

# Introduction of “Digital Dentistry” as Self- Directed Learning Assisted Module in Undergraduate Prosthodontics Curriculum: A Mixed Method Study.

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## Introduction

The implementation of digital technologies in dental curricula has started globally and reached varying levels of penetration depending on local resources and demands. In India, digital dentistry in the regular undergraduate course has not been started.

The present project on ‘Introduction of “Digital Dentistry” as Self- Directed Learning Assisted Module in Undergraduate Prosthodontics Curriculum: A Mixed Method Study.’ was undertaken to find out the perspective of students on the introduced module along with understanding the self –directed learning abilities of the students.

## Methodology

IEC approval (approval no- 3506/ethics/2024) from the Institution  
40 volunteers- third and fourth year BDS undergraduates  
Core team of 3 faculty members from department of Prosthodontics- directly involved in conducting the study

A pre-validated questionnaire on self-directed learning (SDL) was administered to the volunteers to know their SDL abilities. A pre-post-session questionnaire containing feedback questionnaires to know the students’ knowledge and view on “Digital Dentistry” was developed and validated (Cronbach's Alpha-0.804. )

First contact session -A pre designed module<sup>1</sup> was applied on volunteers. 2 hours duration of lecture for ‘Digital Dentistry’ was delivered by 2 faculty members. The lecture contained 3 chapters -Introduction, diagnosis and treatment planning and CAD- CAM.

2 weeks of intersession period- online/offline supplementary materials were shared with the students via WhatsApp for self learning.

4-hour visit to DHR- MRU lab was facilitated to the students under faculty supervision.

For outcome assessment, 3 end of module assessment questionnaires containing 10 multiple choice questions in each set were shared in google form and responses were recorded.

Second contact session- debriefing by faculty and post-module questionnaire was administered.

The responses obtained from SDLI, assessment questionnaires and pre-post-module questionnaires were further analyzed.

For quantitative analysis, Percentage statistics and Wilcoxon Signed Rank test were used and for qualitative data, thematic analysis was done.

## Results

Table 1-Students response to Self-directed Learning Instrument (SDLI Median score -77.325)

S No.	Items	%Disagreement	%Neutral	%Agreement	Mean Score
<b>Learning Motivation</b>					
1	I know what I need to learn.	7.5	25	67.5	3.85
2	Regardless of the result or effectiveness of my learning, I still like learning.	5	12.5	82.5	4.1
3	I strongly hope to constantly improve and excel in my learning.	5	5	90	4.5
4	My successes and failures inspire me to continue learning.	5	7.5	87.5	4.28
5	I enjoy finding answers to questions.	5	7.5	87.5	4.3
6	I will not give up learning because I face some difficulties.	7.5	10	82.5	4.08
<b>Overall</b>		<b>5.83</b>	<b>11.25</b>	<b>82.9</b>	<b>4.19</b>
<b>Planning and Implementation</b>					
7	I can proactively establish my learning goals.	7.5	22.5	70	3.83
8	I know what learning strategies are appropriate for me in reaching my learning goals.	15	30	55	3.63
9	I set the priorities of my learning.	7.5	17.5	75	4.1
10	In the classroom or on my own, I am able to follow my own plan of learning.	12.5	40	47.5	3.55
11	I am good at arranging and controlling my learning time.	17.5	37.5	45	3.35
12	I know how to find resources for my learning.	17.5	25	57.5	3.58
13	I can connect new knowledge with my own personal experiences.	10	25	65	3.83
<b>Overall</b>		<b>12.5</b>	<b>28.21</b>	<b>59.29</b>	<b>3.70</b>
<b>Self-Monitoring</b>					
14	I understand the strengths and weakness of my learning.	2.5	27.5	70	4
15	I can monitor my learning progress.	5.1	17.9	76.9	3.83
16	I can evaluate on my own learning outcomes.	2.5	45	52.5	3.68
<b>Overall</b>		<b>3.37</b>	<b>30.13</b>	<b>66.5</b>	<b>3.84</b>
<b>Interpersonal communication</b>					
17	My interaction with others helps me plan for further learning.	12.5	10	77.5	3.83
18	I would like to learn the language and culture of those whom I frequently interact with.	2.5	22.5	75	3.9
19	I am able to express messages effectively in oral presentations.	15.4	46.2	38.4	3.29
20	I am able to communicate messages effectively in writing.	5	30	65	3.8
<b>Overall</b>		<b>8.85</b>	<b>27.18</b>	<b>63.98</b>	<b>3.71</b>

Table 3- Themes and verbatim responses of the participants regarding the expectation with the module

Sr no	Themes	Verbatim
1.	Aware with current advancement/future in Dentistry	"I hope this digital dentistry will bring good future in dentistry." "Get awareness about it so that we can easily access this in future." "To know current advancement in dentistry." "To know what is going in world in dentistry now a day and see future of dentistry." "I have fair expectations with digital dentistry in the upcoming future."
2.	Learning new things/procedures in dentistry	"I Will get to learn something new." "To learn something new and important."
3.	Learn various aspects of dental care	"My expectation from this course is to provide various aspects of dental care."
4.	Improving skill	"better working environment"

