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BRIDGING THE GAPS IN IMPLEMENTING THE ETAC STANDARD 2024: AN IN-DEPTH ANALYSIS

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Abstract:

Higher education accreditation plays a pivotal role in maintaining the global standing and viability of engineering education. Amidst evolving educational demands, engineering programs must align with the progressive standards set by international accrediting bodies. This study explores the transition from a 12-attribute framework to a streamlined 11-attribute system that incorporates Sustainable Development Goals (SDGs) and enhances critical thinking skills. By utilizing examples, this paper highlights effective strategies for bridging the gap between previous and current accreditation standards. These insights are crucial for programs aiming to align with updated international criteria, ensuring the cultivation of graduates equipped to meet contemporary engineering challenges. The sharing examples will be beneficial for others to adapt to the new standards and facilitate a smooth transition.

Keywords:

Accreditation, Engineering Education, Graduate Attributes, Gap Analysis

Introduction

Accreditation is vital in maintaining the quality of academic programs in higher education institutions (Hegji, 2020; Vlăsceanu et al., 2007). While researchers have investigated the role of accreditation in higher education, the results have been inconsistent. Some studies have shown that accreditation positively impacts various aspects of higher education (Kumar et al., 2020), whereas others have found little to no effect on teaching, learning, and institutional quality (Dattey et al., 2017; Jalal et al., 2020). Additionally, much of the research on

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accreditation is qualitative, leading to a lack of definitive empirical evidence on its effectiveness in enhancing higher education performance.

The International Engineering Alliance (IEA), established in 1998, is instrumental in achieving global recognition for engineering competencies acquired through higher education in different countries (Zhang et al., 2023). The IEA comprises several international agencies responsible for accrediting engineering education. Its primary objectives include improving the professional quality and skills of engineers, advancing global engineering education standards, and upholding the quality and reputation of engineers worldwide. The IEA's accreditation framework encompasses three key agreements: the Washington Accord, the Sydney Accord, and the Dublin Accord. These agreements facilitate mutual recognition in international engineering education, ensuring that graduates possess globally acknowledged engineering qualifications.

Accreditation of an academic program signifies that it meets the standards and quality expectations of the public, educational community, and industry. In the context of engineering education, accreditation is a critical process that enables graduates from accredited engineering programs to pursue professional engineering qualifications (Mohd Said et al., 2011). It serves as a benchmark for employers to assess the quality of an engineering graduate's education, given that the accreditation process involves rigorous evaluation of both technical and soft skills (Mohd Said et al., 2011). Consequently, the pursuit of accreditation has become essential for institutions offering engineering education. Moreover, international agreements facilitate the mutual recognition of accredited engineering qualifications and professional competencies among member countries, thus allowing graduates from accredited programs to seek employment and professional recognition internationally.

Therefore, accreditation is highly advantageous for engineering programs, as it enables graduates to attain professional engineer status and enhances their career mobility on a global scale. Conversely, the lack of accreditation can have severe implications: graduates from unaccredited programs are typically ineligible for professional engineering licensure, and their degrees may not be recognized internationally (Phillip et al. 2000).

Due to the changes in the standard for ETAC, these updates highlight the need to address the gap between the current graduate attributes and the new standards. This paper focuses on the gap analysis that engineering programs must conduct to adjust and improve to meet the updated requirements of international engineering accreditation for Sydney and Dublin Accords.

Literature Review

The development of an engineering professional is a continuous process which involved with several key stages. Firstly, through the obtaining an accredited educational qualification, which known as the graduate stage. The main purpose is to establish a knowledge and develop the attributes that enable graduates to continue learning and progress to formative development for cultivating the competences required for independent practice. The second stage is professional registration where the graduates build their educational foundation by working alongside experienced engineering practitioners and gradually shift from an assisting role to taking on more individual and team responsibilities thus able to demonstrate competence at the level required for registration. Once registered, the practitioners must continuously maintain and expand their competence to stay current in their field.

