A Redesigned Peer Learning Model for Fair Assessment in Distance Education

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Abstract: Learning is widely adopted in distance education to promote collaboration. However, Peer group-based assessments often suffer from unequal contribution and free-riding. This study examines the redesign of a programming group project in a distance learning environment to address these concerns. In the previous implementation, students worked collaboratively to develop a web application, and the assessment was based on a shared group outcome. Analysis of the results revealed anomalies: students with weaker performance in other modules received disproportionately high grades, suggesting a potential dependence on peers. To mitigate this issue, the project structure was redesigned to balance collaboration with individual accountability. While students were randomly assigned to groups to maintain peer interaction, all project deliverables were completed individually. A structured peer-learning component was introduced through the Moodle Workshop module, where students submitted their Software Requirements Specification (SRS) and engaged in peer assessment by evaluating and providing feedback on group members' submissions. This workshop activity was embedded as a compulsory intermediate assessment within the project sequence, with progression strictly conditional: students were required to complete both their individual submission and the associated peer-review tasks before proceeding to subsequent stages of the project. Failure to complete this component prevented advancement, thereby ensuring full participation in both individual and peer-learning activities. The study investigates the impact of this intervention on assessment validity, student performance, and engagement. Findings suggest that the redesigned model reduces grade inflation, enhances individual accountability, and preserves the benefits of peer learning through structured feedback. The results highlight the potential of integrating peer review mechanisms in distance education to improve both learning outcomes and assessment integrity.

Keywords: Peer Learning, Distance Education, Assessment Integrity, Group Assessment, Project-Based Learning.

1. Introduction

Distance education increasingly adopts collaborative and project-based learning approaches to improve student engagement and encourage peer interaction. In software-related modules, group projects are commonly used to simulate industry practices and develop teamwork skills. However, maintaining fairness and assessment integrity in online group assessments remains a significant challenge.

One major issue in group-based assessments is unequal contribution, where some students rely heavily on stronger peers while contributing minimally to the actual implementation process. This issue is particularly critical in technical modules where practical software development skills are key learning outcomes. Although collaborative learning promotes discussion and peer support, fully shared assessment structures may unintentionally encourage free-riding behaviors and reduce individual accountability.

This study examines the redesign of the module ITE2953 Programming Group Project conducted at the Centre for Open and Distance Learning in 2026. In previous offerings of the module, students completed the project as a fully group-based assessment where major deliverables, including the project proposal and Software Requirements Specification (SRS), were submitted collectively. Although students were individually evaluated during the final viva, instructors observed that some students focused mainly on documentation tasks without actively participating in the implementation of the web-based system.

To address these concerns, the assessment structure was redesigned to preserve peer learning while improving individual accountability. Students were assigned to random peer groups for discussions and stakeholder analysis activities, while all assessed deliverables were completed individually. A structured peer-learning component was introduced through the Moodle Workshop module, where students evaluated peer SRS submissions using a rubric-based assessment process.

The redesigned module also introduced multiple assessment checkpoints, enabling continuous monitoring of student participation and technical progress throughout the project lifecycle. This paper presents the redesigned

assessment model, discusses the integration of structured peer-learning activities in a distance education environment, and reports preliminary observations from the ongoing implementation. The study focuses on peer-learning effectiveness, participation patterns, continuous assessment monitoring, and assessment integrity in technical project-based learning.

2. Literature Review

Peer learning has become an important pedagogical strategy in higher education, particularly within online and distance learning environments where student interaction and collaborative engagement support participation and learning outcomes. Research has shown that peer interaction contributes positively to students' sense of community, motivation, collaborative learning experiences, and continued engagement with online learning systems (Hidinger & Borland, 2023; Alshammari & Alshammari, 2024). These findings highlight the importance of collaborative engagement in effective online learning environments.

