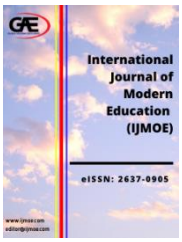
International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 7 Issue 24 (March 2025) PP. 431-441
DOI: 10.35631/IJMOE.724031



INTERNATIONAL JOURNAL OF MODERN EDUCATION (IJMOE)
www.ijmoe.com

GLOBAL ACADEMIC EXCELLENCE

CONTINUAL QUALITY IMPROVEMENT CONTRIBUTING TO PROGRAMME LEARNING OUTCOMES IN GEOTECHNICAL ENGINEERING COURSE IN MALAYSIA

Mohamad Shakri Mohmad Shariff [1], Che Maznah Mat Isa[2*]

[1] Faculty of Engineering and Quantity Surveying (FEQS), INTI International University, Nilai, Negeri Sembilan, Malaysia
Email: shakri.shariff@newinti.edu.my
[2] Civil Engineering Studies, College of Engineering Universiti Teknologi MARA Cawangan Pulau Pinang Permatang Pauh Campus, 3500 Pulau Pinang, Malaysia
Email: chema982@uitm.edu.my
[*] Corresponding Author

Article Info:

Article history:
Received date:31.07.2024
Revised date: 13.10.2024
Accepted date: 26.11.2025
Published date: 11.03.2025

To cite this document:

Shariff, M. S. M., & Mat Isa, C. M (2024). Continual Quality Improvement Contributing to Programme Learning Outcomes in Geotechnical Engineering Course in Malaysia. *International Journal of Modern Education, 7* (24), 431-441.

DOI: 10.35631/IJMOE.724031

Abstract:

This study investigates the effectiveness of Continual Quality Improvement (CQI) processes in aligning Course Learning Outcomes (CLOs) with Programme Learning Outcomes (PLOs) within a Geotechnical Engineering course in a Malaysian engineering program. Utilizing a qualitative methodology, the research analyzes data collected longitudinally over six semesters from the Outcome-Based Education (OBE) system, specifically focusing on CO-PO mapping. The study distinctly addresses two core PLOs: PLO1, which emphasizes Engineering Knowledge, and PLO4, which focuses on Investigation skills. Through comprehensive document analysis, this paper evaluates how targeted improvements in CLOs influence the attainment of these PLOs over time. The findings reveal that specific CQI interventions tailored to each PLO significantly enhance their respective learning outcomes. For PLO1, enhancements in teaching methodologies and curriculum alignment were most effective, while for PLO4, integrating research-based projects and improving experimental learning opportunities showed substantial benefits. The study proposes a refined CQI framework that offers strategic recommendations for curriculum development, assessment practices, and faculty development. By comprehending and implementing these recommendations, the goal is to narrow the gap between accrediting criteria and industry requirements, thereby improving student readiness and the overall quality of engineering education.

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 7 Issue 24 (March 2025) PP. 431-441
DOI: 10.35631/IJMOE.724031

Keywords:

Continual Quality Improvement, Programme Learning Outcomes, Course Learning Outcomes, Engineering Programme, Geotechnical Engineering

Introduction

In Malaysia, engineering programmes have utilised diverse analytical instruments to evaluate students' achievement of course and programme learning outcomes. However, these instruments frequently fall short in facilitating significant and ongoing quality enhancement. Best practices involve adopting a practical approach in which educators prioritise the assessment of effective outcomes. This is crucial for Continuous Quality Improvement (CQI) and is in line with certification criteria (Liew et al., 2022). The incorporation of Course Learning Outcomes (CLOs) and Programme Learning Outcomes (PLOs) is essential in engineering education, since it establishes a well-defined plan for attaining educational goals. Although accreditation organisations and educational institutions provide a formal framework, there is still a significant vacuum in evaluating the extent to which advances in CLO practices contribute to the achievement of PLOs, especially in specialised engineering courses. A study conducted by Mohamad et al. (2021) examined the implementation of the MyCOPO system at the Faculty of Civil Engineering at Universiti Teknologi MARA. The study revealed that both staff and students expressed a high level of satisfaction with the system. This indicates that the system is efficient in quality management and CQI within the faculty. The integration of Outcome-Based Education (OBE) in Integrated Design Projects within the field of civil engineering showcases a successful alignment of course and programme outcomes, guaranteeing that graduates are equipped to tackle the demands of Industry 4.0 (Basir et al., 2019). Integrating student input into curriculum modifications can greatly improve course content and contribute to the CQI process, guaranteeing that learning results are in line with programme objectives (Koh and Chong, 2019).

