Integrating E-Learning Platforms in Teaching Clinical Steps of Complete Denture Rehabilitation

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ABSTRACT

Background:
Complete Denture rehabilitation (CDR) is a vital component of Prosthodontic education that requires in-depth clinical training, but traditional teaching in India we often faces challenges like large class sizes and limited resources. Integrating digital tools such as video tutorials, mobile apps, and virtual simulations can help us overcome these limitations by providing consistent, accessible, and visually rich learning experiences for students.

Objective:
India about the clinical procedures involved in Complete Denture rehabilitation, and to evaluate their efficacy in improving theoretical understanding, procedural knowledge, and clinical reasoning when combined it with traditional teaching methods.

Study design:
A cross-sectional observational study using a validated questionnaire will assess Dental interns' perceptions, accessibility, and perceived effectiveness of e-learning platforms in mastering Complete Denture rehabilitation, with data analysed through descriptive as well as inferential statistics.

Materials and methods:
A cross-sectional, questionnaire-based observational study was conducted in Department of Prosthodontics, Crown and Bridge, across Dental teaching Institutions in India. This study was carried out over a period of 3 months, targeting Dental Interns who completed teaching and clinical exposure in Complete Denture rehabilitation.

Results:
Many participants preferred a blended learning approach over purely traditional or digital formats and expressed interest in further e-learning opportunities based on prior experience. While they rated their theoretical understanding of Complete Denture rehabilitation highly, their confidence in performing technical tasks was lower, though most felt capable of guiding patients and believed e-learning could enhance both knowledge and skills.

Conclusion:
Dental students favored combination of both learning for Complete Denture rehabilitation, showing strong theoretical knowledge but less confidence in technical skills. Most believed e-learning when combined with hands-on training, could effectively enhance both knowledge and clinical competence.

Keywords:
Complete denture rehabilitation, Prosthodontics education, Blended learning, e-learning, Dental students, Clinical competence, Mobile learning, CAD/CAM, 3-D scanning, Patient education.

INTRODUCTION

Complete denture rehabilitation (CDR) remains a traditional yet essential prosthodontic treatment for patients without teeth, particularly those facing health issues, anatomical challenges, or financial difficulties. This intervention is crucial in India, where such situations are common and access to advanced dental treatments may be scarce. CDR provides a budget-friendly, minimally invasive, and broadly applicable option to regain masticatory function, aesthetics, and

overall quality of life[1]. For dental interns and final-year students, mastering CDR is a high-stakes endeavor: the learning curve can be steep, given the individualized nature of each case, the requirement for consistent clinical judgment, and the necessity for impeccable accuracy in both impressions and jaw relations. Additionally, mistakes during the fabrication or insertion of dentures can lead to significant functional and psychosocial repercussions for patients[2]. In numerous dental schools across India, the methodology for teaching CDR still heavily depends on traditional approaches—didactic lectures, live demonstrations on typodonts, and direct chair-side supervision from faculty. Although all these methods are beneficial, they often face logistical challenges. High student-to-clinical staff ratios, restricted clinical seats, and inconsistent patient availability in college clinics can diminish hands-on experience and personalized guidance[3].

This situation means that interns may observe procedures without getting enough practice, hindering the development of essential skills such as fine motor coordination, border-molding sensitivity, occlusal adjustment proficiency, and confident patient interaction—all critical to successful CDR outcomes[4]. In this context, the swift growth of digital resources in India—characterized by affordable smartphones, widespread internet connectivity, and increased digital literacy among students—presents significant opportunities for technology-enhanced education. Mobile learning (m-learning) tools, engaging video content, simulation software, and facilitated online discussion platforms can complement traditional teaching methods. These e-learning formats allow interns to review procedure videos, revisit treatment processes, and participate in peer discussions at their own pace, reinforcing conceptual understanding and procedural memory without interfering with clinical schedules[5,6]. Research from India supports these benefits. Case-based, computer-assisted programs in prosthodontics have clearly improved interns' capabilities in treatment planning, sequencing, and critical decision-making[7].

