2026 ASEE ANNUAL CONFERENCE June 21–24, 2026 | Charlotte Convention Center, NC
Host Sponsor UNC Charlotte
Paper ID #51790

Evolving ABET Standards: What Literature Says Related to Faculty Challenges in Course Alignment and Impact on Student Learning

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Abstract

Over the last ninety-three years, the Accreditation Board for Engineering and Technology (ABET) has driven change in undergraduate engineering programs across the United States and globally. Initially focused on the professional development of engineers, ABET's scope of practice has expanded to cover additional areas. ABET's ever-evolving criteria aim to ensure that undergraduate curricula provide students with the technical, professional, and design skills necessary to succeed in a rapidly evolving technical industry. Understanding the Accreditation Board for Engineering's influence on curriculum design and delivery has become increasingly important for educational institutions committed to the continuous improvement of student learning.

This paper examines the prevalent challenges faculty encounter in aligning undergraduate course content with ABET standards, maintaining attention to their influence on student learning outcomes and performance. This research synthesizes peer-reviewed journal articles and studies, conference proceedings, ABET policy documents, and public institutional accreditation case studies to analyze central themes, including mandated objectives and assessment practices, inadequate institutional resources, the integration of emerging technologies, and the emphasis on student outcomes-based education.

This literature review examines tensions and misalignments between ABET criteria and diverse institutional goals and stakeholder needs. The synthesis reveals key barriers for faculty, including varied interpretations of ABET criteria, a disconnect between ABET expectations and teaching realities, poor integration of new technologies, and resource constraints. These issues ultimately affect students' preparedness in technical, professional, and design skills. This paper informs institutions by highlighting faculty barriers to effective alignment of the curriculum with ABET standards.

Introduction

What is ABET Accreditation?

With rapidly increasing demand for engineers and the evolving landscape of engineering education, it is essential to establish regulations and learning standards. These standards are relevant to student equity and access to advanced engineering programs, ensuring that the necessary skill competencies are regulated before students enter the workforce. This common belief gained traction in the 1930s, when large-scale infrastructure projects and the need for additional engineering roles surged. In 1932, the Engineers' Council for Professional Development (ECPD) was established. This organization was committed to the regulation, accrediting, and developing engineering professionals and students in the United States [1].

ECPD shifted its title to the Accreditation Board for Engineering and Technology (ABET) as it continued to prioritize accreditation at 4-year undergraduate institutions [1]. ABET's scope of practice has expanded to include additional areas, such as applied and natural sciences, computing, engineering, and engineering technology education. "They are actively responsible for accrediting 4,773 programs at 930 educational institutions across 42 countries" [2]. ABET's ever-evolving criteria aim to ensure that undergraduate curricula equip students with the technical, professional, and design skills necessary to succeed in a rapidly evolving technical industry [2].

The Accreditation Board for Engineering and Technology has evolved a set of criteria over the last 90 years, the most significant shift being EC2000 [3], to ensure confidence that collegiate programs have met standards that are imperative for preparing graduates to enter critical STEM fields in the global workforce. Graduates from an ABET-accredited program are expected to have a solid educational foundation, ensuring they are capable of "leading the way in innovation, emerging technologies, and in anticipating the welfare and safety needs of the public" [4].

The ABET '25-'26 Accreditation Criteria

The Accreditation Board for Engineering and Technology's focus in recent years has evolved from criteria updates. With the most recent updates for the 2025-2026 accreditation cycle, the ABET Engineering Accreditation Commission (EAC) has once again revised its criteria, building on the previously established framework [5]:

Criterion 1: Students

Engineering programs must assess student performance, track progress toward achieving student learning outcomes, and award appropriate academic credit for courses completed at the institution. They must also advise students on educational and career matters, enforce admissions policies, and facilitate credit transfers. Furthermore, the program must establish and maintain procedures to verify and document that graduates meet all graduation requirements [6].

Criterion 2: Program Educational Objectives

Program Educational Objectives (PEOs) are defined as "broad statements that describe what graduates are expected to achieve within a few years of graduation" [7]. Programs must publish educational objectives in alignment with the institution's mission, ABET criteria, and stakeholders' needs, including students, faculty, investors, and industry professionals. The program must periodically review and update documentation [6].

