ISRG Journal of Engineering and Technology (ISRGJET)

ISRG PUBLISHERS

Abbreviated Key Title: ISRG J Eng Technol

ISSN: 3107-5894 (Online)

Journal homepage: https://isrgpublishers.com/isrgjet/

Volume – I Issue-IV (November-December) 2025

Frequency: Bimonthly

Toward International Engineering Standards: An Empirical Study on the Initiatives and Challenges of HEIs Pursuing ABET Accreditation

Rosario Danga

University of Saint Louis, Tuguegarao City, Philippines
Department of Science and Technology Regional Office 2, Carig Sur, Tuguegarao City, Cagayan, Philippines

| **Received:** 19-11-2025 | **Accepted:** 25-11-2025 | **Published:** 04-12-2025

***Corresponding author: Rosario Danga**

Department of Science and Technology Regional Office 2, Carig Sur, Tuguegarao City, Cagayan, Philippines

Abstract

Engineering programs in the Philippines are increasingly encouraged to align with international standards as part of broader efforts to strengthen academic quality and global competitiveness. Among these standards, the Accreditation Board for Engineering and Technology (ABET) framework has gained attention for its emphasis on student outcomes, curriculum coherence, faculty competence, adequate facilities, and continuous improvement. This study examined the initiatives and challenges of engineering higher education institutions (HEIs) in Northern Philippines as they prepare for potential ABET accreditation. Using a descriptive–qualitative design, data were gathered through open-ended questionnaires, focus group discussions, and document analysis involving deans, program chairs, faculty members, and student representatives. The results show that regional HEIs have begun implementing several initiatives that reflect early alignment with ABET expectations. These include participation in national and international quality assurance activities, upgrading laboratory facilities, undertaking curriculum review and mapping, and providing faculty development programs. While these efforts indicate a commitment to improvement, institutions also face persistent challenges. The most frequently reported concerns involve inadequate laboratories and physical facilities, limited financial resources, difficulties in curriculum alignment, faculty workload and qualification issues, and challenges in meeting ABET's documentation and continuous improvement requirements. Overall, the study finds that engineering HEIs in Northern Philippines are moving toward ABET readiness but require more consistent support, strategic planning, and resource investment. Addressing these challenges is essential for building sustainable systems that will allow institutions in the region to meet global accreditation standards and better prepare engineering graduates for professional practice.

Keywords: *ABET accreditation, engineering education, quality assurance, curriculum alignment, higher education institutions, Northern Philippines*

DOI: 10.5281/zenodo.17863516

INTRODUCTION

Engineering education in the Philippines has been undergoing steady and sometimes difficult reform as institutions attempt to adjust to higher expectations for quality, relevance, and global competitiveness. The introduction of outcomes-based education (OBE) through CHED Memorandum Orders No. 37, s. 2012 and No. 46, s. 2012 required colleges and universities to take a closer look at how their engineering programs were structured and delivered. These policies pushed institutions to rethink their curricula, redesign teaching and learning activities, and put systems in place to monitor whether students were actually achieving the intended learning outcomes. The reforms did not happen in isolation; they form part of a broader international movement calling for greater transparency, accountability, and student-centered learning in engineering education. As industries increasingly demand graduates who can solve real-world problems, communicate effectively, and adapt to rapid technological changes, academic institutions have been compelled to consider quality assurance systems that align their programs with international expectations and provide external validation of their efforts.

One of the most recognized systems in this regard is the accreditation framework developed by the Accreditation Board for Engineering and Technology (ABET). ABET defines accreditation as a rigorous and voluntary process where an external body evaluates whether a program meets established global standards for engineering education. These standards cover several critical areas, including the curriculum, student outcomes, faculty qualifications, physical and academic resources, and continuous quality improvement processes. ABET-accredited programs are generally regarded as having the capacity to produce graduates who are ready to enter professional practice and contribute meaningfully to the engineering field. In the Philippines, institutions such as De La Salle University and Mapúa Institute of Technology have pursued or achieved ABET accreditation, demonstrating how the framework influences curriculum revisions, strengthens assessment practices, and encourages faculty to participate in professional development and research (Le, 2025; Mariano & Valenzuela, 2021). These experiences have also shown that ABET accreditation is achievable for Philippine institutions, provided that adequate institutional support and sustained commitment are in place.

