Original Article

Integrating Student Feedback to Improve Learning Outcomes: An Action Research Study in Oral and Maxillofacial Surgery

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Abstract

Background: Student feedback now stands as one of the most important pillars of learner-centered education, shaping how teaching is designed and how students learn. However, structured mechanisms for obtaining student feedback largely remain underutilized in dental curricula.

Objective: The objective was to examine the effect of feedback-informed action research cycles on teaching effectiveness and student learning outcomes in Oral and Maxillofacial Surgery.

Methods: Two final-year BDS cohorts at Isra Dental College participated in a two-cycle action research study (2021 control vs. 2022 intervention). A purposive sample of forty students was taken from each cohort. Traditional lectures were given to the 2021 cohort, whereas feedback-informed lectures were given to the 2022 cohort. Independent sample t tests were used to assess quantitative data. Thematic analysis was used to examine the qualitative input. The Ethical Review Committee granted ethical approval.

Results: The feedback-informed cohort scored significantly higher in final examinations than the traditional cohort: mean 62.1% (SD 5.1) versus mean 54.2% (SD 4.8), respectively (p = 0.002). On a Likert scale, 85% of students rated clarity of lectures as "high" compared with 45% in the control cycle, 78% valued the interactive activities, and 90% felt that their suggestions were used. Qualitative themes included improved clarity, engagement, and responsiveness. Instructors indicated that their teaching practice is becoming more reflective and dialogical.

Conclusion: Integrating structured student feedback within an action-research framework improved lecture effectiveness and enhanced student performance.

Keywords: Dental education, student feedback, action research, Oral and Maxillofacial Surgery, reflective teaching

Introduction

Traditional dental education has long relied on didactic lectures. Although feedback is crucial for enhancing student performance, it is nevertheless given inconsistently, according to a systematic assessment of feedback practices in preclinical dentistry training.[1] Modern approaches such as the Ask-Tell-Ask framework, which has been shown to be more successful than earlier "feedback sandwich" techniques, demonstrate that organized feedback improves student satisfaction and promotes deeper knowledge, underscoring the need for more sophisticated feedback techniques.[2] A range of approaches, including constructive, individual, group, and reflective

procedures, are revealed by qualitative research on feedback styles among dental educators, highlighting the significance of customizing feedback to the needs and context of the learner.[3] Furthermore, excellent feedback has a significant and favorable impact on student motivation and achievement, according to meta-analytical evidence from a variety of disciplines.[4] There are few official channels for students to provide feedback, and dental education in Pakistan is still primarily teacher-centered. Students find it more difficult to participate completely and realise their potential as a result. In order to address this, we employed an action research methodology that incorporates student input into the lecture structure

of a course on oral and maxillofacial surgery. We set out to determine whether feedback-driven teaching could enhance exam outcomes, increase student participation, and clarify the material by continually organizing, delivering, reviewing and improving the lectures based on student comments. Understanding how these feedback-informed cycles impact student' learning outcomes and the general efficacy of instruction was the goal.

Recent studies on self-assessment and peer feedback have shown that these approaches encourage students to reflect more critically and help close the gap between how students and instructors evaluate work. In light of these findings, incorporating structured assessment sheets and peer-review processes into preclinical courses is strongly recommended.[5] Digital tools, such as software for assessing dental preparation, offer more avenues for input. Despite the fact that most students respond well to these methods, there may still be integration problems and little effect on performance.[6] In Pakistan, medical and dental education continues to be largely teacher-centered, with few systematic feedback mechanisms embedded in curricula. Recent reviews emphasize the urgent need for reforms to adopt more learner-centered educational models.[7,8] Furthermore, the widely accepted definition of feedback as information about a learner's performance intended to support future improvement serves as a conceptual foundation for this study.[9,10]This research contributes to the growing body of literature advocating for learner-centered dental education by implementing structured student feedback within an action research framework.

