

Evaluating The Effectiveness Of Near-Peer Teaching Modality In Undergraduate Dental Students Learning A Psychomotor Skill (Partial Denture Fabrication) Considering Social And Cognitive Congruence Factors

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Abstract

Objective: To analyze the effectiveness of Near Peer Teaching (NPT) modality in the psychomotor skills development of dental students in fabricating removable partial dentures considering cognitive and social congruence factors

Methods: This sequential two-phase experimental study was carried out from September 2022- December 2022 at Watim Dental College Rawalpindi. 50 Students of second-year BDS and recently graduated dental interns who were doing House jobs participated in the study. 50 students were divided into 2 groups A and B respectively. Quantitative data was collected against a 5-point performance appraisal rating scale and feedback from students was taken using a course experience questionnaire. The quantitative data was analyzed using SPSS-23. Descriptive statistics and the Whitney U test were applied to make a comparison between tutoring techniques. P-value ≤ 0.05 was considered significant. The qualitative data gathered through three Focus Group Discussions (two tutee groups and one peer tutor group) was analyzed through thematic analysis.

Results: All the participants (50) of the survey were in the age group 20-24 years and female students outnumbered the males (7:1). The Mann-Whitney U test applied to make a comparison between experienced and near-peer tutoring modality showed greater student satisfaction with near-peer teaching. Focus group discussion also revealed various themes such as the benefits of experience as NPT, skills achieved and enhanced motivation thus supporting the "Involvement of NPT in dental education".

Conclusion: It can be concluded that the near-peer teaching technique is advantageous and feasible for both tutees and tutors because of social and cognitive factors. Near-peer tutors have more cognitive congruence and are more socially active in helping their peers. Near peer tutors endorse this technique as it allows them to enhance their knowledge and improve their communication and professional skills.

MeSH Keywords: Peer Tutor, Peer Tutee, Social Congruence.

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1. Introduction

A unique method of instruction known as near-peer teaching (NPT), involves a tutor being one or more academic years older than the student being taught. This concept was first used by Whitman in 1988. It is a feasible strategy employed to reduce the workload of faculty members.¹ Applying the principles of cognitive and social congruence makes this strategy more effective. Cognitive congruence or similar prior knowledge and study experiences enable the learners to understand the language, logic and conceptual framework of the subject being taught thus aiding better understanding. Social congruence is produced between student tutees and tutors because of similar social status. A comfortable learning environment where student tutors interact more casually and are

more receptive to the needs, difficulties and expectations of tutees can be created through social congruence. Near peer teachers understand the information held by their junior peers due to the close age gap and shared experiences.^{2,3}

The Nomenclature of Near peer teaching varies substantially due to different teaching techniques, historical roots, disciplines and countries where this concept was founded.⁴ This cutting-edge strategy promotes the participation of students from diverse backgrounds and cultures.⁵ NPT teaching method can make prudent use of institutional resources. Effective peer mentoring can foster long-lasting professional relationships and peer collaborations.⁶ It helps the peer tutors develop mentoring skills, and enhance their communication, coordination, time management and professional skills. It also helps them learn leadership

skills, motivation to contribute to the education of others, teaching, assessment and feedback procedures. They can reflect on their shortcomings and gain a deeper understanding of the subject matter. The tutors and tutee connect on a deeper level, it is comforting for students to hear their close friends finished the same course, providing them more faith in their abilities. Many NPT participants outperform their seniors in exams.⁷

Medical education stakeholders are putting consistent efforts to create healthcare professionals who are well-educated via active learning, critical thinkers and flagbearers of higher ethical standards. Thus, one important educational strategy, successful in enhancing medical students' learning is peer teaching. The focus is on inquiry-based learning, exploring social dynamics and relationships influencing students' communication and interpersonal skills. NPT employs several beliefs that support active learning.^{3,7}

Research has pointed out the efficiency of peer-assisted learning primarily focusing on developing psychomotor skills for medical students such as basic clinical examination, intravenous access, neurological examination, bladder catheterization, resuscitation and lumbar puncture.^{2,7} Whereas there is a dearth of research in determining the effectiveness of peer-assisted teaching in specific dental psychomotor skills, for instance fabricating a partial denture.

Therefore, this study was done to analyze the effectiveness of NPT related to the development of psychomotor skills of dental students, by comparing the level of skill acquired for fabricating removable partial dentures through two teaching methods considering cognitive and social congruence factors.

