ORIGINAL RESEARCH

FEEDBACK IN DENTAL EDUCATION: A NARRATIVE REVIEW OF PRINCIPLES, MODALITIES, AND IMPLEMENTATION STRATEGIES

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Abstract

Feedback, an essential tool in dental education, is vital for students to shape their clinical competence. Consistent, on-time, and well-structured feedback is a good recipe for ensuring that learning outcomes are met. In-depth clinical training without proper feedback cannot ensure either the effectiveness of teaching methods or the appropriateness of assessments. This narrative review articulates current evidence on feedback methods in dental education and highlights various strategies to enhance student learning and clinical competence. It would help educators and students improve the application of feedback methods, thereby fostering student growth and clinical success.

INTRODUCTION

Feedback helps students assess their academic performance and focus more effectively on learning in dental education. Inadequate feedback practices or a lack of structured formative assessment can lead to significant risks, including compromised patient safety due to inaccurately developed clinical skills or incomplete competence in essential procedures. Feedback offers advantages such as timely guidance, highlighting strengths in teaching and learning, and identifying areas for improvement.[1] This approach facilitates the development of clinical competence, attainment of required standards, and readiness for independent practice. Evidence indicates that effective feedback improves academic outcomes, self-confidence, and adaptability, all of which are critical for success in the health professions. [2, 3]

Effective feedback encourages students to provide their reflections, engage in continuous improvement, and maintain sustained motivation. The supervising faculty can utilize this to refine teaching methods and update curricula.[4] Although it can be challenging, effective feedback results in meaningful and enduring learning experiences. Instructors should provide unbiased feedback for every clinical procedure they supervise, highlighting their strengths and areas for improvement. When students engage in reflective practice and draw their own interpretations from feedback, they achieve deeper learning and lasting behavioral change, rather than simply following instructions. [5]

This narrative review aims to: (i) synthesize current evidence on feedback practices in dental education; (ii) compare the effectiveness of formative, summative, verbal, written, peer, and self-assessment feedback; (iii) outline faculty- and system-level strategies to enhance feedback quality; and (iv) identify gaps to plan future research and curricular design.

A narrative search of PubMed, Scopus, and ERIC from January 2000 to October 2024 focusing on original and review articles was performed using the terms: 'dental education', 'feedback', 'formative assessment', 'summative assessment', 'peer feedback', 'self-assessment', 'OSCE', 'haptic', and 'AI'. Short communications or commentaries without primary data were excluded. A formal risk-of-bias assessment was not performed; rather, emphasis was placed on study method and educational relevance.

Principles of Effective Feedback

Effective feedback can transform even low-achieving students, thereby improving their competence and self-confidence. Evidence from a prompt feedback obtained in a dental hospital suggests it promotes reflective self-evaluation and the development of clinical competencies.[1]   A supervisor who routinely engages students immediately after observing a procedure to provide focused guidance, observational reports suggest that addressing minor technical modifications at the exact moment enables students to acquire clinical skills more efficiently.

Feedback should be performance-specific and action-oriented, recognizing strengths and areas for improvement. For instance, faculty should proactively recommend procedural modifications, rather than simply stating that a procedure or technique is unsatisfactory.[6] Educators are also encouraged to reflect on which feedback strategies have most effectively enhanced student engagement or motivation. A balanced feedback model addressing both strengths and areas needing refinement helps maintain engagement and motivation.[7] When constructive guidance is combined with positive reinforcement, it enhances confidence and clinical competence. Research consistently shows that feedback that is both supportive and candid is most effective for learning.[8] Ongoing use of these strategies promotes the development of competent, reflective dental professionals.

