DOI: https://doi.org/10.53350/pjmhs2023171707

ORIGINAL ARTICLE

Evaluating a Constructivist Model for Learning Clinical Skills in Pre-Clinical Years of a Dental Curriculum

OSAMA KHATTAK[1], AMBREEN USMANI[2], JUNAID TARIQ[3]
[1]Professor, Department of Restorative Dentistry, College of Dentistry, Jouf University, Saudi Arabia
[2]Professor, Principal and Dean Health Sciences (Bahria University Medical & Dental College)
[3]Program Coordinator/ Research Facilitator (College of Physicians and Surgeons Pakistan)
Corresponding author: Osama Khattak, Email: dr.osama.khattak@jodent.org

ABSTRACT

Objective: The purpose of this study was to investigate whether or not using a constructivist model for teaching clinical skills had an impact on students' performance in a pre-clinical operative dentistry course.

Study Design: Randomized Control Trial

Place and Duration: College of Dentistry, Jouf University, Saudi Arabia, two months (March and April 2022).

Methods: A total of 50 second year BDS students participated in this trial. The students were divided randomly into two groups. Group I received traditional method and group II received constructivist method. The students' capability of performing rubber dam application skill on the typodont tooth was evaluated through the use of laboratory activities. After the conclusion of the research, the participants were given a questionnaire to complete out and provide feedback on. Examinations that were objective and systematic were performed on both groups clinically (OSCEs).

Results: There was a statistically significant difference in learning modes (p 0.001). The students learning method has nothing to do with their age or gender. Group II (constructivist) demonstrated considerably higher development in scores across lab tasks ($p<0.05$). While students of all backgrounds valued supplemental learning resources, those who got aligned materials reported feeling more grateful for them.

Conclusion: The constructivist approach can be used as a complementary teaching strategy in pre-clinical operative dentistry courses to improve students' learning outcomes and prepare them for success in the dental profession.

Keywords: preclinical education, predoctoral education, learning styles, operative dentistry, and education.

INTRODUCTION

Many shifts in teaching methodology may be attributed to research on how adults learn. Due to reforms in the field, more time is now spent instructing students in pre-clinical simulation units. Later, these abilities will be implemented in clinical environments.

One method to characterize an educational stance is by examining the guiding principles that inform its practice [1]. There are three major schools of thought in education, and they are known as behaviorism, cognitivism, and constructivism [2]. Learning is described as a shift in behavior in the behaviorists' framework. Students take on the role of passive recipients, while teachers have a major role in the educational process.

The students (rather than the instructors) should be considered the primary agents in the learning process. When teaching, it's important to adopt methods that help students make connections between new and existing information, promote the organization of information, and stimulate their own interest in learning [3].

The notion of constructivism holds that students learn through constructing new meaning from existing information. Because of this, it is crucial that learning takes place in environments where the activities being performed have some sort of meaning[4]. Learners are responsible for their own education, with teachers serving more as facilitators than lecturers[5]. Active learning approaches increase knowledge retention in students[3]. They have improved motivation and problem-solving abilities[6]. Students who take charge of their education have a greater incentive to stay current in their field[7].

Traditionally, medical education was focused on the instructor, but recently there has been a trend toward a more student-centered approach. Compared to students who were taught using more conventional methods, individuals whose education was oriented on them had greater gains in professional competence and academic success[8].

However, there hasn't been a corresponding change in the approaches taken to educating future clinicians. The conventional method of passing on knowledge is still widely used. The vast majority of published models of skill acquisition take a behaviorist approach, with instructors defining how students should perform and acquire a skill, and then providing appropriate feedback to help them achieve their objectives[9].

Students in our traditionally teacher-centered skill-learning models see live demonstrations of the method before putting what they've seen into practice. As described in Peyton's fourth step[10], the student engages in practice both with and without direct instruction. Clinical performance among dental students may be enhanced by the use of study tools and textbooks [11].

MATERIAL AND METHODS

This randomized control trial was conducted at College of Dentistry, Jouf University, Saudi Arabia. The total number of participants were 50 students in 2nd year of the BDS program who were taking the Pre-Clinical Operative Dentistry skill course. The participating students provided informed consent that was obtained through the institutional review board and authorized by the local ethical committee (LCBE at Jouf University, Saudi Arabia). Lab work in this study had no bearing on students' final marks.

