An Optimal Mapping Framework for ABET Criteria 3 (a-k) Student Outcomes into the Newly Proposed (1-7) Student Outcomes

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Abstract

The Accreditation Board for Engineering and Technology (ABET) is a non-governmental organization that accredits post-secondary degree-granting engineering programs primarily in the United States and all over the world. At the beginning, the ABET accreditation criteria focused mainly on the logistics of the engineering education such as curriculum, faculty expertise, and facilities. However, this criteria didn't address the student learning outcomes effectively. Therefore, in 1997, ABET adopted the Engineering Criteria 2000 which focused on the student learning outcomes and the continuous improvement process. Even though, this modified criteria which included the a-k Criteria 3 student outcomes have helped improve the engineering education process, it still lacks in the specificity of student learning outcomes. This made understanding and interpreting the criteria very difficult. ABET has currently proposed to change Criteria 3 as part of its continuous quality improvement process to help alleviate some of these shortcomings. The proposed modifications changed the infamous eleven student learning outcomes (3-a to 3-k) to only seven students outcomes with significant changes to their content. These drastic changes will certainly trigger a widespread assessment and curricular revamping across all engineering programs. Even though, the proposed changes to the ABET students outcomes have the potential to improve engineering education, they also might have a negative effect on the educational process if they are not well understood or properly implemented. Therefore, this paper proposes a novel mapping framework that will help engineering faculty and administrators to map their current student performance indicators and rubrics using the new ABET criteria 3 student outcomes. This process is intended to ease the transition and minimize the needed changes in the assessment process which will ensure minimal disruption. In addition, this new mapping will ensure an optimization of the faculty time allocated to adapt their assessment efforts.

Introduction

The Accreditation Board for Engineering and Technology (ABET); is a non-governmental organization that accredits post-secondary degree-granting engineering programs all over the world. ABET was established in 1932 under the name of Engineers' Council for Professional Development (ECPD). The name officially changed to ABET in 1980. ABET is a federation of 35 professional and technical societies. Since then, ABET was primarily an accreditation agency for programs within the US. However, in 2007, ABET began officially accrediting international programs outside the US. The purpose of ABET Accreditation is to ensure that essential educational outcomes are addressed within academic programs offering a specific degree while encouraging innovation and embracing diverse approaches to engineering education rather than promoting conformity. ABET has 4 commissions that accredit different academic programs as follows:

1. Applied Science Accreditation Commission (ASAC): this commission accredits applied science programs such as Health Physics, Industrial Hygiene, Industrial & Quality Management, Safety Sciences, and Survey/Mapping.

2. Computing Accreditation Commission (CAC): this commission accredits computing-related programs such as Computer Science, Information Systems, and Information Technology.

3. Engineering Accreditation Commission (EAC): this commission accredits engineering programs such as Electrical Engineering, Mechanical Engineering, Civil Engineering, and Manufacturing Engineering.

4. Engineering Technology Accreditation Commission (ETAC): this commission accredits engineering technology programs such as Electrical Engineering Technology, Mechanical Engineering Technology, and Civil Engineering Technology.

Even though all the commissions share a similar criteria for accreditation, we will focus our discussion in this paper on the Engineering Accreditation Commission since it applies to engineering programs.

ABET Engineering Accreditation Criteria

The purpose of the ABET accreditation criteria is to develop high quality academic programs that satisfy the needs of their constituents and ensure a continuous improvement through a systematic process. The current engineering criteria are referred to as the Engineering Criteria 2000 (EC 2000) since these criteria were adopted in 2000. These criteria were based on setting program objectives to address the constituents' needs and defining students' learning outcomes that adhere to the professional practice within the discipline. The EC 2000 provided guidelines to help facilitate the assessment process and institute a continuous improvement plan. Engineering Criteria 2000 consist of the following sections:

1- Criterion 1 – Students
2- Criterion 2 – Program Educational Objectives
3- Criterion 3 – Student Outcomes
4- Criterion 4 – Continuous Quality Improvement
5- Criterion 5 – Curriculum
6- Criterion 6 – Faculty
7- Criterion 7 – Facilities
8- Criterion 8 – Support
9- Additional Program Specific Criteria

One of the objectives of revising the ABET accreditation criteria was to harmonize the accreditation across all four commissions by streamlining some of the criterion shared by the various commissions. This resulted in two criterion groups, 1) common criteria across commissions, and 2) commission-specific criteria as illustrated in Table I.