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Engineering education in all over the world has facing with a lot of challenges for the past 20 years such as decreasing number of students intake compared to the another courses according to the data obtained from UNESCO Institute for Statistics (Chen et al., 2022). Thus, it requires the changes in the engineering education such as shifting toward problem-based, project based, and challenge based learning. Besides, the integration with the sustainable development is needed. Nowadays, global engineering education is focus to 17 Sustainable Developments Goals (SDGs) and the field of engineering education is required to meet the requirement of new Graduate Attributes & Professional Competencies (GAPC). The requirement to revisit the existing standard is a must to ensure that new GAPC able to reflect the sustainable goals (Alhorani et al., 2021).

GAPC profile defined the expected outcome for engineering education program for the education accords. Under the IEA, there are several international accords which provide for recognition of graduates; Washington Accord (WA) provides for mutual recognition of programs accredited for the engineering meanwhile The Sydney Accord (SA) establishes mutual recognition of accredited qualifications for engineering technologist and The Dublin Accord (DA) provides for mutual recognition of accredited qualifications for engineering technicians. In Malaysia the recognition of engineering, engineering technologist and technician programme have been placed under Engineering Accreditation Department, Board of Engineer Malaysia. The Washington Accord has been located under Engineering Accreditation Council whilst Sydney and Dublin Accord have been located under Engineering Technology Accreditation Council.

Methodology

This paper adopts a qualitative approach through document review via gap analysis which is a strategic assessment process that involves comparing and evaluating the differences between the current state of a standard (ETAC Standard 2020) in the program (the "as-is" state) and a desired future state or a set of standards or requirements (ETAC Standard 2024) (the "to-be" state). It is commonly used in educational program transitions, to facilitate decision-making, planning, and improvement.

The Overview of Changes

In response to the implementation of the Sustainable Development Goals (SDGs) (UNESCO, 2019; UNECE, 2012), there have been updates to the Graduate Attributes. These standards are now aligned with IEA GAPC 2021-Version 3, which consolidates 12 Graduate Attributes into 11 by combining "The Engineer and Society (PO6)" and "Environment and Sustainability (PO7)" under the new heading "The Engineers and the World (PO6 – Standard 2024)." Furthermore, the revised standards emphasize critical thinking, innovation, emerging technologies, and lifelong learning (PO11 – Standard 2024), as well as knowledge and awareness of ethics, diversity, and inclusion (PO7 – Ethics – Standard 2024).

The Standard 2024 will highlight and encourage more on critical thinking, innovation, emerging technologies and lifelong learning requirements. Besides, it also emphasis on the knowledge and awareness of ethics, diversity which inclusion of United Nations SDG. The transition of the graduate attributes for engineering technology and technician programme can be visualized in Table 1 and Table 2 respectively.

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Table 1: The Differences Between Programme Outcome Statement Version 2020 and Programme Outcome Statement Version 2024 for Engineering Technology Program (IEA, 2021; BEM,2020a)

PO	PO Statement version 2020	PO	PO Statement version 2024
PO1	apply knowledge of mathematics, science, engineering fundamentals and an engineering specialisation to defined and applied engineering procedures, processes, systems or methodologies; (SK1 to SK4)	PO1	Apply knowledge of mathematics, natural science, **computing** and engineering fundamentals and an engineering specialization as specified in **SK1 to SK4** respectively to defined and applied engineering procedures, processes, systems or methodologies.
PO2	Identify, formulate, research literature and analyse Broadly Defined d engineering problems reaching substantiated conclusions using analytical tools appropriate to their discipline or area of specialisation; (SK1 to SK4)	PO2	Identify, formulate, research literature and analyse Broadly Defined d engineering problems reaching substantiated conclusions using analytical tools appropriate to their discipline or area of specialisation; **with considerations for sustainable development** ; (SK1 to SK4)
PO3	Design solutions for Broadly Defined d engineering technology problems and contribute to the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations; (SK5)	PO3	Design solutions for Broadly Defined d engineering technology problems and contribute to the design of systems, components or processes to meet identified needs with appropriate consideration for public health and safety, **whole life cost, net zero carbon as well as resource, cultural, societal, and environmental considerations as required** ; (SK5)
PO4	Conduct investigations of Broadly Defined d problems; locate, search and select relevant data from codes, data bases and literature, design and conduct experiments to provide valid conclusions; (SK8)	PO4	Conduct investigations of Broadly Defined d engineering problems; locate, search and select relevant data from codes, data bases and literature, design and conduct experiments to provide valid conclusions; (SK8)
PO5	Select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to Broadly Defined d engineering problems, with an understanding of the limitations; (SK6)	PO5	Select and apply, and recognize limitations of appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to Broadly Defined d engineering problems; (**SK2 and** SK6)
PO6	Demonstrate understanding of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to	PO6	Analyze and evaluate sustainable development impacts to: society, the economy, sustainability, health and safety, legal frameworks, and the