In computing and programming education, collaborative learning is commonly implemented through group projects that simulate real-world software development practices. Such projects help students develop teamwork, communication, problem-solving, and employability skills while preparing them for professional environments that increasingly rely on virtual collaboration (Donelan & Kear, 2024). However, despite these benefits, group-based assessments continue to present significant challenges related to participation and assessment fairness.

A recurring issue in collaborative learning literature is unequal contribution among group members. Studies frequently report problems such as low participation, uneven workload distribution, and weak communication within online group projects (Donelan & Kear, 2024). In programming projects, these challenges become particularly significant when technically stronger students undertake most development tasks while weaker students receive equivalent grades despite limited contribution. Such free-riding behaviours raise concerns regarding assessment validity and fairness.

Assessment of integrity has therefore become an important consideration in digitally mediated learning environments. Delvenne (2026) emphasized that assessment validity is compromised when submitted work does not accurately represent a student's authentic learning or reasoning process. In collaborative programming projects, this concern emerges when assessment outcomes fail to reflect individual technical competency. Consequently, there is increasing interest in assessment models that preserve the benefits of collaboration while strengthening individual accountability.

Peer assessment has been widely proposed as a mechanism for addressing these concerns. Research suggests that peer review can improve accountability, engagement, reflective judgement, and collaborative responsibility while encouraging students to critically evaluate the work of others (Yang et al., 2022). However, peer assessment is not without limitations. Challenges relating to reliability, consistency, friendship bias, leniency, and student resistance have been reported in the literature (Yang et al., 2022; Rasooli et al., 2025). These concerns highlight the importance of careful pedagogical design when implementing peer-learning activities.

Recent studies advocate for structured assessment approaches that balance collaboration with accountability. Valencia-Forrester (2026) demonstrated that peer-review frameworks can support assessment integrity and student engagement when embedded within a carefully designed learning process. Similarly, Learning Management System tools such as Moodle Workshop provide opportunities to facilitate structured peer-review workflows through automated allocation, feedback exchange, and progression management.

Although previous research has explored collaborative learning, peer assessment, and assessment fairness in higher education, limited attention has been given to assessment redesign models that combine structured peer learning with individually assessed project deliverables in distance programming education. This study addresses that gap by examining a redesigned programming project model that integrates Moodle Workshop peer-review activities while maintaining individual assessment requirements. The study aims to explore how collaboration can be preserved while strengthening accountability, assessment validity, and participation within an asynchronous distance learning environment.

3. Research Methodology

3.1 Research Approach

This study adopted an Action Research approach combined with a mixed-methods research design. The research was conducted within the ITE2953 Programming Group Project module offered by the Centre for Open and Distance Learning (CODL), University of Moratuwa. The study involved the redesign and implementation of a project-based assessment framework intended to improve individual accountability while preserving peer-learning opportunities in a distance education environment. The action research approach was selected because the intervention was implemented by the teaching team within the module and evaluated through ongoing observation and analysis of student participation and assessment outcomes

3.2 Research Questions

The study was guided by the following research questions:

RQ1: How does the redesigned peer-learning model influence student participation in a distance learning programming project module?

RQ2: How does the redesigned assessment framework improve the monitoring of individual student engagement compared with a traditional group-based assessment structure?

RQ3: Can structured peer-review activities preserve the benefits of collaboration while increasing individual accountability in project-based learning?

RQ4: What are the preliminary implications of the redesigned model for assessment integrity in distance education?

3.3 Participants and Context

The study was conducted during the 2025S1 offering of the ITE2953 Programming Group Project module. A total of 210 students were enrolled in the module. Students were required to develop an individual web-based application based on a common project theme while participating in structured peer-learning activities. Students were randomly assigned to peer-learning groups to support discussion, stakeholder analysis, and peer-review activities.

For comparative purposes, assessment data from the previous module implementation, which followed a traditional group-based assessment model with 185 enrolled students, were also considered.

