

# The effectiveness of online peer-feedback for group interaction and assessment quality in a high-enrolment and culturally diverse undergraduate topic

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## Abstract

*In higher education, the cognitive, behavioural and motivational benefits of peer feedback have been realised. Previously, we reported enhanced group interaction and assessment quality following online peer feedback in a small, undergraduate cohort (Emery, 2024). In this study, we applied key components from theoretical feedback models to online (FeedbackFruits) activities to verify peer feedback outcomes in a high-enrolment, culturally diverse, undergraduate topic. Students actively participated (range 88.8-97.4%) in five online peer feedback tasks, with feedback value ranked as 'high' for peer-to-peer (58.7%) and group-to-group (62.0%) processes. Group-to-group feedback significantly ( $p<0.01$ ) improved poster format (3.79 vs 4.61), referencing (3.25 vs 4.40) and topic coverage (3.88 vs 4.70) between draft and final submissions. Similarly, mean peer evaluation scores significantly ( $p<0.05$ ) improved for information sharing (3.86 vs 3.93) and discussion skills (3.86 vs 3.91%) post-feedback. This study highlights the importance of understanding learner characteristics and technologies in optimising feedback practice in real-world settings.*

**Keywords:** Feedback; peer; assessment; quality; student characteristics.

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## 1. Introduction

Online peer feedback refers to technology-facilitated interactions enabling students to submit their work and exchange feedback with their peers through online platforms, without restrictions on time or location (Gao *et al.*, 2024).

In higher education, the shift to digital learning environments combined with the expansion of available online tools (e.g. FeedbackFruits, Articulate, Expertiza, Peergrade, Blackboard, Google Docs) has led to a substantial evidence-base describing the benefits of online peer

feedback for students and educators (Kerman *et al.*, 2024). For students, online peer feedback guides learner-centered strategies that improve cognitive (e.g. knowledge, analysis, comprehension), behavioural (e.g. communication, engagement, teamwork) and affective (e.g. motivation, self-regulation, confidence) outcomes (Simonsmeier *et al.*, 2020). For academics, online learning tools facilitate the implementation of customised feedback processes with comprehensive auditing and evaluation. These tools have become essential for improving feedback quality and efficiency, particularly in larger cohorts (Alshenafi, 2017).

However, the application of online peer feedback is not without challenges. Learner disengagement due to asynchronous communication, misunderstandings of online tone (Noroozi & Mulder, 2017), low quality feedback associated with anonymous, non-specific commentary (Topping, 2017) and task complexity related to student experience in giving feedback (Er *et al.*, 2021) have been commonly reported.

Attempts to optimise online peer feedback processes have been partially addressed by the identification of key feedback components (Gao *et al.*, 2024; Kerman *et al.*, 2024) and theoretical models (Panadero & Lipnevich, 2022; Wu & Schunn, 2023). However, the adoption of optimised peer feedback into educational practice relies on a further understanding of how individual student characteristics and learning environments impact peer feedback engagement and learning outcomes. Previously, we reported enhanced group interaction and assessment quality following online peer feedback in a small, undergraduate cohort (Emery, 2024). The aim of this study was to verify the effectiveness of optimised online peer feedback on assessment quality and peer interaction in a high-enrolment, culturally diverse, undergraduate topic.

## **2. Methods**

### **2.1. Study cohort and demographics**

Undergraduate 3<sup>rd</sup> year Bachelor of Medical Science and 2<sup>nd</sup> year Bachelor of Clinical Science students enrolled at Flinders University, Australia in Semester 2 of 2024 were eligible for the study. Student demographic data was accessed using the University's Intelligence Portal.

### **2.2. Group Assessment**

The assessment consisted of a group research project, produced over 8 weeks. Submission comprised a poster and 3-minute video presentation. Randomly allocated groups (30) of 3-4 students, researched an infectious disease point-of-care test/device. The connectivity, analytical performance and equipment specifications were evaluated against 'ideal' benchmarking criteria described by Land *et al.* (2019). The assessment formed 15% of the topic grade; 4% (group),

6% (individual) and 5% feedback. Final grades were moderated in accordance with the University's assessment policy.

## 2.3. Assessment Feedback

Assessment feedback comprised four activities in FeedbackFruits: 1) peer-to-peer assessment of draft poster (0.5%), 2) peer-to-peer assessment of final poster (0.5%), 3) group-to-group assessment of draft poster (0.5%) and 4) group-to-group assessment of final poster (0.5%). The student evaluation of feedback (3%) was designed as a Canvas quiz.

