

Implementation of Modified Peyton's Method for Skill Training among Undergraduate Students in Prosthodontics

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ABSTRACT

Introduction: Simulation training has been practiced in dental schools all throughout. The pertinent use of simulation in any professional education program allows the students to get clarity for their clinical skills without the danger of harming the patient during the learning process. The success of different teaching methods in skill laboratories is still debated in the literature. One of them is Peyton's approach which is designed for student: teacher ratio of 1:1. To overcome this modified Peyton's method was introduced which allows each of the trainees to perform respective skill at least once.

Aim: To evaluate and compare modified Peyton's approach with conventional teaching for skill training among undergraduate students in Prosthodontics.

Materials and Methods: This prospective interventional study will be conducted in Department of Prosthodontics at Sharad

Pawar Dental College, Wardha, Maharashtra, India, from October 2022 to December 2023. The study will involve 70 third year Bachelor of Dental Surgery (BDS) students randomly divided into two groups equally. The study will be conducted in dental setting utilising the dental skill laboratory to make alginate impression. Group A will be taught using conventional method and group B will be divided into 10 subgroup and taught using modified Peyton's method and evaluation will be done using Objective Structured Practical Examination (OSPE) and post-test.

Expected Outcome: At the end of the study, student's taught using modified Peyton's method might show better result in OSPE and post-test.

Conclusion: Modified Peyton's method will prove beneficial to students learning new skill.

Keywords: Alginate, Dental, Interventional, Teaching method

INTRODUCTION

People working in primary health care use different types of skills. These skills can be divided into cognitive skill, psychomotor skill and communication skill. Whenever an action is performed, it is psychomotor; decision making is same as cognitive and communication is used in both the places [1]. For any medical student to develop, they should be taught basic clinical skills, scientific knowledge and moral values. The traditional triad of knowledge, attitude and skills is required for any medical practitioner to flourish [2].

In dentistry all these skills should be incorporated into the curriculum to allow for smooth transition from preclinics to clinics by improving the hand-eye co-ordination. For this to occur, simulation training has been practiced in dental schools all throughout [3]. The pertinent use of simulation in any professional education program allows the students to get clarity for their clinical skills without the danger of harming the patient during the learning process [4].

The success of different teaching methods in skill laboratories is still debated in the literature. The most historic approach of teaching skills is the Halsted approach, 'See one, Do one' approach. Although, this approach is being used since ages, it does not adhere to the recent principles of adult learning [5]. So, the teaching approach was modified to "see many, learn from the result and do many" [6].

Because prior training methods were insufficient, "Frank Doto" developed a "five-step approach," which was first published in the "Advanced Trauma Life Support Instructor Manual" and later published. Later, Rodney Peyton's adapted this into a "four-step approach" that integrated two of the steps of Doto technique and has been shown to be effective in teaching the skills [7]. This method of teaching consists of four steps:

1. Demonstration
2. Deconstruction

3. Comprehension
4. Performance

Both the Doto and Peyton's techniques emphasise the importance of the understanding step, in which students are urged to:

1. Think about the facts you gathered in the previous step.
2. Help them to organise their thoughts before verbalising them actively
3. Facilitate the integration of new knowledge with that which is already acquired [7].

Originally, the Peyton's method was designed for a 1:1 teacher: student ratio. This method was changed in small group teaching in 2014 and was described as modified Peyton's method [8]. The number of students receiving skills lab training in medical field is generally five to eight trainees or even more. So, modified Peyton's method was developed to involve all students and preserves Step 3 of Peyton's four-step approach because this step is crucial for the learning didactic method [9]. This method consists of following parts:

1. Demonstration and deconstruction
2. Comprehension, tutor's performance and observation
3. Comprehension, trainee's performance and observation
4. Tutor and peer feedback
5. Circulation
6. Completion and conclusion

This model allows each of the trainees to perform the respective skill at least once [9]. This approach is useful for small group teaching and also this is practicable, easy for tutors to realise and well accepted by trainees. It also allows clinical teaching to move from a teacher-centred approach which is considered a traditional and passive strategy to a student centered approach, in which students become active participant in their learning [10].

Modified Peyton's approach has been used in teaching students of various fields, but there is very less evidence of use and effectiveness of this technique within the dental education literature. Qutieshat A, conducted a study implementing combination of Gagne's theory and Peyton's four step approach to teach inferior alveolar nerve block injection [11]. Students gave a positive feedback and felt less anxious and more confident after attending the session but they did not conduct assessment or taken any feedback after introducing the teaching method. Of I et al., conducted a study which compared access cavity preparation and root canal location among group of junior residents using the traditional see-one-do-one approach; and the Peyton's four steps of instruction approach [12]. The time taken for the task and the angle of flare of the mesio-axial wall from the log axis of the mesio-buccal canal was recorded. The outcomes with Peyton's approach were significantly better than traditional method. This was the reason for planning this educational research project as very few studies were done using this approach.