Although the literature on OBE, curriculum reform, and quality assurance has grown in the last decade (Tam, 2014; Khanna & Mehrotra, 2019), much of the attention has been given to national policy changes or to the experiences of relatively well-resourced universities. There is much less discussion about how regional engineering programs—particularly those in Northern Philippines—are preparing for international accreditation. Regional HEIs operate under different conditions: they often have fewer financial resources, smaller pools of qualified faculty, and older facilities compared with large private universities or HEIs in major urban centers. Because of these differences, strategies that worked for large institutions may not be immediately applicable to regional ones. The lack of studies focusing on regional engineering programs means that their efforts, concerns, and contextual limitations are not fully captured in the current literature. This is a significant oversight considering that many engineering graduates in the country come from these regional institutions.

Existing research has also pointed out several long-standing issues in engineering programs—such as inadequate laboratories, budget constraints, limited faculty qualifications, and uneven assessment practices (Khan & Abid, 2021; Muzata, et al., 2024; Matarneh, et al., 2025). International studies add that engineering schools commonly encounter difficulties related to documentation, data collection, facilities, and curriculum alignment when seeking accreditation (Benz-Camino, et al., 2023; Headley & Benson, 2024). However, these observations tend to be discussed in general terms and are rarely examined specifically in the context of ABET's detailed criteria. For example, while there are reports of facility shortages, few studies explore how these shortages affect an HEI's ability to meet ABET's expectations for laboratories, assessment systems, or continuous improvement. This leaves important questions unanswered about how Philippine HEIs—especially those outside Metro Manila—are navigating the accreditation process or what unique obstacles they face in trying to meet international standards.

Given these gaps, there is a need to take a closer look at the experiences of engineering HEIs in Northern Philippines as they begin preparing for ABET accreditation. Documenting the initiatives they have undertaken—whether in curriculum improvement, faculty development, quality assurance, or facility upgrades—helps show how these institutions are responding to the demands of global engineering education. At the same time, identifying the challenges they encounter provides a clearer picture of the specific constraints and support needs of regional HEIs. Understanding these two aspects is essential for developing realistic plans, institutional strategies, and policy interventions aimed at strengthening engineering education in the region. This study contributes to this effort by examining both the initiatives and challenges faced by engineering HEIs in Northern Philippines, offering insights that may guide future capacity-building efforts and inform ongoing discussions on international accreditation in the Philippines.

METHOD AND MATERIALS

This study employed a descriptive–qualitative research design, supported by simple quantitative frequency counts, to explore the initiatives and challenges of engineering Higher Education Institutions (HEIs) in Northern Philippines as they work toward Accreditation Board for Engineering and Technology (ABET) accreditation. The qualitative approach served as the primary mode of inquiry, enabling an in-depth understanding of institutional practices and constraints, while the quantitative summaries strengthened the analysis by identifying the most frequently reported experiences across institutions.

The research was conducted among engineering HEIs located in Northern Philippines, specifically those offering engineering programs with at least Level II accreditation from CHED-recognized accrediting bodies. These institutions included both State Universities and Colleges (SUCs) and Private Higher Education Institutions (PHEIs), all of which offer programs such as Civil, Electrical, Electronics, Mechanical, Chemical, and Agricultural and Biosystems Engineering. Participants were purposively selected based on their involvement in program management and accreditation-related functions. They included deans, program chairs or coordinators, faculty members teaching professional engineering courses, and fourth-year engineering students and graduates who participated in the validation phase through focus group discussions. These respondents were chosen for their direct engagement in curriculum implementation, faculty

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development, laboratory and facility management, quality assurance processes, and institutional planning.

