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Comparison of case-based learning and traditional learning style in final year BDS (Bachelor of Dental Surgery) students in paediatric dentistry unit lesson

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ABSTRACT

The challenge in the present scenario for dental schools is how to improve the quality of dental education and training of qualified people. Case-based learning (CBL) uses virtual "trigger" cases to stimulate interest and generate the knowledge and skill needed in patient care and can bring the improvement. In the present study, 60 students from final BDS were included and distributed into two major groups (A and B) consisting of 30 students in each group. Group A was given didactic lecture and Group B was trained in the same topic through CBL. Pre- and post-test questionnaire was given to all 60 students before and after the training session. Intra- and intergroup comparisons showed significant difference in both the groups. CBL method showed more improvement in students than observed in students taught through didactic method. CBL simulates the clinical environment and encourages students' clinical thinking more effectively than conventional teaching.

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Case-based learning; traditional learning style; final BDS students; questionnaire; pre-test and post-test; stainless steel crown; primary molars; improved knowledge

Introduction

The present scenario for dental schools required the improvement of dental education and preparing of qualified individuals who can both adjust to a quickly changing world and all the while address the issues of the patients [1,2]. The traditional method is a lecture-based course that includes 1 hour sessions taught by the Faculty of Paedodontics and Preventive Dentistry. In this, the succession of PowerPoint slides that is didactic lecture with varying media support has been utilized as an educating strategy. The conventional methodology of educating has been condemned for various reasons such as it being instructor focused trouble in clinical utilization of procured hypothesis information. Efforts have been made in a few schools to modify teaching practices which has led to a creative showing strategies like problem-based learning (PBL), virtual learning technique, case-based learning (CBL), etc. [3,4].

CBL utilizes virtual "trigger" cases to revive enthusiasm for a specific range of the educational programs. Cases can be utilized for teaching small groups which can promptly produce the information and abilities required in patient consideration [5,6]. Small groups are taught by the coaches with preparing and mastery not simply in the subject and substance of the learning module additionally in the aptitudes and procedures included in encouraging this kind of learning.

CBL is dissimilar to PBL in many ways; CBL is a particular method of teaching that is based on the principles of PBL but it places more emphasis on putting your learning into practice in a clinical setting, which may enhance the learning and enhancing the knowledge and skills in clinical topics [6,7]. CBL is a new method of learning and is an attempt to see the effect and comparison of both the studies in its outcome which may be used as an innovative teaching methodology in the dental education.

The aim of the present study was to compare the CBL and traditional learning style in final year BDS student in Pediatric Dentistry unit lesson and also

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to evaluate the learning outcome after respective teaching learning method.

Materials and Methods

The present study was conducted at K. M. Shah Dental College and hospital (KMSDCH), Sumandeep Vidyapeeth, Piparia, Vadodara. For this, a draft proposal of the present educational research project was presented to the institutional ethical committee and permission from the Institute's Ethical committee was obtained. The required cases for learning were taken from the Dept. of Paedodontics and Preventive Dentistry of KMSDCH. Nearly, 60 students from final BDS who were voluntarily willing to take part in the study were included.

CBL and traditional learning education

The aim of the course was to improve students' comprehension of clinical application and knowledge of Stainless Steel Crown procedure on Primary Molar (Fig. 1). The learning objectives were the same for the two groups. Both groups were given questionnaire to check the basic knowledge about the topic. Then, they were taught separately and study duration was kept same for both the groups so that the detailing of topic related information remain the same as well as information bias is minimized.

Group A was given didactic lecture with audio-visual aids (which is a traditional method) on the topic of "Stainless Steel Crown for Primary Molars".

GROUP B was divided into three sub-groups of 10 each and trained in the same topic through CBL.

CBL sessions were planned in following manner:

1. Set of one real and one virtual case was utilized for each sub-group.
2. First with the help of virtual case, students were taught about the topic followed with real case and the steps were shown and discussed.
3. The subject expert carried out the teaching learning method CBL.

Questionnaire and test for both groups

All students from both the groups then underwent a written test with 20 questions of 1 mark each. They were given pre-test questionnaire to assess the base line knowledge regarding the topic 1 week before starting the training session. Based on the answers of the questions, they were arranged in the ascending order of their marks and were randomly assigned (in odd and even numbers) into two major groups (A and B) consisting of 30 students in each group, so that the same level of understanding among the groups was maintained. Both the groups were given the post-test questionnaire after the study to assess the improvement of knowledge through both the methods of teaching.