Table I – Common vs. Commission-specific Criteria

Commission-Common Criteria	**Commission-Specific Criteria**
Criterion 1 – Students	Criterion 3 – Outcomes
Criterion 2 – Program Educational Objectives	Criterion 5 – Curriculum
Criterion 4 – Continuous Improvement	Criterion 6 – Faculty
Criterion 7 – Facilities	Program-specific Criteria
Criterion 8 – Support	

These criteria are defined as follows [1]:

Criterion 1 – Students

"Student performance must be evaluated. Student progress must be monitored to foster success in attaining student outcomes, thereby enabling graduates to attain program educational objectives. Students must be advised regarding curriculum and career matters. The program must have and enforce policies for accepting both new and transfer students, awarding appropriate academic credit for courses taken at other institutions, and awarding appropriate academic credit for work in lieu of courses taken at the institution. The program must have and enforce procedures to ensure and document that students who graduate meet all graduation requirements".

Criterion 2 – Program Educational Objectives

"The program must have published program educational objectives that are consistent with the mission of the institution, the needs of the program's various constituencies, and these criteria. There must be a documented, systematically utilized, and effective process, involving program constituencies, for the periodic review of these program educational objectives that ensures they remain consistent with the institutional mission, the program's constituents' needs, and these criteria."

Criterion 3 – Outcomes

"*The program must document 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. The (a-k) student outcomes are as follows:*

a) an ability to apply knowledge of mathematics, science, and engineering.
b) an ability to design and conduct experiments, as well as to analyze and interpret data.
c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
d) an ability to function on multidisciplinary teams.
e) an ability to identify, formulate, and solve engineering 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 engineering solutions in a global, economic, environmental, and societal context.*
i) *a recognition of the need for, and an ability to engage in life-long learning.*
j) *a knowledge of contemporary issues.*
k) *an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.*"

<u>Criterion 4 – Continuous Improvement</u>

"The program must regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are being attained. The results of these evaluations must be systematically utilized as input for the continuous improvement of the program. Other available information may also be used to assist in the continuous improvement of the program."

<u>Criterion 5 – Curriculum</u>

"*The curriculum requirements specify subject areas appropriate to engineering but do not prescribe specific courses. The faculty must ensure that the program curriculum devotes adequate attention and time to each component, consistent with the outcomes and objectives of the program and institution. The professional component must include:*

a) *one year of a combination of college level mathematics and basic sciences (some with experimental experience) appropriate to the discipline. Basic sciences are defined as biological, chemical, and physical sciences.*

b) *one and one-half years of engineering topics, consisting of engineering sciences and engineering design appropriate to the student's field of study. The engineering sciences have their roots in mathematics and basic sciences but carry knowledge further toward creative application. These studies provide a bridge between mathematics and basic sciences on the one hand and engineering practice on the other. Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs.*

c) *a general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives.*

Students must be prepared for engineering practice through a curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple realistic constraints.

One year is the lesser of 32 semester hours (or equivalent) or one-fourth of the total credits required for graduation."

Criterion 6 – Faculty

"The program must demonstrate that the faculty members are of sufficient number and they have the competencies to cover all of the curricular areas of the program. There must be sufficient faculty to accommodate adequate levels of student-faculty interaction, student advising and counseling, university service activities, professional development, and interactions with industrial and professional practitioners, as well as employers of students.

The program faculty must have appropriate qualifications and must have and demonstrate sufficient authority to ensure the proper guidance of the program and to develop and implement processes for the evaluation, assessment, and continuing improvement of the program. The overall competence of the faculty may be judged by such factors as education, diversity of backgrounds, engineering experience, teaching effectiveness and experience, ability to communicate, enthusiasm for developing more effective programs, level of scholarship, participation in professional societies, and licensure as Professional Engineers."