Data were gathered using three complementary techniques. First, a researcher-developed questionnaire was administered, with Part III containing open-ended questions designed to elicit detailed information on the programs and initiatives undertaken by HEIs in preparation for ABET accreditation, as well as the challenges they encounter in meeting ABET requirements. Second, focus group discussions (FGDs) were conducted to validate and deepen the insights derived from the questionnaire responses. The FGDs included deans, program chairs, faculty members, selected students, and program graduates, and the discussion guide was aligned with ABET's general criteria focusing on curriculum improvements, faculty preparation, assessment processes, facilities enhancement, and resource-related constraints. Third, document analysis was conducted on institutional materials such as accreditation reports, curriculum documents, faculty development plans, program manuals, and laboratory inventories to triangulate and substantiate the qualitative findings.

Data gathering followed ethical and procedural rigor. Approval to conduct the study was obtained through regional authorities, and formal communication was issued to participating institutions. Questionnaires were personally distributed to maximize the response rate, and FGDs were conducted either onsite or virtually depending on institutional preference and participant availability. All FGD sessions were recorded with participant consent and transcribed for analysis. Ethical considerations—including informed consent, voluntary participation, confidentiality, and secure data handling—were strictly upheld throughout the study.

Data analysis followed Braun and Clarke's (2006) thematic analysis framework. The researcher familiarized with the data, generated initial codes, identified and reviewed potential themes, refined theme definitions, and produced the final thematic structure. Themes were generated separately for institutional initiatives toward ABET readiness and for challenges encountered during the accreditation preparation process. To complement the qualitative analysis, frequency counts were computed to determine how often particular initiatives and challenges were mentioned across participating institutions. Triangulation of questionnaire responses, FGD insights, and document analysis enhanced the credibility and trustworthiness of the findings, ensuring that the results accurately represented the experiences and perspectives of engineering HEIs in Northern Philippines.

RESULTS AND DISCUSSION

Table 1. Initiatives of Engineering HEIs Toward ABET Accreditation

Programs and Initiatives	Frequency
National and international quality assurance initiatives and preparation activities for ABET accreditation	14
Acquisition and improvement of school facilities and laboratory resources	10
Faculty Development Program	7
Conduct of curriculum review and enhancement	6
Programs and activities preparing students and graduates in the professional practice of engineering	4

The initiatives identified across engineering HEIs in Northern Philippines illustrate a clear and deliberate movement toward meeting the expectations of the Accreditation Board for Engineering and Technology (ABET). As reflected in Table 5, the most frequently cited initiative involves participation in national and international quality assurance activities, which serve as preliminary steps in aligning institutional practices with ABET standards (f = 14). Respondents emphasized that these activities—such as accreditation seminars, benchmarking, documentation workshops, and compliance reviews—have helped their institutions become familiar with global accreditation language and processes. This trend mirrors the broader shift in Philippine higher education toward internationalization, particularly following the Commission on Higher Education's mandate to adopt outcomes-based education (OBE) and a typology-based quality assurance framework through CMO No. 37, s. 2012 and CMO No. 46, s. 2012. Long before these policies became fully institutionalized, several pioneering universities such as De La Salle University, Mapúa Institute of Technology, and others had already begun integrating OBE principles and international standards into their curricula and assessment systems (Linsangan, et al., 2011; Alves, et al., 2013). These early adopters demonstrated how aligning with international benchmarks can drive curricular improvements, assessment reforms, and enhanced student preparation—an experience now being echoed by regional HEIs embarking on the same path.