Statistical analysis

The collected data were entered in the Master chart prepared on the computer using Microsoft excel 2007 and the data were analyzed using SPSS software. Data were analyzed using Chi square test, independent T-test, and paired T-test.

Results

After conducting the pre-test, all of them were divided into two groups (CBL method and didactic method) of 30 each. Among them, in the CBL group, 6 (20%) were male and 24 (80%) were female, whereas in the didactic or conventional group, 5 (16.7%) were male and 25 (83.3%) were female (Fig. 2). Chi-square *p*-value was statistically insignificant (0.739) for gender association in both the groups.

Pre-test results showed that mean knowledge among the CBL group and didactic group was 26.88 ± 9.45(%) and 30.83 ± 9.84(%), respectively, which has increased to 86.46 ± 10.90(%) in the post-test for CBL group and 69.58 ± 14.38(%) for the didactic or conventional group (Tables 1–3 and Fig. 3). Improvement shown by CBL group was 59.58%, while it was only 38.75% for the didactic or conventional group (Fig. 4).

Discussion

In the present study, the numbers of students of different gender with similar proportion were included. The number of female students enrolling for Bachelor of Dental Surgery course is more as compared with male students. Hence, to keep the effect of gender neutralized, the gender proportion was kept same in both the groups and was found statistically insignificant. The conventional teaching method is lecture-based learning, which requires teachers to give didactic lectures strictly following the rationales on textbooks. As a result of this fossilized showing mode, the degree of students' curiosity and inspiration generally relies upon the nature of instructor focused presentations. [8–10]. It has been contended that the CBL approach fulfills satisfies assumptions underlying the adult learning theory and in this way, empowers a more important

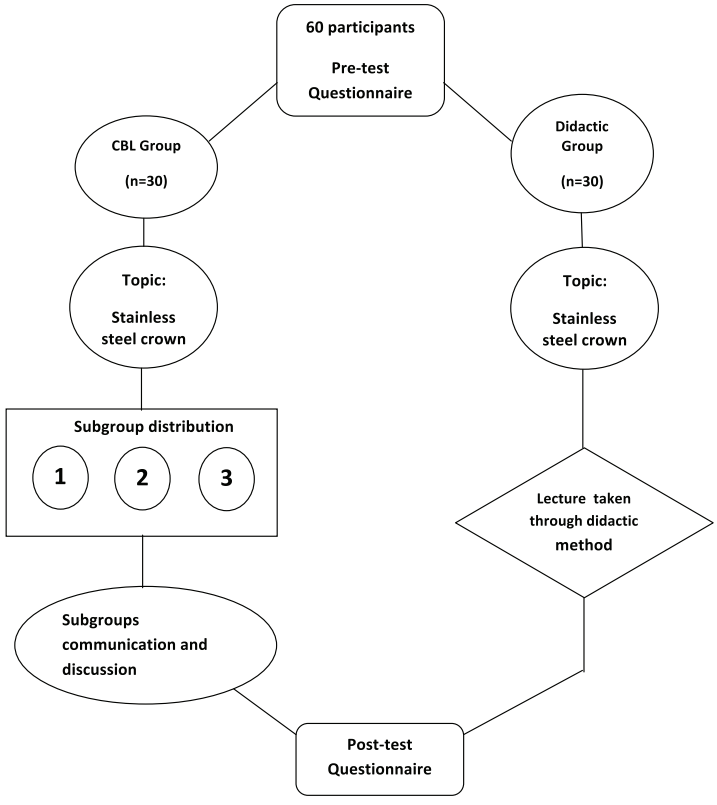

Figure 1. Flow chart of CBL and traditional learning method among final year BDS students.

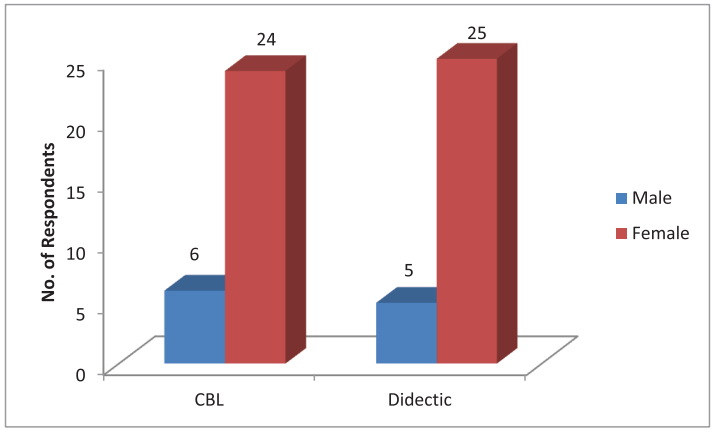

Figure 2. Gender distribution in CBL and didactic group.