There is a gap of comprehension of the extent to which enhancements in CLOs directly contribute to the achievement of PLOs, particularly in specialised engineering courses. This discrepancy impacts the strategic congruence between the accomplishments of individual courses and the broader objectives of the programme. The purpose of this paper is to examine the current methods of CQI in an engineering course, specifically focusing on the performance of CLOs and PLOs. Additionally, this paper aims to assess how improvements in CLOs affect the achievement of PLOs, offering empirical evidence on their effectiveness and identifying areas that require improvement. By addressing these objectives, this paper aims to contribute to the body of knowledge in engineering education, supporting the advancement of teaching practices and curriculum development that are responsive to both academic and professional demands especially in geotechnical engineering courses in Malaysia.

The Engineering Programme in Malaysia

The engineering curriculum should be structured to ensure that students acquire a combination of soft and hard skills, encompassing the capacity to assess, resolve, oversee, take charge, and make judgements about complex problems and activities. The 12 programme learning outcomes (PLOs) explain the basic complex engineering processes. The programme should be meticulously developed to include a specific set of essential elements in each engineering

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 7 Issue 24 (March 2025) PP. 431-441
DOI: 10.35631/IJMOE.724031

branch. Additionally, it should cover fundamental concepts in mathematics, engineering principles, and effective communication (Wasson, 2015). The programme's core and fundamental engineering knowledge provides a wide range of qualifications, while the specialist courses offer discipline-specific information and skills. An engineering program's curriculum should encompass both technical (engineering) and non-technical (non-engineering) subjects (Hoeffner, 2020; Shih, 2021)

The engineering programme should provide students with a comprehensive understanding of several disciplines, enabling them to become experts in each area. The programme places significant focus on fundamental concepts at the outset, before delving into more advanced technical expertise. In addition, the engineering course places a strong focus on developing soft skills that foster the growth of versatile engineers. These skills include effective communication, efficient management, the cultivation of ethical principles and personal attitudes, and the development of leadership abilities (Rovida and Zafferri, 2022). This can be accomplished through non-technical courses. In order to stay at the forefront of innovation and technology, students must cultivate the skill of lifelong learning as engineering technology continues to advance swiftly (Burns, 2020). The implementation of outcome-based assessment, which requires students to actively engage in the exploration of new ideas and abilities in order to achieve competence, plays a crucial role in the development of these skills (Asim et al., 2021). In order to maintain the quality of the engineering programme, it is necessary for academic staff and external stakeholders to periodically review and evaluate the Programme Learning Outcomes (PLO) and Course Learning Outcomes (CLO) continually. This ensures that the courses offered align with the desired programme outcomes and remain up-to-date with technological advancements. This also guarantees an uninterrupted Continuous Quality Improvement (CQI) process.

The Programme Learning Outcomes Assessment Models

Malaysia's universities typically employ two common assessment methodologies: summative and cumulative, when evaluating and analysing student performance. The culminating assessment model outlines significant course options that serve as evidence of achieving the specified programme learning objectives (PLOs) (Yamayee and Albright, 2008; Gurocak, 2009; Liew et al., 2021). This methodology necessitates a computation system that is more straightforward and precise in calculating student PLO accomplishments as compared to a cumulative assessment model that takes into account all courses in the programme for calculation. For each course, the summative model records individual student performance on assessment components, such as continuous assessment and final tests. For each outcome, the computation system receives input. This procedure is carried out for every course within a programme in order to determine the student's attainment of PLO upon graduation or completion of the engineering programme (Liew et al., 2021).