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	engineering technology practice and solutions to Broadly Defined d engineering problems; (SK7)		environment, in solving Broadly Defined d engineering problems; (**SK1, SK5, and** SK7)
PO7	Understand the impact of engineering technology solutions of Broadly Defined d engineering problems in societal and environmental context and demonstrate knowledge of and need for sustainable development; (SK7)		
PO8	Understand and commit to professional ethics and responsibilities and norms of engineering technology practice; (SK7)	PO7	Understand and commit to professional ethics and norms of engineering technology practice **and adhere to relevant national and international laws. Demonstrate an understanding of the need for diversity and inclusion; inclusion;(SK9)**
PO9	Function effectively as an individual, and as a member or leader in diverse technical teams;	PO8	Function effectively as an individual, and as a member or leader in diverse and inclusive teams **and in multi-disciplinary, face to face, remote and distributed settings ; (SK9)**
PO10	Communicate effectively on Broadly Defined d engineering activities with the engineering community and with society at large, by being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions;	PO9	Communicate effectively and inclusively on Broadly Defined d engineering activities with the engineering community and with society at large, by being able to comprehend and write effective reports and design documentation, make effective presentations, **taking into account cultural, language, and learning differences;**
PO11	Demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member and leader in a team and to manage projects in multidisciplinary environments;	PO10	Apply knowledge and understanding of engineering management principles and economic decision making to one's own work, as a member and leader in a team and to manage projects in multidisciplinary environments;
PO12	Recognize the need for, and have the ability to engage in independent and lifelong learning in specialist technologies	PO11	Recognize the need for, and have the ability for i) independent and lifelong learning **and ii) critical thinking in the face of new specialist technologies. (SK8)**

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Table 2: The Differences Between Programme Outcome Statement Version 2020 and Programme Outcome Statement Version 2024 for Engineering Technician (IEA, 2021; BEM,2020b)

PO	PO Statement version 2020	PO	PO Statement version 2024
PO1	Apply knowledge of applied mathematics, applied science, engineering fundamentals and an engineering specialisation as specified in DK1 to DK4 respectively to wide practical procedures and practices;)	PO1	Apply knowledge of applied mathematics, applied science, computing and engineering fundamentals and an engineering specialisation as specified in DK1 to DK4 respectively to wide practical procedures and practices;
PO2	Identify and analyse well defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity (DK1 to DK4);	PO2	Identify and analyse well defined engineering problems reaching substantiated conclusions using codified methods of analysis specific to their field of activity (DK1 to DK4);
PO3	Design solutions for well defined technical problems and assist with the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations (DK5);	PO3	Design solutions for well defined technical problems and assist with the design of systems, components or processes to meet specified needs with appropriate consideration for public health and safety as well as , cultural, societal, and environmental considerations as required (DK5);
PO4	Conduct investigations of well defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements	PO4	Conduct investigations of well defined problems; locate and search relevant codes and catalogues, conduct standard tests and measurements **(DK8)**
PO5	Apply appropriate techniques, resources, and modern engineering and IT tools to well defined engineering problems, with and awareness of the limitations (DK6)	PO5	Apply appropriate techniques, resources, and modern engineering computing and IT tools to well defined engineering problems, with an awareness of the limitations (**DK2 and** DK6)
PO6	Demonstrate knowledge of the societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to engineering technician practice and solutions to well defined engineering problems (DK7)	PO6	**Consider sustainable development impacts to society, the economy, sustainability**, health and safety, legal **frameworks, and the environment, in solving** well defined engineering problems (**DK1, DK5, and** DK7)
PO7	Understand and evaluate the sustainability and impact of engineering technician work in the solution of well-defined		