appreciation and coordination of the essential and clinical sciences [11,12]. It upgrades maintenance and review of data, develops enduring self-composed learning capacities, engages and fortifies hypothetico-deductive thinking, and subsequently plans undergraduate students better for their future. The most characterizing highlight of the CBL method was that it is more of student-centered method. CBL teaches students to structure information effectively and also helps in rapid retrieval of relevant information while performing the clinical procedures (Table 4).

According to cognitive learning theory of David Ausubel, "The most important single factor influencing learning is what the learner already knows" [11]. Students taught through traditional method can just depend on the information with no ability to interact with people included in the situation or to request clarification to better comprehend the context of the problem [13]. Additionally, the text book scenario may not sufficiently portray the issue in a way that a student can at least relate it to a real-world situation. CBL can empower the valuable talk among exceptionally energetic students who as of

Table 1. Correct answers and improvement in number and improvement in percentage for both the groups in pre- and post-test.

	Didactic group			CBL group		
Question no.	Correct answers pre	Correct answers post	Improvement (% out of 30)	Correct answers pre	Correct answers post	Improvement (% out of 30)
Q1	13	23	33.33	7	26	63.33
Q2	4	20	53.33	6	26	66.67
Q3	4	20	53.33	7	27	66.67
Q4	14	20	20.00	8	25	56.67
Q5	12	21	30.00	7	24	56.67
Q6	11	14	10.00	12	24	40.00
Q7	11	18	23.33	5	27	73.33
Q8	8	18	33.33	4	24	66.67
Q9	13	19	20.00	8	24	53.33
Q10	3	18	50.00	6	24	60.00
Q11	8	17	30.00	5	25	66.67
Q12	27	26	−3.33	24	29	16.67
Q13	12	21	30.00	14	24	33.33
Q16	0	30	100.00	5	30	83.33
Q17	1	30	96.67	4	30	86.67
Q18	7	19	40.00	7	26	63.33

Table 2. Intragroup comparison for both the groups in pre- and post-test.

			Paired differences			
	Mean (std. deviation)	*N*	Mean (std. deviation)	95% confidence interval of the difference		*p*-value
CBL group						
Post knowledge (%)	86.5 (10.9)	30	59.6 (14.9)	Lower	Upper	<0.001*
Pre knowledge (%)	26.9 (9.5)	30		54.0	65.2	
Didactic group						
Post knowledge (%)	69.6 (14.4)	30	38.7 (11.2)	Lower	Upper	<0.001*
Pre knowledge (%)	30.8 (9.8)	30		34.6	42.9	

Table 3. Mean score of pre-test and post-test knowledge and mean score of improvement in knowledge.

	Group	*N*	Mean score (std. deviation)	*t*-test for equality of means				
				p-value	Mean difference	Std. error difference	95% confidence interval	
							Lower	Upper
Pre knowledge (%)	CBL	30	26.9 (9.5)	0.117	−3.95833	2.49070	−8.94402	1.02735
	Didactic	30	30.8 (9.8)					
Post knowledge (%)	CBL	30	86.5 (10.9)	<0.001	16.87500	3.29381	10.28172	23.46828
	Didactic	30	69.6 (14.4)					
Improvement in knowledge (%)	CBL	30	59.6 (14.9)	<0.001	20.83333	3.40529	14.01690	27.64977
	Didactic	30	38.8 (11.2)					

Independent *t*-test was highly significant (<0.001) for both post-test scores and improvement in knowledge in both the groups (Table 4).