### 2.3.1 Feedback Fruits Rubrics

Analytic assessment rubrics for FeedbackFruits designed by topic academics in 2023 were utilised in this study. The focus of the peer-to-peer feedback was group interaction (Table 1).

**Table 1. Indicative\* Peer-to-Peer Feedback Rubric in FeedbackFruits**

Interaction	Beginning (1)	Emerging (2)	Proficient (3)	Experienced (4)
<b>Sharing information</b>	No information shared	Minimal	Moderate	Maximal
<b>Discussion Skills</b>	No participation	Occasionally spoke when encouraged	Contributed most of the time	Consistently contributed
<b>Listening Skills</b>	Did not listen, acted autonomously	Occasionally listened	Listened most of the time	Actively listened to incorporate ideas
<b>Task Completion</b>	No task completion	Completed some assigned tasks	Completed most assigned tasks	Completed all assigned tasks

*\*Truncated peer responses shown. Numerical evaluation scores (1), (2), (3) or (4) were used for data analysis.*

The focus of the group-to-group feedback was topic coverage and formatting (Table 2).

**Table 2. Indicative\* Group-to-Group Feedback Rubric in FeedbackFruits**

Poster Criteria	Beginning (1)	Emerging (2)	Proficient (3)	Experienced (4)	Highly Experienced (5)
<b>Topic Coverage</b>	Insufficient	Variable	Satisfactory	Complete	Advanced
<b>Collaboration</b>	Limited	Emerging	Satisfactory	Effective	Outstanding
<b>Referencing</b>	Limited	Inconsistent	Satisfactory	Complete	Precise

*\*Truncated poster criteria shown. Broadly, topic coverage refers to: evidence-based information, evaluation completeness and assessment cohesion. Collaboration refers to: poster uniformity and integrated information. Referencing refers to: correct reference format used and list completeness. Numerical evaluation scores (1), (2), (3), (4) or (5) were used for data analysis.*

### 2.3.2 Student Evaluation of Feedback

Students evaluated feedback received following the final poster submission using an online Canvas quiz (Table 3). Open text commentary was reviewed by academics.

**Table 3. Indicative\* Evaluation of Feedback Rubric in Canvas quiz**

Feedback Evaluation Category	Response Type
Peer-to-peer and group-to-group feedback value	Low/Medium/High
Assessment changes made to own group poster	Open text
Interaction changes made with own group	Open text
Feedback preference	Anonymous/Identified
Changes made to the poster your group reviewed^	Open text

*\*Truncated feedback evaluation categories shown. ^New question for this study.*

### 2.4 Student Feedback Process

Students accessed feedback rubrics using an individualised access number and password. Academics educated students in safe learning environments, trusted peer relationships and provided with guidance on the use of FeedbackFruits and Canvas.

### 2.5 Data Extraction and Analysis

Deidentified data was extracted from Canvas for analysis. Numerical rankings were applied to peer-to-peer (Table 1) and group-to-group (Table 2) feedback responses to generate draft and final poster evaluation scores, which were analysed using two-sided paired t-tests.

### 2.7 Ethics and Funding

This University's Human Research Ethics Committee approved the study (#HEL-6549-9). Students could 'opt-out' from FeedbackFruits via email and completed online consent for the evaluation quiz. The study received no funding.

## 3. Results

### 3.1 Student Demographics and participation

In this study, the number of students (n=116), proportion of international students (32% non-Australian citizens) and proportion of students who spoke non-English languages at home (44%) were high. Most (79%) students were 20-24 years, female (58%) and none identified as Aboriginal or Torres Strait Islander. Student feedback participation rates were high, irrespective of assessment stage or activity type (Table 4).

Table 4. Student Feedback Participation Rate

Poster Stage	Feedback type	Percentage (%) of students (n=116)
Draft	Group-to-group	96.5
Draft	Peer-to-peer	95.7
Final	Group-to-group	97.4
Final	Peer-to-peer	88.8
Post-final	Evaluation Quiz	93.9

3.2 Impact of Peer-to-Peer Feedback

Mean peer evaluation scores significantly ( $p<0.05$ ) improved for information sharing (3.86 vs 3.93) and discussion skills (3.86 vs 3.91) at final assessment (from draft) but were not significantly different for task completion (3.94 vs 3.96;  $p=0.21$ ) or listening skills (3.94 vs. 3.94;  $p=0.44$ ) (Figure 1).

