Designing Better Engineering Education Through Assessment: A Book Review

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Abstract
Designing Better Engineering Education Through Assessment: A Practical Resource for Faculty and Department Chairs on Using Assessment and ABET Criteria to Improve Student Learning, edited by Joni E. Spurlin, Sarah A. Rajala, and Jerome P. Lavelle, provides a comprehensive guide to enhancing engineering education through effective assessment practices aligned with ABET accreditation standards. Aimed at faculty members and department chairs, this book focuses on the practical application of assessment methods to improve student learning and meet accreditation criteria. It explores the role of both formative and summative assessments in evaluating student outcomes at various stages of the engineering curriculum, from introductory courses to capstone projects and graduate education. The book is divided into four main parts: the basics of assessment, barriers and challenges to effective implementation, assessing student learning across the educational continuum, and the future of assessment in engineering education. The first part introduces fundamental assessment concepts and the importance of aligning assessments with desired learning outcomes. The second part addresses common obstacles, such as faculty resistance and institutional inertia, and provides strategies for overcoming these challenges. Part three discusses the integration of assessment throughout the engineering education experience, emphasizing methods used at different educational stages. The final part looks ahead, examining emerging trends and technologies that could transform the future of assessment. Through its practical examples, case studies, and expert insights, this book serves as a valuable resource for those seeking to improve engineering programs by ensuring that student learning is effectively measured and continuously enhanced. It offers actionable strategies for creating a culture of assessment that supports the ongoing improvement of engineering education.

Keywords: ABET, student learning, accreditation, curriculum improvement, program outcomes, formative assessment.

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Introduction

Designing Better Engineering Education Through Assessment serves as an essential guide for engineering faculty and department chairs looking to enhance the quality of their educational programs through effective assessment practices. Edited by Joni E. Spurlin, Sarah A. Rajala, and Jerome P. Lavelle, the book offers a practical, evidence-based approach to applying assessment methods that align with the Accreditation Board for Engineering and Technology (ABET) criteria. As engineering education continues to evolve in response to global challenges and industry demands, this book provides a comprehensive roadmap for institutions aiming to improve student outcomes and meet accreditation standards.

The editors bring extensive expertise in engineering education and assessment, with Spurlin, Rajala, and Lavelle all holding significant academic and leadership roles in engineering education reform. Their combined experience ensures that the book not only offers theoretical insights but also practical, real-world applications that are vital for institutional leaders. Spurlin's work in engineering education assessment, Rajala's experience as a former dean, and Lavelle's focus on curriculum design and program evaluation make the book an authoritative resource for improving the quality of engineering education.

This book is divided into four key sections, each addressing different aspects of assessment. The first part explores the fundamentals of assessment, introducing readers to the concepts and tools necessary for measuring student learning outcomes.

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The second part tackles the challenges and barriers to implementing effective assessment, particularly focusing on overcoming resistance from faculty and institutional constraints. In the third part, the book looks at how assessment can be integrated throughout the engineering educational experience, from introductory courses to capstone projects. The final section examines emerging trends and technologies in assessment, offering a vision for the future of engineering education assessment.

By providing both a theoretical understanding of assessment and practical examples of its application across different stages of the engineering curriculum, the editors ensure that the book is not only a tool for meeting ABET's accreditation requirements but also a comprehensive guide to fostering continuous improvement in engineering programs (Raza et al., 2024). With contributions from experienced educators and assessment professionals, Designing Better Engineering Education Through Assessment is an invaluable resource for anyone looking to enhance the effectiveness of their engineering education program.

Summary and opinions

Designing Better Engineering Education Through Assessment provides an in-depth exploration of how assessment practices can be used to improve engineering education at both undergraduate and graduate levels. The book offers both theoretical insights and practical guidance, making it a valuable resource for faculty, department chairs, and academic administrators

Part One: Basics of Assessment

The first section introduces the core principles of assessment, focusing on its importance in improving student learning, curriculum, and teaching practices. Linda Suskie's chapter, *Understanding the Nature and Purpose of Assessment*, provides a thorough overview of assessment theory, emphasizing how it should be linked to clear and important educational goals. This section will appeal to faculty members who are new to assessment or looking to strengthen their understanding of its role in improving program outcomes. The book stresses that assessments must be used to inform decisions about curriculum design, teaching methods, and overall program improvement, making this section particularly relevant for faculty who are involved in program design or accreditation processes.

Part Two: Barriers and Challenges

The second part of the book addresses the barriers that often prevent effective assessment in engineering education, such as faculty resistance and institutional inertia. In *Barriers and Challenges to Assessment in Engineering Education*, J. Joseph Hoey and Eleanor W. Nault explore the challenges institutions face in establishing a culture of assessment, such as resource constraints and lack of professional development. One of the most compelling aspects of this section is its focus on strategies to overcome these barriers. This is especially useful for department chairs and faculty leaders who may be tasked with guiding their institutions through the process of implementing or improving assessment practices. The book suggests that fostering a collaborative environment, building trust among faculty, and securing administrative support are essential for successful assessment adoption which is similar to approach by Fiore & Koverola (2021). Faculty members can benefit from understanding how to overcome resistance and implement practical solutions within their own departments.