A notable illustration is the mobile learning application developed at VSPM Dental College, Nagpur: it significantly bolstered clinical reasoning as assessed by script-concordance tests, and interns indicated higher levels of engagement, greater comprehension of clinical rationale, and improved preparedness for patient care[6]. Observational studies are also indicate that blended learning approaches—where digital education complements and integrates with clinical training—result in enhanced cognitive retention and increased learner confidence while still recognizing the need for supervised hands-on practice[8]. Nevertheless, Indian research consistently emphasizes that e-learning cannot fully replace in-person clinical training. The subtleties of peripheral border molding, appropriate tissue displacement, pressure areas, and dynamic occlusal adjustments are best acquired through direct patient interaction and faculty feedback[4,9]. Consequently, the prevailing agreement in Indian dental education advocates for a blended learning model: one that combines the scalability, accessibility, and interactivity of digital education with organized, faculty-led clinical sessions for thorough skill development in CDR[10].

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MATERIALS AND METHODS

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Study design:
A cross-sectional observational study utilizing a descriptive, questionnaire-based approach will be carried out among interns who have received instruction in complete denture rehabilitation. This research will evaluate the students' access to, perceptions regarding, and experiences with e-learning platforms as they relate to comprehending and executing the clinical procedures involved in complete denture fabrication. Data will be gathered through a structured and validated questionnaire, and statistical analysis will be conducted to uncover trends and correlations between the use of e-learning and perceived educational outcomes.

Sample size:
The factor of interest of participating as sample among the population was considered as 50%.
That is, P=50%

Sample size= $Z^2 p q / L^2$

Where, Z = normal standard varies at 95%
    = 1.96

P = population proportion has factors of   interest
    participating in this

q = 100- p

L = margin of error at 90%
    = 10%

Therefore,

Sample size= $(1.96)^2$ x (50) x (50) / $(10)^2$

= 96

Approximately 100 participants selected for survey

Criteria:

Inclusion criteria:
1. Interns who have finished theoretical studies in prosthodontics.
2. Interns who are engaged in clinical training related to complete denture rehabilitation (CDR).
3. Interns ready to give informed consent and take part in the research

Exclusion criteria:
1. Dental students who are not in their final year.
2. Interns without any clinical exposure or involvement in complete denture rehabilitation.
3. Interns who have not successfully completed essential prosthodontic coursework.
4. Participants who are not willing to participate or do not complete the necessary survey

Ethical approval for study:
The Institutional Ethics Committee had given permission to initiate research (Protocol Number 123/2025-2026) titled, "Integrating E-Learning Platforms in Teaching Clinical Steps of Complete Denture Rehabilitation"

Data collection:
The survey will be made available in digital formats (Google Forms) to maximize accessibility among the colleges involved. Prior to distribution, a brief overview of the study's aims will be provided.

Data collection methods:
Participants and Questionnaire-
An online survey was developed and distributed using the Universal Questionnaire Designer platform to assess dental interns' backgrounds and their perspectives on e-learning in the context of complete denture rehabilitation (CDR). The participants were interns at the start their clinical rotations, possessing foundational theoretical knowledge but with limited practical experience. Participation required respondents to complete all sections of the questionnaire. Prior to taking part in the study, entire individuals provided informed consent.

Statistical Methodology:
Data will be gathered through Microsoft Excel and analysed using SPSS software (version XX, IBM Corp., Armonk, NY, USA). Summary statistics, then frequency, percentage, mean, as well as standard deviation, will used to characterise participant demographics and overall response patterns. The Chi-square test will be employed examine relationships between the categorical variables, while mean score comparisons between the two groups will utilise the independent t-test, and comparisons with involving more than two groups will conducted using one-way ANOVA with Tukey's post-hoc analysis. To investigate associations between continuous variables, Pearson's correlation will be applied, and the reliability of the questionnaire will be assessed using Cronbach's alpha, with values of 0.7 or higher indicating acceptable internal consistency. A significance with level of $p < 0.05$ will be established for all statistical analyses.