Criterion 7 – Facilities

"Classrooms, offices, laboratories, and associated equipment must be adequate to support attainment of the student outcomes and to provide an atmosphere conducive to learning. Modern tools, equipment, computing resources, and laboratories appropriate to the program must be available, accessible, and systematically maintained and upgraded to enable students to attain the student outcomes and to support program needs. Students must be provided appropriate guidance regarding the use of the tools, equipment, computing resources, and laboratories available to the program.

The library services and the computing and information infrastructure must be adequate to support the scholarly and professional activities of the students and faculty."

Criterion 8 – Institutional Support

"Institutional support and leadership must be adequate to ensure the quality and continuity of the program. Resources including institutional services, financial support, and staff (both administrative and technical) provided to the program must be adequate to meet program needs. The resources available to the program must be sufficient to attract, retain, and provide for the continued professional development of a qualified faculty. The resources available to the program must be sufficient to acquire, maintain, and operate infrastructures, facilities, and equipment appropriate for the program, and to provide an environment in which student outcomes can be attained."

Program Specific Criteria

PROGRAM CRITERIA FOR ELECTRICAL, COMPUTER, COMMUNICATIONS, TELECOMMUNICATION(S) AND SIMILARLY NAMED ENGINEERING PROGRAMS
Lead Society: Institute of Electrical and Electronics Engineers
Cooperating Society for Computer Engineering Programs: CSAB

"*These program criteria apply to engineering programs that include "electrical," "electronic(s)," "computer," "communication(s)," telecommunication(s), or similar modifiers in their titles. 1. Curriculum The structure of the curriculum must provide both breadth and depth across the range of engineering topics implied by the title of the program. The curriculum must include probability and statistics, including applications appropriate to the program name; mathematics through differential and integral calculus; sciences (defined as biological, chemical, or physical science); and engineering topics (including computing science) necessary to analyze and design complex electrical and electronic devices, software, and systems containing hardware and software components.*

The curriculum for programs containing the modifier "electrical," "electronic(s)," "communication(s)," or "telecommunication(s)" in the title must include advanced mathematics, such as differential equations, linear algebra, complex variables, and discrete mathematics.

The curriculum for programs containing the modifier "computer" in the title must include discrete mathematics. The curriculum for programs containing the modifier "communication(s)" or "telecommunication(s)" in the title must include topics in communication theory and systems.

The curriculum for programs containing the modifier "telecommunication(s)" must include design and operation of telecommunication networks for services such as voice, data, image, and video transport."

Why ABET Criterion 3 Needed Changing?

As part of ABET continuous improvement process, the idea of revising Criterion 3 was first suggested in 2009, since it has not been revised since it was formulated in the mid-1990s. A task-force was formed to develop a systematic process to assess, evaluate, and recommend improvements for this criterion. The assigned task-force developed a step-by-step process for reviewing and revising Criterion 3 as follows:

1- Identify the EAC Criterion 3 constituents and obtain their feedback regarding Criterion 3.
2- Survey the EAC program evaluators to identify Criterion 3 shortcomings.
3- Analyze the reported Criterion 3 shortcomings.
4- Solicit the constituents feedback regarding Criterion 3.
5- Review the constituents' feedback.
6- Conduct an in-depth literature review of the desired attributes of engineers.
7- Develop a revised draft of Criterion 3 students' outcomes for general feedback.

The task-force's first report in 2010 identified the potential stakeholders as follows:

1. Domestic and non-domestic undergraduate engineering programs.
2. Domestic and non-domestic graduate engineering programs.
3. Employers of the graduates of domestic and non-domestic colleges and universities, including private and public companies that hire engineering graduates, national research laboratories, Government research laboratories, Corps of Engineers, and others.
4. Boards of Professional Engineering Registration.
5. Professional Societies.

In addition, a survey of EAC program evaluators was conducted during the 2010- 2011 cycle to identify the appropriateness of the Criterion 3 student outcomes. This survey identified shortcomings in all the 11 (a-k) student outcomes with majority of the programs having the most difficulty with the following outcomes:

- 3-(d) ability to function on multidisciplinary teams,
- 3-(f) understanding of professional and ethical responsibility,
- 3-(h) a broad education to understand engineering solutions in global, economic, environmental, and societal context,
- 3-(i) recognition of the need for and ability to engage in life-long learning,
- 3-(j) knowledge of contemporary issues.