Liew et al. (2021) have conducted a study to examine the assessment process used by University A to evaluate students in the Bachelor's Degree Engineering Programme in Communication Engineering. The study aims to offer a detailed explanation of how students demonstrate their PLO accomplishments. Figure 1 displays the study's results, providing a comprehensive list of courses that meet specific PLO requirements. Based on Figure 1, it can be said that the engineering courses at University A are divided into two main categories: enabling and culminating. A capstone course is an intensive engineering course that focuses on a single topic of engineering and typically builds upon the information gained from

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 7 Issue 24 (March 2025) PP. 431-441
DOI: 10.35631/IJMOE.724031

foundational courses. An enabling course encompasses the fundamental engineering principles often taught in the early stages of an engineering curriculum. Typically, students demonstrate their achievements in PLO. Enrolling in this last course enables the identification and improvement of any deficiencies in the PLO. A targeted curriculum, consisting of support and capstone courses, achieves this by addressing individual PLOs (Mohammad and Zaharim, 2012; Sylwester, 2017)

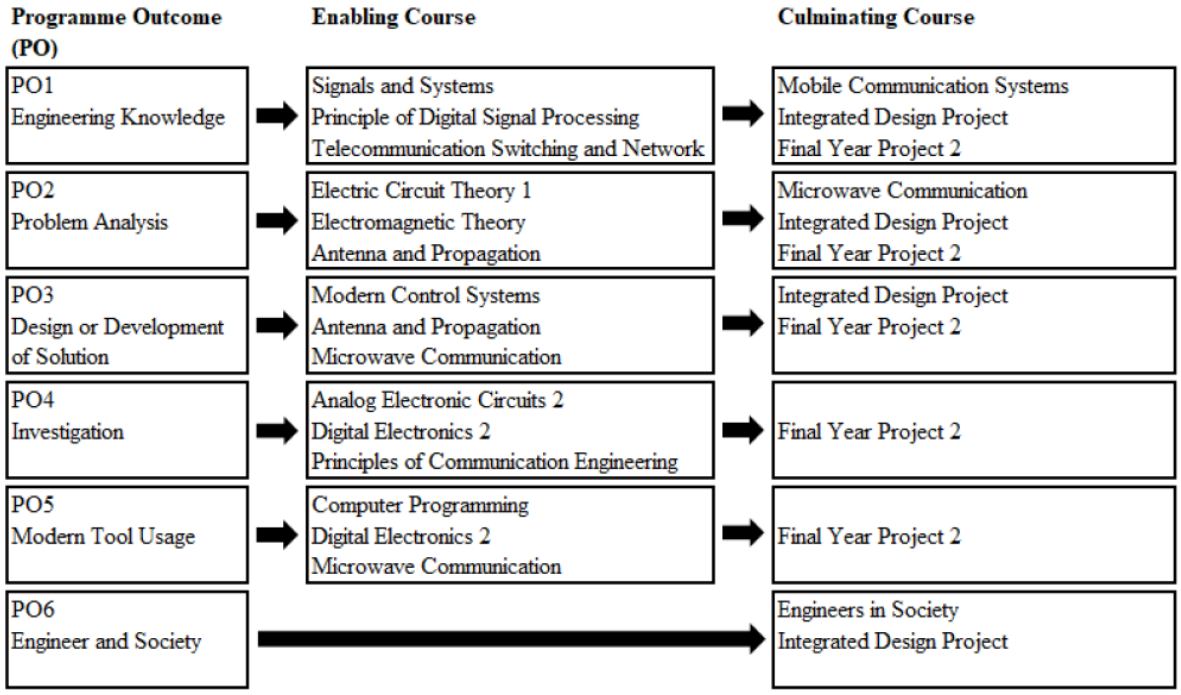


Figure 1: Example of a Culminating Programme Outcomes Assessment Model by University A (Liew et al., 2021)

The final evaluation framework requires faculty members to provide less data input on their students' performance compared to the accumulating model, as culminating courses have fewer entries (Liew et al., 2021). The culminating assessment model is characterised by a decreased number of courses, with the demonstration of programme results occurring at the end of the programme. This approach offers numerous advantages, including reducing the burden on engineering professors and offering a more accurate representation of students' accomplishments (Mahboob et al., 2020; Qadir et al., 2020; Liew et al., 2021). The Engineering Programme provides various models for assessing outcomes.