Part Three: Learning Along the Continuum of the Educational Experience

Part three focuses on the integration of assessment across the entire educational experience, from first-year courses to graduate programs. One of the highlights of this section is Jerome P. Lavelle and Sarah A. Rajala's chapter on Assessing the First Year of Engineering Education. This chapter presents innovative assessment methods for first-year engineering courses and discusses how early assessment can help improve retention rates and address the unique challenges faced by first-year students. The use of longitudinal tracking, pretest/post-test assessments, and attitudinal surveys is discussed as part of a broader effort to assess the foundational stages of engineering education. Faculty teaching introductory courses can find this section particularly valuable, as it provides evidence-based strategies for assessing the effectiveness of first-year curricula and identifying areas for improvement. The goal is to better equip students from the outset, ensuring that they are on track for success throughout their academic careers.

In our view, the integration of assessment across the educational continuum is crucial not only for improving retention but also for fostering a deeper understanding of the material. By implementing early assessments, educators can identify and address challenges before they become insurmountable, helping students build a strong foundation for their future courses (Imran et al., 2023). Moreover, these assessments encourage a proactive approach to learning, empowering students to take ownership of their educational journey (Ibrahim & Julius, 2024). It is essential that this kind of thoughtful and data-driven assessment continues to evolve, ensuring that every student, regardless of their entry point into the program, has the support they need to thrive academically and professionally.

Part Four: The Future of Assessment

The final section of the book looks ahead to the future of assessment in engineering education. This part explores emerging assessment technologies, including the use of concept maps, model-eliciting activities (MEAs), and e-portfolios, and how these tools can provide richer, more dynamic insights into student learning. The chapter on *The Future of Assessment*, written by Mary Besterfield-Sacre and Larry J. Shuman, presents the evolving landscape of assessment tools that are likely to shape the next generation of engineering education. This forward-thinking chapter will be of particular interest to faculty and administrators who are looking for innovative ways to measure student learning and adapt to the changing needs of both the engineering profession and educational accreditation bodies.

Highlighted Sections of Interest

Chapter 3: Assessment Methods Used in Undergraduate Program Assessment by Joni E. Spurlin

This chapter presents practical approaches to assessment in undergraduate engineering programs, including how course-based assessments can be used to evaluate student learning outcomes. It is particularly valuable for faculty members, as it provides a comprehensive framework for integrating assessment methods into everyday teaching practices. By focusing on the alignment of assessment methods with program objectives and educational outcomes, this chapter helps faculty understand how assessments can drive program improvements. It also introduces the concept of assessing educational objectives through multiple constituencies, such as faculty, alumni, and employers, making it an invaluable tool for those seeking to improve both their teaching practices and the quality of their engineering programs.

Chapter 9: Assessment for Improving Teaching and Student Learning within a Course by C. Dianne Raubenheimer

This chapter addresses how engineering faculty can use Classroom Assessment Techniques (CATs) to evaluate and improve their own instructional methods. The chapter categorizes CATs into techniques for assessing course knowledge, learner attitudes, and reactions to teaching, offering a range of tools for faculty to assess the effectiveness of their teaching. The use of action research in the classroom is also discussed as a way for instructors to continuously assess and improve their teaching practices. For faculty members who are looking to refine their own teaching strategies and engage students more effectively, this chapter is an excellent resource, providing actionable techniques for real-time assessment and feedback.

Educational Theories and Models in Engineering Assessment

"Designing Better Engineering Education Through Assessment" offers a comprehensive approach to assessment in engineering education, grounded in two pivotal educational theories/models: Formative and Summative Assessments and Assessment for Continuous Improvement.

Formative and Summative Assessment Framework

One of the central themes in the book is the use of both formative and summative assessments. The authors highlight how formative assessments used to monitor student progress throughout a course, are critical for providing ongoing feedback that informs teaching practices. Summative assessments, in contrast, evaluate students at the end of the learning period, serving as a final judgment of their achievement. This dual approach ensures that assessments are not only used for evaluation but also for the continuous enhancement of both teaching methods and student outcomes. The book emphasizes that these assessments must align with clear, predefined educational goals, ensuring that they contribute meaningfully to student learning.

Assessment for Continuous Improvement

Another key educational framework discussed in the book is the idea of assessment as a tool for continuous improvement. The authors argue that assessments should not be viewed solely as final evaluations of student performance but as integral components of the broader educational process. Through continuous assessment, educators can refine teaching strategies and adapt curricula based on student feedback and performance trends. This approach not only enhances the immediate learning experience but also fosters long-term improvements in educational quality and program design. The book underscores that assessments must be a dynamic, iterative process, one that evolves as both students and educational practices progress.