Types of Feedback in Dental Education:

Formative Vs. Summative assessments: These two assessments differ in timing, purpose, and learner involvement. Formative feedback is part of the instructional process to improve understanding of concepts, emphasizing immediate guidance and encouraging reflective learning, rather than just determining grades. It identifies learning gaps, reduces anxiety among beginners, and enables timely error correction.[9] In contrast, summative feedback is a comprehensive evaluation of achieved outcomes, often contributing to final grades. It is learning outcome-oriented and focuses primarily on their achievability of outcomes rather than the journey of learning. However, in a 2008 study, Anziani reported that students' performance on formative assessments in oral surgery did not consistently translate into higher grades on their final examinations.[10] In another study on postgraduate dental training, specific, focused feedback was found to be essential for accurately evaluating clinical skills, as relying on final grades may obscure individual progress and fail to reflect true competence.[11] Hence, it becomes essential for curriculum developers and educators to adopt appropriate assessment and feedback strategies that enhance clinical judgment, performance, and self-regulatory skills. Examining instances where formative performance does not correspond with summative outcomes emphasizes the need for targeted interventions and flexible teaching methods, which are central to promoting excellence in dental education.[12] Divergence between formative and summative performance underscores construct alignment issues and the need for programmatic assessment.

Verbal Vs. Written feedback: Verbal feedback enables real-time interaction, fostering a motivational learning environment. However, to improve retention of information in students' minds, proper documentation is helpful, as verbal feedback may be forgotten over time.[13] However, well-constructed written feedback can be maintained by students and reviewed at a later, convenient date for reflection and self-assessment. Hence, a combination of both written and verbal feedback facilitates better comprehension and prepares students for real-world practice (Table 1).

Table 1. Feedback Modalities and Key Characteristics

Feedback modality	Key features	Advantages	Limitations	Typical context & references
Formative feedback	Ongoing, performance-specific, dialogic	Promotes reflection, early error correction	Time-intensive, variable uptake	Preclinical labs; chairside teaching [9,12]
Summative feedback	Outcome-focused, grade-oriented	Certifies competence, benchmarks learning	Limited learning impact if isolated	End-of-course/OSCEs [10,11]
Verbal feedback	Immediate, interactive	Motivating, contextual	May be forgotten	Chairside supervision [14,15]
Written feedback	Documented, structured	Supports reflection & tracking	Variable engagement	Assignments, portfolios [16]
Peer & self-feedback	Collaborative, reflective	Builds critical thinking	Requires calibration	Case presentations [20–22]

DISCUSSION

Teaching students how to use feedback may be more helpful than focusing on learning styles, since some students want to keep improving, while others focus mainly on passing. Carless (2018) reported that final-year dentistry students preferred verbal feedback on their theory and clinical skills, as they felt there was insufficient time after sessions for written feedback.[14] Hence, the good inter-professional relationship between the supervisor and the student is vital for proper feedback assessment.[15] It is observed that low-achieving students need regular feedback, whereas targeted strategies are well-suited for high-achieving students. One approach involves assigning faculty mentors to each student to ensure consistent, balanced feedback. In addition, data analytics can be used to track feedback practices, helping identify and correct inconsistencies. However, findings by Glover and Brown indicate that the depth of written feedback is not necessarily associated with students' academic performance.[16] Both verbal and written feedback contribute to continuous improvement and goal attainment. Overall, integrating multiple feedback approaches supports the development of all learners, regardless of their level of achievement.

Teachers should provide feedback soon after an assignment so students can identify and correct mistakes quickly. Immediate feedback activates the basal ganglia, especially the striatum, which helps with habit and reinforcement learning. Fast feedback helps students change their behavior and rewards good habits, leading to better learning and adaptability.[17] Feedback given after a pause helps students think more deeply. It helps them internalize criticism. The hippocampus supports contextual memory and learning in this process. Studies show that the hippocampus processes delayed feedback, while the basal ganglia process instant feedback. Delayed feedback enhances long-term understanding of content.[18] Peer feedback lets students give each other helpful comments about their work or assignments. This creates an active learning environment, enhances learning, and builds skills such as critical thinking, self-reflection, and communication. Peer feedback also helps students see things from different viewpoints.[19] Over time, students tend to appreciate peer assessment more, recognizing its importance in learning how to evaluate performance and engage constructively in feedback.