RESULT

Survey conducted for 100 students, 102 completed the survey—a response rate of 102% among them, 52% were female and 58% male.
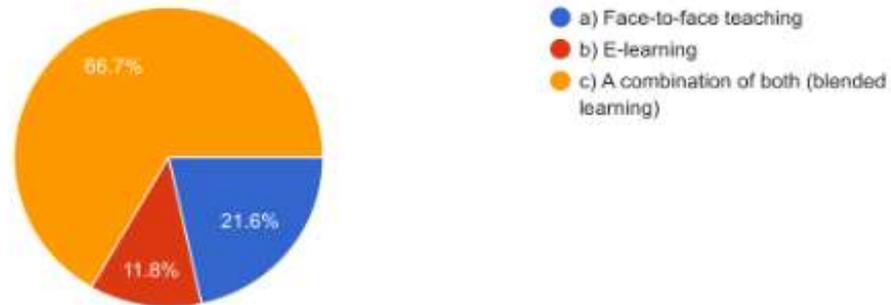

Gender
102 responses

Male
Female
Others

52%
48%

Question of survey are following:

- The preferred instructional method for dental education, based on participant responses, is 21.6% with being face-to-face teaching, 11.8% with e-learning, and 66.7% with combination of both (blended learning).
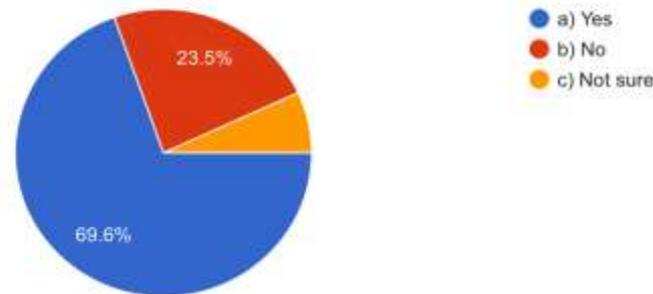

- Regarding previous participation in e-learning, the majority of respondents answered with69.6%with being Yes, 23.5% No, and 6.9%with Not sure."

- Interest in participating in e-learning for dental subjects was indicated by 86.3% with being Yes, 10.8% with No, and 2.9% Not sure.
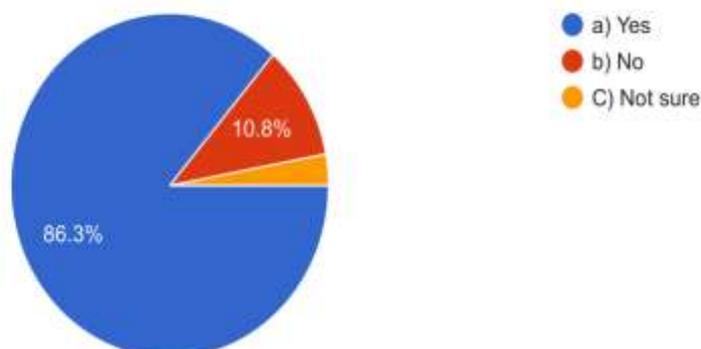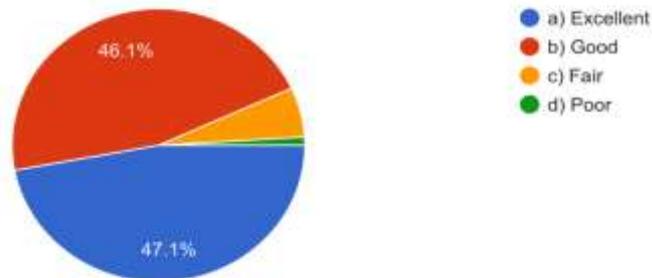
- Respondents rated their current level has knowledge regarding complete denture rehabilitation as follows: 47.1% Excellent, 46.1% Good, 5.9% Fair, and 0.9% Poor.