3.4 Previous Assessment Model

The previous module structure included:

- Fully group-based project activities
- Shared submission of SRS, project report, and final project submission
- Shared grading for early assessments
- Individual viva evaluation at the final stage

Although the viva assessed students individually, observations indicated that some students contributed minimally to implementation activities while relying on peers during earlier stages.

3.5 Redesigned Assessment Model

The redesigned structure preserved peer learning while introducing individual accountability.

The redesigned assessment framework consisted of five major stages:

- Individual Project Proposal Submission
- Moodle Workshop Peer Assessment Activity
- Final Software Requirements Specification (SRS) Submission
- Individual Project Implementation and Final Submission
- Practical Examination and Viva Evaluation

Students were required to complete each stage successfully before progressing to subsequent assessment activities. The Moodle Workshop activity required students to submit a draft SRS document and complete four anonymous peer reviews using a rubric-based assessment framework. Students subsequently revised their SRS based on the feedback received.

3.6 Data Collection

Data were collected from multiple sources generated during module delivery, including:

- Moodle assessment completion records
- Moodle Workshop participation records
- Project submission data
- Practical examination attendance records
- Final viva eligibility records
- Instructor observations recorded throughout module delivery

At the time of writing, final viva evaluations were still ongoing. Therefore, the present analysis focuses primarily on participation and progression data obtained from continuous assessment activities.

3.7 Data Analysis

Quantitative data were analyzed using descriptive statistical techniques to examine participation patterns, progression rates, and assessment completion across the project lifecycle. Comparative analysis was performed between the previous group-based assessment model and the redesigned individually assessed peer-learning model. Qualitative observations recorded by instructors during module delivery were used to interpret participation trends, identify implementation challenges, and evaluate the effectiveness of the redesigned assessment structure.

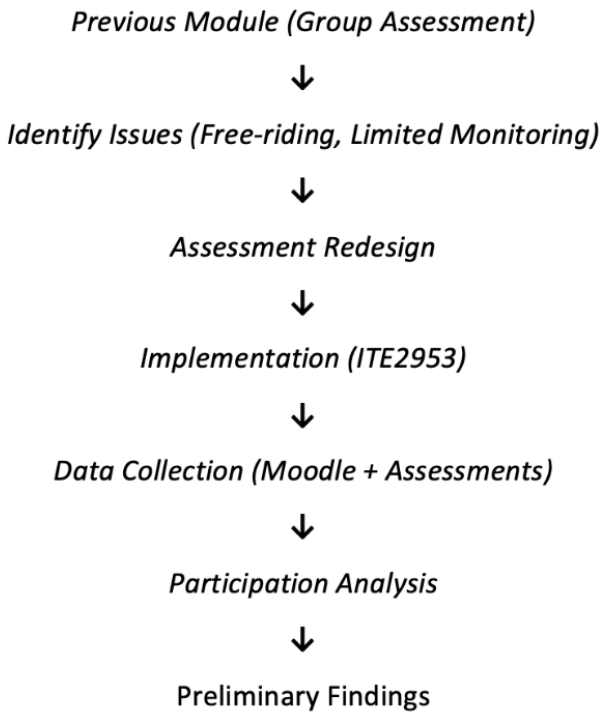


Figure 1: summary of the research process

4. Redesigned Peer Learning Framework

4.1 Assessment Workflow

Table 1: A summary of the workflow that has been redesigned for the module

Stage	Activity	Assessment Type
1	Project Proposal	Individual
2	SRS Draft Submission (Moodle Workshop)	Individual with Peer Learning
3	Peer review (Moodle Workshop)	Individual with Peer Learning
4	Final SRS Submission	Individual
5	Final Project Implementation and Submission	Individual
6	Final report submission	Individual
7	Practical Exam	Individual
8	Final Viva Evaluation	Individual

4.2 Moodle Workshop Integration

Students submitted their draft SRS documents through Moodle Workshop and were automatically assigned four peer submissions for evaluation using a five-level rubric.