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	engineering problems in societal and environmental contexts (DK7)		
PO8	Understand and commit to professional ethics and responsibilities and norms of technician practice (DK7)	PO7	Understand and commit to professional ethics and responsibilities and norms of technician practice **and including compliance with national and international laws. Demonstrate an understanding of the need for diversity and inclusion (DK9)**
PO9	Function effectively as an individual, and as a member in diverse technical teams	PO8	Function effectively as an individual, and as a member in diverse **and inclusive teams in multi-disciplinary, face to face, remote and distributed settings (DK9)**
PO10	Communicate effectively on well defined engineering activities with the engineering community and with society at large, by being able to comprehend the work of others, document their own work, and give and receive clear instructions;	PO9	Communicate effectively and inclusively on well-defined engineering activities with the engineering community and with society at large, by being able to comprehend the work of others, document their own work, and give and receive clear instructions;
PO11	Demonstrate knowledge and understanding of engineering management principles and apply these to one's own work, as a member or leader in a technical team and to manage projects in multidisciplinary environments	PO10	Demonstrate **awareness of** engineering management principles as a member or leader in a technical team and to manage projects in multidisciplinary environments
PO12	Recognise the need for, and have the ability to engage in independent updating in the context of specialised technical knowledge	PO11	Recognize the need for, and have the ability for i) independent and lifelong learning **and ii) critical thinking in the face of specialised technical knowledge (DK8)**

Table 3, Table 4, and Table 5 display the Graduate Attributes and Professional Competences for technology and technicians through the definitions of levels of demand, knowledge profiles, and outcomes that have to be achieved, which require planning for such attainment to judge further learning and experience (IEA, 2021).

Table 3: Knowledge Profile for Technology and Technician Programme (IEA, 2021)

	Technology		Technician
SK1	A systematic, theory-based understanding of the natural sciences applicable to the sub-discipline and awareness of relevant social sciences	DK1	A descriptive, formula-based understanding of the natural sciences applicable in a sub-discipline and awareness of directly relevant social sciences

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SK2	Conceptually-based mathematics, numerical analysis, , data analysis, statistics and formal aspects of computer and information science to support detailed consideration and use of models applicable to the sub-discipline	DK2	Procedural mathematics, numerical analysis, statistics applicable in a sub-discipline
SK3	Systematic, theory-based formulation of engineering fundamentals required in an accepted sub-discipline	DK3	A coherent procedural formulation of engineering fundamentals required in an accepted sub-discipline
SK4	Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for an accepted sub-discipline	DK4	Engineering specialist knowledge that provides the body of knowledge for an accepted sub-discipline
SK5	Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations using the technologies of a practice area	DK5	Knowledge that supports engineering design and operations based on the techniques and procedures of a practice area
SK6	Knowledge of engineering technologies applicable in the sub-discipline	DK6	Codified practical engineering knowledge in recognized practice area
SK7	Knowledge of the role of technology in society and identified issues in applying engineering technology, such as public safety and sustainable development	DK7	Knowledge of issues and approaches in engineering technician practice, such as public safety and sustainable development
SK8	Engagement with the current technological literature of the discipline and awareness of the power of critical thinking	DK8	Engagement with the current technological literature of the practice area
SK9	Ethics, inclusive behaviour and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes	DK9	Ethics, inclusive behaviour and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes

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Table 4: Engineering Problem Technology and Technician Programme (IEA, 2021)

	Attribute	Technology	Technician
1	Depth of Knowledge Required	SP1 cannot be resolved without engineering knowledge at the level of one or more of SK 4, SK5 and SK 6 supported by SK 3 with a strong emphasis on the application of developed technology	DP1 cannot be resolved without extensive practical engineering knowledge as reflected in DK5 and DK6 supported by theoretical knowledge defined in DK3 and DK4
2	Range of conflicting requirements	SP3 which involve a variety of constraints technical and non-technical issues (such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements	DP2 which involve several technical and non-technical issues such as ethical, sustainability, legal, political, economic, societal) and consideration of future requirements
3	Depth of analysis required	SP3 can be solved by application of well proven analysis techniques and models	DP3 can be solved in standardised ways
4	Familiarity of issues	SP4 are belong to families of familiar problems which are solved in well accepted ways	DP4 are frequently encountered and thus familiar to most practitioners in the practice area
5	Extent of applicable codes	SP5 are address problems that may be partially outside those encompassed by standards or codes of practice	DP5 are addresses problems that are encompassed by standards and/or documented codes of practice
6	Extent of stakeholder involvement and level of conflicting requirements	SP6 is involve different engineering disciplines and other fields with several groups of stakeholders with differing and occasionally conflicting needs	DP6 is involve a limited range of stakeholders with differing needs
7	Interdependence	SP7 addresses the components of, or systems within complex engineering problems	DP 7 is addresses discrete components of engineering systems