Research clearly shows that peer feedback is valuable in dental education. A study at King's College London Dental Institute found that students who regularly took part in peer assessment and feedback improved both their grades and their ability to reflect.[20]Those who attended 10 or more peer assessment sessions performed better on important exams and demonstrated stronger critical thinking than those who did not. Peer review encourages students to take charge of their learning and think critically, making it a key strategy for training skilled and confident dental professionals. Self-evaluation improves critical thinking and problem-solving skills by allowing students to review their own work and identify areas for improvement. This also helps students take responsibility for their learning.[21] Self-evaluation has been shown to increase dental hygiene students' awareness of their strengths and weaknesses, thereby improving their clinical performance. Even though students may rate themselves higher than teachers do, self-assessment has led to encouraging real reflection and better learning results.[22]

Reflective feedback prompts students to evaluate their learning experiences and translate reflections into improved future performance, thereby strengthening lifelong learning and clinical understanding. A study by Jonas-Dwyer in 2013 showed that third-year dental students' reflective abilities led to their professional development.[23] Reflective portfolios also enhance clinical competence by promoting structured reflection and self-evaluation. Hence, to enhance students' educational experiences, encourage self-directed learning, and ultimately develop competent and self-assured dental professionals, it becomes important that both self-assessment and reflective feedback are delivered.[24]

Methods and Strategies for Providing Feedback

(i) Individualized Feedback: Active clinical practice necessitates individualized feedback as it facilitates targeted improvement of therapeutic abilities, fosters professional development, and improves patient communication. Best practices involve timely post-procedure feedback, clear identification of areas for improvement, balanced reinforcement and correction, actionable guidance, promotion of self-reflection, and longitudinal progress tracking. For example, a student receiving immediate feedback on the dental procedure clearly understood the adjustment to the bur's angulation, emphasizing the importance of timely feedback. Although this approach is more demanding for the faculty in terms of effort and time, it is rewarding.[4]

(ii) Group Feedback: Students actively share their constructive criticism, their viewpoints, and the learning experiences with peers in small-group pre-clinical or clinical tasks. Such cooperative methods promote confidence and can play a key role in peer-assisted learning and reflective group discussions, leading to deeper understanding of concepts and skill development.[25] For example, students can critically analyze the Class II restoration experience, focus on

technique, ergonomics, and communication with patients. Students can similarly receive feedback from their faculty and colleagues when they review and present clinical cases related to diagnosis, treatment planning, and presentation skills. Students gain a well-rounded perspective that enables them to identify and address areas for development by gathering feedback from peers, teachers, and even patients.[26]

Student performance can be objectively evaluated using rubrics and structured assessment tools that are transparent and consistent. The performance criteria of the rubrics must be clearly defined in line with the expectations and intended learning outcomes. This was demonstrated in a study at Beirut Arab University, which showed that student performance improved when standardized rubrics were used, as they increased transparency, consistency, and opportunities for self-assessment.[27] Similarly, clinical competence can be appropriately evaluated in a controlled, standardized setting using an Objective Structured Clinical Examination (OSCE). It helps to assess students' ability to integrate theoretical knowledge, perform diagnostic tasks, and apply sound clinical judgment. They are more accurate and reliable than traditional evaluation methods. They also successfully pinpoint students' strengths and areas for growth and offer insightful, practice-focused feedback. Dental graduates are better prepared for clinical practice when such assessment techniques are used.[28]

Feedback can be further strengthened through rubric-based digital dashboards that deliver real-time performance indicators. By combining technology-enhanced feedback with structured assessment frameworks, these systems offer immediate insights into learner progress. The faculty and their students can easily make informed decisions using real-time data visualization that supports active learning and continuous improvement. Educators need to evaluate available platforms and select tools aligned with curricular objectives to ensure effective implementation. Faculty should be encouraged to pilot test within selected courses to generate valuable insights for refinement. A phased institutional rollout can therefore facilitate systematic enhancement of feedback and assessment practices.

(iii) Technology-Assisted Feedback: Technologies such as Haptic and force-feedback are reshaping dental education by delivering immediate tactile cues to improve precision, performance, and overall clinical competency.[29] Recent evidence indicates that this strengthens skill acquisition and helps minimize subjectivity, thereby improving students' preparedness for clinical practice.[30]

Role of Feedback in Clinical Training
(i) Preclinical vs. Clinical Feedback: During the preclinical phase, students focus on improving their technical skills in simulated environments to enhance manual dexterity.[31] Feedback advances toward real patient work in a clinical setting, combining psychomotor and communicative skills. The question "What metrics will ensure haptic-gained proficiency translates to patient care?" serves as a guiding point for narrowing the gap between simulation and the required clinical competence. This question prompted teachers and students to assess how preclinical simulations enhance clinical preparedness.

