

Academic Program Assessment

A value-added activity for safety and industrial hygiene programs?

By Carol Boraiko, John N. Zey and Alice Greife

IN TODAY'S COMPETITIVE marketplace, organizations must demonstrate value-add to their customers. Most businesses increasingly use plan-do-check-act (PDCA) management systems and continuous quality improvement processes. Constituents, including customers and partners, are requiring evidence of quality in products from those companies with which they contract.

The demand for evidence of quality also applies to academic programs. Assessment of academic programs is similar to assessments that companies conduct to improve efficiency, such as internal and external audits, and complying with ISO standards (Zey & Boraiko, 2007). Accreditation is beneficial to all constituents of an academic program, including students, faculty, administration, employers, alumni and others interested in the program's quality. Just as businesses strive for external recognition of product quality and affirmation of their commitment to issues such as sustainability, academic programs also need confirmation of the quality of their program and graduates.

Given the multiple delivery methods for academic degrees and competition for students, individual programs are turning to management systems, specifically quality improvement processes, to demonstrate that these programs provide the requested consistency of the educational experience in addition to the competence and relevance of the graduates. Academic accreditation serves as a quality control process used to exhibit the quality of educational experiences between institutions.

Accreditation typically involves three major activities (Eaton, 2009):

1) Institutional faculty, administrators and staff conduct a self-study using the accrediting association's standards or criteria (i.e., set of expectations regarding quality) as their guide.

2) A site visit is conducted by a team of peers selected by the accrediting association to review the evidence, and interview faculty, staff and students. The academic program is given an opportunity to challenge the reviewers if they have concerns with the process.

3) A commission of the accrediting organization (a group of peer faculty and professionals) makes a decision on accreditation action based on the site visit team's written report and recommendations. This decision is communicated to the institution and other constituencies as appropriate.

The work required to achieve and maintain accreditation is ongoing (Figure 1, p. 36). It includes an extensive workload at the beginning and an additional 10 to 30 hours (as estimated from informal surveys) per month. Continuous effort must be expended to maintain accreditation, usually on a 5- to 10-year cycle. Given this, what are the value-added attributes of undergoing this rigorous process?

Academic Accreditation Educational Evaluation

The Joint Commission on Standards for Educational Evaluation defines evaluation as "the systematic investigation of the worth or merit of an object" (Fowler, 2004). Others suggest that the purpose of evaluation is to gather information which can be used to learn about organizations or programs in order to make decisions pertaining to and

Abstract: Academic institutions and programs use third-party accreditation to ensure that they are meeting established standards of educational quality. Graduating from an accredited institution or program signifies that an individual is sufficiently prepared to enter the profession. Graduating from an accredited safety and industrial hygiene program gives graduates higher recognition and is highly valued by employers.

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Figure 1

The Accreditation Timeline

Year 1



Year 2

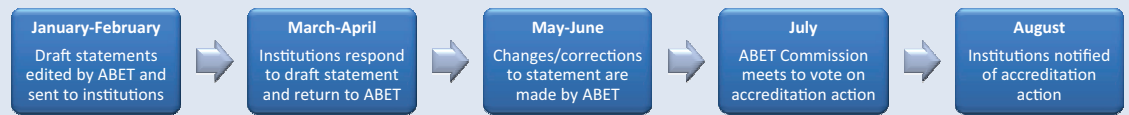


Figure 1: The work required to achieve and maintain accreditation is ongoing. It includes an extensive workload at the beginning and an additional 10 to 30 hours per month. Continuous effort must be expended to maintain accreditation, usually on a 5- to 10-year cycle.

affecting in positive capacities those organizations or programs (Patton, 1997; Preskill & Torres, 1999).

According to Patton (1997), "Education has long been a target for evaluation." He then suggests that educational evaluation has been in existence since the late 19th century. "Beginning with Joseph Rue's comparative study of spelling performance by 33,000 students in 1897, the field of educational evaluation has been dominated by achievement testing" (p. 10).

Council for Higher Education Accreditation (CHEA, 2009) comments:

Accreditation is the primary means of assuring and improving the quality of higher education institutions and programs in the United States. Active for the past 100 years, this private, voluntary system of self-examination and peer review has been central to the creation of a higher education enterprise that is outstanding in many respects.

Program Accreditation

In the U.S., academic institutions may seek voluntary accreditation from private organizations [Higher Learning Commission (HLC), 2003]. Six regional associations offer academic institution accreditations. One of these associations, the North Central Association of Colleges and Universities (NCA), was founded to foster close cooperation between secondary schools and colleges in their area of responsibility. According to HLC, one of two independent corporations with NCA membership, "There are two types of educational accreditation: Institutional and specialized." HLC accredits higher learning institutions that grant degrees.