The Criterion 3 task force concluded that some of the (a)-(k) components were correlated, broad and vague in scope, or very hard to measure. As a consequence, program evaluators were inconsistent in their interpretation of how well programs were complying with Criterion 3.

An outreach effort across all the constituents was conducted to inform them that Criterion 3 is being reviewed and to solicit suggestions for modifying it. Several responses indicated that the current (a-k) outcomes are not complete and suggested additional outcomes which increased the total outcomes to 75 (not very practical).

In addition to the feedback received from constituents, the task force reviewed national and international reports/publications which addressed the desired attributes of engineers. These reports/publications came from ABET [1], American Society of Civil Engineering (ASCE) [2], American Society of Mechanical Engineering (ASME) [3], University of Michigan [4], American Society of Engineering Education (ASEE) [5], International Engineering Alliance [6,7], National Academy of Engineering (NAE) [8,9], and National Society of Professional Engineers (NSPE) [10].

In conclusion, the task force presented their findings to the EAC in July 2013 highlighting the need to revise Criterion 3. The findings are summarized as follows:

- Criterion 3 had the most reported shortcomings which necessitates immediate action.
- Within Criterion 3 some student outcomes are difficult to measure.

- The innovation component was not represented properly within the student outcomes.
- Program evaluators were inconsistent in their interpretation of how well programs were complying with Criterion 3.
- Some constituencies reported the need to add more student outcomes.

The EAC Criteria Committee took the task force findings of the review process and incorporated them into a revised Criterion 3. In the process of revising Criterion 3, the committee saw the need to revise Criterion 5 as well.

First Proposed Changes to Criteria 3 & 5

In 2014, the EAC Criteria committee presented the first proposed revision to Criterion 3 & 5. The proposed changes to the outcomes are explained as follows:

Student outcome 1: combined student outcomes ***e*** and ***a*** as follows:

1) *an ability to apply knowledge of mathematics, science, and engineering to identify, formulate, and solve engineering problems.* (outcomes *a* + *e*)

Student outcome 2: combined student outcome ***c*** and ***h*** as follows:

c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability engineering solutions in a global, economic, environmental, and societal context. (outcomes *c* + *h*)

Then rewritten as follows:

2) *an ability to apply both analysis and synthesis in engineering design process, resulting on designs that meet constraints and specifications. Constraints and specifications include societal, economic, environmental, and other factors as appropriate to the design.* (rewritten [outcomes *c* + *h*])

Student outcome 3: rewrote student outcome ***b***

b) an ability to design and conduct experiments, as well as to analyze and interpret data. (outcome *b*)

Then rewritten as follows:

3) *an ability to develop and conduct appropriate experimentation and testing procedures, and to analyze and draw conclusions from data.* (rewritten [outcome *b*])

Student outcome 4: modified student outcome ***g***

g) an ability to communicate effectively. (outcome *g*)

Then modified as follows:

4) *an ability to communicate effectively with a range of audiences through various media.* (Modified [outcome *g*])

Student outcome 5: modified student outcome ***f***

f) an understanding of professional and ethical responsibility. (outcome *f*)

Then modified as follows:

5) *an ability to demonstrate ethical principles in an engineering context.* (Modified [outcome *f*])

Student outcome 6: modified student outcome ***d***

d) an ability to function in multidisciplinary teams. (outcome *d*)

Then modified as follows:

6) *an ability to establish goals, plan tasks, meet deadlines, manage risk and uncertainty, and function effectively on teams.* (Modified [outcome *d*])

Furthermore, student outcomes ***i*** and ***j*** were completely removed and outcome ***k*** was included in Criterion 5.