A second major initiative involves the upgrading of facilities and laboratory resources (f = 10). Respondents repeatedly noted the importance of improving laboratories, acquiring modern equipment, and enhancing computing facilities as part of their preparation for ABET accreditation. These efforts directly respond to ABET's general criteria, which emphasize that institutions must provide adequate spaces, tools, and technical resources to facilitate hands-on learning, design activities, experimentation, and engineering practice. The findings are consistent with earlier studies highlighting infrastructure development as a key preparatory step for engineering accreditation (Alhorani, et al., 2021; Prados, et al., 2005). The literature likewise stresses that well-equipped laboratories not only allow students to experience authentic engineering tasks but also support institutions in demonstrating clear attainment of student outcomes (Kumari, et al., 2024). For regional HEIs, these upgrades often represent significant institutional investments, underscoring the seriousness with which they approach eventual ABET compliance.

Another recurring initiative is the deliberate strengthening of faculty development programs (f = 7). Respondents cited training in OBE, participation in accreditation workshops, seminars on assessment and documentation, and engagements that expand faculty exposure to industry practices. Since ABET accreditation requires faculty who are academically prepared, professionally active, and capable of sustaining outcomes-based instruction, institutions appear to be taking steps to enhance faculty readiness. Several studies affirm that faculty competence is foundational to successful accreditation, noting that programs must demonstrate not only qualifications but also evidence of continuous professional growth (Junprasert, et al., 2025; Raj, et al., 2022). Faculty development is also critical in sustaining continuous quality improvement, as it allows instructors to refine assessment tools, evaluate student outcomes more systematically, and integrate industry-relevant practices into instruction (Xinghua, 2024). These

DOI: 10.5281/zenodo.17863516

efforts indicate that HEIs recognize faculty as central actors in achieving and maintaining accreditation standards.

A fourth initiative involves curriculum review and enhancement (f = 6). Respondents explained that programs have initiated curriculum mapping, reviewed prerequisite structures, aligned learning outcomes across courses, and clarified performance indicators in preparation for ABET. This is consistent with earlier literature which underscores curriculum alignment as one of the most critical components of accreditation, ensuring that students' academic pathways meaningfully contribute to the attainment of program outcomes (Selvakumar, et al., 2025; Rose & Sorge, 2023; Kayyali, 2024). Philippine institutions that have pursued internationalization in recent years reported similar reforms, particularly as they adapted to OBE and sought to strengthen the coherence of their engineering curricula (Pabutawan, 2023). Curriculum review is particularly important in ABET processes because it allows institutions to trace how each course contributes to student outcomes, how assessments are implemented, and how results inform program improvement.

Some institutions also reported initiatives aimed at enhancing student preparation for professional engineering practice (f = 4). These include strengthening internship programs, expanding industry linkages, updating practicum requirements, and offering competency-based training activities. International literature affirms the value of such student-focused initiatives, emphasizing that exposure to real engineering environments builds essential competencies, reinforces theoretical knowledge, and enhances employability (Al-Shammari, 2025; Kerr, 2025). Moreover, these activities directly support ABET's expectation that graduates possess not only technical knowledge but also practical, professional, and interpersonal skills.

Taken together, the initiatives undertaken by engineering HEIs in Northern Philippines reflect a growing institutional commitment to ABET-aligned reforms. These actions mirror global trends in engineering education, where institutions continuously refine their curricula, upgrade facilities, and strengthen faculty capacities as part of broader quality improvement and internationalization efforts (Vedhathiri, 2022; Kayyali, 2024). While the pace and extent of these initiatives vary across institutions, the overall direction suggests that HEIs in the region are steadily laying the groundwork required for future ABET accreditation.