In the present study, a comparison was done between conventional teaching versus modified Peyton's method in third BDS students within a dental setting utilising the dental skill laboratory to make an alginate impression on maxillary/mandibular jaw. Assessment will be done using pretest, post-test and Objective Structured Practical Examination (OSPE) and a feedback will be obtained.

The objectives of the study are

- To sensitise the students and staff towards modified Peyton's approach
- To study the perception of students about utilising modified Peyton's approach as a teaching and learning method along with assessing the effectiveness of conventional teaching approach and modified Peyton's approach as a method of learning in Prosthodontics.
- To do a comparison between modified Peyton's approach and conventional teaching group in undergraduate teaching in Prosthodontics.

Hence, the aim of the study is to evaluate and compare modified Peyton's approach with conventional teaching for skill training in undergraduate students in Prosthodontics.

MATERIALS AND METHODS

This prospective interventional study will be conducted in Department of Prosthodontics at Sharad Pawar Dental College, Wardha, Maharashtra, India, from October 2022 to December 2023. The study will involve 70 third year BDS students after obtaining the voluntary informed consent. The synopsis was submitted to Institute of Ethical Committee (IEC) and certificate of approval was obtained before starting the study (Reference no: DMIMS (D.U.)/IEC/2021/229).

Sample size: The sample size was calculated using G power analysis and the estimated sample size was 70. A total of 70 third year BDS students from Sharad Pawar Dental College, Sawangi (Meghe), Wardha, will be included in the study.

Inclusion criteria: All the students of third year BDS who will be posted in Clinical Prosthodontics and undergoing skill laboratory training will be included in the study.

Exclusion criteria: The students who will be absent on the day of intervention will not be considered in the study.

Study Procedure

The skill training selected is alginate impression because it comes under the course criteria for third BDS students having posting in skill lab and also performing on the procedure on the phantom before doing on the patient would give the students the confidence to do on the patients as it is the most common procedure which is to be performed in the dental setting. Prior to implementation of the project, four lecturers from the Department of Prosthodontics will be sensitised about the modified Peyton's method teaching. At the start

of the session, 70 third year BDS students will be allocated into 10 (A to J) small groups/batches. Each batch including seven students who will be posted in the Department of Prosthodontics during their rotatory clinical posting for a period of 15 days. On first day of clinical posting, students of each batch will be randomly assigned using lottery method into two groups to either the modified Peyton's method or the conventional method. To ensure a balanced design regarding the groups, randomisation will be done using randomised blocked design. The students will not be familiar with the approach prior to the classes. The practical classes will be preceded by a pretest which was prepared by the author himself from the textbook of dental materials and was validated by the dental education unit, with the validity and reliability score as 0.819 according to the chronbachs alpha formula. It includes 10 questions and 1 mark will be awarded for each question to assess the participant's knowledge at the onset of the course.

Modified Peyton's Method

The modified Peyton method will be conducted as follows:

A) Demonstration and deconstruction: The lecturer will perform the steps 1 and 2 of Peyton's four step approach to all students of one group i.e., the lecturer will demonstrate the skill of taking alginate impression on maxillary/mandibular jaw in the dental skill lab at his normal pace without any comments (Demonstration). The demonstration will include dispensing the water and powder in proper ratio in the rubber bowl followed by performing the manipulation of material in correct figure of eight motion and the loading the material on the stock tray and taking the impression of the jaw on the phantom. The demonstration for step-2 the lecturer will repeat the procedure, this time describing all necessary sub-steps (Deconstruction) which will also include explaining the students about the properties, composition, advantages, disadvantages and uses of alginate material.

B) Comprehension, lecturers performance and observation: The Lecturer will perform the step 3 by following the instructions of Trainee (student) 1 who will perform the skill describing all the necessary sub steps, while all other Trainees will be observing.

C) Comprehension, trainee's performance and observation: Trainee 1 will perform step 3 following the instructions of Trainee 2, while the other Trainees will be observing.

D) Circulation: Part C will be repeated in turn until the last trainee will perform step 3 following the instructions of a Trainee.

E) Completion and conclusion: Finally, the last trainee will perform step 4.

The described model allows each of the trainees to perform the respective skill at least once. Part D (Circulation) leads to a combination of steps 3 and 4, meaning that all of the trainees (except the last trainee) will perform the task under verbal instructions of a student trainee.