Criterion 3: Student Outcomes

Programs must document and publish student outcomes that support program objectives. The following objective may be added in line with the institution's mission [6]:

1. "An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. An ability to communicate effectively with a range of audiences.
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative environment, establish goals, plan tasks, and meet objectives.
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to conclude.
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies" [5].

Criterion 4: Continuous Improvement

Programs must regularly evaluate and assess student outcomes using the appropriate documented process. The results of these evaluations and assessments must be systematically used for internal institutional improvement [6].

Criterion 5: Curriculum

Programs must fulfill curriculum requirements in specific engineering subject areas. These areas are not officially approved as courses. The program must ensure that each area covers sufficient content, along with criteria 2 and 3, to prepare students with the skills and knowledge necessary for engineering practice upon completing their degree. Curriculum updates must comply with the following requirements:

1. “A minimum of 30 semester credit hours (or equivalent) of a combination of college-level mathematics and basic sciences with experimental experience appropriate to the program.
2. A minimum of 45 semester credit hours (or equivalent) of engineering topics appropriate to the program, consisting of engineering and computer sciences and engineering design, and utilizing modern engineering tools.
3. A broad education component that complements the technical content of the curriculum and is consistent with the program educational objectives.
4. A culminating major engineering design experience that 1) incorporates appropriate engineering standards and multiple constraints, and 2) is based on the knowledge and skills acquired in earlier coursework” [5].

Criterion 6: Faculty

Programs must demonstrate a sufficient number of subject-competent faculty, given the program's size and needs, to meet all programmatic and curricular requirements. There must be adequate student-faculty interaction ratios to ensure good student outcomes in learning, “interaction, student advising and counseling, university service activities, professional development, and interactions with industrial and professional practitioners, as well as employers of students” [5].

Program faculty must be well-qualified and possess sufficient authority to lead the program effectively. These faculty members must be sufficiently competent to responsibly guide the program in developing and implementing processes for assessment, evaluation, and continuous improvement. Faculty qualifications must be demonstrated through education, engineering, and teaching experience; strong communication skills; enthusiasm for program improvement; commitment to scholarly work; personal involvement in the program; and, in moderation, licensure as a professional engineer [5], [6].

Criterion 7: Facilities

Programs must ensure that classrooms, offices, laboratories, and related equipment provide a productive learning environment that supports criterion 3: student outcomes. “Modern tools, equipment, computing resources, and laboratories appropriate to the program must be available and systematically maintained and upgraded to enable students to attain the student outcomes and to support program needs” [5]. Additionally, the program must ensure “students receive appropriate guidance on the tools, equipment, computing resources, and laboratories available”. The program should also provide adequate library services and a robust computing and information infrastructure to meet the scholarly and professional needs of students and faculty [6].

Criterion 8: Institutional Support

Programs must have adequate institutional support, leadership, and resources to complete the following:

1. “Ensure the quality and continuity of the program.
2. Attract, retain, and provide for the continued professional development of a qualified faculty.
3. Acquire, maintain, and operate infrastructures, facilities, and equipment appropriate for the program.
4. Create and foster a respectful environment among the program’s students, faculty, staff, and administrators to support student outcomes. Resources include institutional services and policies, financial support, and administrative and technical staff” [5].

Stakeholders In ABET Accreditation

Accreditation functions within a complex ecosystem where different stakeholder groups interpret, implement, and assess ABET criteria. “Understanding accreditation policies, procedures, and requirements greatly improves a program’s ability to manage processes” [7]. Furthermore, recognizing each group’s stake and understanding the involved power dynamics are crucial for overcoming systemic barriers and aligning curricula effectively with ABET’s standards.

Faculty

Despite popular belief, faculty are central to the accreditation process, as they are responsible for translating the ABET criteria into instruction, curricula, and assessments [8]. Faculty members play various roles during the accreditation cycle, including serving as course coordinators, curriculum designers, teaching in the engineering department, and members of instructional teams for coordinated courses [9]. They can be pressured to make decisions weighed down by the heavy responsibility of accreditation [10]. Additionally, this role often involves time-consuming documentation efforts to prepare for accreditation, which can divert attention and priorities from classroom innovation toward mere compliance. It’s essential to recognize that faculty interpretations significantly shape how ABET accreditation criteria are understood and applied in the classroom.