Specialized academic program accreditation has been around since at least the 1930s when the Accreditation Board of Engineering and Technology (ABET) began offering accreditation to schools of engineering. ABET currently accredits about 2,500 programs at more than 500 colleges and universities. Another specialized accreditation is the Council on Education for Public Health (CEPH), between university and program. Many industrial hygiene programs are in Schools of Public Health, so they choose to be accredited under CEPH's requirements.

External Program Assessment

Reasons to Pursue Accreditation

The academic accreditation process is voluntarily initiated by the institution or program in order to assure the consumers of higher education (parents, students, employers) that the program is meeting at

least some minimum standard. For safety and industrial hygiene programs, the goal is to publicize this information to diverse groups including;

- safety and industrial hygiene managers with hiring responsibilities who are assessing the advantages of employing a graduate of an accredited program;
- prospective students and parents who are selecting a program of study for either an undergraduate or graduate degree;
- faculty/administrators of academic programs who are considering the value of accreditation for their own program;
- safety and industrial hygiene practitioners with a strong interest in quality assurance and continuous improvement in their continuing education.

As noted, the two primary types of accreditation are those for the entire academic institution and those that cover specific programs within an institution (HLC, 2003). Institutional accreditors such as NCA are referred to as "regional" accreditors, and assess the college or university as an entire educational institution. Specialized accreditors evaluate a specific educational program, that is, a defined path of study which leads to a degree. This process involves assessing a specific program (e.g., safety) rather than the institution. Thus, the program seeks accreditation, not the department, college or university.

Professional accreditors such as those for medicine, law, architecture and engineering, as well as safety and industrial hygiene, fall into this latter category (ABET, 2009b). For safety and industrial hygiene programs, ABET is the primary organization providing accreditations and quality assurance.

Accreditation Development

Academic programs are accredited following defined standards or specific criteria. In the case of ABET accreditation, these criteria are established jointly between ABET and a sponsoring society with recognized responsibility for an applied science program in a given area. For industrial hygiene programs, the criteria were developed jointly between ABET's Applied Science Accreditation Commission (ASAC) and AIHA/Academy of Industrial Hygiene's (AIH) Academic Accreditation Committee (Whitehead, 2007). The criteria for safety programs were developed with ASAC and ASSE.

The criteria can be divided into two parts: core criteria and program criteria. Core criteria, or general program outcomes, established by ASAC, must be met by any program seeking accreditation under that commission (industrial hygiene, safety, survey-

ing and mapping, health physics, industrial management). Program criteria or specific program outcomes, established by the responsible society (AIHA/AIH or ASSE), are unique to the program area being accredited and reflect specific competencies associated with that discipline.

Currently, 27 different industrial hygiene college programs are accredited under the ASAC/AIHA/AIH criteria, while 11 safety programs are accredited under the ASAC/ASSE criteria. In the past 5 years, presentations at the American Industrial Hygiene Conference have addressed issues surrounding program assessment in the occupational safety and health field (Zey, 2005; Zey & Boraiko, 2007).

A combined SH&E criteria was developed jointly by AIHA and ASSE. These criteria are designed to allow programs that combine SH&E curriculum to show these disciplines in their title. In 2006, then-ASSE president Donald S. Jones, P.E., CSP, and then-AIHA President Frank Renshaw, Ph.D., CSP, CIH, described this criteria as a "set of new ABET program accreditation criteria for schools wishing to offer a broader approach to environmental, health and safety in their curricula" (Jones & Renshaw, 2006). To date, two programs are accredited in this category.

In the 1990s, ABET changed its criteria from being based on curricula (what is being taught) to one based on outcomes (what the graduate can do). This change was in line with ASSE's and AIHA's interest in using a management system approach and followed trends of the regional accreditation commissions. In an interview with Steven Levine (2007), Charles Redinger and David Dyjack said, "We applied social science methods, in part, by looking at qualitative measures of leading indicators, rather than quantitative measures of trailing indicators." This new approach of evaluating measures of leading indicators is evidenced by changes in the accreditation criteria.

Criteria for the accreditation of both baccalaureate and master's safety and industrial hygiene programs are divided into the following categories (ABET, 2008b): 1) students; 2) program educational objectives; 3) program outcomes; 4) continuous improvement; 5) curriculum; 6) faculty; 7) facilities; 8) support; and 9) program criteria. The sidebar on p. 38 provides specifics under each criterion.