Table 2. Challenges faced by Engineering HEIs towards ABET

Challenges	Frequency
Challenges faced by institution on the adequacy of classrooms, offices and laboratories to support attainment of student outcomes and provide an atmosphere conducive to learning	12
Challenges faced by institution regarding sufficient resources such as institutional support, financial support, and resource allocations to meet program needs	11
Challenges faced by institution on curriculum alignment with the program educational objectives and student outcomes	8
Challenges faced by institution on faculty	5
Challenges faced by institution on meeting the requirements of the different ABET criteria	5
Challenges faced by institution on the conduct of continuous quality improvement of the program	4

Despite their preparatory efforts, engineering HEIs continue to face a range of structural, financial, and academic challenges as they work toward ABET accreditation. The most frequently reported concern relates to the adequacy of physical facilities, particularly the availability and quality of classrooms, offices, and laboratories (f = 12). Respondents repeatedly emphasized that limited laboratory spaces, outdated equipment, and insufficient specialized facilities make it difficult to deliver the hands-on, practice-based learning experiences expected in engineering programs. Since ABET places strong emphasis on student exposure to experimentation, engineering design, and modern tools, these deficiencies pose significant obstacles. This concern mirrors international findings, where laboratory constraints and limitations in physical resources have been identified as key barriers to accreditation across various engineering institutions (Larrondo-Petrie, et al., 2021; Khadar, et al., 2025). Similar observations were made in Philippine studies, which have long pointed to chronic gaps in laboratory infrastructure, equipment modernization, and the maintenance of engineering facilities as persistent challenges in the delivery of quality engineering education (Ramos, et al., 2023). These facility-related issues also reflect broader inequalities among higher education institutions, particularly between well-funded universities and resource-constrained regional institutions.

The second major challenge concerns insufficient institutional resources and financial support (f = 11). Many respondents explained that their institutions face difficulties in securing the financial investments required to sustain the long-term demands of ABET preparation, such as procuring laboratory equipment, upgrading specialized engineering tools, establishing stronger internal quality assurance mechanisms, and sending faculty to professional development activities. This aligns with national literature showing that Philippine HEIs often operate within limited fiscal environments, resulting in delayed modernization efforts and constrained opportunities for capacity-building (Bayudan-Dacuycuy, et al., 2024). Public HEIs, in particular, rely heavily on government funding cycles, which may not always align with the resource-intensive nature of accreditation preparation. International studies likewise affirm that ABET accreditation is a costly undertaking; institutions must allocate substantial budgets for training, documentation systems, updated facilities, and curricular realignment (Le, 2025; James-Okeke, et al., 2019; Zaid Abualkishik, et al., 2022) Without consistent funding streams, HEIs struggle to meet the evolving demands of engineering education and its required global benchmarks.

A third challenge involves the alignment of curriculum with program educational objectives and student outcomes (f = 8). Respondents reported difficulties in ensuring that course outcomes, instructional activities, and assessment practices consistently reflect ABET expectations. This is especially challenging in institutions transitioning from traditional content-based models to outcomes-based education (OBE), where curriculum restructuring requires significant coordination among faculty members, program chairs, and academic leaders. Literature on OBE implementation highlights similar struggles, noting that mapping curricula to learning outcomes, establishing assessment systems, and ensuring program coherence demand sustained effort and faculty training (Shaheen, 2019; Alhazmi, 2025). Previous studies on Philippine engineering education also reported gaps in outcome alignment,

DOI: 10.5281/zenodo.17863516

especially in ensuring that engineering graduates develop industry-relevant competencies and meet international standards (Dotong & Laguador, 2014; Laguador & Dotong, 2020). These curricular challenges are further complicated by the need for consistent documentation, regular curriculum review cycles, and alignment with professional regulations and licensure requirements.

Challenges related to faculty qualifications, workload, and professional engagement (f = 5) were likewise prominent. Several HEIs struggle with limited numbers of faculty members holding graduate degrees, particularly in specialized engineering fields. Heavy teaching loads and administrative responsibilities also restrict the ability of faculty to update their professional competencies, engage in research, or participate in industry immersion—activities that are essential in strengthening their alignment with ABET expectations. This issue is not unique to the region; studies have consistently emphasized the role of faculty readiness and competence as central to accreditation success Redelsheimer, et al., 2015; Romero, 2008). Without sufficient faculty development opportunities, institutions find it difficult to sustain continuous quality improvement and evidence-based assessment practices.