Graph-1 Overall score of Students pre-post Module questionnaire

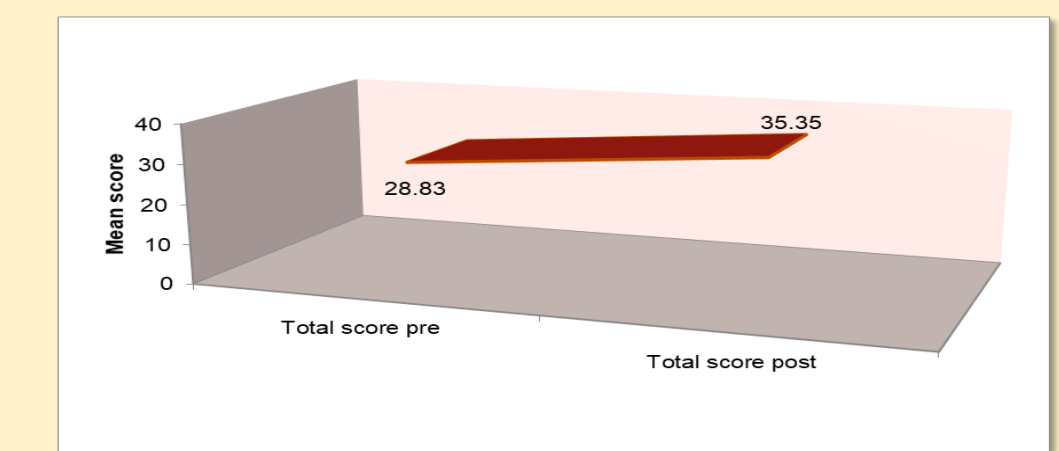


Table 2- Overall score of Students pre-post Module questionnaire

	Paired Samples Statistics				95% CI of the difference	Z value	p-value	
	Mean	N	SD	Mean difference				
Total score pre	28.8250	40	5.42968	-6.675	-23.16	-8.54 to -4.51	-4.924	<0.001
Total score post	35.3500	40	4.35919					

Table 4 - Themes and verbatim responses of the participants regarding the feedback for the module

Sr no	Themes	Verbatim
1.	Learning about newer technologies	"It was good experience learning about newer technologies and their implementation in the field of dentistry." "It's was very informative and got to see upcoming technology in dentistry" "It helped me to learn a new and interesting aspect of dentistry." "I really gain new things and I would like to learn more regarding digital dentistry in the future" "Great experience learning about new advances and different applications of new age dentistry."
2.	Satisfaction with the module	"Very nice", "Good-2", "Nice", "Very Good-2", "It was very helpful", "It was very helpful and worthy session", "Excellent", "This was a wonderful module", "Need more knowledge" "When I read about any big international institution related to dentistry, digital dentistry is the thing that always caught my attention. On social media also, I have seen how digital dentistry is gaining so much popularity in the developed countries but our country is still lacking somewhere in it. It feels so nice and it was also so much motivating that we were taught this wonderful course."
3.	Informative	"This course was very useful. It helps me gain knowledge regarding digital dentistry", "It was informative", "Great learning and experience." "It has given me more knowledge based on this area." "It was very helpful. We learnt a lot from the lecture and lab visits " "I gained lot of information through this workshop, and want to gain more such informative knowledge in future related to digital dentistry." "Digital dentistry is a very good step towards proper and easier diagnosis and treatment for the patient and for the doctor."
4.	Future of Dentistry	"The course was very useful in understanding the future of Dentistry" "Surely this program has provided me with a broader vision about advancements in the field and I consider it as the base of my future technically advanced clinical practice." "I feel digital dentistry is the future of dentistry and this module certainly helped a lot in providing information and detailed knowledge about its application."
5.	Good initiative taken	"Great initiative-2", "It's a good initiative" "A great initiative to provide clarity on the concept of digital dentistry to UG level students."
6.	Enhanced communication	"Digital dentistry has revolutionized the field by enhancing precision, efficiency, and patient experience. From digital impressions to CAD/CAM technology for crowns and bridges, it streamlines processes and improves outcomes. Plus, it allows for better communication between dentists and dental laboratories. However, like any technology, it requires ongoing training and investment to stay updated."
7.	Time saving	"Digital dentistry has reduced time for technical or clinical procedures, improved quality and patient comfort."
8.	Interactive	"Very helpful, interactive and worthy"
9.	Well organized	"Very well-organized module for embedding the basics of Digi-Den"
10.	Mandatory course	"This should be a mandatory course"
11.	Learning different aspects of dentistry	"Thanks for this great opportunity to get so many insights about digital dentistry." "It will be the future of dentistry"
12.	Easy way Learning	"Has given us an opportunity to learn something new with easy format."

Table-5 Student's (40) assessment Record for the 'Digital Dentistry Module'

Sr no	Chapters	Total points	Mean of marks obtained	Median of marks obtained
1	Introduction of Digital dentistry	10	7.27	8
2	Diagnosis and treatment planning	10	6.66	7
3	CAD/CAM	10	7.38	8
	Total	30	7.10	8

## Conclusion

Within the limitations of the present study, following conclusions can be drawn-

- 1.Student’s self-directed learning abilities, as evaluated by using SDLI score with median value of 77.325 showed a good score.
- 2.Participants showed significant improvement in their awareness and perceptions of digital dentistry.
- 3.Mean of total scores obtained was found to be around 70% showing good performance of the students in assessment.

Course integration with digital technology and the clinical workflow will further provide graduates with the knowledge, skills, and experiences to become competent in providing

## Reference

- 1.Tripathi S, Manoharan PS, Nagda S. Developing an instructional module of 'digital dentistry' for undergraduate prosthodontics curriculum. J Oral Biol Craniofac Res. 2024 Jan-Feb;14(1):44-48.

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