2. Materials & Methods

This mixed-method study was carried out from September 2022 to December 2022 at Watim Dental College Rawalpindi after the approval from ethical committee. A thorough explanation of the study and consent form were given to every participant. All students willing to participate were included in the study. Data confidentiality was guaranteed at every stage of research. It was a Sequential two-phase experimental study. The first was qualitative and second was

quantitative, comparing instruction of qualified instructor and peer teachers' demonstrations about the fabrication of partial dentures by second-year BDS students in a skill lab.

Students of second-year BDS (n=50) and recently graduated dental interns who were doing House jobs participated in the study. 50 students were divided into 2 groups, 25 each according to their university roll numbers A and B respectively. The lottery method was used to select a group to be exposed to peer tutors. Group B was selected to be exposed to peer Tutors. Simple random sampling was done to pick peer tutors from a total of 25 house officers (n=3)

Quantitative data was collected against a 5-point performance appraisal rating scale and feedback from students was taken using a course experience questionnaire. The quantitative data was analyzed using SPSS-23. Descriptive statistics and Cronbach Alpha of both batches were computed. The Mann Whitney U test was applied to make a comparison between tutoring modality techniques. P-value ≤ 0.05 was considered significant.

Focus groups were done by randomly selecting 8 students from group A guided by a faculty instructor and 8 students from group B, the Peer-led group. The last Focus group was done with all 3 peer tutors. A research team was formed to assist with the focus group study. The lead researcher assumed the role of moderator and was facilitated by 2 co-researchers. The discussion continued for 1 hour and 15 minutes.

The data was manually examined after being transcribed. The items' themes and assertions were described using open codes and construct codes were assigned through the open coding method. The supervisor and study participants verified the veracity of the statements which led to the creation of a thorough list of items that replicated the findings of both the literature and the research population.

3. Results

The data was collected in two parts a) through survey questionnaires and b) in-person interviews. The quantitative data was analyzed in four steps using the SPSS-23 version. In the first step, percentages of responses were calculated separately for both batches.

Table 1: Mann Whitney U-test along both batches' satisfaction percentage with teaching modality

Statements	Faculty Exposed Group (% who were satisfied)	p-value Mann Whitney U test	Peer Tutor Exposed group (% who were satisfied)	p-value Mann Whitney U test
Was the Session appropriate?	64	0.21	88	0.74
Did the Tutor seem informed?	88	0.77	72	0.04
Were the explanations clear?	76	0.38	68	0.92
Was the feedback from the tutor useful?	52	0.59	80	0.21
Were you comfortable asking questions	64	0.72	92	0.50
Are you confident after the training session?	68	0.68	64	0.46
Would you recommend this session to a friend?	68	0.86	76	0.71

In the second step, Descriptive statistics and Cronbach Alpha of both batches (Batch A Faculty Exposed Group) and (Batch B Peer Tutor Exposed Group) were computed. In the third step, Mann Whitney U test was calculated to make a comparison between experienced and near-peer tutoring modality techniques (Table 1). The qualitative data was gathered through three Focus Group Discussions (two tutee groups and one peer tutor group) and has been analyzed through thematic analysis. Quantitative Analysis of Questionnaire

All the participants (50) of the survey were in the age group 20-24 years and female students outnumbered the males (7:1).

According to Table 1, results showed that the values of the peer tutor group are closer to the level of significance suggesting that students were more satisfied with the session conducted by peer tutors, due to the timely given feedback and ease of asking questions. Thus, NPT in teaching psychomotor skills i.e. fabrication of partial denture improves satisfaction of dental students.

Focus group discussions (Batch A and Batch B tutees):

Table 2: Thematic Analysis Coding Process for focus group discussions with tutees

Sr#	Themes	Quotations
1.	Satisfactory Clinical Teaching Sessions	Batch A: Right guidance was given according to the subject; all the instructions had been given step by step for performing practical work. Batch B: one of the Best practical sessions and learning in a better environment
2.	Instructors' good attributes	Batch A: Should be calm, kind, must have good communication skills Batch B: Must be qualified, have strong grip on a subject or particular topic, should be able to manage his/her time during lectures
3.	Challenges faced	Batch A: the instructors have personal judgments, and give biased feedback and gender discrimination. Batch B: The only problem with near-peer tutors is that they have a shortage of time lack some expertise or are only trained in a particular topic
4.	Comfortably asking queries	Batch A: The instructors give good instructions but at times they are not given enough time for practical sessions Batch B: Very comfortable in asking questions due to less age and communication gap, less hesitation in asking questions
5.	Well prepared instructor	Batch A: Well prepared and have a good command of their particular subjects Batch B: Well prepared and well trained but having poor time management
6.	Stay connected after college hours	Batch A: Instructors available to give guidance Batch B: Social Medium is the best way to keep in touch immediately with peers
7.	Timely Feedback	Batch A: timely feedback from instructors with appreciation. Batch B: feedback given to improve skills
8.	Deficiency	Attitude Batch A: Most of the time senior instructors have harsh attitudes towards students and treat them rudely Batch B: good communication skills, don't have attitude problems and are friendly. Knowledge Gap Batch A: have enough knowledge and grip on their subjects Batch B: having proper knowledge about a particular topic or subject but sometimes having less eye contact with students