These educational frameworks provide the theoretical foundation for the practical strategies presented in the book. By emphasizing the role of assessment in both improving immediate learning outcomes and ensuring ongoing educational development, the book offers a valuable guide for engineering educators looking to foster a culture of continuous improvement within their programs.

Conclusion

Designing Better Engineering Education Through Assessment serves as a crucial guide for faculty, department chairs, and academic administrators who are dedicated to improving the quality of engineering education through effective assessment practices.

Edited by Joni E. Spurlin, Sarah A. Rajala, and Jerome P. Lavelle, the book provides an extensive framework for aligning assessment strategies with ABET accreditation criteria, addressing both the theoretical underpinnings of assessment and its practical application in real-world educational settings. The book's comprehensive approach offers readers valuable insights into how assessment can be integrated into engineering curricula at all stages of student development, from first-year courses to graduate education. The editors emphasize that assessment should not be viewed merely as a means of evaluating student performance but as an ongoing, dynamic process that informs curriculum design, teaching practices, and continuous program improvement. This focus on assessment as a tool for fostering educational development rather than a mere compliance measure aligns with the broader goals of engineering education, to ensure that graduates are equipped with not only technical knowledge but also the problem-solving, critical thinking, and teamwork skills essential for success in the modern engineering workforce.

One of the most significant contributions of the book is its discussion on the barriers and challenges to implementing effective assessment. The chapters on overcoming faculty resistance and institutional inertia provide actionable strategies for creating a culture of assessment within engineering programs. The emphasis on collaborative efforts, professional development, and fostering trust among faculty members ensures that institutions can build a supportive environment for adopting assessment practices that lead to continuous improvement. Faculty members and administrators will find these sections particularly useful in navigating the often complex and resource-intensive process of implementing assessment in higher education. The book also emphasizes the importance of integrating assessment throughout the entire engineering education experience. From introductory courses to capstone projects and graduate-level work, the book provides a clear framework for using formative and summative assessments to track and improve student progress. This holistic view ensures that assessment is not a one-time event but an integral component of the learning process that adapts to students' evolving needs as they progress through their education (Amini et al., 2024)

Moreover, the book looks to the future, presenting innovative assessment techniques and tools, such as e-portfolios, concept maps, and adaptive learning systems, that will play an increasingly important role in shaping how student learning is measured. As the engineering field becomes more interdisciplinary and complex (Van den Beemt et al., 2020), these new assessment methods offer opportunities to capture a broader spectrum of student competencies, including collaboration, creativity, and problem-solving. This forward-thinking approach ensures that engineering programs can remain responsive to industry needs and societal challenges, preparing graduates for a rapidly changing global workforce. Ultimately, *Designing Better Engineering Education Through Assessment* is an essential resource for anyone involved in the improvement and accreditation of engineering programs. Its clear, evidence-based strategies provide a comprehensive toolkit for creating and sustaining high-quality educational programs that are both innovative and effective. By focusing on continuous improvement, overcoming barriers, and preparing for the future of assessment, the book provides a roadmap for institutions committed to advancing the quality of engineering education. Whether a faculty member looking to refine their teaching methods or a department chair seeking to enhance program outcomes, this book offers invaluable insights that will help shape the future of engineering education, ensuring that graduates are prepared to meet the evolving challenges of the profession.

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Conflict of Interest

The authors declare no conflict of interest.

References

Amini, M., Ravindran, L., & Lee, K.-F. (2024). Adapting education shifts in Malaysia after COVID-19: A comprehensive review of flexible assessments, lifelong learning initiatives, and diversified learning trajectories. *Asian Journal of Assessment in Teaching and Learning*, *14*(1), 1–14.

Fiore, L. B., & Koverola, C. (2021). *Building trust between faculty and administrators: An intercultural perspective*. Routledge.

Ibrahim, M. S. N., & Julius, A. (2024). Book Review: Instructional Scaffolding in STEM Education–Strategies and Efficacy Evidence. *Asean Journal of Engineering Education*, *8*(2), 110–113.

Imran, M., Ahmad, N., Al-Harthy, A. A. Q., & Jat, Z. G. (2023). Early identification and intervention: Amplifying the voice of slow learners. *AITU Scientific Research Journal*, *2*(2).

Raza, K., Li, S., & Chua, C. (2024). A conceptual framework on imaginative education-based engineering curriculum. *Science & Education*, *33*(4), 923–936.

Van den Beemt, A., MacLeod, M., Van der Veen, J., Van de Ven, A., Van Baalen, S., Klaassen, R., & Boon, M. (2020). Interdisciplinary engineering education: A review of vision, teaching, and support. *Journal of Engineering Education*, *109*(3), 508–555.