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RESTRUCTURING TEST AND ASSIGNMENT: THE ROLE OF ASSIGNMENT EMPHASIS IN REDUCING FAILURE RATES IN SOIL ENGINEERING COURSE

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Abstract

This study aimed to evaluate the effects of revised assessment strategies on student performance in the Soil Engineering course (ECG353), which is offered to Diploma in Civil Engineering students at Universiti Teknologi MARA (UiTM). ECG353 is a crucial course; however, it experienced high failure rates, reaching 37.5% in Semester 20224. As a result, a significant revision of its assessment approach was implemented in Semester 20244. The assignment weightage was increased from 10% to 20%, and the test component was reduced from 30% to 20% while maintaining consistent teaching methods and syllabus content. This quantitative, descriptive research analysed grade distributions and Program Outcome (PO) attainment across three semesters (20224, 20234, 20244) involving a total of 513 students. The finding of the current study shows a significant improvement in academic performance and an obvious reduction in failure rates during Semester 20244, corresponding with the revised assessment structure. The increased focus on formative assessment in the form of assignments improved the levels of achievement of PO1/CO1 (application of technical knowledge) and PO3/CO2 (problem-solving skills) from the corresponding level of 50% in semester 20224 to 65% in 20244. The findings indicate that continuous assignment-based assessments encourage deeper learning, alleviate exam-time anxiety, and create inclusive pathways towards academic success.

Keywords: Soil Engineering; Assessment; Assignment; Failure Rate; Problem Solving

Abstrak

Kajian ini dijalankan untuk menilai kesan strategi penilaian yang disusun semula terhadap prestasi pelajar dalam kursus Kejuruteraan Tanah (ECG353) yang ditawarkan kepada pelajar Diploma Kejuruteraan Awam di Universiti Teknologi MARA (UiTM). ECG353 adalah kursus penting; bagaimanapun, ia mengalami kadar kegagalan yang tinggi, mencecah 37.5% pada Semester 20224. Hasilnya, semakan ketara pendekatan penilaiannya telah dilaksanakan pada Semester 20244. Oleh itu, kursus ini telah menjalani semakan besar untuk pendekatan penilaiannya pada Semester 20244. Wajaran tugasan dinaikkan daripada 10% kepada 20%, dan komponen ujian dikurangkan daripada 30% kepada 20% sambil mengekalkan kaedah pengajaran dan kandungan sukatan pelajaran yang konsisten. Penyelidikan deskriptif kuantitatif ini menganalisis taburan gred dan pencapaian Program Outcome (PO) merentas tiga semester (20224, 20234, 20244) yang melibatkan seramai 513 pelajar. Dapatan kajian semasa menunjukkan peningkatan yang ketara dalam prestasi akademik dan pengurangan jelas dalam kadar kegagalan semasa Semester 20244, sepadan dengan struktur penilaian yang disemak semula. Peningkatan tumpuan terhadap penilaian formatif dalam bentuk tugasan meningkatkan tahap pencapaian PO1/CO1 (aplikasi pengetahuan teknikal) dan PO3/CO2 (kemahiran menyelesaikan masalah) daripada tahap yang sepadan iaitu 50% pada semester 20224 kepada 65% pada tahun 20244. Penemuan menunjukkan bahawa

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penilaian berasaskan tugasan berterusan menggalakkan pembelajaran yang lebih mendalam, mengurangkan kebimbangan masa peperiksaan, dan mewujudkan laluan inklusif ke arah kejayaan akademik.

Kata kunci: Kejuruteraan Tanah; Penilaian; Tugasan; Kadar Kegagalan; Penyelesaian Masalah

1.0 INTRODUCTION

Soil engineering courses are a fundamental subject in civil engineering. It covers the studies of the behaviour of soil materials and their application in civil engineering works. Soil engineering courses are related to determining soil deformations, forces, stresses, and strains prior to analyzing and designing foundations and buildings. The Soil Engineering course (ECG353) is available to fifth-semester students pursuing a Diploma in Civil Engineering at UiTM. It is a 2.0 credit hours course, and it is one of the core and fundamental subjects for the program of Diploma in Civil Engineering, UiTM. Soil Mechanics (ECG243) from semester three is the prerequisite course for this subject. This course deals with the application of basic soil mechanics principles to civil engineering works. It covers topics on vertical stress distribution in soils, lateral earth pressure, bearing capacity of soils, slope stability and subsurface soil exploration. The course outcome is in line with the program outcome for the Diploma in Civil Engineering, UiTM. The details of the course outcome (CO) and program outcome (PO) for the Soil Engineering course are shown in Table 1.