Methodology, Results and Discussion

This study employs a qualitative approach to evaluate the continual quality improvement of Course Learning Outcomes (CLOs) contributing to Programme Learning Outcomes (PLOs) in a Geotechnical Engineering course within a Malaysian engineering programme. The primary data source for this research is the Outcome-Based Education (OBE) system, specifically the Course Outcomes to Program Outcomes (CO-PO) mapping system. Data collection is conducted through a longitudinal technique over six semesters: August 2021, January 2022, August 2022, January 2023, August 2023, and January 2024. This approach involves tracking and analyzing changes in the same cohort's performance in relation to the specified CLOs and

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 7 Issue 24 (March 2025) PP. 431-441
DOI: 10.35631/IJMOE.724031

PLOs across these time points. The use of a longitudinal study design is pivotal as it allows for an in-depth examination of patterns, trends, and potential causal relationships over time, offering a dynamic perspective that is not possible through cross-sectional analysis. The document analysis involves detailed scrutiny of CO-PO mapping data from the OBE system. This analysis helps in identifying which aspects of the CLOs are effectively contributing to the attainment of PLOs and highlights areas where improvements are necessary. The longitudinal data provides a temporal dimension to the analysis, enabling the study to document the progression and the effectiveness of interventions over the selected semesters.

By employing this methodology, the research aims to capture the dynamics of educational outcomes within the program. It seeks to understand how continual adjustments to the course structure, content, and delivery influence the broader educational objectives as outlined in the PLOs. Additionally, this approach allows for the observation of long-term trends and the impact of specific educational strategies or changes implemented throughout the study period. Table 1 displays the course CLO-PLO mapping. The course consists of four (4) course CLOs that have been aligned with two PLOs that are appropriate for the course's teaching, learning and assessment methodology.

Table 1: CO-PO Mapping for Geotechnical Engineering

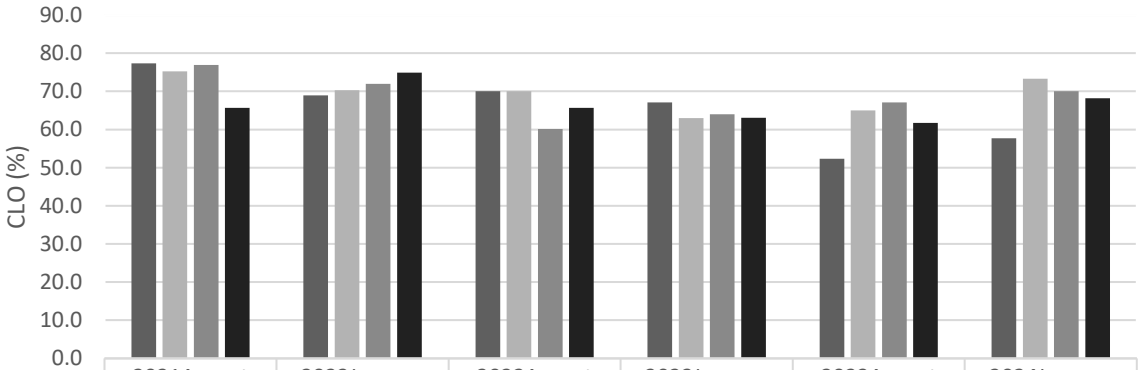
Course learning Outcome		Programme learning Outcome	
CLO 1	Analyse lateral earth pressure and design of earth retaining structures.	**PLO 1**	Engineering Knowledge - Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialisation as specified in WK1 to WK4 respectively to the solution of complex engineering problems.
CLO 2	Analyse ground settlement as a function of time due to consolidation.		
CLO 3	Analyse and determine the stability of slopes.		
CLO 4	Identify and determine suitable soil improvement methods for weak soils.	**PLO 4**	Investigation - Conduct investigation of complex engineering problems using research-based knowledge (WK8) and research methods, including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusion.