The revised Criterion 3 student outcomes (a-k) are as follows:

1) an ability to apply knowledge of mathematics, science, and engineering to identify, formulate, and solve engineering problems.
2) an ability to apply both analysis and synthesis in engineering design process, resulting on designs that meet constraints and specifications. Constraints and specifications include societal, economic, environmental, and other factors as appropriate to the design.
3) an ability to develop and conduct appropriate experimentation and testing procedures, and to analyze and draw conclusions from data.
4) an ability to communicate effectively with a range of audiences through various media.
5) an ability to demonstrate ethical principles in an engineering context.
6) an ability to establish goals, plan tasks, meet deadlines, manage risk and uncertainty, and function effectively on teams.

The revised Criterion 5 is presented as follows: (with modification in bold and strikethrough ommissions in red)

The curriculum requirements specify subject areas appropriate to engineering but do not prescribe specific courses. **The curriculum must support attainment of the student outcomes and must include:**

a) one year of a combination of college level mathematics and basic sciences (some with experimental experience) appropriate to the discipline. Basic sciences are defined as biological, chemical, and physical sciences.

b) one and one-half years of engineering topics, consisting of engineering sciences and engineering design appropriate to the **program and incorporating modern engineering tools**. The engineering sciences have their roots in mathematics and basic sciences but carry knowledge further toward creative application. These studies provide a bridge between mathematics and basic sciences on the one hand and engineering practice on the other. Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences, mathematics, and the engineering sciences are applied to convert resources optimally to meet these stated needs.

c) a general education component that complements the technical content of the curriculum and is consistent with the program and institution objectives.

Students must be prepared for engineering practice through a curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple constraints.

One year is the lesser of 32 semester hours (or equivalent) or one-fourth of the total credits required for graduation.

Second Proposed Changes to Criteria 3 & 5

The first proposed changes to Criteria 3 and 5 were presented to the full EAC in July 2014 and were posted online at the ABET website to solicit the constituents feedback. ASEE and other constituents expressed concerns regarding the new proposed changes to Criterion 3 and urged ABET to reconsider or modify some of the proposed changes.

Based on the feedback received, the ABET Criteria Committee proposed a second revised draft of Criteria 3 and 5 in addition to a new modification to the preamble. The proposed changes to the outcomes are explained as follows:

Student outcome 7: student outcome 6 became student outcome 7 as follows:

7) *an ability to establish goals, plan tasks, meet deadlines, manage risk and uncertainty, and function effectively on teams.*

Student outcome 6: brought back a modified student outcome ***i***.

i) a recognition of the need for, and an ability to engage in life-long learning.

Then modified as follows:

6) *an ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.*

The second revision of Criterion 3 student outcomes are presented as follows:

1) an ability to apply knowledge of mathematics, science, and engineering to identify, formulate, and solve engineering problems.
2) an ability to apply both analysis and synthesis in engineering design process, resulting on designs that meet constraints and specifications. Constraints and specifications include societal, economic, environmental, and other factors as appropriate to the design.
3) an ability to develop and conduct appropriate experimentation and testing procedures, and to analyze and draw conclusions from data.

4) an ability to communicate effectively with a range of audiences through various media.
5) an ability to demonstrate ethical principles in an engineering context.
6) an ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.
7) an ability to establish goals, plan tasks, meet deadlines, manage risk and uncertainty, and function effectively on teams.

The second revision of Criterion 5 is presented as follows: (with modification in bold and strikethrough ommissions in red)

The curriculum requirements specify subject areas appropriate to engineering but do not prescribe specific courses. The curriculum must support attainment of the student outcomes and must include:

a) one year of a combination of college level mathematics and basic sciences (some with experimental experience) appropriate to the discipline.
b) one and one-half years of engineering topics, consisting of engineering sciences and engineering design appropriate to the program and **utilizing** modern engineering tools.
c) **A broad education component that includes humanities and social sciences, complements the technical content of the curriculum, and is consistent with the program educational objectives**

Students must be prepared **to enter the professional practice of engineering** through a curriculum culminating in a major design experience based on the knowledge and skills acquired in earlier course work and incorporating appropriate engineering standards and multiple constraints.

The definitions removed from Criterion 5 were added to the Criteria for Accrediting Engineering Programs preamble.