(ii) Hands-on Skill Assessment: In dentistry, mastering clinical skills is vital. Feedback methods, especially self-assessment and teacher evaluation, are key to skill development. Encouraging self-evaluation helps students think critically, become more independent, spot their weaknesses, track their progress, and gain confidence in their abilities.[31]

(iii) Patient Interaction and Communication Skills Feedback: Research shows that educational programs that use role-playing and simulations are highly effective because they strengthen these skills, ultimately leading to better patient outcomes.[32]

(iv) Ethical and Professionalism Feedback: A great dental practice relies on professionalism and strong ethics. Helpful feedback in this area covers topics like patient privacy, informed consent, and professional behavior. It is important to include this kind of feedback in dental education. Training programs that focus on these values through regular teaching and mentoring help build trust and integrity in patient care. In the end, a culture of self-evaluation and ongoing growth, supported by clear and timely feedback on skills, communication, and ethics, produces skilled, caring dental professionals.[33]

Challenges in Providing Feedback in Dental Education
(i) Student Resistance to Feedback: Feedback may be resisted by learners because they lack confidence, are afraid of receiving a poor grade, or don't fully comprehend its purpose. According to studies, many dental students take constructive criticism personally, which can impede their ability to learn and grow as professionals.[1] Reframing feedback as a chance for growth rather than a judgment is a useful strategy to allay this worry. This change can be aided by encouraging students to view criticism as instructive advice. Students are better able to appreciate the value of feedback when reflective questions are used, such as those that highlight strengths or provide detailed instructions for growth. Feedback thus shifts the focus from perceived personal flaws to useful, practical insights.

(ii) Faculty Training and Capacity Constraints: Educators lack formal training in delivering feedback and hence struggle to deliver it with quality. Introducing practical strategies, such as the ask–tell–ask approach and feedforward language, can lead to improvement. Institutions may support this through workshops, online training, and the integration of AI-based tools to provide a personalized feedback experience among faculty.[34]

(iii) Time Limitations: Although individualized feedback is proven to be effective, time constraints among faculty and students during clinical years often restrict its frequency and depth. Its outcomes vary with learners' educational backgrounds and anxiety levels. A multimodal approach is needed to address these issues.[1]

Strategies to Enhance Feedback Effectiveness

(i)Training Faculty on Effective Feedback Techniques: Teachers must receive formal training in evidence-based feedback techniques. Ramani et al.[35] emphasized the importance of structured feedback techniques using the Pendleton model in preclinical restorative dentistry, thereby encouraging students to self-reflect before receiving reflections from their faculty. Another model, the Sandwich Method, makes students more receptive to feedback by combining encouragement, helpful criticism, and positive comments. Focusing on what students do rather than on personal traits and giving clear, practical advice makes feedback even more effective and improves learning.

(ii)Encouraging a Growth Mindset Among Students: It is highly useful to adopt a development mentality, which is the conviction that abilities can be acquired with hard work and perseverance. This mindset encourages dental students to grow and helps them take constructive criticism. According to research, students' clinical performance increases significantly when they view criticism as an opportunity to grow rather than as an assessment of their skills.[36]

(iii)Developing a Feedback-Rich Learning Culture: To make feedback most effective, it is important to create an environment where feedback is regular, expected, and valued. A culture that embraces criticism makes it a natural aspect of learning and lessens the anxiety that often accompanies it. The University of Michigan School of Dentistry has developed a robust feedback culture by integrating self-evaluation into clinical training, peer review, and enhancing students' evaluative abilities.[37] One effective way to model this culture is through a consistent, recognizable routine that reinforces feedback as a shared responsibility. A brief daily practice can serve this purpose—for example, dedicating the first five minutes of each session to rapid reflections and practical feedback. At the University of Michigan, this simple routine has proven effective in sustaining an ongoing cycle of feedback and growth, making feedback a natural and integral part of the learning experience.