The course provides a comprehensive evaluation of the assignment, project, test, and final exam content. The weightage assigned to each of the assessment tools are within the range of 20% to 30% to maintain a balanced distribution of evaluations within the course's intended learning outcomes. The accomplishment of CLO is made easier by the program's exclusive software, CO-POsystem, developed internally to optimise the instructional process. The CO-POsystem is the foundation of our academic structure, offering a strong platform for monitoring and assessing student development. The CO-POsystem enables educators to evaluate the achievement of CLO by utilising a user-friendly interface and advanced algorithms. This ensures that students receive personalised help and feedback that aligns with their own learning paths.

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 7 Issue 24 (March 2025) PP. 431-441
DOI: 10.35631/IJMOE.724031

Continual Quality Improvement at Course and Programme Levels

In order to address the decrease in performance for both CLOs and PLOs, the course and programme levels have made various enhancements based on improvement actions that are suitable to the course, such as guest lecturers from experts, additional tutorials, and calculations. These enhancements also include the specific alignment of these outcomes. Figures 2 and 3 display the CLOs and PLOs for various semesters, whereas Table 2 provides a comprehensive analysis of the variations between them. Table 3 presents the recommended and implemented Continuous Quality Improvement (CQI) activities, together with their current progress. The graph indicates a decline in PLO and CLO achievement from 2021 to 2023. The programme was established in response to the implementation of online continuous assessment and examination in 2021 due to COVID-19. At the end of 2022 and into 2023, the programme resumed its standard operations, with continuing assessments and examinations conducted in person. The achievement of CLO and PLO declined from 2021 to 2022 as a result of the assessment implementation approach. The students appear more at ease and achieve higher scores in the online assessment format compared to the physical mode.



	2021August	2022January	2022August	2023January	2023August	2024January
CLO1	77.3	68.9	70.0	67.1	52.3	57.7
CLO2	75.2	70.3	70.0	63.0	65.0	73.3
CLO3	76.9	72.0	60.1	64.0	67.1	70.0
CLO4	65.7	74.9	65.7	63.1	61.7	68.2

Figure 2: CLO for 6 Semesters for Geotechnical Engineering

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 7 Issue 24 (March 2025) PP. 431-441
DOI: 10.35631/IJMOE.724031