The workshop process included:

- Step 01 - Individual draft submission
- Step 02 - Anonymous peer allocation
- Step 03 - Peer evaluation
- Step 04 - Feedback review
- Step 05 - Final SRS resubmission

Progression to subsequent assessments was conditional upon completing both submission and peer-review tasks.

5. Results and Findings

5.1 Comparative Analysis of Assessment Outcomes and Individual Accountability

To evaluate the effectiveness of the redesigned peer learning model, assessment outcomes from the current implementation (ITE2953) were compared with those from the previous curriculum (ITE2952), where a conventional group assessment approach was followed. The comparison focused on indicators related to individual accountability, including viva participation, viva performance, and successful module completion. While completion rates provide an overview of student progression, individual viva performance provides stronger evidence of whether students could demonstrate ownership and understanding of their project contributions.

Table 2: Comparison of Assessment Outcomes and Individual Accountability Indicators Between Conventional and Redesigned Assessment Models

Indicator	Previous Curriculum (ITE2952 – Conventional Group Assessment)	Redesigned Peer Learning Model (ITE2953)
Total enrolled students	185	210
Students eligible for viva assessment	173	164
Students who participated in viva	165	150
Viva participation rate (among eligible students)	95.4%	91.5%

Indicator	Previous Curriculum (ITE2952 – Conventional Group Assessment)	Redesigned Peer Learning Model (ITE2953)
Students successfully completing the module	146	137
Overall completion rate (based on enrolment)	78.9%	65.2%
Students achieving viva marks above 50	102	108
Percentage of viva participants achieving above 50	61.8%	72.0%
Highest viva mark	92.05	100
Assessment approach	Shared group marks for selected assessments + viva	Peer assessment + individual accountability checkpoints + practical assessment + viva verification

Although the previous curriculum demonstrated a higher overall completion rate, this metric alone does not indicate the accuracy of assessment outcomes or the extent of individual learning. Under the conventional group assessment structure, students could achieve satisfactory overall grades through shared group marks, even when their individual viva performance indicated limited understanding. In contrast, the redesigned model introduced multiple accountability mechanisms that required students to demonstrate individual knowledge and ownership of their contributions. The comparison of viva outcomes provides stronger evidence of improved assessment integrity. While 61.8% of viva participants achieved marks above 50 in the previous curriculum, this increased to 72.0% under the redesigned model. Additionally, the highest viva mark increased from 92.05 to 100, with several students demonstrating exceptional understanding of their implementations and confidently explaining their design decisions. These findings suggest that the redesigned model strengthened the alignment between assessed performance and actual individual competence.

While Table 2 provides a comprehensive comparison of assessment outcomes, viva performance provides a more direct indication of individual understanding because students were required to independently explain their implementation decisions and project contributions.