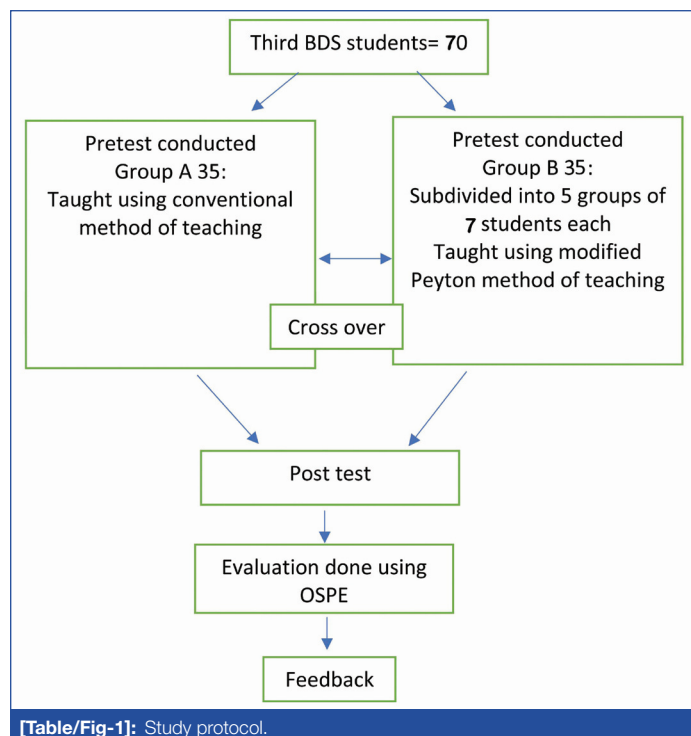
The other group will be taught by the conventional method of teaching where all the 10 students of the group will be explained the skill by Halsted approach, 'See one, Do one' approach, where the lecturer will demonstrate the procedure and the students will observe and later perform it [5].

Objective Structured Practical Examination (OSPE)

After the completion of the teaching all the students of both the groups will be given a post-test which has the same questions as the pretest to check the knowledge of the students and an OSPE will be conducted for all students. The OSPE examination includes three stations:

- Station 1: The students will be asked to make a maxillary impression using alginate
- Station 2: Writing the composition of alginate material
- Station 3: Any four requirements of impression material.

Following this a feedback will be taken for students who were taught using modified Peyton's method which includes statements about the teaching modalities which were rated on a six-point Likert scale (1="I completely agree" to 6="I completely disagree") will be conducted. The feedback questionnaire was validated by subject experts [Annexure-1]. The questions of pretest, post-test and OSPE will be blinded from the staff conducting the study. After completing of the exercise, a cross over will be conducted where the other group will also be sensitised using modified Peyton's method. The study protocol has been described in [Table/Fig-1].



[Table/Fig-1]: Study protocol.

DISCUSSION

Originally, Peyton's method was used only in situations where there is only one student per one instructor. Previously comparison has been done between the Peyton's four step method and the normal 2-step approach. Nikendei C et al., used a modified method of Peyton's 4-step method to give instruction to small group of students. The main drawback of Peyton's four step was that it could be used only for teacher-to-student ratio of 1:1, so Nikendei C et al., wanted to evaluate a new approach of Peyton's for teaching small groups [9].

In their study, in Newborn Life Support (NLS), Nourkami-Tutdibi N et al., compared whether additional functional explanation with talking through every single activity during Peyton's step-3 is superior to merely structural explanation with an emphasis on initial and follow-up/long-term knowledge and skill retention. They reached to a conclusion that verbalisation in step-3 of Peyton's method improved the speed of NLS performance [13]. Gradl-Dietsch G et

al., assessed the effectiveness of Peyton's 4-step approach on the acquisition of complex psychomotor skills by conducting 2 OSPE [14]. The performance was better for the students in the Peyton's group than in the control group. But the sample size being very small, significant difference was not seen. Previous study has exhibited the hands-on application of the modified Peyton's method for teaching different medical procedures which are difficult and also whose knowledge is crucial for the medical students [15]. Teaching one of the basic dental procedure, which is the alginate impression making on maxillary/mandibular jaw by dental students of third year will be carried out in our study to assess its effectiveness.

CONCLUSION(S)

In conclusion, the current study will examine the modified Peyton's four step approach to educate small groups of students in skills laboratory training sessions, which may be approved by the students, as seen in the previous studies. The method might prove a new learning scheme for teaching alginate impression making in skill laboratory that will facilitate understanding and memorisation.

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ANNEXURE 1

1.	I have learnt a lot during the training session.
2.	I was continuously alert during the training.
3.	Repeatedly observing the same step helped me in recalling.
4.	Given to perform independently gave me the confidence.
5.	The same step was repeated too many times.
6.	Commenting on and instructing the procedure helped me in recalling the steps and was helpful.
7.	After the training I felt confident enough to perform the procedure alone.
8.	Having finished the training, I already felt secure in performing the procedure on the patient also.
9.	After the training, I feel I can answer any question related to the procedure.
10.	The method is time consuming due to repeated observations and repeated performances.
11.	The method makes it easier to remember.
12.	The method should be applied to other skill training procedures of the dept as well for demonstration.