4. How would you rate your current level of knowledge regarding complete denture rehabilitation?
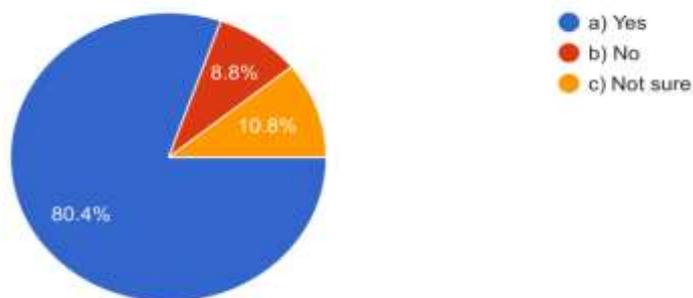
102 responses

- Confidence in performing complete denture rehabilitation in a clinical setting was reported as 80.4% Yes, 8.8% No, and 10.8% Not sure.

5. Do you have confidence in your ability to perform complete denture rehabilitation in a clinical setting?
102 responses

- Confidence in communication with patients undergoing complete denture procedures was reported as 86.3% Yes, 7.8% No and 5.9% Not sure.

6. Are you confident in your communication with patients undergoing complete denture procedures?
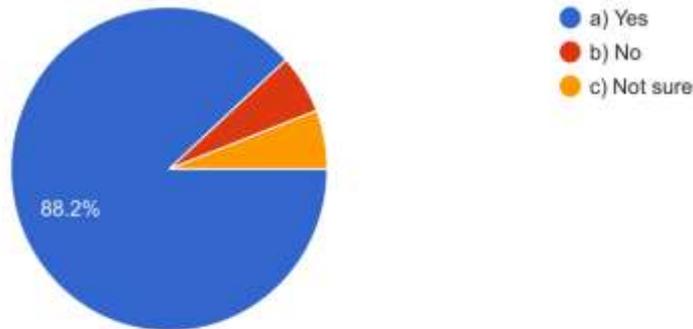102 responses
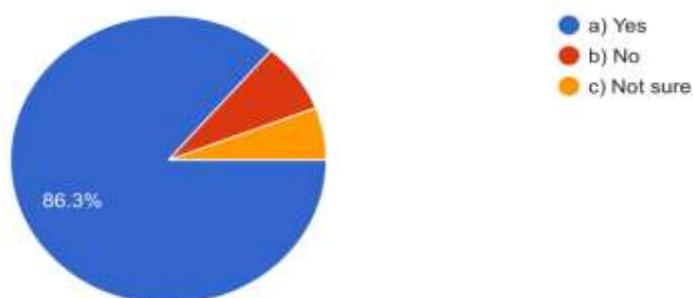
- Ability to independently perform impression-taking procedures for complete denture cases was reported as 88.2% Yes, 5.9% No, and 5.9% Not sure.

7. Can you independently perform impression-taking procedures for complete denture cases?
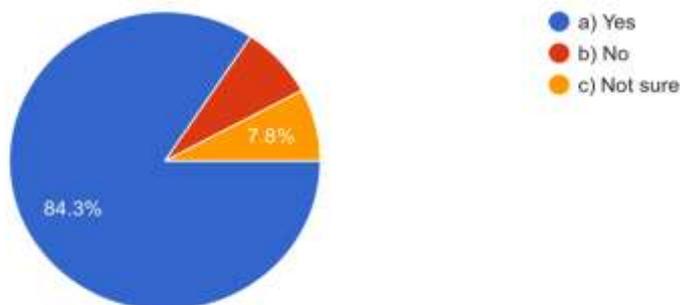102 responses

- Ability to independently record the occlusal relationship for a complete denture patient was reported as: 84.3% Yes, 7.8% No, and 7.8% Not sure.

8. Can you independently record the occlusal relationship for a complete denture patient?
102 responses

- Knowledge of how to properly instruct patients on wearing and maintaining full removable dentures was reported as 89.2% Yes, 3.9% No, and 6.9% Not sure.

9. Do you know how to properly instruct patients on wearing and maintaining full removable dentures?
102 responses
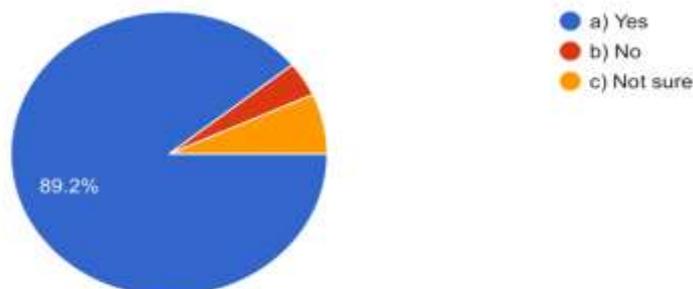
- Belief that e-learning is helpful in enhancing understanding and skills in complete denture rehabilitation was reported as 87.3% Yes, 7.8% No, and 4.9% Not sure.