Table 5: Range of Engineering Activities Technology and Technician Programme (IEA, 2021)

	Attribute	Technology	Technician
	Preamble	Broadly Defined d activities means (activities or projects that have some or all of the following characteristics	Well defined activities mean (engineering) activities or projects that have some or all of the following characteristics:
1	Range of resources	Involve a variety of resources including people, data and money information, natural, financial	Involve a limited range of resources for example people ,data and information ,

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		and physical resources and appropriate technologies including analytical and/or design software	natural, financial, and physical resources and/or appropriate technologies
2	Level of interactions	Require the best possible resolution of occasional interactions between technical, non-technical and engineering issues, of which few are conflicting	Require the best possible resolution of interactions between limited technical, non-technical, and engineering issues
3	Innovation	Involve the use of new materials, techniques or processes in non-standard ways	Involve the use of existing materials techniques, or processes in modified or new ways
4	Consequences to society and the environment	Have reasonably predictable consequences that are most important locally, but may extend more widely	Have predictable consequences with relatively limited and localised impact
5	Familiarity	Require a knowledge of normal operating procedures and processes	Require a knowledge of practical procedures and practices for widely applied operations and processes

Results and Discussion

Based on the document review of both standards, the gap analysis by the technology and technician educational programs can be carried out smoothly and seamlessly during the transition period which allowed from the 1st of January 2025 until 31st of December 2025.

Gap Analysis

Step 1. Clearly define the specific standards or requirements of the 20 and 24 standards and understand what is expected in each, for example, 12PO reduced to 11POs (PO7 included in the new PO6 – Engineers and the World).

Step 2: Gather data and documentation related to your existing program, including course materials, syllabi, teaching methods, assessment practices, and any relevant program information.

Step 3: Evaluate your current educational program against the 24 standard's requirements. Categorize each criterion as "Compliant," "Partially Compliant," or "Non-Compliant" to assess your program's alignment with the 24 standard.

Step 4: Determine the critical areas that need to be compared between the 20 and 24 standards. These areas may include curriculum content, assessment methods, program outcomes, and any other relevant criteria.

Step 5: Conduct a side-by-side comparison of the 20 and 24 standards, examining each criterion or requirement to understand the differences between them.

Step 6: Note where the new standard introduces changes (e.g., PO statement & knowledge profiles, SP & TA and DP&NA), omits requirements (e.g., PO7 – Environment & Sustainability), introduces additional criteria (e.g., SK5/DK5 – knowledge on efficient resource

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use, environmental impacts), and modifies existing criteria (e.g., SK8/DK8 in Lifelong Learning & Critical Thinking, SDGs, WP & EA).

To ensure a systematic implementation and documentation during the transition period which is from 1 January 2025 until 31 December 2025. The programs need to be taken into consideration the followings:

1) Identify the specific gaps or differences between 2020 and 2024 standard by determine which element need to modify or improve.
2) Use the systematic approach to evaluate or compare each criterion (OBE, academic curriculum, students, staff, facilities and QMS.
3) Begin the implementing the changes outline in action plan and make sure all the stakeholders (faculty, external stakeholders-Industrial Advisory Panel/External Examiner) are informed and provided with the resources and training required for the transition.
4) Continuously monitor the progress of the program in meeting the new standard requirements. Regularly report progress to relevant accreditation bodies or stakeholders.
5) Keep detailed records of the changes made and their impact on the program (PO tray/boxes/folders courses contributed to the 12POs assessment details to support achievement of PO, other students' learning assessment activities and details, samples of students' work
6) Quality assurance: use the results of your monitoring and evaluation to make adjustment and improvement as needed

Systematic Constructive Alignment

Constructive alignment is a fundamental concept in outcome-based education (OBE) where the students are at the core of the instructional process, where learning outcomes, instruction, and assessment are constructively aligned to enhance learning. Figure 1 indicates the constructive alignment that need to be accounted when the adjustment and improvement has been considered during the process of developing gap analysis. These covered during the planning stage that covered the syllabus, learning outcome and lesson plan, the implementation stages which involved with the delivery methods and assessment stages covered the direct, indirect, summative and formative assessment. The details of the assessment aspects involve the usage of different tools, weightage, levels of difficulty, complexities, rubrics, descriptors, and criteria used to evaluate student performance.