(iv)Implementing Regular Feedback Mechanisms: Timely feedback is essential for student growth and preventing the formation of bad habits. Digital tools and weekly reviews are effective ways to ensure feedback is given regularly. Al-Jewair et al.[38] used a tablet app for delivering instant feedback following orthodontic training and found that technical skills improved after wire-bending exercises. However, it is important that regular feedback sessions be held after clinical work and that they combine both formative and summative assessments to track progress.

(i) Role of Technology in Feedback Delivery: Technology has significantly transformed feedback delivery in dental education by enabling advanced tools and platforms that enhance learning. E-portfolios, for example, support ongoing assessment and reflection through self-evaluation, systematic feedback, and progress tracking. The e-portfolio system used at Harvard School of Dental Medicine effectively supports monitoring of clinical program progress.[39]

(ii) AI-Based Feedback Systems: AI's ability to provide prompt, personalized feedback is transforming dentistry education. AI-powered tools assess students' performance in simulations and offer precise insights regarding technique and procedural accuracy. For example, the DenTeach system is a cloud-based platform that offers high-precision, haptic-enabled training using state-of-the-art hardware and software.[40] Furthermore, by accurately segmenting anatomical structures and recognizing pathological changes (such as caries and periapical lesions), AI-driven software significantly improves students' diagnostic skills.[41]

(iii) Online Peer Review Platforms: Students can use digital peer review systems for feedback, which promote critical thinking and reflective learning. The COVID-19 pandemic's quick shift to online learning further demonstrated the need for these resources[42]. Despite fewer difficulties, these technologies have facilitated the sharing of feedback in clinical training, increasing student motivation and academic achievement[43] These developments enhance education and help produce knowledgeable, competent dental practitioners.

Assessing Feedback Effectiveness on Student Learning

(i) Assessing improvement in Knowledge and Skills: In dental education, feedback is crucial for students' skill development. Debates and discussions would improve reasoning, problem-solving, and critical thinking, while Objective Structured Clinical Examinations (OSCEs) effectively test clinical skills, knowledge, and decision-making.[44] In a study of a dental materials course, students assessed the sandwich feedback models favorably, with a slight preference for the latter.[45]

(iii) Faculty Perspectives on Feedback Effectiveness: To improve teaching, it is important to know how faculty view feedback (Figure 1). Teachers, too, should value reliable, timely, and relevant feedback to help ensure student learning.[46]
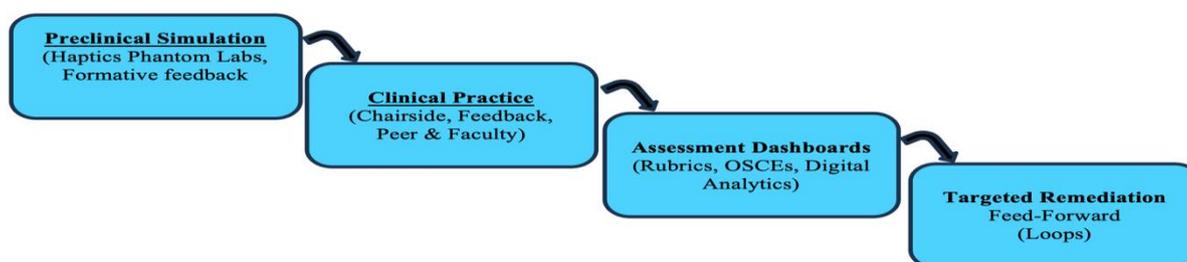

Figure 1. Programmatic Feedback Flow in Dental Education

CONCLUSION

Feedback is basic to the professional development of dental students and shapes their clinical competence. Its effectiveness relies on faculty training and efforts, as well as a strong feedback culture adopted in the institution. However, challenges need to be addressed, such as time constraints and learner resistance. Educators should adopt and implement at least one strategy described in this review to improve professional standards among their students. A collective commitment to these educational practices is key to improving standards of dental education.

DECLARATIOM

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REFERENCES

1. Davis S, Duane B, Loxley A, Quigley D. The evaluation of an evidence-based model of feedback implemented on an undergraduate dental clinical learning environment. BMC Med Educ. 2022 Aug 1;22(1):588.
2. Bissell V, Dawson LJ. Assessment and feedback in dental education: a journey. Br Dent J. 2022 Sep 23;233(6):499-502.
3. Australian Dental Council**.** Professional competencies of the newly qualified dentist. Melbourne (Australia): Australian Dental Council; 2016.
4. Fine P, Leung A, Tonni I, Louca C. Dental teacher feedback and student learning: a qualitative study. Dent J (Basel). 2023 Jun 30;11(7):164.
5. Langer P. The use of feedback in education: A complex instructional strategy. Psychol Rep. 2011 Dec;109(3):775–84.