The students were randomly distributed into two groups. One group was given the standard teaching method which comprised of traditional demonstration whereas the second group was asked to review supporting material with reference to the skill being taught. Prior to the lab session the second group was also provided previously recorded video lectures. They were also given a pre-laboratory discussion time to discuss the steps of the skill. This was based on the concept of constructivist approach where the students build knowledge actively. The study's "standard training material," comprised of a set of slides about rubber dam isolation on a typodont, was created in PowerPoint format. Rudder dam isolation on a Typodont tooth #9 was the skill in the lab that followed this synchronous lecture (henceforth referred to as Lab Exercise). After the exercise an OSCE exam was conducted for all the students. The OSCE stations were conducted by a group of operative dentistry faculty members. Each student was required to take stock of their exercise and document their successes and failures in a reflective essay.

It was determined through the use of descriptive statistics to describe the quantitative elements. Frequencies and percentages were used for categorical variables. Examinations that were objective and systematic were performed on both groups clinically (OSCEs). We used the chi-square and Fisher exact tests for this study to compare categorical data. The significance level (alpha) utilised in all statistical tests was 0.05.Statistical Package for the

Social Sciences, version 20.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis.

RESULTS

There was not a statistical significant difference in the average age of the participants when they were separated into two groups depending on the type of instruction. In both groups females were higher as compared to males. (Table 1)

Table-1: Demographically detailed of enrolled participants

Variables	Group I (25)	Group II (25)
Mean age (years)	24.7±8.23	25.1±7.19
Gender		
Male	10 (40%)	9 (36%)
Female	15 (60%)	16 (64%)

Significantly improvement in skills were found in group II as compared to group I with p value <0.005. (figure 1)

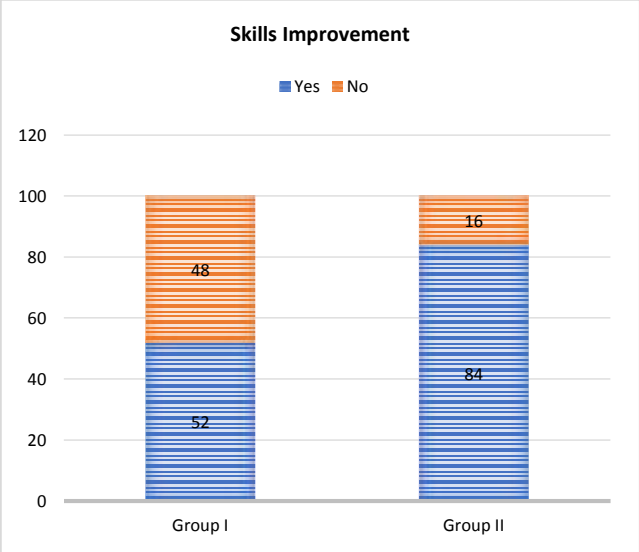

Figure-1: Comparison of skills improvement among both groups by using chi-square test

An independent-sample t-test was conducted to evaluate the homogeneity of the CGPA scores in both groups. There was no significant difference in the CGPA scores for Group I (M = 3.1, SD = 0.68) and Group II (M = 3.9, SD = 0.25), p = 0.00.4. These results suggest that both the groups were homogenous and identical concerning CGPA. Performance of students of each group at each of the two OSCE stations. All students passed, with the cut-off score set at 60%. Group II performed better at each station compared to Group I.(table 2)

Table-2: Comparison of results among both groups by OSCE stations

Variables	Group I	Group II	Difference
Station I			
OSCE I	1.18	2.02	0.84
OSCE II	3.30	4.30	1.00
Station II			
OSCE I	1.59	1.70	0.11
OSCE II	3.48	3.89	0.41

DISCUSSION

Statistically significant differences between the mean scores on OSCE I and OSCE II may suggest that testing itself can boost performance by serving as a motivator for honing the skill in question. Students' OSCE results were poor across the board, but by the conclusion of the semester, clinical evaluations showed that the vast majority of students had achieved predicted levels of competence. This indicates that the OSCE's validity as a whole is uncertain and that it should only be used as one component of a more comprehensive examination of clinical skill performance.

In our study constructivist method showed good results as compared to traditional method among all participants. We also anticipate that this will encourage greater student-faculty interaction in the skill labs and so promote more in-depth exploration of the issue. Their findings, like ours, indicating students have a favorable impression of the constructivist approach are consistent with our own. The panel urged professors to make advantage of such materials.[12] The results of our research showed that female students outperformed their male counterparts. This is consistent with research on undergraduate dental education, wherein female students consistently outperformed male students academically.

Based on the constructivist SPICES paradigm, the BDS curriculum should be developed in accordance with modern pedagogical practices, in an integrated manner to assist instruction and evaluation. When compared to more conventional methods of education, this approach is progressive and holistic. There are a total of six teaching methods included.