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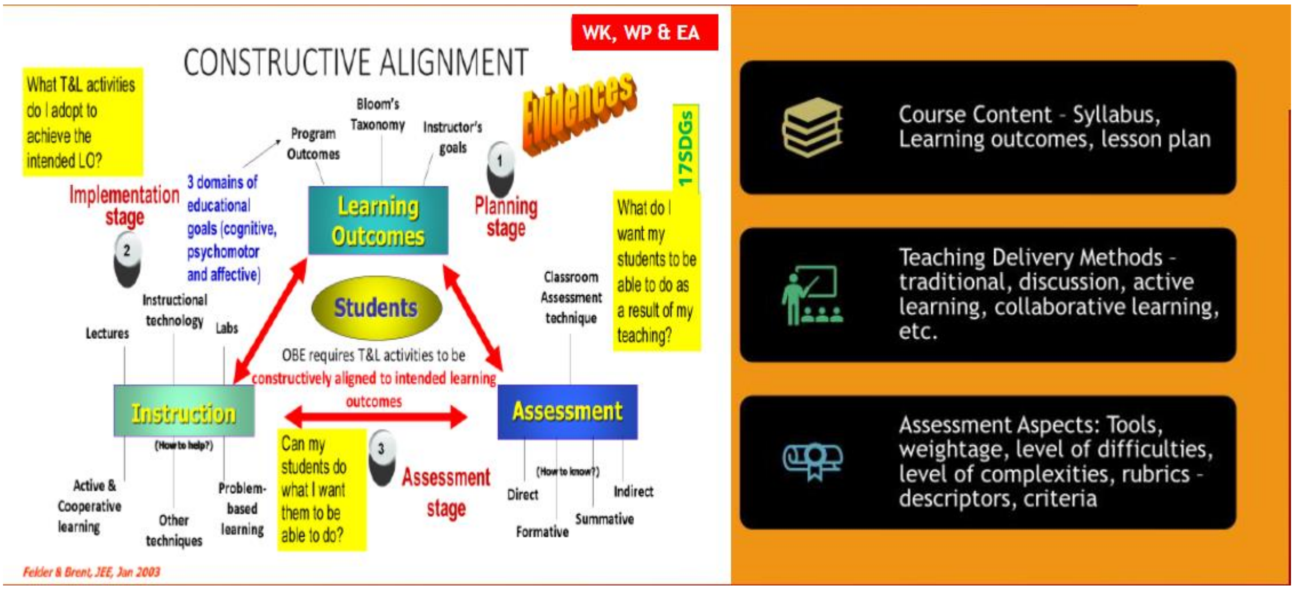

Figure 1: Systematic Constructive Alignment

Examples on How to Address the Gap Analysis

The gap analysis should be carried out explicitly through the Programme Outcome box. This can be verified though the mapping, delivery of SKs/DKs, assessment via the development of solution to Broadly Defined d Engineering Problems and Activities (SP & TA)/Well Defined Engineering Problems and Activities (DP & NA), students work assessment, measurement of PO attainment and ongoing Continual Quality Improvement process. Table 6 shows the examples of gap analysis conducted for PO1

For example, in addressing PO 1 in ETAC Standard 2024 for Technician Programme, the new statement which is apply knowledge of applied mathematics, applied science, computing and engineering fundamentals and an engineering specialisation as specified in DK1 to DK4 respectively to wide practical procedures and practices. To fulfil the gap, the analysis should be clearly conducted through the mapping of Programme Outcomes (PO) to the related subjects such as Mapping Programme Outcomes to Subjects by identifying the specific Programme Outcomes (PO) that need to be achieved and the relevant subjects within the curriculum. This ensures that each subject contributes to the attainment of specific POs. For example, PO1 might involve the application of engineering principles, which should be covered in fundamental engineering courses. Besides, there are an urgency to update course to PO1 Mapping through the Review and update the existing mapping of courses to PO1. This can be ensured that each course that contributes to PO1 is explicitly identified, and that the extent of its contribution is clearly outlined. The updating version might involve revising course objectives, content, and instructional methods to better align with PO1 to ensure the mapping process is systematic and comprehensive, covering all aspects of the curriculum that relate to PO1.