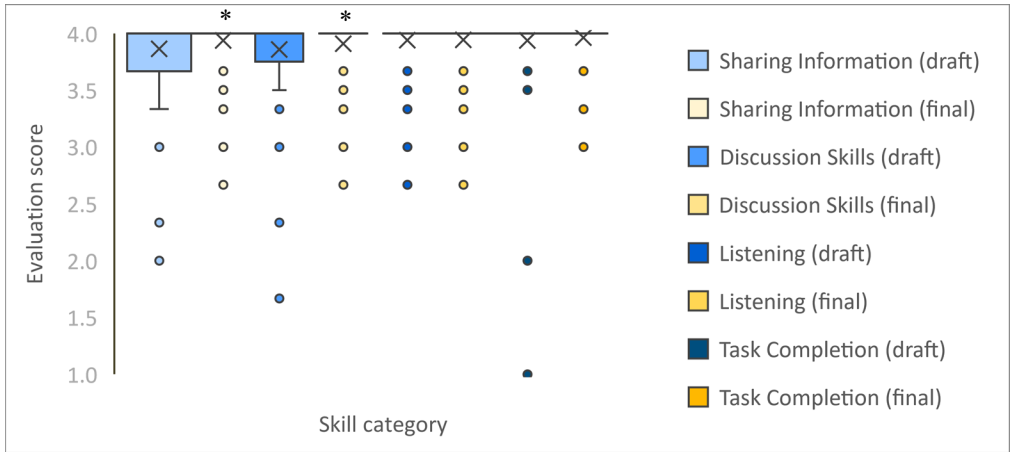


Figure 1: Box plot of evaluation scores by category; sharing information, discussion skills, listening or task completion for draft and final poster submission. Within each box, mean (cross) evaluation scores are shown. Boxes extend from the 25th to the 75th percentile; vertical extending lines denote the minimum values within 1.5 interquartile range of the 25th percentile of each peer group; outliers (dots) represent evaluation scores outside of range of adjacent values. Significant ( $p<0.05$ ) differences between paired (draft and final) mean evaluation scores are denoted by an asterix (\*).

3.3 Impact of Group-to-Group Feedback

Mean group evaluation scores significantly ( $p<0.01$ ) improved for topic coverage (3.88 vs. 4.70), formatting (3.79 vs. 4.61) and referencing (3.25 vs. 4.40) at final assessment (from draft) (Figure 2).

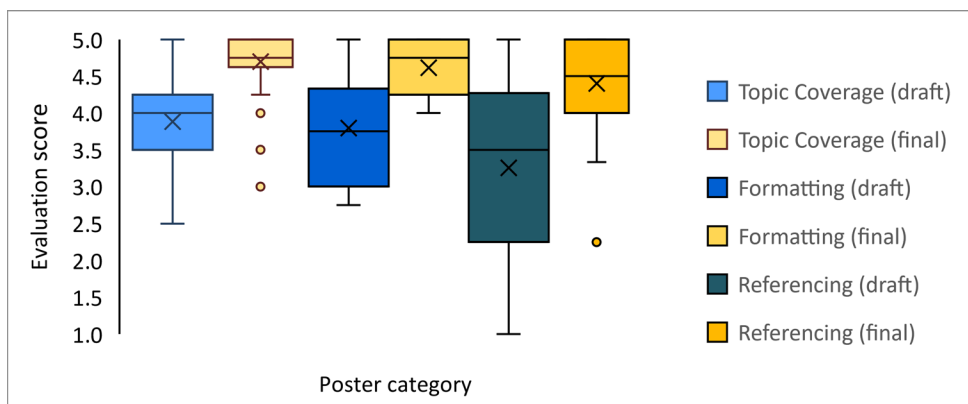


Figure 2: Box plot of evaluation scores by poster category; topic coverage, formatting or referencing for draft and final poster submission. Within each box, mean (cross) and median (horizontal black line) evaluation scores are shown. Boxes extend from the 25th to the 75th percentile; vertical extending lines denote the minimum (lower) or maximum (upper) values within 1.5 interquartile range of the 25th or 75th percentile of each group, respectively; outliers (dots) represent evaluation scores outside of range of adjacent values. Significant ( $p < 0.05$ ) differences between paired (draft and final) mean evaluation scores are denoted by an asterix (\*).