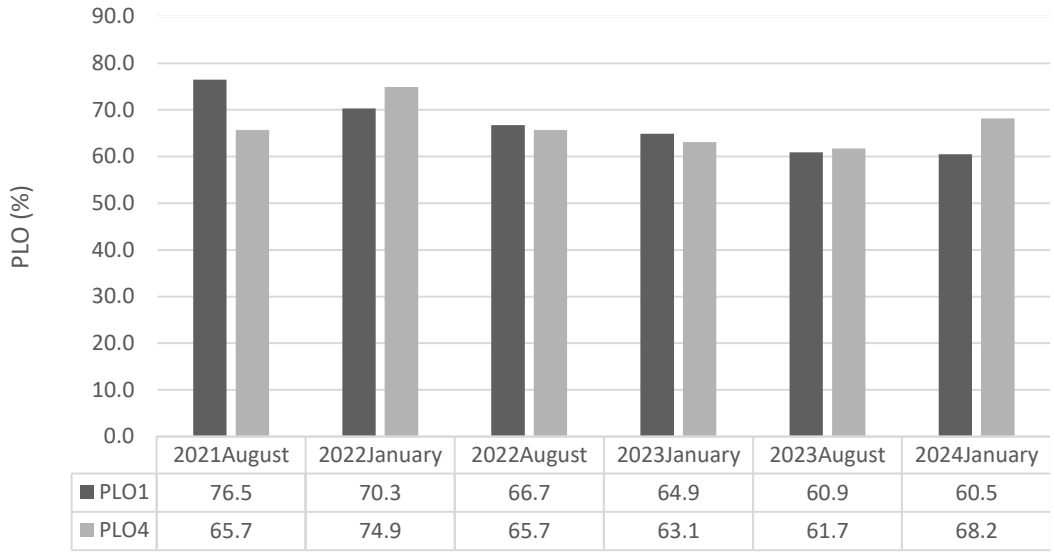


Figure 3: PLO for 6 Semesters for Geotechnical Engineering

Table 2. CLO-PLO Attainment for 6 Consecutive Semesters

Semester/ Programme Learning Outcome	Course Learning Outcome			
	CLO1	**CLO2**	**CLO3**	**CLO4**
2021August	77.3	75.2	76.9	65.7
PLO	*76.5*			*65.7*
2022January	68.9	70.3	72.0	74.9
PLO	*70.3*			*74.9*
2022August	70.0	70.0	60.1	65.7
PLO	*66.7*			*65.7*
2023January	67.1	63.0	64.0	63.1
PLO	*64.9*			*63.1*
2023August	52.3	65.0	67.1	61.7
PLO	*60.9*			*61.7*
2024January	57.7	73.3	70.0	68.2
PLO	*60.5*			*68.2*

Table 3: CQI for 6 Semesters

Semester	CQI Conducted	Is/Are CQI successfully executed?
2021August	Concentrate on course outcome 4, which is ground improvement. A guest lecturer who is an expert in this topic will be called for a talk session.	N/A
2022January	Will focus on CLO1. Students will be given more examples of these chapters. (Retaining Wall)	Yes, CLO4 improved from 65.7 to 74.9

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 7 Issue 24 (March 2025) PP. 431-441
DOI: 10.35631/IJMOE.724031

2022August	This semester, students seem to have a problem with CLO3, which slopes. Will conduct more tutorials and examples during the class.	Yes, the percentage for CLO1 increased to 70.0%.
2023January	Will focus on CLO2. Will provide students with additional examples from these chapters. The slot for tutorials will increase by 20%.	Yes. CLO3 increased from 60.1 to 64.0.
2023August	Will focus on CLO1. Two guest lecturers will be invited to conduct a talk session	Yes. CLO2 increased from 63.0 to 65.0.
2024January	Even CLO1 has improved; however, compared with other CLOs, it is still the lowest, so additional exercise and slots (maybe) for this topic will be increased.	Yes

In the August 2021 semester, both CLO4 and PLO4 attained a 65.7% score, which is deemed to be a subpar performance compared to the other CLOs. Therefore, the proposed CQI measure was to arrange for a guest lecturer to conduct a session in the class. The closure of the loop indicates that the CQI intervention was effective, as both CLO4 and PLO4 demonstrated an improvement from 65.7% to 74.9%. In the next January Semester of 2022, CLO1 attained a score of 68.9%, which corresponds to a PLO1 achievement of 70.3%. Therefore, the proposed CQI was implemented to offer additional illustrations regarding retaining walls. The CQI initiative achieved success with the improvement of CLO1, which increased to a 70.0%. Nevertheless, PLO1 decreased to 66.7%. In the August Semester of 2022, CLO3 was determined to have a low score of 60.1%, whereas PLO1 had a score of 66.7%. To enhance CLO3, it was recommended to incorporate additional tutorials and examples specifically focused on slopes. The closure of the loop indicates that the CLO3 has had an enhancement, reaching a value of 64.0%, but the PLO1 has reduced to 63.1%. The CQI recommends incorporating more examples and increasing the number of tutorial slots to improve the mapping of CLO2 (63.0%) to PLO1 (64.9%) for the January 2023 semester. The CQI intervention yielded positive results, as CLO3 exhibited a rise from 63.0% whereas PLO1 showed a reduction to 60.9%. In the August 2023 semester, the attainment level for CLO1 was 52.3%, while the PLO1 was 60.9%. As a result, the CQI team recommended inviting two guest lecturers to enhance CLO1. The CQI intervention yielded positive results, with a rise in CLO1 to 57.7% while PLO1 remained stable at 60.5%. For the upcoming January 2024 semester, there has been some improvement in CLO1. However, it is still considered relatively low compared to other CLOs, with a score of 57.7%. To address this, it is recommended to provide extra exercises and time slots. Nevertheless, the CQI action will be monitored during the ongoing August 2024 semester.