10. Do you believe that e-learning is helpful in enhancing your understanding and skills in complete denture rehabilitation?
102 responses
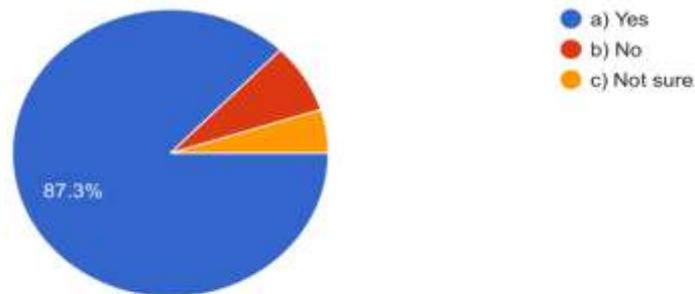
The survey investigated dental students' preferences, experiences, confidence levels, and opinions regarding complete denture rehabilitation and e-learning. A significant number of respondents preferred combination of both as their favored teaching method, and many reported having engaged in some form of e-learning in the past.There was considerable enthusiasm for participating in e-learning focused on dental subjects.When evaluating their self-assessed knowledge of complete denture rehabilitation, responses varied from Excellent to Poor, with the majority self-rating as excellent.Confidence in performing associated clinical procedures differed, showing that participants feel more assured in communicating with patients compared to their ability to carry out technical tasks like impression-taking and recording occlusal relationships independently.Regarding patient education, most participants feel they understood how to effectively instruct patients about the usage and care of full removable dentures. Ultimately, the majority of respondents believed that e-learning could significantly improve their knowledge and capabilities in complete denture rehabilitation.

DISCUSSION

The present study explored Dental students' preferences, prior exposure, confidence levels, and perceptions regarding Complete Denture rehabilitation, with particular attention to role of e-learning in prosthodontics education. Findings showed a large proportion of respondents favored a blended instructional model that integrates face-to-face teaching with online components, rather than relying exclusively on traditional or fully digital methods. This aligns along with earlier research indicating that hybrid approaches offer an effective balance between theoretical delivery and clinical training, fostering both engagement and learning outcomes[1,2]. By uniting the advantages of in-person learning—such as immediate instructor feedback and opportunities for hands-on skill development—with the flexibility and accessibility of digital tools, blended learning accommodates varied learning preferences and overcomes logistical barrier[4,5]. Many respondents reported prior engagement with e-learning, and the majority expressed interest in further opportunities of this kind. This reflects the global trend in dental education following the COVID-19 pandemic, during which institutions rapidly transitioned to online formats[1,5,8].

Studies have shown that shift not only normalized digital instruction but also improved students' willingness to continue using such methods. Additionally, mobile learning applications had been shown to enhance clinical decision-making in prosthodontics by providing interactive, self-directed resources that complement conventional teaching[6,7]. When asked to assess their own knowledge of complete denture rehabilitation, most participants selected "Excellent," suggesting a strong theoretical base. However, this self-assessment was not always reflected in practical proficiency. While students reported high confidence in communicating effectively with patients—a skill essential for patient compliance and satisfaction—fewer felt equally confident in carrying out technical procedures such as independent impression-taking or recording occlusal relationships. This gap between theoretical confidence and technical competence has now been highlighted in earlier literature[3,10], pointing to the need for more targeted, skills-focused training in the prosthodontics curriculum. An encouraging observation was that most participants felt equipped to provide patients with clear instructions with wearing and maintenance of complete dentures, a skill that plays a important role in prosthesis longevity, oral health, and patient satisfaction[9]. Communication and patient education, therefore, remain vital competencies alongside technical expertise. A dominant theme in the responses was the belief that e-learning could significantly enhance knowledge and practical skills in complete denture rehabilitation. Previous research supports that view, showing that structured e-learning—especially when incorporating visual demonstrations,