Students

Students are the primary subjects of assessment and the target outcome of accreditation. Students have an outcome-based role and influence in shaping the structure of the accreditation process. The work completed by the students is used to measure the program's ability to serve the public and industry stakeholders in producing well-rounded engineers [2].

Administrators

Administrators often serve as accreditation leads, working closely with faculty. They serve as liaisons and bridges among the program, the institution's goals, and ABET accreditation requirements. This role typically sets expectations for faculty to maintain compliance and uphold the overall narrative presented to ABET for review [11]. They also ensure that data collection and documentation for review are systematically organized, thereby holding faculty accountable for accurate documentation [12], introducing possible power dynamics.

Accreditation Program Evaluators and Industry Advisors

ABET program evaluators (PEVs) and commission boards serve as assessors for accreditation validity. PEVs conduct site visits, review evidence submitted by institutions, and submit on-site findings for evaluation [13]. Commission boards create and update criteria to stay aligned with current educational trends [14]. Industry advisors, similar in function to commission boards, provide external insights into the skills required by industry to meet future engineering needs. "ABET emphasizes the need for engineering curricula to include components that enable students to identify, formulate, and propose engineering solutions to address industrial problems as well as contemporary social or global issues" [9].

These stakeholders and their involvement in the complex changing ecosystem of engineering accreditation will be explored in this literature review. As Heileman and Abdallah [3] observe, "Given the changing landscape of higher education and the emergence of a global information economy, engineering programs are under increasing pressure to adapt to the evolving demographics of incoming college students and future job markets." From the literature presented below, accreditation is viewed as a system that balances innovation and adherence to standards. "The implementation of the ABET criteria is a nonlinear, ongoing negotiation" [10]. This complex ecosystem illuminates the nuanced role of faculty compared to other stakeholders in shaping, interpreting, and implementing ABET criteria. Accreditation is more than a mere compliance requirement; it is a dynamic process where faculty, students, administrators, ABET officials, and industry advisors collaborate to assess and maintain the quality of engineering education. Recognizing these relationships and dynamics provides an essential foundation for understanding the barriers faculty face through the accreditation process.

Methodology

This literature review aims to identify publications on ABET accreditation processes, the stakeholders involved in accreditation, engineering education, and program quality and assessment. The search for relevant literature was conducted through various scholarly engineering education platforms, including: The Journal of Engineering Education (JEE), Wiley Online Library, the American Society for Engineering Education (ASEE) Conference Library, and IEEE Xplore. Additionally, the ABET organization's information library were used to identify publications that provide institutional data and deeper insights into the accreditation process and its objectives. This was essential for expanding knowledge of accreditation, given the limited availability of accreditation research.

This literature review was structured using an inclusion criteria model focused on peer-reviewed journal articles, conference proceedings, ABET policy documents, and public accreditation case studies from the past decade to examine key themes, including required objectives and assessment practices, insufficient institutional resources, the integration of emerging technologies, and the emphasis on student outcomes-based education. Sources were excluded if they were irrelevant to the topic, did not align with the scope of faculty relevance, lacked methodological rigor, or lacked transparency in data collection. The literature was organized in a literature review that analyzed each publication's research questions and purpose, methods, study implications, and research gaps.

Results and Discussion: Faculty Obstacles with the Application of ABET Criteria

Varied Interpretation and Application of ABET Criteria

Available literature on accreditation reveals inconsistent understanding and application of ABET criteria, especially criterion 3: student outcomes [5], [6]. Felder and Brent [11] emphasize the complexities of interpreting engineering ABET standards, noting that it is "no trivial goal" due to the dense jargon involved. The absence of clear and "agreed-upon operational definitions" for terms such as objectives, outcome indicators, and performance targets causes vagueness and misinformation among institutions. This varied interpretation adds confusion for faculty, who are expected to understand exactly how to equip students with the skills required for each criterion without additional support or resources. The literature indicates that ABET accreditation criteria covering faculty, equipment, and resources have changed very little since the implementation of EC2000 [15], [16], directly ignoring criterion 4 [6].