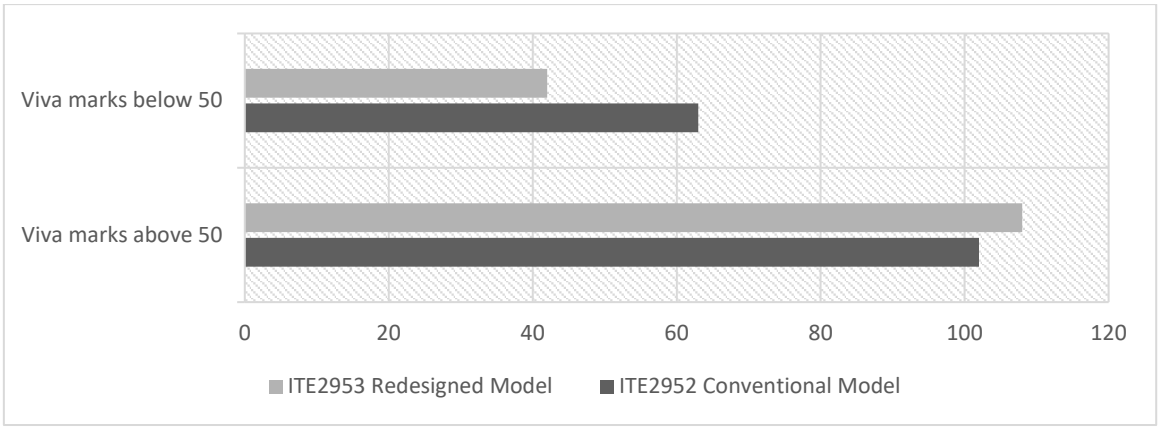


Figure 2: Comparison of Viva Performance Outcomes Between Conventional and Redesigned Assessment Models

As shown in Figure 2, the redesigned model resulted in a higher proportion of students achieving satisfactory viva performance compared with the conventional assessment approach. Under ITE2952, 102 out of 165 viva participants achieved marks above 50 (61.8%), whereas under ITE2953, 108 out of 150 viva participants achieved marks above 50 (72.0%). Additionally, the number of students receiving lower viva marks decreased from 63 to 42. These findings indicate that the redesigned model provided stronger mechanisms for ensuring that final assessment outcomes reflected individual understanding rather than solely group performance.

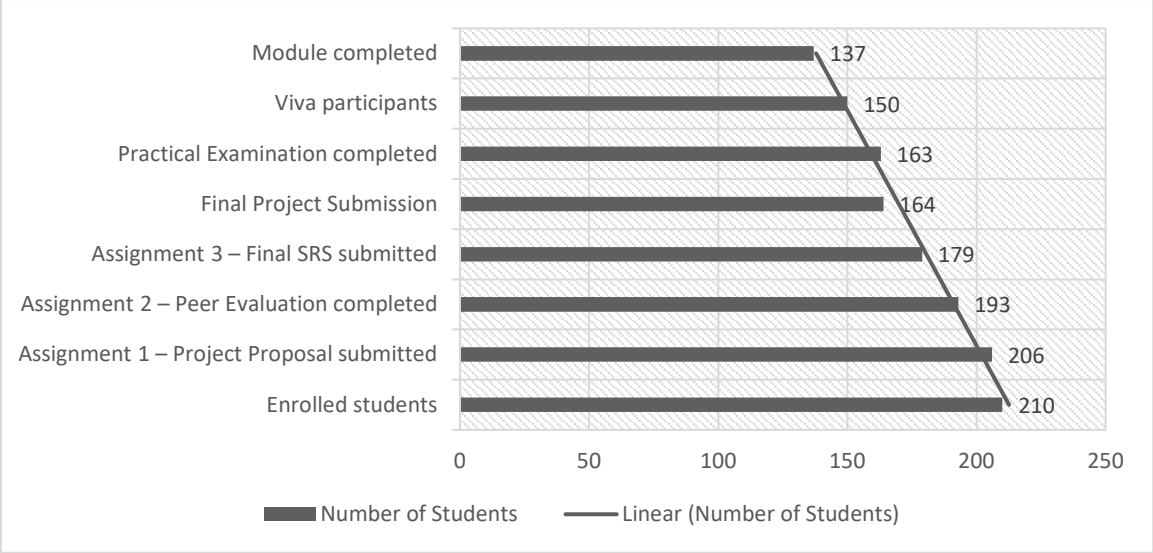


Figure 3: Student Progression Across Assessment Stages in the Redesigned Peer Learning Model

Figure 3 illustrates student progression across the different assessment stages of the redesigned model. The gradual reduction in participation reflects the expected attrition pattern in distance education environments, while most students continued through multiple individual and collaborative assessment checkpoints. 163 students completed the practical examination, demonstrating sustained engagement until the individual competency verification stage. The final viva and module completion outcomes further indicate that the redesigned structure provided multiple opportunities to monitor participation and identify students requiring additional support.