Another significant concern pertains to the difficulty of meeting specific ABET criteria, especially those involving systematic documentation, data collection, and assessment of student outcomes (f = 5). Respondents noted that while initial assessment systems may be in place, maintaining consistent data gathering and producing credible evidence remain challenging. Several studies have observed similar difficulties, emphasizing that the technical rigor of ABET requires institutions to develop robust assessment frameworks and documentation processes (Damaj, et al., 2017; Saeed, et al., 2021; Tahmina & Kelley, 2024). Related to this is the challenge of strengthening continuous quality improvement (CQI) mechanisms (f = 4). Many institutions acknowledged having some form of CQI process, but these mechanisms are often implemented inconsistently, rely on incomplete data, or lack systematic follow-through. Effective CQI requires regular evaluation cycles, stakeholder participation, and reliable evidence—components that institutions are still developing.

Taken together, these challenges reveal structural gaps in resources, infrastructure, curriculum coherence, faculty readiness, and internal assessment systems. While HEIs have demonstrated clear commitment through their initiatives, addressing these persistent challenges will require sustained support, strategic investment, and long-term institutional planning.

CONCLUSION

This study examined the initiatives undertaken and the challenges encountered by engineering HEIs in Northern Philippines as they work toward ABET accreditation. The results show that institutions in the region have begun implementing several preparatory actions, such as engaging in national and international quality assurance activities, upgrading laboratories and facilities, revisiting their curricula, and investing in faculty development. These initiatives indicate a growing recognition of the importance of aligning engineering education with international standards and preparing graduates to be competitive in both local and global engineering fields. Despite these efforts, the study also reveals several persistent challenges that hinder the readiness of HEIs for ABET accreditation. Inadequate laboratories and instructional facilities, constrained institutional budgets, limited faculty qualifications and heavy workloads, and difficulties in curriculum alignment and documentation were among the most frequently cited concerns. These challenges reflect broader systemic issues faced by many regional higher education institutions, where limited resources, aging infrastructure, and uneven academic capacity slow down the pace of reform. Overall, the findings suggest that while engineering HEIs in Northern Philippines are moving in the right direction, significant gaps remain, and sustained institutional commitment and external support will be necessary for meaningful progress.

REFERENCES

1. Alhazmi, A. K. (2025, March). Bridging Theory and Practice in Outcome-Based Assessment: Developing a Web Application for Learning Outcome Alignment. In *2025 14th International Conference on Educational and Information Technology (ICEIT)* (pp. 356-367). IEEE.
2. Alhorani, R. A., Abu Elhaija, W., Bazlamit, S. M., & Ahmad, H. S. (2021). ABET accreditation requirements and preparation: Lessons learned from a case study of Civil Engineering Program. *Cogent Engineering*, *8*(1), 1995109.
3. Al-Shammari, M. (2025). *Embracing Student Centered Learning in Higher Education* (Doctoral dissertation, The University of Western Ontario).
4. Alves, A. C., Kahlen, F. J., Flumerfelt, S., & Siriban Manalang, A. B. (2013, November). Comparing engineering education systems among USA, EU, Philippines and South Africa. In *ASME International Mechanical Engineering Congress and Exposition* (Vol. 56277, p. V005T05A027). American Society of Mechanical Engineers.
5. Bayudan-Dacuycuy, C., Flores, H., & Uy, A. O. (2024). Financial sustainability of higher education institutions in the Philippines: Issues, challenges, and opportunities.
6. Benz-Camino, M., Ramírez-Valdivia, M. T., Morales-Casetti, M., & Sirias, D. (2023). Lessons learned designing and implementing a quality assurance system in an industrial engineering school. *Quality Assurance in Education*, *31*(3), 369-385.
7. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative research in psychology*, *3*(2), 77-101.
8. Damaj, I., Zaher, A., & Yousafzai, J. (2017). Assessment and evaluation framework with successful application in ABET accreditation.
9. Headley, M., & Benson, L. (2024, December). Literature Review Paper: Exploring Engineering Students Perceptions of Engineering Accreditation. In *2024 World Engineering Education Forum-Global Engineering Deans Council (WEEF-GEDC)* (pp. 1-6). IEEE.
10. James-Okeke, P. A., Ladeji-Osias, J. O., & Scott, C. J. (2019, June). ABET Accreditation: Best Practices for A Systematic Coordinated Multi-Program Approach. In *2019 ASEE Annual Conference & Exposition*.
11. Junprasert, T., Wongsatayanon, B., Pheeraphan, N., Klaykaew, K. K., Prasittichok, P., Suwanwong, C., & Dechokietawan, M. (2025). Transforming faculty development: key outcomes and strategies for achieving UKPSF accreditation excellence. *Quality Assurance in Education*.