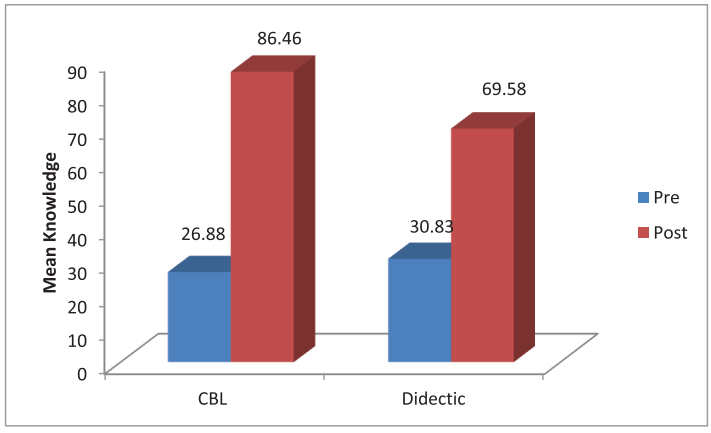

Figure 3. Mean score percentage of pre-test and post-test knowledge.

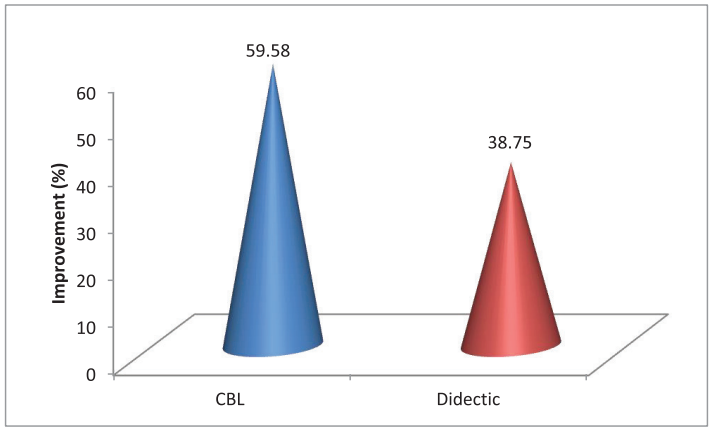

Figure 4. Improvement in knowledge shown by CBL and didactic group.

Table 4. Differences between traditional and case-based learning.

	Traditional learning style	CBL
Mode of delivery	Lecture based	Real/virtual "trigger" cases
Interaction with students	Unidirectional, less scope of interaction	interactive, student-centered, instructor-led learning approach
Support used	Didactic lecture with varying media support	Coaching and training with the help of cases and supporting armamentarium
Size of group	Large groups	Small groups
Types of topics covered	Theoretical subject e.g., Knowledge regarding growth and development	Topics requiring aptitudes and procedures learning. e.g., knowledge and skills in clinical topics
Cognitive level	Surface-learning	Deep-learning with reflective thinking

now comprehend the factual background, as the medical education establishment desperately needs studies that examine the skills that really count the ability to care for the patient in a knowledgeable and empathetic way. In the present study, when comparison regarding the post- and pre-knowledge was done, post-knowledge mean of the participants taught through CBL was found to be higher than those taught through didactic or traditional learning method. On the intergroup comparison, almost 60% of improvement was observed in CBL group and 38.75% improvement was observed in the group taught through traditional method. In 2012, Novak [5] also stated that students taught through

conventional teaching method can only rely on the information with no ability to interact with individuals involved in the present scenario. The conventional or traditional teaching method may not adequately depict the problem in a way that a student can ultimately relate it to a real-world situation. Students who have learnt clinical skills through a conventional teaching method may be at loss when confronted with a real-world patient. On the other hand, cases from real clinical patients can simulate future clinical work, which often stimulates dental students' interest. The facilitator supported students' discussion to determine learning issues, provided support and guided their clinical reasoning method, and also helped the dental students to summarize key learning objectives.

In 2007, Jamkar et al. [1] made the inference that students have completely welcomed the CBL process. They gave criticism that they acknowledge CBL method as a valuable learning action and it has enhanced their clinical thinking abilities, expanded their skill, and propelled them to learn. In 2008, Ellaway and Masters [6] also expressed that CBL offers students to take part in adaptable, learner-focused teaching which encouraged greater interaction amongst those undertaking the blended learning variant, i.e., (conventional method). Their questionnaire data also indicate that CBL is preferred by student over conventional or didactic lectures [6]. Other research has also shown that it is better and more useful than conventional or didactic lecture methods as it uses virtual "trigger" cases to stimulate interest in a particular area of the curriculum [14–16].

In one of the study done in microbiology subject for second-year professional MBBS students, CBL helped in retention of knowledge and its application better than DL. Study stated that more sessions on commonly encountered case scenarios can be useful for students in recalling basic science knowledge in their later years as practitioners [17].