Methods

This study employed a mixed-method, two-cycle action research design at Isra Dental College, Hyderabad, Pakistan, spanning the 2021 (control) and 2022 (intervention) academic years. We employed an action-research design. Quantitative and qualitative open-ended responses were collected concurrently within each action-research cycle. Quantitative data consisted of end-of-course summative exam scores, analysed with descriptive statistics and independent-samples t-tests. Qualitative data comprised open-ended student feedback responses and instructor reflective journal entries, analysed using thematic analysis. The quantitative and quali-

tative results were interpreted together at the end of each cycle to triangulate findings and inform iterative improvements Ethical approval was obtained from the Ethical Review Committee. A total of eighty final-year BDS students were purposively selected, with forty from the 2021 cohort and forty from the 2022 cohort. The 2021 control cohort and the 2022 intervention cohort were two distinct groups of final-year BDS students; no student participated in both cohorts. Within each cohort, twenty top and twenty bottom performers, based on internal assessments, were chosen to represent a range of academic abilities. The sample size of 40 students per cohort was calculated based on statistical needs for detecting significant differences in exam scores between groups, ensuring a power of 0.80. A priori power analysis (G*Power 3.1, two-tailed independent-samples t-test, $\alpha = 0.05$, power = 0.80, expected effect size $d \approx 0.65$–0.70) indicated that at least 34 participants per group were required. To account for potential attrition, we enrolled 40 students in each cohort." Eligible participants were those enrolled in the Oral and Maxillofacial Surgery course who provided informed consent.

Traditional presentations and a teacher-centered approach were used to deliver lectures during the first cycle. A standardized feedback form comprising ten closed-ended items on a five-point Likert scale (1 being strongly disagree and 5 being strongly agree) and three open-ended questions was completed by students in the intervention cohort after each lecture in the second cycle. The closed-ended questions evaluated the coherence of the aims, material relevance, instructional strategies, possibilities for involvement, and integration of previous remarks, as well as the overall efficacy of the lecture. Students were urged to highlight their strengths, offer suggestions for enhancements, and provide any further remarks by means of open-ended questions. The questionnaire was created in accordance with the goals of the study and after a review of pertinent literature.[1–4] Three senior faculty members with backgrounds in medicine and dentistry were gathered to evaluate its content validity. The instructor kept a reflective notebook in addition to the questionnaire to record observations, difficulties, and suggestions for development. Ten reflective journal entries and 120 open-ended student responses made up the qualitative corpus, which was subjected to thematic

analysis without the need for individual interviews. The teaching team updated the lectures for the intervention group based on feedback from the first cycle. They simplified difficult material, included pertinent clinical cases, added interactive techniques like think-pair-share and in-lecture polls, and directly addressed student suggestions. Final exam results and each cohort's pass/fail status were among the data collected. The departmental summative exam at the end of the course was used to calculate the final exam results. While student remarks were examined using Braun and Clarke's thematic analysis frame-work[8], Likert-scale responses were examined desc-riptively. With statistical significance set at $p < 0.05$, independent samples t-tests were conducted using SPSS version 25 to compare mean examination scores across cohorts. To guarantee authenticity and depen-dability, two researchers independently coded the qualitative material, and themes were honed through iterative discussion.

Results

The comparison of summative scores between the 2021 (control) and 2022 (intervention) cohorts is presented in Table 1. The data reflect the mean scores, standard deviations, pass rates, and the statistical significance (p-value) for both cohorts. Mean difference 7.9 points (95 % CI 5.70–10.10); t(78) = 7.13, p < 0.001; Cohen's d ≈ 1.60. Pass rates improved from 92.5 % (control) to 100 % (intervention). Students with higher performance levels had an average improvement of 6 points, while those with lower performance levels saw an improvement of 9 points. With higher final exam scores and a 100% pass rate, the intervention group showed a notable improvement over the control cohort, which had a 92.5% pass rate.