DOI: 10.5281/zenodo.17863516

12. Kayyali, M. (2024). Exploring Accreditation Standards and Processes. In *Quality Assurance and Accreditation in Higher Education: Issues, Models, and Best Practices* (pp. 1-60). Cham: Springer Nature Switzerland.
13. Kerr, V. E. (2025). *Harnessing Cultural Assets: Identifying Effective Experiential Learning Preparation Practices for International Graduate Engineering Students* (Doctoral dissertation, University of Pittsburgh).
14. Khadar, A. A., Kansra, P., & Khan, S. A. (2025). Challenges of Accreditation in Developing Countries: Overcoming Barriers and Expanding Opportunities. *Global Perspectives on Quality Management and Accreditation in Higher Education*, 301-318.
15. Khan, Z. H., & Abid, M. I. (2021). Distance learning in engineering education: Challenges and opportunities during COVID-19 pandemic crisis in Pakistan. *The International Journal of Electrical Engineer*
16. Khanna, R., & Mehrotra, D. (2019). The roadmap for quality improvement from traditional through competency based (CBE) towards outcome based education (OBE) in dentistry. *Journal of oral biology and craniofacial research*, *9*(2), 139-142.
17. Kumari, P., Mwesigye, A., & Balimuttajjo, S. (2024). Science Laboratory Education and Students' Perceived Behavior Towards Science Education: A Review. *Journal of Research Innovation and Implications in Education*, *8*(4), 555-561.
18. Laguador, J. M., & Dotong, C. I. (2014). Knowledge versus practice on the outcomes-based education implementation of the engineering faculty members in LPU. *International Journal of Academic Research in Progressive Education and Development*, *3*(1), 63-74.
19. Laguador, J. M., & Dotong, C. I. (2020). Engineering Students' Challenging Learning Experiences and Their Changing Attitude towards Academic Performance. *European Journal of Educational Research*, *9*(3), 1127-1140.
20. Larrondo-Petrie, M. M., Zapata-Rivera, L. F., Aranzazu-Suescun, C., Sanchez-Viloria, J. A., Molina-Peña, A. E., & Santana-Santana, K. S. (2021, November). Addressing the need for online engineering labs for developing countries. In *2021 World Engineering Education Forum/Global Engineering Deans Council (WEEF/GEDC)* (pp. 387-396). IEEE.
21. Le, N. D. (2025). ABET-Compliant Training Program Implementation Impact on Improvement of Training Quality. *Journal of Technical Education and Training*, *17*(2), 197-212.
22. Linsangan, N., Santiago, R., Ballado Jr, A., Navalta, C., & Caluyo, F. (2011). Shifting to outcomes-based education: The Mapúa institute of technology experience. In *Proceedings of the World Congress on Engineering and Computer Science* (Vol. 1, pp. 19-21).
23. Mariano, O. R., & Valenzuela, I. C. (2021, December). Comparative analysis of the quality of accreditation among the electronics engineering program of private and public higher education institutions in the Philippines. In *2021 IEEE International Conference on Engineering, Technology & Education (TALE)* (pp. 01-06). IEEE.
24. Matarneh, S., AlQaraleh, L., Alkhrissat, T., & Abdel-Jaber, M. (2025). An analysis of E-learning system challenges in engineering education: an empirical study. *Cogent Education*, *12*(1), 2445967.
25. Muzata, A. R., Singh, G., Stepanov, M. S., & Musonda, I. (2024, November). Immersive learning: A systematic literature review on transforming engineering education through virtual reality. In *Virtual Worlds* (Vol. 3, No. 4, pp. 480-505). MDPI.