Table 3: Thematic Analysis Coding Process for focus group discussions with tutors

Themes	Quotation
Experience of serving as NPT	A very pleasant experience working as a tutor/instructor in the near-peer group. Enhanced the existing knowledge.
Benefits	Overall morale boost and better time management. Learned leadership qualities.
Skills Achieved	Improved communication skills. Improved social skills.
Changing in Behavior	More responsible adult Have adopted empathetic behaviour with students
Motivational Factors	Appreciation by institutions, acknowledgement certificates by institutions, positive feedback from the students

4. Discussion

The present study measured the effectiveness of near-peer teaching modality in undergraduate dental students considering social and cognitive congruence factors. The tutors and tutees (dental students) showed a high level of satisfaction with NPT. This was by a similar study.^{7,8} However other studies showed contradictory results.^{9,10}

The present study concluded that NPT is an effective teaching modality in dental education and should be considered as a viable alternative to traditional teaching methods. A study conducted in China also supported the effectiveness of NPT in teaching dental anatomy to undergraduate students.¹¹

In the present study, NPT was associated with higher performance scores in fabricating a partial denture. Similar results were seen in a local study in which NPT was associated with higher scores on clinical skills exams and greater student satisfaction compared to traditional teaching methods.¹¹ Another study from Pakistan examined the effectiveness of NPT in teaching pathology to undergraduate medical students and also found that NPT was associated with higher scores on pathology exams and greater student satisfaction compared to traditional teaching methods.¹² Such studies further support the effectiveness of the NPT modality in medical education in Pakistan and suggest that it should be considered as a reliable alternative to traditional teaching methods in medical and dental education.

The study found out that near peers were able to provide relatable examples and convey the subject matter more effectively to the students hence making the learning process more interesting. This was seen in a study

exploring the role of NPT in teaching prosthodontics to undergraduate dental students and other similar studies.¹³⁻¹⁵ An international study supported NPT and found that using NPTs in a surgical skills training program led to significant improvements in trainee performance compared to traditional methods.¹⁶ On the contrary a study found that NPT was not effective in enhancing the critical thinking and problem-solving skills of students, as such skills develop under the guidance of experienced teachers.¹⁷

The present study suggests NPT as an economical and useful strategy for learning psychomotor skills i.e. fabrication of removable partial dentures. This was by a somewhat similar study.¹⁸ However, another study found that trainees who received instruction from peer tutors had similar skills and satisfaction with the training program as compared to those who received instruction from traditional faculty. Therefore, local context and specific circumstances should be taken into consideration before implementing NPT programs in the curriculum.¹⁹

The present study showed that near-peer tutors help students learn by providing a more comfortable and secure environment while giving them instructions at their cognitive level. This was supported by a study conducted in India that showed the NPT effectiveness of dental students on multiple-choice exams taught by peer tutors.²⁰ A contrast was presented by another study on NPT, which showed no improvement in students' performance on clinical skills assessment.²¹ Near-peers are still students themselves and are more open to experimenting with different teaching methods and adapting their approach based on their peers' needs. Therefore, this can lead to a dynamic and flexible teaching approach catering for the diverse needs and learning styles of students. Near-peer teaching is considered a more adaptive and cognitively-oriented teaching technique.

The study pointed out the benefits of NPT programs for young tutors, such as helping them become more responsible adults and enhancing their communication and leadership skills. This was seen in a similar study where an opportunity is provided for young tutors to help them become more effective instructors in the future.

Limitations: The study was carried out at a single dental college and explored just one psychomotor skill. Hence the results cannot be generalized. Similar studies with larger sample sizes and exploring psychomotor skills in

other disciplines of dentistry will help explore the effectiveness of near-peer teaching in dentistry.

5. Conclusion

It can be concluded that the near-peer teaching technique is advantageous, feasible and productive for both tutees and tutors because of social and cognitive factors. Near-peer tutors have more cognitive congruence than faculty members and are more socially active in helping their peers. Near-peer tutors also endorse the NPT technique as it allows them to become confident tutors, helps them enhance their knowledge and develops leadership skills.

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S.I - Conception of study

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