The constructivist method should be used to organize the whole BDS curriculum. The constructivist method places the emphasis squarely on the student, encourages critical and in-depth thinking, and produces bright, self-driven students. [13] Therefore, it is important to try to ensure that there is limited didactic instruction and a greater emphasis on facilitation based on themes, such as PBL, while developing the modules. [14] This will be evident in the fact that the approaches of teaching being employed are more geared toward the needs of the students being taught. Students are encouraged to think for themselves and develop an insatiable curiosity via the use of a constructivist methodology. [15]

Many students felt that their professors had effectively emphasized key concepts and provided supporting evidence to help students better understand the material covered in class. There are, however, conflicting accounts of these findings in the literature. Of the total number of students surveyed, 74% felt comfortable asking questions during class discussions. Only around half of the students thought the presentation was presented and paced appropriately.

Formative and summative evaluations are also possible.[16] The majority of the study's participants were pleased with the study's written (50%) and viva (68%) evaluation methods. New, novel assessment techniques such as direct observation of procedural skills (DOPS), small clinical examination exercises (CEX), multiple source feedback (MSF), and regular feedbacks should be given to students following formative and summative assessments to improve assessment procedures. [17-19]

REFERENCE

1. Posner, G. J. Analyzing the curriculum. 3rd ed. Boston: McGraw-Hill; 2004.
2. Bruning RH, Schraw GJ, Norby MM. Cognitive psychology and instruction. 5th ed. Boston: Pearson Education; 2011.
3. Schmidt, H. G. Foundations of problem-based learning: some explanatory notes. Medical Education.1993; 27, 422-432.
4. Ertmer, P. A., & Newby, T. J. Behaviorism, Cognitivism, Constructivism: Comparing critical features from an instructional design perspective. Performance Improvement Quarterly. 1993; 6(4), 50 - 72.
5. Sayer, M., Chaput De Saintonge, M., Evans, D., & Wood, D. Support for students with academic difficulties. Med Educ.2002; 36(7), 643-650.
6. Barton KL, Schofield SJ, McAleer S, Ajjawi R. Translating evidence-based guidelines to improve feedback practices: The interACT case study. BMC Med Educ 2016;16:5.
7 Abbas S, Sadiq N, Zehra T, Ullah I, Adeeb H. Comparison of performance of undergraduate medical students trained in conventional and integrated curriculums. Int J Acad Med 2022;8:109-15
8 Alrahlah,A. How effective the problem-based learning (PBL) in dental education. A critical review. Saudi Dent J.2016 Oct; 28(4): 155–161.

9 Moulaert, V., Verwijnen, M. G. M., Rikers, R., & Scherpbier, A. J. J. A. The effects of deliberate practice in undergraduate medical education. Med Educ. 2004; 38(10), 1044-1052.
10 Akram A, Rizwan F, Sattar K, Hadi JI, Meo SA. An approach for developing integrated undergraduate medical curriculum. Pak J Med Sci 2018;34:804-10.
12 Jang, H.W.; Kim, K.-J. Use of online clinical videos for clinical skills training for medical students: Benefits and challenges. BMC Med. Educ. 2014, 14, 56.
13 Sawair, F.A.; Baqain, Z.H.; Al-Omari, I.K.; Wahab, F.K.; Rajab, L.D. Effect of gender on performance of undergraduate dental students at the University of Jordan, Amman. J. Dent. Educ. 2009, 73, 1313–1319
14 Zemelman S, Daniels H, Hyde A. Best practice: New standards for teaching and learning in America's schools 1993
15 Gwendi C. Problem-Based learning: A paradigm shift or a Passing Fad. Medical Education Online 1996;1(2):1-6
16 Frankola K. Why online learner dropout 2001. Available from: https://www.workforce.com/news/why-onlinelearners-drop-out. Accessed January 2021.
17 Kay D, Kibble J. Learning theories 101: application to everyday teaching and scholarship. Adv Physiol Educ. 2016; 40: 17– 25.
18 Eom SB, Wen HJ. The determinants of students' perceived learning outcomes and satisfaction in university online education: an empirical investigation. Decis J Innov Educ. 2016; 4: 215– 3
19 Field J, Stone S, Orsini C, Hussain A, Vital S, Crothers A, Walmsley D. Curriculum content and assessment of pre-clinical dental skills: A survey of undergraduate dental education in Europe. Eur J Dent Educ. 2018 May;22(2):122-127.