5.2 Comparative Analysis of Assessment Monitoring and Student Engagement

5.2.1 Assessment Structure Comparison

The two Figures show how assessment monitoring changed between the old and new curriculum.

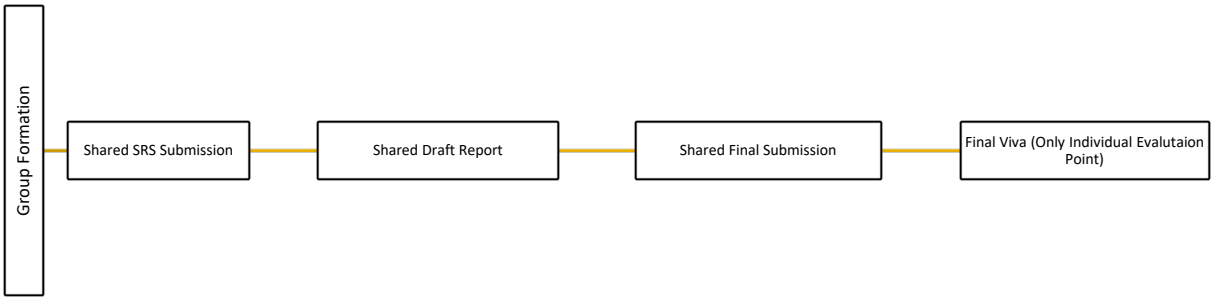


Figure 4: The old curriculum (ITE2952) flow

Here are the key issues of this flow

- Limited visibility of individual contribution
- Individual progress is monitored only during the final viva
- High possibility of opportunities for free riding

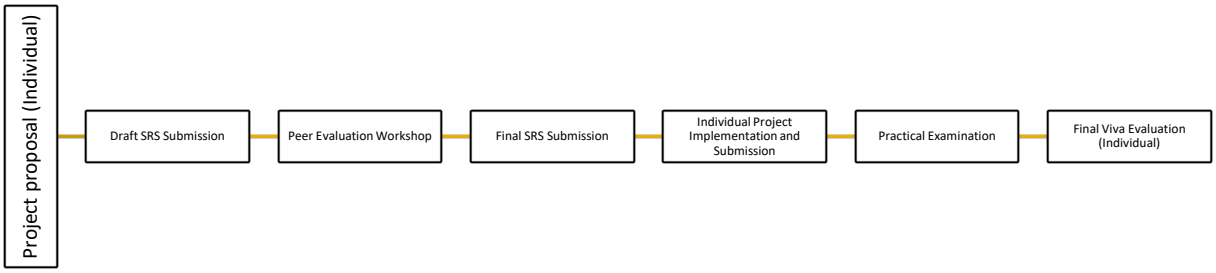


Figure 5: The new curriculum (ITE2953) flow

Here are the key advantages of this flow

- Continuous monitoring of student progress
- Multiple individual checkpoints
- Peer-learning with accountability
- Early identification of inactive students

5.2.2 Comparative Analysis of Assessment Structures

Table 3: Compares the previous fully group-based assessment structure with the redesigned peer-learning-based individual assessment model.

Assessment Aspect	Previous Model (ITE2952)	Redesigned Model (ITE2953)
Project Structure	Fully Group-Based	Individual Deliverables with Peer Learning
Proposal Submission	Shared Group Submission	Individual Submission
SRS Submission	Shared Group Submission	Individual Submission
Peer Learning	Informal Collaboration	Structured Moodle Workshop
Feedback Process	Limited Instructor Feedback	Peer + Instructor Feedback
Implementation Responsibility	Shared Among Group Members	Fully Individual
Assessment Progression	Flexible	Mandatory Completion-Based Progression
Practical Evaluation	Final Viva Only	Practical Exam + Final Viva
Accountability Level	Moderate	High
Risk of Free-Riding	High	Reduced
Assessment Integrity	Difficult to Monitor	Improved Through Individual Evaluation