The proposed changes to the Preamble are presented as follows:

Original
"These criteria are intended to assure quality and to foster the systematic pursuit of improvement in the quality of engineering education that satisfies the needs of constituencies in a dynamic and competitive environment. It is the responsibility of the institution seeking accreditation of an engineering program to demonstrate clearly that the program meets the following criteria."

Modified

"These criteria are intended to provide a framework of education that prepares graduate to end the professional practice of engineering who are

i. able to participate in diverse multicultural workplaces;
ii. knowledgeable on topics relevant to their discipline, such as usability, constructability, manufacturability and sustainability; and
iii. cognizant of the global dimensions, risks, uncertainties, and other implications of their engineering solutions.

Further, these criteria are intended to assure quality and to foster the systematic pursuit of improvement in the quality of engineering education that satisfies the needs of constituencies in a dynamic and competitive environment. It is the responsibility of the institution seeking accreditation of an engineering program to demonstrate clearly that the program meets the following criteria."

Mapping the Original Criteria 3 to the Newly Proposed Criteria 3

Even though the proposed changes to the ABET students outcomes have the potential to improve engineering education, they might have a negative effect on the educational process if they are not well understood or properly implemented. Therefore, we propose a novel mapping framework that can help engineering faculty and administrators to map their current student performance indicators and rubrics using the new ABET Criterion 3. This process is intended to ease the transition and minimize the needed changes in the assessment process to ensure minimal distrubtion. In addition, this new mapping matrix will ensure an optimal allocation of faculty time to adapt to the new assessment process. This mapping matrix is illustrated in Table II.

Table II – Mapping the Original and the Newly Proposed Criterion 3 Student Outcomes

Newly Proposed Criterion 3 Student Learning Outcomes	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**
Original Criterion 3 Student Learning Outcomes	Apply knowledge of mathematics, science, and engineering to identify, formulate, and solve engineering problems.	Apply both analysis and synthesis in engineering design process, resulting on designs that meet constraints and specifications. Constraints and specifications include societal, economic, environmental, and other factors as appropriate to the design.	Develop and conduct appropriate experimentation and testing procedures, and to analyze and draw conclusions from data.	Communicate effectively with a range of audiences through various media.	Demonstrate ethical principles in an engineering context.	Recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.	Establish goals, plan tasks, meet deadlines, manage risk and uncertainty, and function effectively on teams.
(a) Apply knowledge of mathematics, science, and engineering.	☑						
(b) Design and conduct experiments, as well as to analyze and interpret data.			☑				
(c) Design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.		☑					
(d) Function in multi-disciplinary teams.							☑
(e) Identify, formulate, and solve engineering problems.	☑						
(f) Understand professional and ethical responsibility.					☑		
(g) Communicate effectively.				☑			
(h) Understand the impact of engineering solutions in global, economic, environmental, and societal context.		☑					
(i) Recognize the need for, and engage in life-long learning.						☑	
(j) Knowledge of contemporary issues	Eliminated in the new Criterion 3						
(k) Use the techniques, skills, and modern engineering tools necessary for engineering practice.	Addressed in the new Criterion 5						

Conclusion

This paper presented a review of the ABET accreditation criteria and highlighted the continuous improvement process developed throughout the years. In addition, the paper detailed the findings at every stage of the continuous improvement process. This process identified significant shortcomings related to Criterion 3 (Student Learning Outcomes), which triggered its first revision. Based on the constituents' feedback, an improved second revision was introduced. Even though, the proposed changes to ABET students outcomes have the potential to improve engineering education, they might have a negative effect on the educational process if they are not well understood or properly implemented. Therefore, a mapping framework was proposed in this paper to help engineering faculty and administrators map their current student outcomes to the new ABET criteria 3 student outcomes. This process is intended to ease the transition and minimize the needed changes to ensure minimal disruption in the assessment process.

Disclaimer

The bulk of the work presented in this paper was drawn from publically available ABET documents, ASEE Ad Hoc Committee on ABET EAC Changes Webinar, and the National Academy of Engineering Forum on Proposed Revisions to ABET Engineering Accreditation Commission General Criteria on Student Outcomes and Curriculum (Criteria 3 and 5).

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