Assessment Process

As noted, the initial process for a program assessment includes an internal evaluation, and development and submission of a lengthy self-study questionnaire followed by an on-site visit by a team of individuals trained in the specific assessment methodology. The sidebar on p. 39 addresses the self-study.

Assessment Team

In the case of safety or industrial hygiene programs, the three-person assessment team is comprised of a team chair and two program evaluators. The chair must be a current ASAC commissioner, which ensures that s/he is a qualified, experienced evaluator knowledgeable of ABET accreditation pro-

grams, policies and criteria. This individual will have an engineering/applied science background but will not necessarily be an SH&E professional. Program evaluators are SH&E practitioners or academicians representing AIHA or ASSE as volunteers in the accreditation process.

All team members undergo specific training (including an accreditation site visit as an observer for industrial hygiene evaluators) before being qualified by ABET in their respective roles. The team chair's responsibilities include assembling the team, organizing the site visit, mentoring program evaluators, developing statements to the institution, recommending accreditation action and presenting the findings of the team to the full ASAC. Program evaluators review the self-study questionnaire and other materials (such as transcripts) submitted by the institution, conduct the site visit, analyze the information presented and contribute to the recommendation of accreditation action.

The initial program evaluation is based on the data submitted by the institution. The self-study questionnaire contains extensive documentation and evidence as to how the program is achieving each criterion. It is a qualitative assessment that examines strengths and limitations of the program and the institution. It includes a discussion of the formal policies and procedures relating to the establishment and ongoing evaluation of the program's educational objectives and assessment of these objectives.

Both qualitative and quantitative data must be submitted to the team to demonstrate that graduates have achieved program objectives and that assessment results are applied to further develop and improve the program. Changes implemented to develop and improve the program must be documented. The report also includes data relating to faculty, curriculum, institutional support and financial resources.

The Program Being Assessed

In addition to preparing the extensive self-study report, program staff provide the visiting team samples of student work.

To make a qualitative evaluation of a program, it is necessary that the institution exhibit teaching materials such as course outlines and textbooks for all courses required for graduation. Sufficient examples of student work in technical, mathematics and science courses must be available to the visiting team for the entire campus visit. The examples should show a range of grades for assignments, including homework, quizzes, examinations, drawings, laboratory reports, projects and samples of computer usage in technical courses (ABET, 2008a).

Preparing for the initial assessment is only the beginning of the process. Fulfilling the ongoing assessment requirement necessitates continuous evaluation and improvement. A PDCA management system as outlined in ANSI/AIHA Z10 can be used to manage the continuous quality improvement processes (Dotson, 2007).

Qualitative and quantitative data submitted must demonstrate that graduates have achieved program objectives and that assessment results are applied to further develop and improve the program.

Criteria for the Accreditation of Safety & Industrial Hygiene Programs

Criterion 1. Students

The program must evaluate, advise and monitor students to determine its success in meeting program objectives. The program must have and enforce policies for the acceptance of transfer students and for the validation of courses taken for credit elsewhere. The program must also have and enforce procedures to ensure that all students meet all program requirements.

Criterion 2. Program Educational Objectives

Each program must have in place:

- a) detailed published educational objectives that are consistent with the mission of the institution and these criteria;
- b) a process based on the needs of the program's various constituencies in which the objectives are determined and periodically evaluated;
- c) a curriculum and processes that ensure the achievement of these objectives.

Criterion 3. Program Outcomes

Degree programs must demonstrate that graduates have:

- a) an ability to apply knowledge of mathematics, science, and applied sciences;
- b) an ability to design and conduct experiments, as well as to analyze and interpret data;
- c) an ability to formulate or design a system, process or program to meet desired needs;
- d) an ability to function on multidisciplinary teams;
- e) an ability to identify and solve applied science problems;
- f) an understanding of professional and ethical responsibility;
- g) an ability to communicate effectively;
- h) The broad education necessary to understand the impact of solutions in a global and societal context;
- i) a recognition of the need for and an ability to engage in lifelong learning;
- j) a knowledge of contemporary issues;
- k) an ability to use the techniques, skills, and modern scientific and technical tools necessary for professional practice.

Criterion 4. Continuous Improvement

The program uses a documented process incorporating relevant data to regularly assess its program educational objectives and program outcomes, and to evaluate the extent to which they are being met. The results of the evaluations are used to effect continuous improvement of the program through a documented plan.