5.2.3 Monitoring Visibility Comparison

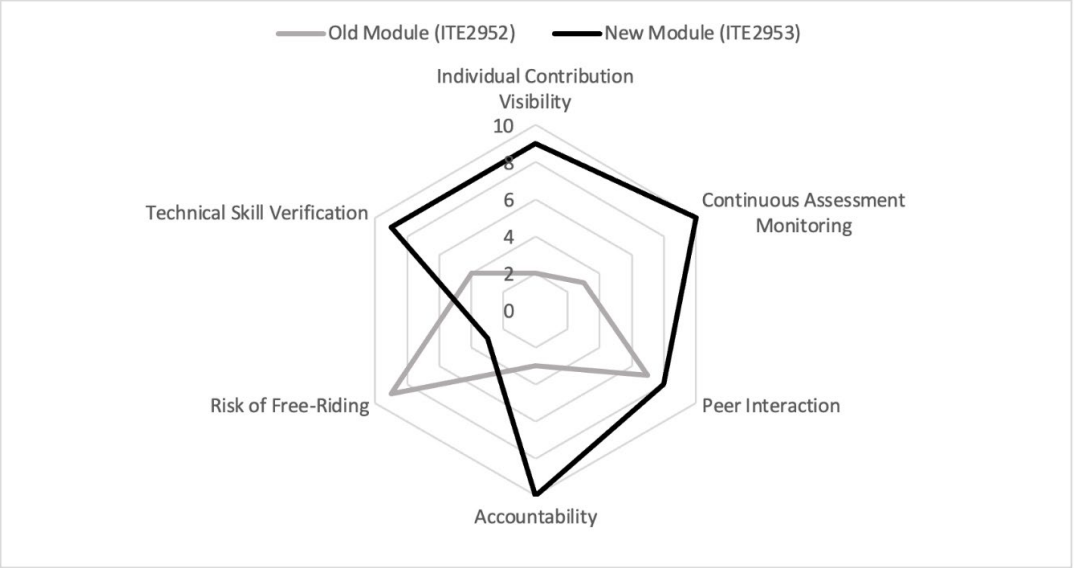


Figure 6: Visually demonstrates how the redesigned assessment structure improved the visibility of student engagement and technical competency throughout the project lifecycle.

5.3 Observed Outcomes

Initial observations suggest several positive outcomes:

- Increased individual engagement
- Reduced dependency on peers
- Better accountability across assessment stages
- Improved participation consistency
- Reduced opportunities for free riding

The structured progression model also encouraged students to actively complete every stage of the project. Although the redesigned module currently shows stronger engagement, accountability, and monitoring capability, the final effectiveness analysis will continue after the completion of the final viva evaluations. Future analysis will include comparative grade distributions, viva performance, technical competency validation, and long-term assessment integrity outcomes.

6. Discussion

The redesigned peer learning model demonstrates how structured peer interaction can be integrated into distance education environments while maintaining individual accountability and assessment integrity. The findings indicate that the model provided greater visibility of student engagement by introducing multiple accountability checkpoints, including peer evaluation, individual project responsibilities, practical examination, and viva assessment. Rather than relying solely on the final group output, the redesigned approach enabled continuous monitoring of student participation and created opportunities to verify individual understanding.

The comparison of viva assessment outcomes provides further evidence of the redesigned model's effectiveness in reducing opportunities for free riding. In the previous curriculum, which used a conventional group assessment structure, students could receive identical marks for selected group-based assessments regardless of their individual contributions. Although 146 out of 173 eligible students successfully completed the module, analysis of individual viva performance showed that only 102 students achieved marks above 50, while several students obtained considerably lower viva marks. This indicates that some students were able to successfully complete the module despite demonstrating limited individual understanding during the viva assessment, as group assessment marks contributed significantly to their overall performance.