Table 1: *Comparison of Summative Scores between Cohorts*

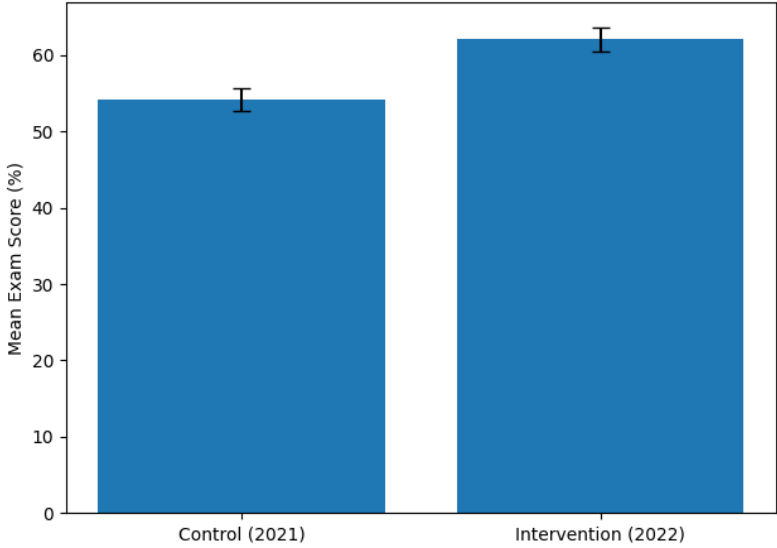| Cohort	Mean Score (%)	Standard Deviation	Pass Rate (%)	p-value
2021	54.2	±4.8	92.5%	
2022	62.1	±5.1	100%	
2022 vs 2021	▢ **Mean difference:** 7.9 percentage points ▢ **95 % CI:** 5.70–10.10 ▢ **t-value (df=78):** 7.13 ▢ **Cohen's d:** 1.60			(*p* = 0.001)

Figure 1*: Comparison of Summative Exam Scores with 95 % Confidence Intervals. Bars show mean exam scores for the control (2021) and intervention (2022) cohorts; error bars represent 95 % confidence intervals*

Students with higher performance levels had an average. The feedback-informed lectures were highly preferred by students over the conventional ones. In contrast to 45% of students who attended the regular lectures, 85% of students in the feedback-driven group rated the sessions as having very clear infor-mation. Nine out of ten students felt that their suggestions were being used, and positive assess-ments of involvement through interactive activities increased from 40% to 78%. Just 5% of respondents felt that the speed was too rapid, compared to 30% in the control group.

Three main themes emerged from the students' comments:

1. *Improved clarity and comprehension:* Students valued shorter, more targeted slides, clinical examples, and visual aids. "I can now apply the theoretical ideas to real life" and "The review at the end of each section helped me tie everything together" were two comments.

2. *Greater interaction and engagement***:** Students were kept focused and motivated to learn from each other through surveys and think-pair-share exer-cises. They observed that these components arou-sed interest and gave the lectures a livelier vibe.

3. *Motivation and responsiveness:* When their sugges-tions were implemented, students were happy and felt appreciated.' I feel good when our opinions are respected,' remarked one, and 'I'm more motivated to attend lectures because I know

my voice matters.' These observations were confirmed by the instructor notes, which emphasized a change from monologue to dialogue and a closer bond with the students.
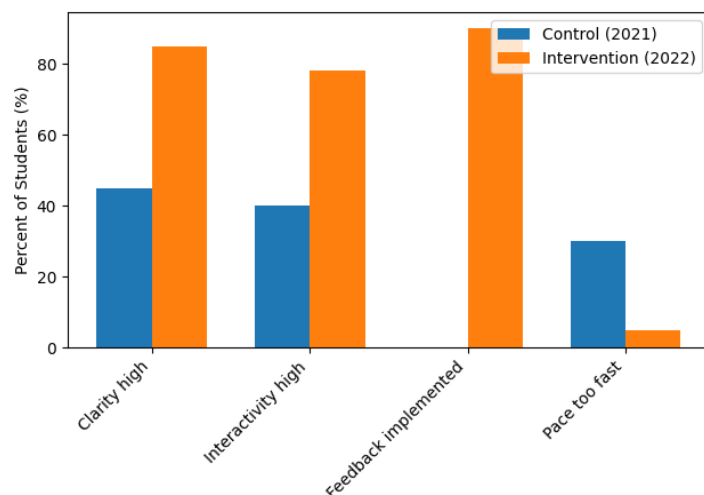