Table 1: Course Outcomes and Program Outcomes

Course Outcome (CO)	Description	Program Outcome (PO)	Description
CO1	Apply knowledge of soil engineering concepts responses to various geotechnical situations.	PO1	Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization to wide practical procedures and practices
CO2	Measure solutions for soil engineering problems with the design system component of processes to meet specified needs with appropriate consideration for safety and environmental consideration	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

Incorporating active learning strategies into both teaching and assessment practices can help students face the realities of engineering work in the real world. This approach aligns with the industry needs, where engineers are expected to be problem solvers, innovators, and a good team player. Besides learning approaches, the assessment in engineering education has also traditionally focused on quantitative problem-solving and theoretical understanding, thus neglecting the development of practical skills and creative thinking. To accurately determine the success and failure rates of teaching methods, student's learning outcomes should be effectively measured. Assessments should be able to measure the success of students' learning and the quality of teaching and learning approaches throughout the semester. Student assessments and evaluations should offer meaningful insights into the content, depth, and quality of their

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learning, as well as their reactions to various teaching methods. Therefore, precise assessment is crucial for enhancing and improving learning environments (Mohameed et al, 2024).

In soil engineering courses, there are two primary types of assessment which are formative and summative assessments to promote critical thinking skills. It is the process of formative assessment (FA) that occurs during the learning process, like assignments, tests, and exams. It is the summative assessment (SA) that occurs at the end of a learning process, like the final examination, that is considered summative (Black & Wiliam,1998; Chand & Pillay, 2024). Assessment methods are based on Bloom Taxonomy levels representing cognitive, psychomotor and affective domains. The assessment for Soil Engineering, ECG353 focuses on the cognitive domain, which is 100% from the overall continuous assessment. Cognitive involves the process of learning, thinking, and understanding and encompasses a broad range of skills, including attention, memory, reasoning, problem-solving, and the ability to process information. The assessment for ECG353 consists of assignments, tests and a final exam. The summary of distribution marks for this code is tabulated in Table 2.

Table 2: Distribution Marks for ECG353 Assessments

Course Assessments	Marks
Assignment	10%
Test	30%
Final Exam	60%
Total	100%

Assessment is an essential part of a course's curriculum. In the teaching-learning process, assessment is an important influence which students in knowing about their knowledge and skills in engineering courses (Bazvand, & Rasooli, 2022). Harlen, (2021) mentioned assessment plays a vital role in assisting students in the evaluation of outcomes. Achieving effective education requires an understanding of how these approaches should be balanced (Muhammad et al, 2024). A key element of an effective assessment evaluation process is the establishment of a system that promotes the continuous improvement of educational outcomes and objectives. Moreover, it is essential to utilize assessment results to guide modifications and changes, thereby fostering a system driven by assessment-based improvement. It is advisable for programs to regularly review their assessment processes and plans to find ways to make it simpler and more effective (Suleiman, 2014). Although formative and summative assessments have well-documented benefits in soil engineering courses, balancing the assessment effectively remains a challenge. Often, lecturers have to balance providing immediate feedback to enhance student learning while also preparing students for high-stakes summative assessments, and final exams at the end of the semester (Guskey, 2020). Furthermore, summative assessments are often perceived by students as high-pressure situations and increase failure rates (Shepard, 2020; Siddiqui et al, 2024). Therefore, this article provides an in-depth on the role of assignment in reducing failure rates in soil engineering courses.