In contrast, the redesigned model strengthened the relationship between student contribution and final achievement by requiring learners to demonstrate ownership of their work. Among the 164 students who

reached the viva stage under the redesigned model, 137 successfully completed the module. The highest viva mark increased to 100, with several students demonstrating excellent understanding of their implementation decisions and confidently explaining their individual contributions. Furthermore, 108 students achieved viva marks above 50, while the remaining students obtained marks above 35. These outcomes suggest improved alignment between assessed performance and actual individual understanding, indicating that the redesigned approach provided a more reliable mechanism for evaluating student contribution within group projects.

Despite these positive outcomes, several limitations and challenges should be acknowledged. Peer assessment remains vulnerable to potential bias, as students may provide overly favorable evaluations to maintain relationships with peers or may lack sufficient experience to critically evaluate the quality of another student's work. Although the use of anonymous peer review and structured rubrics helped reduce these concerns, further reviewer training and calibration activities could improve the reliability of peer-generated assessments. Additionally, some students may initially resist peer assessment due to unfamiliarity with evaluating peers or expectations of traditional instructor-led assessment methods. The additional workload associated with reviewing peers may also create challenges, particularly for students managing multiple academic or professional commitments in distance education settings.

The study is also limited by its implementation within a single module and a specific student cohort. Therefore, the findings should be interpreted within the context of the ITE2953 Programming Group Project module, and further research across different disciplines and larger student populations is required to establish the broader applicability of the model. Future implementations could incorporate more extensive student perception surveys, automated analytics from learning management systems, and longitudinal comparisons across multiple offerings to further evaluate the impact of structured peer learning on engagement, fairness, and learning outcomes.

Overall, the findings suggest that a carefully designed peer learning model can address some of the common challenges associated with group assessment in distance education. By combining peer evaluation with individual accountability mechanisms, the model creates a more transparent assessment environment where collaboration is encouraged while individual learning and contribution remain visible.

7. Conclusion and Future Work

This study presented a redesigned peer learning model implemented within the Centre for Open and Distance Learning programming project module. The redesigned framework addressed the limitations of fully group-based assessments by combining individual accountability with structured peer-learning activities facilitated through the Moodle Workshop module.

Unlike the previous assessment structure, where major deliverables were submitted collectively, the redesigned model required all assessed components to be completed individually while still preserving peer interaction through discussion activities, stakeholder analysis, and rubric-based peer evaluation. The integration of structured peer-review activities encouraged reflective learning, continuous engagement, and constructive feedback throughout the software development lifecycle.

Preliminary findings from the ongoing implementation suggest improved student participation, stronger individual accountability, and reduced free-riding behaviors. The progression-based assessment structure enabled continuous monitoring of student engagement and technical progress across multiple assessment stages rather than relying solely on the final viva evaluation.

However, this study represents a work-in-progress evaluation, as the final viva examinations are still ongoing. Therefore, the current findings are primarily based on continuous assessment participation data and early instructional observations. Future work will include analysis of final viva performance, comparative grade distribution analysis, student perception surveys, evaluation of peer feedback quality, and longitudinal analysis across future semesters.

The results are expected to provide deeper insight into the effectiveness of structured peer-learning frameworks in distance technical education and contribute to the development of fairer and more engaging assessment models for online project-based learning environments.

Ethics Declaration

This study was conducted as part of an educational assessment redesign within the module ITE2953 Programming Group Project at the Centre for Open and Distance Learning. The research used anonymized participation and assessment data collected during normal teaching and learning activities. No personal, sensitive, or identifiable student information was collected or disclosed. Therefore, formal ethical clearance was not required for this study.

AI Declaration

Artificial Intelligence (AI) tools were used during the preparation of this paper to support language refinement, content organization, grammar improvement, and academic writing enhancement. The authors reviewed, edited, and validated all generated content to ensure the accuracy, originality, and academic integrity of the final manuscript. AI tools were not used for data generation, analysis, or fabrication of research findings.

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