assessments, may be combined with the department centered surveys, questionnaires, and examinations to cover all the needed requirements. For the next few years we must learn from one another's ingenuity to solve this multifaceted problem.

Conclusion

Institutions must guard against doing only a partial job in providing the outcomes measures and evidence that those measures are in use for meaningful feed back and continuous improvement of the educational process. The best way to achieve a complete assessment-outcomes-continuous improvement system that meets all the ABET requirements is to start early to put the system in place. Immediately after the last traditional evaluation is not too early.

References

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