### 3.4 Student Evaluation of Feedback

#### 3.4.1 Value of Feedback

Peer-to-peer feedback value was ranked 'high' by 58.7% ( $n=54$ ), 'medium' by 26.1% ( $n=24$ ) and 'low' by 15.2% ( $n=14$ ) of students. The group-to-group feedback value was considered 'high' by 62.0% ( $n=57$ ) or 'medium' by 33.7% ( $n=31$ ) of students, with less than 10% (4.4%,  $n=4$ ) rating the activity value as 'low'.

#### 3.5.2 Assessment Changes Made

Students most frequently reported changing the uniformity of the poster (91.9%,  $n=79$ ) due to the feedback received. Post-feedback, referencing and topic coverage changes were only reported by 40.7% ( $n=35$ ) and 37.2% ( $n=32$ ) students, respectively.

#### 3.5.3 Feedback Preference

Most students (79.3%,  $n=73$ ) preferred anonymous feedback. Only 19 students requested identified feedback. There were 24 students that either did not respond or did not consent for this question.

#### *3.5.4 Changes made to the poster your group reviewed*

Students most frequently reported changes to the uniformity of the poster their group had reviewed (91%, n=67) due to the feedback their group provided. There were 25 students who misinterpreted this question.

### **4. Discussion**

In theory, the effective implementation of online feedback in higher education requires consideration of influential factors categorised in four domains: student characteristics (demographics, academic background, psychological), environment (learning platform, setting), learning processes (content, feedback design) and learning (cognitive, behavioral, affective) outcomes (Kerman *et al.*, 2024). Contributing to a gap in real-world educational practice, this study utilised the key steps of evidence-based conceptual frameworks and the authors prior FeedbackFruits expertise (Emery, 2024) to verify the effectiveness of online peer feedback activities in a large and culturally diverse student cohort. This included: a) gaining insight into the student's demographic and academic backgrounds b) talking to the students regarding their pre-existing knowledge, skills and attitudes toward peer feedback during face-to-face workshops before the study commenced, c) offering comprehensive training and education in the delivery and receipt of safe and effective feedback, d) using anonymous feedback (indicated as preferable by students), d) simplifying FeedbackFruits instructional presentations to the class and f) increasing the assessment duration to maximise the time students had to make changes to the assessment based on the feedback they received.

Whilst the student demographic data showed that the cohort of this study comprised of students with individual characteristics that may have influenced feedback literacy and experience (i.e. young, scientific/medical background, international and bi-lingual/multi-lingual), the student participation in all feedback activities was high and approximately 60% of students ranked the value of the peer-to-peer or group-to-group feedback they received as 'high'. Whilst it is acknowledged that some students may have participated in feedback activities only to improve their topic mark, the tasks in this study were designed such that significant time and effort for completion (4.5 hours over 3 sessions) was required and the marks allocated were minimal.

The authors prior experience to the topic learning environment, good understanding of the learning platform and rapid access to technical support assisted the feedback task clarity and workflow for students. This enabled changes within FeedbackFruits associated with software updates to be quickly rectified and highlights the importance of regularly pre-testing assessment rubrics prior to activation in an online environment.

In this study the group-to-group feedback resulted in significant mean evaluation score improvement for topic coverage, formatting and referencing, indicating the feedback received enhanced overall assessment quality. However, when individual student comments were

evaluated by academics, most students reported or observed aesthetic (i.e. poster uniformity) rather than content-related (i.e. topic coverage) changes based on the group-to-group feedback received. This suggests further improvement to the feedback rubric design and content in future studies could be beneficial to guide student responses to the feedback they received.

Peer-to-peer feedback significantly improved discussion skills and sharing information, but high baseline evaluation scores prevented statistically significant differences being observed for listening and task completion. Despite this study limitation, students reported that the positive peer-to-peer feedback they received motivated them to improve or maintain high-level group interactions. One student commented “*I participated more in group discussions as well as listened to other’s thoughts and ideas and tried to ensure that I completed my work in a timely manner.*” Another student reflected “*Fortunately, our group worked well and as a result received glowing peer-feedback. Throughout the rest of this task, we strived to maintain these good relationships throughout all group interactions. This included effective communication and respect for all team members.*”

## **5. Conclusion**

Online peer feedback improved assessment quality and group interaction in this study, demonstrating the importance of optimising peer feedback in real-world educational practice through a sound understanding of individual student characteristics and learning environments.

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