Each semester's CQI activity targeted the least strong CLOs, frequently incorporating enhanced illustrations, tutorials, or guest lectures. Each semester demonstrated progress in the specific targeted CLOs following CQI measures, indicating successful interventions. However, certain CLOs, such as CLO1 in recent semesters, consistently performed below expectations, indicating a requirement for more consistent or diverse treatments. In summary, the analysis indicates that CQI initiatives often result in enhancements in CLOs. However, there is a consistent problem where PLOs do not demonstrate the same degree of progress and, in certain instances, even show a decline. This implies that the present CQI measures, although advantageous for some CLOs, may require a more all-encompassing approach to tackle wider issues that impact the performance of PLOs at the programme level. Regular evaluation and

International Journal of Modern Education
IJMOE
EISSN: 2637-0905
Volume 7 Issue 24 (March 2025) PP. 431-441
DOI: 10.35631/IJMOE.724031
adjustment of CQI strategies are crucial to ensure that both CLOs and PLOs are effectively addressed.

To improve teaching methods for CLO1, CLO2, and CLO3, which are linked to PLO1, lecturers can consider the following approaches: (a) incorporating more practical examples and case studies related to earth pressure, ground settlement, and slope stability, and utilising simulation software to model real-world scenarios for better comprehension of complex calculations and theories; (b) increasing hands-on learning through lab sessions or field trips to observe and analyse real-world applications of To address CLO4, which corresponds to PLO4, instructors have the option to (a) organise workshops where students can actively participate in various soil improvement techniques under supervision, establish connections with engineering firms to give students insight into current industry practices and difficulties in soil improvement, and (b) revise course content or lesson plans to incorporate the most recent research and technological advancements in soil improvement methods.

At the programme level, the CQI PLO1, which emphasises the utilisation of mathematics, natural science, engineering fundamentals, and specialised engineering knowledge to address intricate engineering challenges, can be enhanced by (a) obtaining feedback from students and industry stakeholders regarding the practicality of the concepts taught in solving real-world engineering problems, and (b) employing analytics to monitor student performance on assessments directly related to PLO1, and adjusting teaching methods accordingly based on observed patterns. Next, the CQI for PLO4 centres on the proficiency in conducting investigations of intricate engineering problems, encompassing the formulation of experiments and analysis of data. To enhance the curriculum, the programme could (a) integrate more research-based projects that necessitate systematic investigation methods, (b) provide additional opportunities for students to participate in practical experiments and fieldwork, and (c) improve training in data analysis and interpretation, which is crucial for drawing accurate conclusions from experimental data. In order to complete the cycle, the programme can achieve the following: (a) establish collaborative projects by facilitating partnerships with industry and research institutions to give students practical investigative experiences, (b) provide workshops on advanced research methodologies, data analysis software, and reporting techniques, and (c) assess the results of student projects and research activities to ensure they meet the expectations of PLO4. By implementing CQI processes specifically for PLO1 and PLO4, the programme can enhance its ability to successfully target and develop the unique skills and knowledge associated with these learning objectives. This focused strategy not only ensures that teaching and learning activities are tightly connected to the desired qualities of graduates, but also improves the overall educational influence on students' preparedness for their careers and their professional talents.

Conclusion

This study demonstrates the significance of continual quality improvement (CQI) processes in ensuring that Course Learning Outcomes (CLOs) are in line with Programme Learning Outcomes (PLOs) in the Geotechnical Engineering course of an engineering programme in Malaysia. The study demonstrated that certain enhancements in CLOs greatly improve the achievement of PLOs, creating a more effective educational structure that meets the requirements of both the EAC standard and industry needs. The study's suggestions for improving teaching methods, designing curriculum, and evaluating outcomes have been positively received, showing a favourable path towards reaching excellence in engineering

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 7 Issue 24 (March 2025) PP. 431-441
DOI: 10.35631/IJMOE.724031

education. To summarise, this study underscores the need of taking a proactive stance towards ensuring educational quality. It emphasises the necessity of consistently reflecting on and adjusting teaching methods and curriculum development. In order to enhance the global competitiveness of Malaysian engineering courses, it is essential to incorporate systematic quality enhancements into the overall educational approach. This will play a vital role in developing future-ready engineers who can make significant contributions to the global workforce.