Figure 2: *Student Perceptions on Key Lecture Attributes. The chart shows the percentage of students in control and intervention cohorts rating clarity, interactivity, and feedback implementation as 'high', and the percentage who felt the lecture pace was too fast*

Discussion

The findings of this study suggest that the inclusion of student feedback through iterative action-research cycles has the potential to significantly improve learning in Oral & Maxillofacial Surgery. Students in the feedback-informed cohort identified increased clarity and understanding, reported being more involved due to interactive engagement, and had their suggestions acted upon. Tutors reported a shift away from a monologic, teacher-centred pattern to a more dialogic and responsive classroom interaction. These qualitative and quantitative improvements together suggest the potential for learner-centered feedback to transform a lecture-based teaching method into an interactive and engaging experience. These findings align with and extend several theoretical frameworks on teaching and feedback. Action research positions educators as co-researchers who plan, act, observe and reflect to iteratively improve practice,[11] and subsequent models provide detailed planners for successive cycles of action and reflection.[12] Studies across health and education disciplines note that feedback delivery must be adapted to learners' needs across written, verbal and group modalities.[13] Adult

learning theory emphasises the importance of self-directed learning that builds on prior experience and relevance to learners' goals,[14] principles embodied in our feedback-driven approach. Evidence from professional development programmes demonstrates that targeted training and reflective practice can strengthen teachers' feedback skills,[15] while sustainable feedback practices advocate iterative assignments, ongoing dialogue and student ownership to promote long-term development.[16] Formative assessment and self-regulated learning models recommend feedback that clarifies goals, supports self-monitoring and encourages students to bridge the gap between current and desired performance.[17] Comprehensive texts on feedback in higher and professional education argue that feedback should be dialogic, actionable and integrated throughout curricula.[18] Surveys of dental students highlight the perceived benefits of digital and asynchronous learning modalities for both didactic and clinical understanding,[19] and the R2C2 model provides a structured framework for reflective performance feedback building rapport, exploring reactions, addressing content and coaching for change.[20] Our qualitative themes mirror these steps: students felt heard (relationship), reacted positively to responsive teaching (reaction), found content clearer (content) and were motivated to act on feedback (coaching).

This study employed purposive sampling and was confined to a single institution, which may limit generalisability and introduce selection bias. Differences in feedback response rates between cohorts could also influence the results. Future research should evaluate feedback-informed teaching across diverse courses and institutions, explore the integration of digital and blended feedback strategies, and employ randomised designs to strengthen causal inference. Expanding sample size and examining long-term impacts will further clarify the efficacy of feedback-driven, action-research interventions.

Sustained improvement will require investment in professional development programmes that train instructors to solicit, interpret and act on structured feedback. Such training can embed learner-centred approaches within curricula and ensure that feedback remains a dynamic and iterative process in dental education.

Conclusion:

A course on oral and maxillofacial surgery showed how adding student input into a planned action research process improved academic performance, lecture clarity, and student engagement. Reflective teaching, student collaboration in the classroom, and an economical model of feedback-driven instructtional transformation were all made possible by the intervention. In order to create learner-centered education, institutions especially those with limited resources should explore blended feedback options like self-assessment, peer review, and digital technologies, as well as adopt structured feedback mechanisms and dedicate to faculty development.

Ethical Permission: The Ethical Review Committee of Isra Dental College Hyderabad approved this study vide IU/IDC/R.A/223/447.

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Authors' contribution:

RA: Conception & design, analysis & interpretation, critical intellectual revision of the work, drafting and reviewing the manuscript, final approval of the version to be published

SS: Analysis & interpretation, critical intellectual revision of the work, drafting of manuscript

AKS: substantial contributions to the conception, design, and acquisition of data.

HF: reviewing the manuscript critically for important intellectual content

SFA: Analysis & interpretation, critical intellectual revision of the work, drafting of manuscript

SZAS: Analysis and interpretation of data, critical revision of the manuscript for intellectual content

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