Criterion 5. Curriculum

The curriculum requirements specify subject areas appropriate to applied science programs but do not prescribe specific courses. The program's faculty must ensure that the curriculum devotes adequate attention and time to each component, consistent with the objectives of the program and institution. The curriculum must include:

- a) a combination of college-level mathematics and basic sciences (some with experimental experience) appropriate to the discipline;
- b) applied science topics appropriate to the program;
- c) a general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives.

Students in baccalaureate degree programs also must be prepared for applied science practice through a curriculum culminating in comprehensive projects or experiences based on the cumulative knowledge and skills acquired in earlier course work.

Criterion 6. Faculty

The faculty must be of sufficient number as determined by student enrollment and the expected outcome competencies of the program. There must be sufficient faculty to accommodate adequate levels of student-faculty interaction, including classroom teaching, laboratory and field supervision, student advising and counseling, and research, as well as nonstudent interactions in university service activities, professional development, and interactions with industrial and professional practitioners, as well as employers of students.

The faculty must have sufficient qualifications and must ensure the proper guidance of the program and its evaluation and development. The overall competence of the faculty may be judged by such factors as education, diversity of backgrounds, applicable experience, teaching performance, ability to communicate, enthusiasm for developing more effective programs, level of scholarship, participation in professional societies, and applicable certifications, registrations or licensures.

Criterion 7. Facilities

Classrooms, laboratories and associated equipment must be adequate to accomplish the program objectives and provide an atmosphere conducive to learning. Appropriate facilities must be available to foster faculty-student interaction and to create a climate that encourages professional development and professional activities. Programs must provide opportunities for students to learn the use of modern applicable instruments and equipment. Computing and information infrastructures must be in place to support the scholarly activities of the students and faculty and the educational objectives of the program.

Criterion 8. Support

Institutional support, financial resources and constructive leadership must be adequate to ensure the quality and continuity of the program. Resources must be sufficient to attract, retain and provide for the continued professional development of a well-qualified faculty. Resources also must be sufficient to acquire, maintain and operate facilities and equipment appropriate for the program. In addition, support personnel and institutional services must be adequate to meet program needs.

Criterion 9. Program Criteria

Each program must satisfy applicable program criteria. Program criteria provide the specificity needed for interpretation of the general criteria as applicable to a given discipline. If a program, by virtue of its title, becomes subject to two or more sets of program criteria, then that program must satisfy each set of program criteria; however, overlapping requirements need to be satisfied only once.

Note. From "Criteria for Accrediting Applied Science Programs: General Criteria," by ABET, 2008, Baltimore, MD: Author.

To fold the PDCA system into the ongoing assessment for accreditation of an academic program, consider the following:

- **Plan.** Conduct the initial program assessment.
 - a) Establish program outcomes.
 - b) Develop goals.
 - c) Identify constituencies.
 - d) Form advisory groups.
- **Do.** Identify what needs to be measured.
 - a) Implement procedures to achieve goals (e.g., update curriculum, modernize laboratories).
 - b) Conduct meetings of constituencies and advisory group; requesting their input on the program's condition.
- **Check.** Identify methods of evaluating.
 - a) Confirm with constituencies and advisory groups that steps taken have met their requests.
- **Act.** Describe responses to the evaluation tool.
 - a) Reassess plan, goals and results of assessment.
 - b) Make changes/improvements results from check phase.
 - c) Report back to constituents the results of their suggestions.

This is an ongoing, repeated process. To further discuss suitable actions to accomplish the plan and check steps of the process, those involved should seek input from various stakeholders including alumni, employers, SH&E practitioners and managers. Contacting alumni and employers of alumni helps program administrators determine whether graduates have the information/knowledge to be viable practitioners in the field.

The voluntary ABET accreditation provides the real-time experience of applying PDAC principles that a program's graduates will be using in professional practice. SH&E professionals who participate in accreditation evaluations will have their understanding of these principles reinforced, further expanding the application of good management principles throughout the SH&E profession.

Value-Added Benefits

Given the work involved to achieve and sustain accreditation, is the amount of work worth it? Is this a value-added process?

According to ABET, accreditation delivers several benefits:

- Accreditation provides a structured mechanism to assess, evaluate and improve program quality.
- Accreditation helps students and their parents choose quality college programs.
- Accreditation enables employers to recruit graduates they know are well-prepared.
- Accreditation is used by registration, licensure and certification boards to screen applicants.

CHEA reports several other benefits:

- Accreditation is a public symbol of academic quality.
- Access to grants and loans can be dependant on obtaining accreditation.
- Accreditation provides protection against fraud and invalid degrees.