2.0 METHODOLOGY

This study involves students enrolling on a Diploma in Civil Engineering at the Civil Engineering Studies, UiTM Johor Branch, Pasir Gudang Campus over three successive semesters namely October 2022 – February 2023 (20224), October 2023 – February 2024 (20234) and October 2024 – February 2025 (20244). The analysis adopts a quantitative, descriptive approach based on the analysis of student grade distributions and Program Outcomes' achievement for the Soil Engineering course. This course is a core civil

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engineering subject that focuses on the application of fundamental soil mechanics principles to real-world geotechnical engineering problems. Despite its importance, this course is widely recognized as a challenging subject, with a high failure rate of 37.5 % logged in semester 20224. The total number of students registered in this course is shown in Table 3, which is broken down into three semesters. The cohort comprises Part 5 students, along with several Part 6 and final-year students who are retaking the course. The demographic data of students (e.g., gender, age, CGPA) were not collected, as the focus was solely on academic performance outcomes in this course.

Table 3: Number of students enrolled in the Soil Engineering course

Semester	Total No. of Students
October 2022 – February 2023 (20224)	120
October 2023 – February 2024 (20234)	207
October 2024 – February 2025 (20244)	186

The comparison across the three selected semesters is intended to examine student performance specifically within the first-intake cohort only. The highest number of students which is 207 recorded in semester 20234, followed by semester 20244 and semester 20224 with the least number of 120 students. Data was collected from official academic records, specifically focusing on the final grades that students scored for this course. The marks were given by the leader in charge for this course and the grading was distributed based on grading in Table 4.

Table 4: Grading Marks

Grade	Marks	Notes
A+	90-100	Pass with distinction
A	80-89	
A-	75-79	Pass with credit
B+	70-74	Satisfactory pass
B	65-69	
B-	60-64	Fail (for core courses)
C+	55-59	
C	50-54	Pass (for elective courses)
C-	47-49	
D+	44-46	
D	40-43	Fail
E	30-39	
F	0-29	

The assessment for the Soil Engineering course was structured to evaluate both students' academic performance and their attainment of specific Program Outcomes (POs). The course employed a summative assessment, which included tests, group assignments, and a final examination. Each assessment component was mapped to relevant POs based on the Course Outcome (CO) alignment matrix. Other than students' final grades for this course, this study also looked at the attainment of students based on the Outcome-Based Education (OBE) alignment which focuses on PO1/CO1 and PO3/CO2. In line with the OBE framework adopted by UiTM, this study also considers how shifts in assessment strategy impacted specific Program Outcomes (POs) and Course Outcomes (COs):

- PO1/CO1: This outcome emphasizes the application of foundational knowledge and technical understanding. With greater assignment-based assessments, students were provided with more opportunities to apply theoretical concepts in structured, real-world-like

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scenarios. This encouraged deeper learning and reinforced core engineering knowledge through active application.

- PO3/CO2: This outcome focuses on problem-solving and analytical thinking. The increased assignment weightage allowed students to tackle open-ended problems and engage in continuous learning cycles, as opposed to the limited scope typically afforded by test-based assessments. The nature of assignments promoted the use of critical thinking, solution generation, and reflective evaluation—key aspects aligned with PO3/CO2.

These alignments were not only useful in enhancing student performance but also in developing graduate attributes that are beneficial for civil engineering professionals.

Beginning in semester 20244, modifications were introduced to the assessment framework of this course as shown in Figure 1. Specifically, changes were made to the test and group assignment components in terms of their weightage. For instance, the test was restructured from 30% to 20% and group assignment marks were increased from 10% to 20%. Despite there being changes in assessment weightage, the course maintained consistency in syllabus content, instructional materials, and teaching methods, to ensure that the primary variable affecting student performance was the mode of assessment.

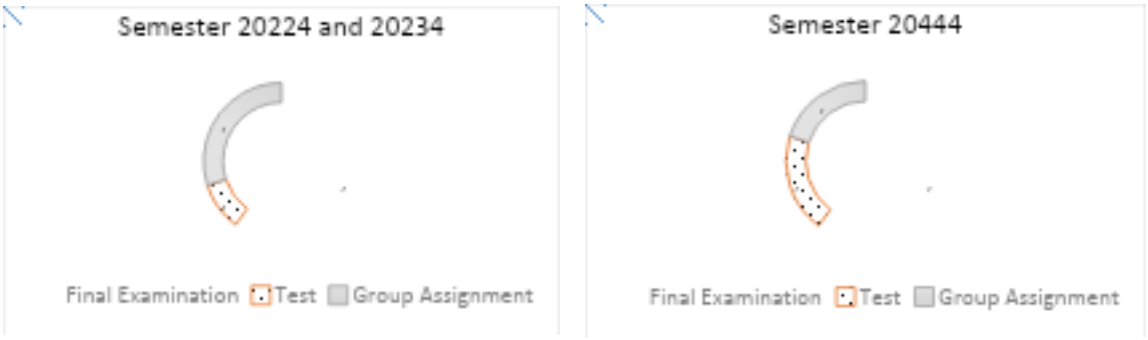

Figure 1: Assessment framework of Soil Engineering course for semesters 20224, 20234 and 20444