6. Goodman JS, Wood RE, Hendrickx M. Feedback specificity, exploration, and learning. J Appl Psychol. 2004 Apr;89(2):248-62.

7. Lin GSS, Tan WW, Hashim H, Foong CC. The use of feedback in teaching undergraduate dental students: feedback sandwich or Ask-Tell-Ask model?. BMC Oral Health. 2023 Jun 23;23(1):417.

8. Tekian A, Watling CJ, Roberts TE, Steinert Y, Norcini J. Qualitative and quantitative feedback in the context of competency-based education. Med Teach. 2017;39(12):1245–9.

9. Shute VJ. Focus on Formative Feedback. Rev Educ Res. 2008 Mar;78(1):153-189.

10. Anziani H, Durham J, Moore U. The relationship between formative and summative assessment of undergraduates in oral surgery. Eur J Dent Educ. 2008 Nov;12(4):233-8.

11. Prescott LE, Norcini JJ, McKinlay P, Rennie JS. Facing the challenges of competency-based assessment of postgraduate dental training: Longitudinal Evaluation of Performance (LEP). Med Educ. 2002 Jan;36(1):92-7.

12. Rung A, George R. A systematic literature review of assessment feedback in preclinical dental education. Eur J Dent Educ. 2021 Feb;25(1):135-50.

13. Carless D, Boud D. The development of student feedback literacy: enabling uptake of feedback. Assess Eval High Educ. 2018;43(8): 1315-1325.

14. Carless D. Differing perceptions in the feedback process. Stud High Educ. 2006;31(2): 219-233.

15. Peck CW. Final-year dental students' perceptions of verbal feedback in the clinical setting [dissertation]. Stellenbosch: Stellenbosch University, Faculty of Medicine and Health Sciences; 2018 [cited 2025 Sep 27]. Available from: https://scholar.sun.ac.za/items/2ec74f31-94db-4f7f-bd24-964113649def/full

16. Glover C, Brown E. Written feedback for students: too much, too detailed or too incomprehensible to be effective? Biosci Educ. 2006;7(1): 1-16.

17. Dobryakova E, Tricomi E. Basal ganglia engagement during feedback processing after a substantial delay. Cogn Affect Behav Neurosci. 2013 Dec;13(4):725-36.

18. Ortu D, Skavhaug IM, Vaidya M. Timescales of learning in the basal ganglia and the hippocampus. Front Behav Neurosci. 2013 Aug 1;7:98.

19. Madi M, Sadaf S, Dawood ZA, Asiri A, Farooqi FA, Abdelsalam M, AlHumaid J. Peer evaluation as an alternative assessment method for case presentations: A cross-sectional study of dental students' perception. J Dent Educ. 2024 Oct;88(10):1388-97.

20. Tricio JA, Woolford MJ, Escudier MP. Fostering dental students' academic achievements and reflection skills through clinical peer assessment and feedback. J Dent Educ. 2016 Aug;80(8):914-23.

21. Mould MR, Bray KK, Gadbury-Amyot CC. Student self-assessment in dental hygiene education: a cornerstone of critical thinking and problem-solving. J Dent Educ. 2011 Aug;75(8):1061-72.

22. Habib SR, Sherfudhin H. Students' self-assessment: a learning tool and its comparison with the faculty assessments. J Contemp Dent Pract. 2015 Jan;16(1):48-53.

23. Jonas-Dwyer DR, Abbott PV, Boyd N. First reflections: third-year dentistry students' introduction to reflective practice. Eur J Dent Educ. 2013 Feb;17(1):e64-9.

24. Neville P. Introducing dental students to reflective practice: a dental educator's reflections. Reflective Pract. 2018 Mar;19(2):278-90.

25. Burgess A, Dornan T, Clarke AJ, Menezes A, Mellis C. Peer tutoring in a medical school: perceptions of tutors and tutees. BMC Med Educ. 2016 Mar;16(1):85.