Then, the related assessment which reflecting to the PO1 mapping should be designed and updated directly to measure the attainment of PO1 and this include the creating or revising assignment projects, exams, and other evaluation methods to focus on the specific competencies and skills outlined in PO. However, to allow students to have various

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opportunities to establish their performance related to PO1, the instructor need to ensure this assessment are varied and comprehensive. These can be done through the implementation of rubrics or other assessment tools that clearly define the criteria to evaluate students' performance related to PO1. By having these steps, the gap analysis will be thorough and clearly conducted to ensure the Programme Outcomes, are effectively integrated into the curriculum and that students' progress towards achieving these outcomes is accurately measured and assessed.

In the delivery phase, the evidence should be explicitly included in the syllabus and lesson plans by highlighting which parts covering computing concepts are integrated into the curriculum. This could include topics such as programming, data analysis, algorithm design, computational thinking, and the use of software tools. Additionally, the students' work should demonstrate their ability to apply engineering principles to solve problems related to Broadly Defined Problem /Well Defined Problem. This involves demonstrating an understanding of engineering concepts and how they can be utilized in practical scenarios.

Moreover, the supplementary documents related to the intended gap analysis should be attached if the submission had been made in accordance with the recent self-assessment Report (SAR). For examples the assessment/ measurement of PO1 which related to the computing that are mapped to PO1 measurement. From that respective measurement, the PO1 attainment will be obtained, and this is able to indicate the overview whether the students have attained PO1 or not in applying computing in order to develop the solution to Broadly Defined Problem and Well Defined Problem.

Table 6: Examples of Gap Analysis

No	Element	Current Status	Issue	Action Plan
1	Programme Outcomes PO mapping**:** PO1: CO1 PO2: CO2	PO 1 Apply knowledge of applied mathematics, applied science, engineering fundamentals and an engineering specialisation as specified in DK1 to DK4 respectively to wide practical procedures and practices.	PO 1 Apply knowledge of applied mathematics, applied science, *computing* and engineering fundamentals and an engineering specialisation as specified in DK1 to DK4 respectively to wide practical procedures and practices.	Introduce the element of computing to students during Week 1 (Include in the Lesson Plan).
2	Other Requirement / Changes	DK 1 A descriptive, formula- based understanding of the natural sciences applicable in a sub-discipline.	DK 1 A descriptive, formula-based understanding of the natural sciences applicable in a sub-discipline and awareness of directly relevant social sciences.	Introduce the awareness of directly relevant social sciences in final exam question.

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Conclusion

This study provides important insights into the strategic importance of aligning engineering programs with evolving international accreditation standards. The transition from the older 12-attribute framework to a more streamlined 11 attribute framework that now integrates Sustainable Development Goals (SDGs) and emphasizes critical thinking reflects a significant shift in engineering education paradigms. The incorporation of these global and forward-thinking elements ensures that the educational outcomes are not only in line with international standards but also relevant to contemporary professional and environmental challenges. Through some examples, this paper presents various strategies for bridging the gaps between the old and new standards, demonstrating how educational institutions can effectively manage these transitions. It is expected that programs to proactively engage in gap analysis and adopt a structured approach to implementing changes are better positioned to meet the requirements of international accrediting bodies. However, while this study provides valuable strategies and frameworks, it is also evident that continuous monitoring and adaptation are essential. The field of engineering is continually evolving, and as such, educational standards must also evolve to keep pace with new technological advancements and industry needs. The current study is limited to the examples given which may not cover all potential scenarios or represent all institutional contexts. As accreditation standards are continually evolving, the findings might become less relevant as new updates to standards are introduced. The reliance on secondary data from existing literature and examples might not fully capture the real-time challenges faced by institutions in adapting to new standards. Thus, incorporating quantitative methods could provide empirical evidence to better assess the effectiveness of changes in accreditation standards. In addition, gathering direct feedback from a wider range of stakeholders, including students, faculty, and industry partners is important to obtain a more comprehensive perspective on the transition process and outcomes.

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