26. Pabutawan, E. L. P. (2023). Investigating the outcomes-based education (OBE): a case study using the Philippine maritime education and training (MET) system.
27. Prados, J. W., Peterson, G. D., & Lattuca, L. R. (2005). Quality assurance of engineering education through accreditation: The impact of Engineering Criteria 2000 and its global influence. *Journal of engineering education*, *94*(1), 165-184.
28. Raj, R. K., Impagliazzo, J., Aly, S. G., Bowers, D. S., Connamacher, H., Kurkovsky, S., ... & Marques Samary, M. (2022). Toward competency-based professional accreditation in computing. In *Proceedings of the 2022 Working Group Reports on Innovation and Technology in Computer Science Education* (pp. 1-35).
29. Ramos, B., dos Santos, M. T., Vianna Jr, A. S., & Kulay, L. (2023). An institutional modernization project in chemical engineering education in Brazil: Developing broader competencies for societal challenges. *Education for Chemical Engineers*, *44*, 35-44.
30. Redelsheimer, C. L., Boldenow, R., & Marshall, P. (2015). Adding value to the profession: The role of accreditation. *Journal of Forestry*, *113*(6), 566-570.
31. Romero, E. J. (2008). AACSB accreditation: Addressing faculty concerns. *Academy of Management Learning & Education*, *7*(2), 245-255.
32. Rose, K., & Sorge, B. H. (2023). Preparing Students for Certifications: A Model for Assessing Curriculum Alignment to Professional Standards. *Assessment Update*, *35*(5).
33. Saeed, S., Almuhaideb, A. M., Bamarouf, Y. A., Alabaad, D. A., Gull, H., Saqib, M., ... & Salam, A. A. (2021). Sustainable program assessment practices: A review of the ABET and NCAAA computer information systems accreditation process. *International Journal of Environmental Research and Public Health*, *18*(23), 12691.
34. Selvakumar, P., Sameer, B. M., Portia, R., Das, A., & Pachar, S. (2025). Curricula Design and Accreditation. In *Instructional Approaches for Health Professions Education* (pp. 431-458). IGI Global Scientific Publishing.
35. Shaheen, S. (2019). Theoretical perspectives and current challenges of OBE framework. *International Journal of Engineering Education*, *1*(2), 122-129.
36. Tahmina, Q., & Kelley, K. (2024, June). ABET Assessment Program for a Bachelor of Science in Engineering Technology Degree–Strategies and Best Practices. In *2024 ASEE Annual Conference & Exposition*.
37. Tam, M. (2014). Outcomes-based approach to quality assessment and curriculum improvement in higher

DOI: 10.5281/zenodo.17863516

education. *Quality assurance in education*, *22*(2), 158-168.

38. Vedhathiri, T. (2022). Dynamic Process for Enhancing Engineering Faculty Competence in India. *Journal of Engineering Education Transformations*, 7-25.
39. Xinghua, X. (2024). Explore Innovation and Practice of Collaborative Training Mode for Vocational Education Teachers Based on Modern Industrial College. *significance*, *1*(1), 25thOctober.
40. Zaid Abualkishik, A., Atassi, R., Singh, A., Elhoseny, M., Alwan, A. A., Iqbal, R., & Khelifi, A. (2022). Outcomes-Based Assessment and Lessons Learned in ABET-CAC Accreditation: A Case Study of the American University in the Emirates. *Mobile Information Systems*, *2022*(1), 1595126.

DOI: 10.5281/zenodo.17863516