CBL stimulates students' interest, so it can be easily incorporated as an aid in an effective evidence-based education system and in turn evidence-based clinical practice. In India, stress is given on "Critical thinking" at a postgraduate level. If it is incorporated at undergraduate level, it would contribute to better understanding [18]. There are few shortcomings of this study like, as both groups have been taught by the same investigator, which may take investigation differently. The decisions made from a single study might be improved by more studies of longer duration and lecture quality can be influenced by the individual styles.

Conclusion can be made from the results of the present study that CBL was an efficient teaching method for teaching "Stainless Steel Crown for Primary Molars" and was preferred by students to didactic lectures. As CBL requires one tutor for each small group, it is not feasible to enforce the CBL method of teaching throughout the entire curriculum because of the large number of students. As a new educational mode, CBL stimulated considerable activity amongst the dental students who achieved better learning outcomes compared with traditional way learning. However, CBL can be amalgamated alongside Audio-Visual guide to break the monotony of didactic lectures and to help students to meet the demands of their professional life. It additionally, urges dental students to set up common relationship that can upgrade learning, enhance students' relational abilities, and build up the capacity to work in a helpful way in their future careers.

References

[1] Jamkar AV, Burdick W, Morahan P, Yemul V, Sarmukadum Y, Singh G. Proposed model of case based learning for training undergraduate medical student in surgery. Indian J Surg 2007; 69:176–83.

[2] Singh A. Student performance and their perception of a patient-oriented problem-solving approach with audiovisual aids in teaching pathology: a comparison with traditional lectures. Adv Med Educ Pract 2011; 2:123–7.

[3] De Jong N, Verstegen DML, Tan FES, O'Connor SJ. A comparison of classroom and online asynchronous problem-based learning for students undertaking statistics training as part of a Public Health Masters. Adv Health Sci Educ 2013; 18:245–64.

[4] Zhang Z, Liu W, Han J, Guo S, Wu Y. A trial of patient-oriented problem-solving system for immunology teaching in China: a comparison with dialectic lectures. BMC Med Educ. 2013; 13:11.

[5] Novak JD. The promise of new ideas and new technology for improving teaching and learning. Cell Biol Educ 2012; 2(2):122–32.

[6] Ellaway R, Masters K. AMEE Guide 32: e-learning in medical education, part 1: learning, teaching and assessment. Med Teach 2008; 20:455–73.

[7] Singh A. Student performance and their perception of a patient-oriented problem-solving approach with audiovisual aids in teaching pathology: a comparison with traditional lectures. Adv Med Educ Pract 2011; 2:9–15.

[8] Kiguli-Malwadde E, Muyinda Z, Kiguli S. Problem based learning: a place in the sun for radiology. Med Educ 2007; 41(5):507–8.

[9] Nandi PL, Chan JN, Chan CP. Undergraduate medical education: comparison of problem-based learning and conventional teaching. Hong Kong Med J 2000; 6(3):301–6.
[10] Mennin SP, Kalishman S, Friedman M, Pathak D, Snyder J. A survey of graduates from the University of New Mexico's conventional and community-oriented, problem based tracks. Acad Med 1996; 71(10):1079–89.
[11] Chinese Ministry of Education: educational statistics yearbook of China. People's Education Press, Beijing, China, 2008.
[12] Niu X, Wang Y, Sun Y, Mao L. Preliminary study of the PBL method in teaching immunology. Basic Med Educ 2011; 13(1):12–3.
[13] Tian H, Yang J. Application of PBL teaching model in medical education. Med Educ (China) 2005; 5(1):48–50.
[14] Burford HJ, Ingenito AJ, Williams PB. Development and evaluation of patient oriented problem solving materials in pharmacology. Acad Med 1990; 65:689–93.
[15] Coles CR. Difference between conventional and problem based curricula in their student's approaches to studying. Med Educ 1985; 19:308–9.
[16] Leinster SJ, Rogers K. Is new always better? A comparison of an established teaching method with a new teaching method in a surgical course. Med Educ 1982; 16:208–11.
[17] Case-based learning in microbiology: observations from a North West Indian Medical College. Int J Appl Basic Med Res 2017; 7(Suppl 1):S47–51.
[18] Shigli K, Aswini YB, Fulari D, Sankeshwari B, Huddar D, Vikneshan M. Case-based learning: a study to ascertain the effectiveness in enhancing the knowledge among interns of an Indian dental institute. J Ind Prosthodont Soc 2017; 17(1):29–34.