26. Ramani S, Krackov SK. Twelve tips for giving feedback effectively in the clinical environment. Med Teach. 2012 Oct 1;34(10):787-91.

27. O'Donnell JA, Oakley M, Haney S, O'Neill PN, Taylor D. Rubrics 101: a primer for rubric development in dental education. J Dent Educ. 2011 Sep;75(9):1163-75.

28. Rayyan MR. The use of objective structured clinical examination in Dental education-A narrative review. Front Oral Health. 2024 Feb 2;5:1336677.

29. Patil S, Bhandi S, Awan KH, Licari FW, Di Blasio M, Ronsivalle V, Cicciù M, Minervini G. Effectiveness of haptic feedback devices in preclinical training of dental students—a systematic review. BMC Oral Health. 2023 Oct 10;23(1):739.

30. Hsu MH, Chang YC. Haptic and force feedback technology in dental education: a bibliometric analysis. Int J Environ Res Public Health. 2023 Jan 11;20(2):1318.

31. Mittal P, Jadhav GR, Pawar M, Banerjee S, Wangaskar S, Di Blasio M, Cervino G, Minervini G. Impact of self-assessment on dental student's performance in pre-clinical conservative dentistry course. BMC Oral Health. 2024 May 22;24(1):593.

32. Buduneli N. Communication skills of the clinician and patient motivation in dental practice. Curr Oral Health Rep. 2020 Sep;7(3):202–7.

33. Zijlstra-Shaw S, Robinson PG, Roberts T. Assessing professionalism within dental education; the need for a definition. Eur J Dent Educ. 2012 Feb;16(1):e128-36.

34. Aminoshariae A, Nosrat A, Nagendrababu V, Dianat O, Mohammad-Rahimi H, O'Keefe AW,

Setzer FC. Artificial intelligence in endodontic education. J Endod. 2024 May;50(5):562–78.

35. Ramani S, Könings KD, Mann KV, van der Vleuten CPM. A guide to feedback for clinical educators. Med Teach. 2017;39(1):10-20.

36. Fugill M. Teaching and learning in dental student clinical practice. Eur J Dent Educ. 2013;17(1):e1-e8.

37. Hattie J, Timperley H. The power of feedback. Rev Educ Res. 2007 Mar;77(1):81-112.

38. Al-Jewair TS, Qamar SR, Al-Moammar KA, Albarakati SF. The use of digital technology in dental education: A review. Saudi Dent J. 2015;27(3):123–30.

39. Parkes KA, Dredger KS, Hicks D. ePortfolio as a Measure of Reflective Practice. Int J ePortfolio. 2013;3(2):99-115.

40. Altafi H, Suresh S, Zareinia K. The potential of cloud-based AI-enabled platforms in healthcare education. Int J Intell Robot Appl. 2024 Dec;8(1):1–11.

41. Bayrakdar IS, Orhan K, Jagtap R. Artificial intelligence in dental education. In: Orhan K, editor. Artificial intelligence in dentistry. Cham: Springer International Publishing; 2024. p. 223–234.

42. Singaram VS, Pillay R, Mbobnda Kapche EL. Exploring the role of digital technology for feedback exchange in clinical training: a scoping review. Syst Rev. 2024 Dec;13(1):1-28.

43. Meschi M, Shirahmadi S, Amiri M, Ebrahimi-Siaghi N. Debating: effective and satisfactory learning method in dentistry. BMC Med Educ. 2024 Mar 19;24(1):307.

44. Kodali MV, Kodali US, Gadicherla S, Smriti K, Singh A, Khurshid Z. The role of soft skills in dental education: challenges and importance. Eur J Dent. 2025 Jul;19(03):851-9.

45. Park JH, Kim S, Lee J, Yoo S. Effectiveness of the sandwich feedback method in a preclinical dental materials course. J Dent Educ. 2016 Oct;80(10):1183–1190.

46. Wiliam D. Integrating assessment with instruction: What will it take to make it work? In: Dwyer CA, editor. The future of assessment: Shaping teaching and learning. Mahwah NJ: Lawrence Erlbaum Associates; 2006.. 53–82.