Some case studies highlight institutions that have misused ABET criteria, such as misinterpreting the criterion to justify creating institutional mandates. For example, Heileman and Abdallah [3] mention that "ABET criteria are commonly cited as the reason why particular changes to engineering programs, such as the required number of credit hours, cannot be considered. Sometimes the ABET criteria are so broadly cited that it is not possible to determine the criterion that might be violated by a proposed change." This clear misuse of ABET criterion 1 sets a precedent for flexible interpretation to support an institution's goals, thereby enabling unchecked authority. The growing misunderstanding and misuse of accreditation requirements have led to a lack of consensus, creating barriers to necessary discussions on alignment. There is a significant risk in allowing variability in the interpretation and application of ABET accreditation criteria, as it can impede open dialogue about engineering education curricula and student learning outcomes, thereby impairing a program's ability to remain compliant with the updated criteria [3].

The overall goal of accreditation is for a program to equip students with transferable skills and knowledge equitably. With increasing variability in the interpretation and operational application of ABET criteria comes greater faculty challenges in aligning well-orchestrated teaching with the application of criteria 1-5 across the program [12].

Misalignment Between ABET Expectations and Instructional Current Realities

Alongside the various interpretations and actions regarding the ABET criteria, there is a significant misalignment between expectations and the instructional realities that faculty actually face. Growing tensions exist between ABET expectations for Program Administrators, PEVs, and Industry Advisors, and the reliance on faculty to meet the daily needs of undergraduate instruction while also bearing the primary responsibility for upholding accreditation requirements [8]. There is a lack of support and resources for faculty to handle the heavy mental load imposed by accreditation pressure [17].

McNeil [8] conducted a qualitative study in which faculty highlighted a lack of awareness of their workload during the accreditation process, which prevents them from focusing on additional responsibilities, such as equipping students with transferable skills and knowledge in the classroom. The misalignment between the expectation that faculty should bear most of the annual burden of meeting ABET accreditation criteria and the current instructional realities of student needs and additional expectations has created a dangerous power imbalance, as faculty are gradually losing autonomy to close this gap [18]. "In our qualitative findings, faculty largely described the ABET accreditation process as having a negative influence on quality teaching—some faculty expressed concern that the accreditation process distracts faculty from having a positive influence on students' learning" [8].

The daunting task of ensuring the program meets ABET requirements, as expected in criterion 5 [5], involves filling curriculum gaps to satisfy each criterion, while limiting faculty autonomy for advancement [9]. The literature documents instances of constrained faculty autonomy to "advance novel curricula," further burdening the student experience and student learning outcomes with "ill-conceived or substandard" curriculum and course documents [18], directly impacting the quality of teaching. Nica [18] showed "that faculty who express various negative views of either the goals or the practice of accreditation are less likely to engage in certain teaching techniques that are more student-centered and more likely to engage in passive delivery."

Inconsistent Assessment Due to Limited Integration of Emerging Technology Innovation

A recurring theme presented across the available ABET literature is the challenge of inconsistent assessment designs that meaningfully assess ABET student outcomes. Ambiguous assessment approaches limit programs' ability to generate detailed insights into their weaknesses, thereby creating a barrier to ongoing program improvement and contradicting criterion 4 [6], [17]. This faculty barrier, in turn, stifles innovation in teaching practice, hindering students' opportunities to develop adaptive, problem-solving skills that align with the demands of engineering practice and the needs of all stakeholders.

Another major recurring faculty barrier is the limited integration of details in the ABET accreditation. The current '25-'26 set of ABET criteria lacks alignment with rapid technological and pedagogical innovations. For example, criterion 3 outcome k, which requires the "ability to use the techniques, skills, and modern engineering tools necessary for engineering practice," is known to be challenging for faculty to incorporate due to resource constraints. Omar [9] observed that institutional programs inconsistently fulfill this outcome by "teaching commercial software packages that can achieve acceptable results in certain aspects to fulfill the course outcomes. However, integrating these commercial packages into a holistic approach to form a problem-solving procedure has been very limited and, in many cases, has not been taken into consideration." As a result, faculty have felt that the barrier created by the accreditation process to the consistent integration of technology has stunted bandwidth for creativity and for consistent, innovative assessment and innovation [8].