3.0 RESULTS AND DISCUSSIONS

Figure 2 illustrates the grade achievement distribution for three different semesters—20224, 20234, and 20244. A noticeable improvement in academic performance is observed in Semester 20244, with a significant increase in the number of students achieving higher grades (A+, A, A-, B+, and B) and a reduction in failure rates. A major factor contributing to this positive shift is the change in the assessment structure implemented during Semester 20244. The percentage for assignment-based assessment was increased from 10% to 20%, while the weightage of the test component was reduced from 30% to 20%. This rebalancing of assessment components likely played a

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pivotal role in the improved student performance. Recent studies have emphasized the benefits of increasing formative assessments, such as assignments, which provide opportunities for deeper engagement and continuous learning. According to Ferdinal, & Isramirawat. (2021), students tend to perform better academically when assessments emphasize learning-oriented tasks rather than high-stakes exams. Formative assessments promote reflective thinking, self-paced learning, and the ability to apply knowledge in real-world contexts (Khan & Asif, 2023). On the other hand, high-stakes summative tests often induce stress and anxiety, which can negatively affect performance. Reducing the test component in Semester 20244 may have helped alleviate this pressure. As highlighted by Papadakis et al. (2021), diversified assessment approaches that reduce the dominance of traditional exams can lead to improved motivation and academic outcomes, especially among students with varying learning styles.

Furthermore, the reduction in the percentage of students in lower-grade categories (C-, D+, D, E, F) suggests that a greater percentage of students were able to shift from marginal performance to passing or higher achievement. This outcome supports the growing evidence that continuous assessment encourages steady academic development and reduces the risk of failure (Alruwais et al., 2018). The improved grade achievement in Semester 20244 appears to be directly linked to the modified assessment strategy. This supports current educational best practices, which advocate for a balanced use of formative and summative assessments to enhance learning and inclusivity in academic evaluation.