case-based learning, and interactive testing—can improve knowledge retention and readiness for clinical application[2,4,6]. Nevertheless, as both the present and prior studies suggest, digital learning must be paired with supervised hands-on experience to ensure that knowledge gained virtually is effectively translated into clinical competence[3,10]. In conclusion, the results suggest that while dental students are enthusiastic about e-learning, educational planners must design blended programs that integrate theoretical, digital instruction with substantial clinical training. Incorporating mobile technologies, CAD/CAM systems, 3-D scanning, and other emerging tools[10] has the potential to further strengthen prosthodontics education while maintaining the clinical rigor required for professional competence.

CONCLUSION

The findings of that study indicate that Dental students clearly prefer a blended learning model which combines in-person instruction with online learning specifically in the field of complete denture rehabilitation. Although a significant portion of respondents exhibited a high level of confidence in their theoretical knowledge, fewer were equally assured in their capability to execute technical procedures independently, highlighting a need for enhanced practical training. The generally positive outlook on potential of e-learning suggests that, when paired with structured clinical experiences, digital education be an effective tool for advancing both knowledge and skill acquisition. The incorporation of modern technologies like mobile learning apps, CAD/CAM systems, and 3-D scanning into a well-structured hybrid curriculum could help close the gap between theoretical understanding and clinical execution in prosthodontics.

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Author Contributions:
Dr Shafa Shakil Mulla was in-charge for the overall conception and design of the study They created the questionnaire, performed the literature analysis, and collected data. They also performed the data analysis and interpretation, and led the writing of the manuscript, including the discussion and conclusion sections.
Dr. Ajay Gaikwad who provided academic guidance throughout the research process. They contributed to refining the study design, supported ethical approvals, and provided critical feedback on the analysis and final draft of the paper.

Disclosure:
The author declares no conflicts of interest related to the content, authorship, or publication of this research.

REFERENCES

[1]. Nallaswamy D. Textbook of Prosthodontics. 3rd ed. New Delhi: Jaypee Brothers; 2017.
[2]. Nallaswamy D, Gujjari AK. Clinical skill acquisition in complete denture fabrication: Challenges in Indian dental colleges. J Indian Prosthodont Soc. 2018;18(4):289–293.
[3]. Datta Meghe Institute of Medical Sciences. Assessment of e-learning in prosthodontics during COVID-19: A cross-sectional study. J Datta Meghe Inst Med Sci Univ. 2022;17(4):641–647.
[4]. Mehta D, Vyas S, Khanna M, Bansal N. Dental students' perception on e-learning during the COVID-19 pandemic in India. Indian J Dent Sci. 2021;13(3):217–221.
[5]. Prakash A, Anand K, Kumar A, Agarwal S, Chauhan H. Knowledge, attitude and perception of dental undergraduates towards mobile and digital learning methods in India. J Educ Health Promot. 2023;12:207.
[6]. Rathi A, Deshpande S, Chahande J. Mobile learning app: A novel method to teach clinical decision-making in prosthodontics. Educ Health (Abingdon). 2017;30(3):198–202.
[7]. Deshpande S, Lambade D, Chahande J. Development and evaluation of learning module on clinical decision-making in Prosthodontics. J Indian Prosthodont Soc. 2015;15(2):158–165.
[8]. Kumar P, Gottumukkala SNS, Ramesh KSV, Deolia S, Konde S. Effect of e-learning methods on dental education: An observational study. J Educ Health Promot. 2020;9:69.
[9]. Nair R, Thomas R, Antony P, Nair V, Gopalakrishnan S. Integration of 3-D scanning and CAD/CAM technology in routine prosthodontic practice: A cross-sectional study in Kerala. Cureus. 2024;16(1):e52143.
[10]. Mehta D, Vyas S, Khanna M, Bansal N. Dental students' perception on e-learning during the COVID-19 pandemic in India. Indian J Dent Sci. 2021;13(3):217–221.