Collectively, these issues highlight the need for increased clarity in the definition of assessment that aligns with and keeps pace with the rapid changes in emerging technology. Without such changes, faculty face overwhelming barriers to supporting and preparing students for engineering practice that serves all stakeholders. This barrier prevents rigorously underserved students from achieving technological innovation through a lack of structured assessment strategies, which stifles student learning outcomes [9].

Institutional Structures and ABET Resource Constraints

Institutional structures that guide the accreditation process, when combined with resource constraints, consistently reinforce the lack of supportive infrastructure for faculty, thereby directly affecting the quality of sustained ABET efforts. Washko et al. [19] emphasize that the literature frequently discusses at length "the burden of meeting ABET accreditation without clear benefits." These challenges are highlighted by McNeil's [8] description of the heavy "top-down pressure for change" in accreditation requirements, often implemented without acknowledgment of the cumulative demands on faculty from accreditation criteria, teaching responsibilities, and institutional expectations.

Additionally, other literature suggests the ABET accreditation "process has failed to adapt to modern program requirements and does not practice continuous improvement" [19]. Given the current perception and treatment of accreditation as compliance-driven, with limited resources, this can place additional strain on faculty, diminishing the drive and capacity for a continual improvement-oriented approach in the program, as expected in criterion 6 [5], [20].

Widely discussed resource limitations significantly impact both student and faculty stakeholders at the course-level alignment, where ensuring "consistency of course outcomes across institutions" is vital [12]. Smith and Nelson [12] identify that these resource constraints further exacerbate barriers for faculty in the accreditation process at the national level, hindering the ability to transfer courses and align skills, and undermining the "confidence students have similar abilities and knowledge" throughout their undergraduate experiences before entering the workforce.

Conclusion and Future Work

In synthesizing the reviewed literature, it has become increasingly clear that the modern use of accreditation has strayed far from the original goals of the Accreditation Board for Engineering and Technology (ABET): "assure confidence that a collegiate program has met standards essential to prepare graduates with the necessary technical, professional, and design skills to succeed in a rapidly evolving technical industry" [4]. Many institutions view the accreditation process as merely a compliance-driven exercise when applying for ABET accreditation; they see themselves simply fulfilling the criteria and checking the box, which is the primary reason for pursuing accreditation [21]. This mindset negatively impacts student outcomes by exacerbating the challenges previously mentioned for faculty [11] and diminishing the benefits of engineering education accreditation for stakeholders [11]. The constantly evolving field of engineering education relies on institutions and accreditation agencies to respond promptly to faculty barriers in pursuit of future institutional improvements [22]. The future of engineering education requires rigorous process review standards to reduce barriers and allocate resources more effectively.

Acknowledging the boundaries of this literature review reveals its limitations and constraints that naturally influence its scope. Most available literature on ABET-related assessment practices and accreditation processes consists of institutional reports, public records, conference proceedings, and a few peer-reviewed studies. While these sources offer valuable insights into current institutional practices, challenges, and stakeholder needs, they often lack comparability across multiple institutions. Limited access to public case studies of internal program experiences, qualitative studies on faculty experiences, and multi-institutional assessment data dampens the ability to highlight how the ABET accreditation process incites faculty barriers fully. Recognizing these limitations is essential to inform the need to address gaps in the literature through future research to develop tools and frameworks that reduce the faculty accreditation burden more broadly.

Future work, aligned with a proposed multiphase study, should focus on evaluating tools and frameworks to reduce the accreditation-related burden on faculty. This involves a more deliberate use of stakeholders and resources to increase the value of accreditation as an improvement model and tool. There are small-scale developed models to improve resource utilization for individual criteria, but none have been formulated through multi-institutional collaboration. As McNeil [8] notes, "a focus on the assessment of outcomes, like a criterion-referenced grading system, allows all programs to succeed rather than distinguishing certain programs; there is only one grade of accreditation." Although the current accreditation system is pass/fail with remediation options, developing such tools would be highly valuable for supporting the reinterpretation of ABET criteria and providing a conceptual reframing of key standards to best improve student learning outcomes.

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