Acknowledgement

The authors would like to express their gratitude and thanks to Academic Office, INTI University for supporting this research.

References

Asim, H. M., Vaz, A., Ahmed, A., & Sadiq, S. (2021). A Review on Outcome Based Education and Factors That Impact Student Learning Outcomes in Tertiary Education System. *International Education Studies,* 14(2), 1-11.

Basir, N., Lian, O. C., & Shaharin, H. (2019). Assessment of outcome-based integrated design project. *JOTSE*, 9(1), 77-84. https://doi.org/10.3926/jotse.541

Burns, R. (2020). Adult Learner at Work: The challenges of lifelong education in the new millenium. *Routledge.*

Gurocak, H. (2009). Planning and implementing an assessment process with performance criteria for ABET accreditation. *The International journal of engineering education*, 25(6), 1236-1248.

Hoeffner, J. K. (2020). Seeing beyond design: exploring non-engineering functions of technology in engineering ethics *(Doctoral dissertation, Colorado State University).*

Koh, Y. Y., & Chong, P. L. (2019). Incorporating student feedback into curriculum review according to outcome-based education philosophy. *Journal of Engineering Science and Technology*, 14(2), 541-556.

Liew, C. P., Lim, L. L., Chor, W. T., Yu, L. J., & Tan, J. (2022). Evaluation practices of learning outcomes that promote culture of continual quality improvement. *In AIP Conference Proceedings (Vol. 2433, No. 1). AIP Publishing*.

Liew, C. P., Puteh, M., Lim, L. L., Yu, L. J., Tan, J., Chor, W. T., & Tan, K. G. (2021). Evaluation of engineering students' learning outcomes: creating a culture of continuous quality improvement. *International Journal of Emerging Technologies in Learning,* 16(15), 62-77.

Liew, C. P., Puteh, M., Mohammad, S., Omar, A. A., & Kiew, P. L. (2021). Review of engineering programme outcome assessment models. *European Journal of Engineering Education*, 46(5), 834-848.

Mahboob, K., Ali, S. A., & Laila, U. E. (2020). Investigating learning outcomes in engineering education with data mining. *Computer Applications in Engineering Education*, 28(6), 1652-1670.

Mohamad, M., Lian, O. C., Zain, M. R. M., Yunus, B. M., & Sidek, N. H. (2021). Student Attainment Measurement System in Civil Engineering Undergraduate Programme*: A Satisfaction Survey. Asian Journal of University Education*, 17(2), 191-202.

Mohammad, A. W., & Zaharim, A. (2012). Programme outcomes assessment models in engineering faculties. *Asian Social Science, 8*(16), 115.

International Journal of Modern Education
EISSN: 2637-0905
IJMOE
Volume 7 Issue 24 (March 2025) PP. 431-441
DOI: 10.35631/IJMOE.724031

Qadir, J., Taha, A. E. M., Yau, K. L. A., Ponciano, J., Hussain, S., Al-Fuqaha, A., & Imran, M. A. (2020). *Leveraging the force of formative assessment & feedback for effective engineering education.*

Rovida, E., & Zafferri, G. (2022). The importance of soft skills in engineering and engineering education. *New York: Springer*.

Shih, B. P. J. (2021). Towards an Engineering Ethics with Non-engineers: How Western Engineering Ethics May Learn from Taiwan. In Engineering and Philosophy: Reimagining Technology and Social Progress (pp. 161-180). *Cham: Springer International Publishing.*

Sylwester, B. D. (2017). *Impact of program assessment in higher education: A case of an applied linguistics program* (Doctoral dissertation, University of Hawai'i at Manoa).

Wasson, C. S. (2015). System engineering analysis, design, and development: Concepts, principles, and practices. *John Wiley & Sons*.

Yamayee, Z. A., & Albright, R. J. (2008). Direct and indirect assessment methods: Key ingredients for continuous quality improvement and ABET accreditation. *The International journal of engineering education*, 24(5), 877-883.