Self Study: General Topics

Program Self-Study Report

Background Information

Criterion 1: Students

- Table 1-1.a History of Admissions Standards for Freshman (Undergraduates)
- Table 1-1.b History of Admissions Standards for Graduate Students
- Table 1-2 Transfer Students for Past 5 Academic Years
- Table 1-3 Enrollment Trends for Past 5 Academic Years
- Table 1-4 Program Graduates

Criterion 2: Program Educational Objective(s)

Criterion 3: Program Outcomes

- Table 3-1 Comparison of Course Learning Objectives to General Program Outcomes
- Table 3-2 Comparison of Course Learning Objectives to Specific Program Outcomes

Criterion 4: Continuous Improvement

Criterion 5: Curriculum

- Table 5-1 Curriculum
- Table 5-2 Course and Section Size Summary

Criterion 6: Faculty

- Table 6-1 Faculty Workload Summary
- Table 6-2 Faculty Analysis

Criterion 7: Facilities

Criterion 8: Support

- Table 8-1 Support Expenditures

Criterion 9: Program Criteria

Appendix A Course Syllabi

Appendix B Faculty Resume

Appendix C Field and Laboratory Equipment

Appendix D Institutional Summary

- Accreditation promotes improvement and innovation while continuing existing quality.
- Accreditation enables a program to prioritize resource demands and improve cost efficiency.
- Certifications and licensure often require graduation from an accredited program.
- Courses/credits taken at an accredited program facilitate the transfer of credit hours, particularly internationally.
- Methods for establishing accountability are designed into the accreditation process.

Program constituents are a primary reason to pursue external recognition (e.g., certification, accreditation). For occupational safety and health programs, this constituent group includes employers, the government and the public (Brauer, 2002).

Other constituents, including students, parents, employers, faculty and the institution, receive value from an accredited program as well. Prospective students and their parents can see that the program has been externally reviewed against specific criteria and has successfully met the standard. Published statements of program objectives and outcomes, as well as descriptions of required comprehensive projects and experiences, can help students select a program that aligns with their own career aspirations.

Additionally, the institution gains extensive insight into its programs. The extensive accreditation process, which includes both self- and external review, allows faculty and administrators to thoroughly examine a program, learn its strengths and weaknesses, and incorporate a continuous improvement process.

The customers of accredited safety and industrial hygiene degree programs have many reasons to want to be associated with an accredited program.

Mauerman (2008) discusses another benefit, namely, using an industry advisory council (IAC) to improve the program. IAC members often are adjunct faculty, provide equipment for instruction, offer internships or cooperative opportunities, and provide publicity for the program. An IAC is a recommended part of the check portion of the PDCA management system. Finally, attaining academic accreditation provides both the institution and program "bragging rights."

Potential employers of program graduates have perhaps the most to gain from understanding the value of hiring a graduate from an accredited program. When considering a graduate from an accredited program, a potential employer:

- is assured that the graduate's program of study has been extensively reviewed, both internally and externally;
- can consider the published program goals, objectives and outcomes to determine how well the knowledge, skills and attitudes described match what is needed in a new hire;
- will know that a formal process of evaluation and assessment is in place to ensure that the program is in a cycle of continuous improvement;
- can discuss continuous improvement processes with program faculty, including feedback data and actions to improve the program;
- Will know that external constituencies, including practitioners, are part of the continuous improvement process to ensure that the program is up to date and consistent with current practice;
- will know that the graduate has the educational credentials necessary to obtain professional certification as a CSP or CIH;
- will know that the graduate not only has relevant contemporary skills but is also prepared for lifelong learning and continued professional development.

Furthermore, ASSE's (2005) Position Statement on Accreditation of Institutions of Higher Education describes the benefits of program-specific accreditation as assuring "a level of quality and serves to engender employer confidence in the educational content of the program and its delivery."

Conclusion & Recommendations

The benefits of academic accreditation for safety and industrial hygiene programs appear to exceed the efforts. The customers of these programs have many reasons to want to be associated with an accredited program. Since the workload associated with achieving accreditation falls on individuals from the institution, and the academic programs themselves, it is important that faculty also recognize they receive some benefits from the accreditation process. The benefits and value-added activities described here can be used to encourage support for the process. Once they recognize their activities are value-added, they may be more willing to execute the activities with enthusiasm. The process can be streamlined by adding the ongoing activities into the department's procedures and calendar.

As a final point, following the intent of the outcomes-based model used in the accreditation process, allows those involved to:

- carefully review the academic program using a critical thinking method;
- fully involve stakeholders in continuous improvement;
- utilize the concept of continuous improvement, an integral part of outcomes-based assessments, to ensure that the program improves on the basis of input. ■

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