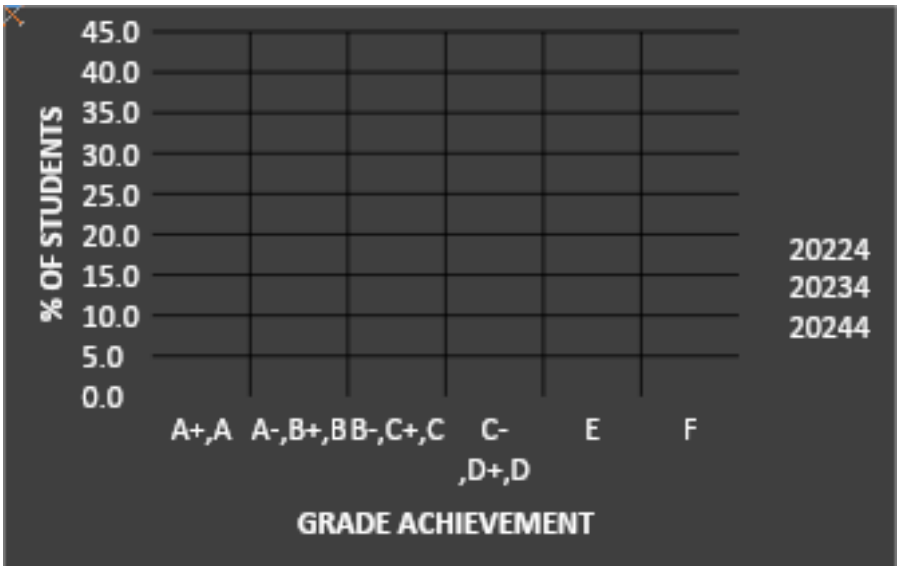

Figure 2: Grade achievement for different semesters

Figure 3 presents the percentage of students attaining Program Outcome 1/Course Outcome 1 (PO1/CO1) and Program Outcome 3/Course Outcome 2 (PO3/CO2) across three consecutive semesters. The data reveals a progressive improvement in attainment levels, with the highest percentages recorded in Semester 20244, where both outcomes reached approximately 65%. In Semester 20224, the attainment for PO1/CO1 and PO3/CO2 was around 50%, indicating that only half of the cohort achieved the minimum benchmark typically set at 50% or higher in outcome-based education (OBE). By Semester 20234, this figure rose to approximately 58–60% and further increased in Semester 20244. This upward trend

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corresponds with the improved grade distribution observed in Figure 2 and suggests a strengthening alignment between teaching, assessment strategies, and learning outcomes.

The enhanced performance in Semester 20244 can be attributed, in part, to the revised assessment structure. The shift in weightage, with assignment marks increased from 10% to 20% and test marks reduced from 30% to 20%, likely provided students with more continuous and supportive learning opportunities. Formative components such as assignments not only allow students more time to engage with complex concepts but also offer repeated chances to demonstrate understanding, which supports higher attainment in course and program outcomes (Ferdinal, & Isramirawat, 2021). PO1/CO1, which generally reflects the application of foundational knowledge and technical understanding, benefited from this structure as students were able to apply theoretical principles in practical contexts. Meanwhile, PO3/CO2, often associated with problem-solving and analytical skills, showed parallel gains, indicating that students had more opportunities to engage in active learning strategies that promote these competencies (Torrance, 2012; Papadakis et al., 2021). The attainment increase also suggests improved curriculum delivery and assessment alignment. When learning activities and assessments are carefully designed to reflect intended learning outcomes, students are more likely to achieve them (Alruwais et al., 2018). Therefore, the high attainment rates in Semester 20244 may reflect not only changes in assessment weightage but also enhanced instructional quality and student engagement.

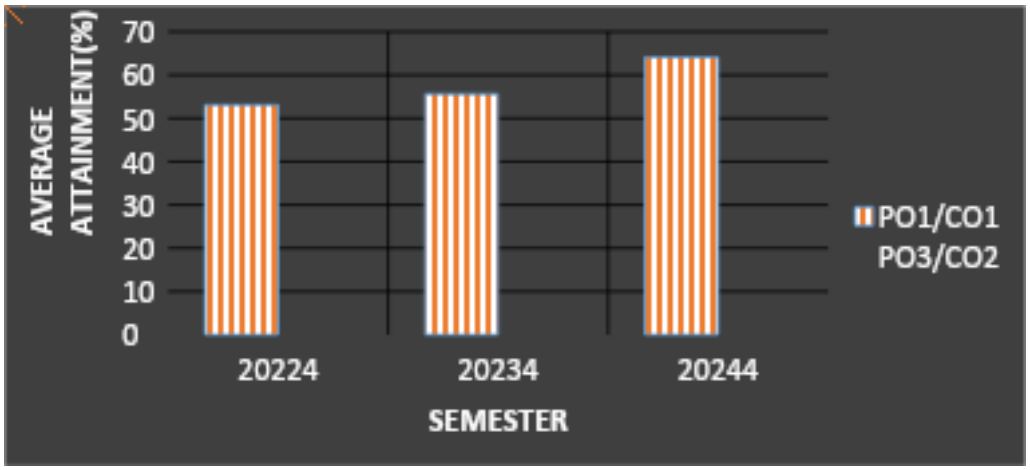

Figure 3: Students attainment for PO1/CO1 and PO3/CO2

4.0 CONCLUSION

This study examined the impact of rebalancing the weightage between tests and assignments on student performance in a Soil Engineering course. The findings indicate that increasing the emphasis on assignments significantly reduced failure rates, particularly benefiting students who may underperform in traditional test-based assessments. The results underscore the educational value of incorporating continuous assessment strategies that align with students' diverse learning styles and competencies. This rebalanced approach not only enhances academic outcomes but also promotes a more inclusive and supportive learning environment. Future research should explore the long-term effects of such assessment strategies across different engineering disciplines and investigate the interplay between assignment quality, student engagement, and learning

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outcomes.

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