DOI: https://doi.org/10.54393/pjhs.v6i5.2910

PAKISTAN JOURNAL OF HEALTH SCIENCES
(LAHORE)
https://thejas.com.pk/index.php/pjhs
ISSN (E): 2790-9352, (P): 2790-9344
Volume 6, Issue 05 (May 2025)

Original Article

OPEN ACCESS

Comparing the Learning Experience of Student LED CBL (S-CBL) and Instructor Led CBL (I-CBL) in BDS Clinical Years

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ARTICLE INFO

Keywords:
Case-Based Learning, Dental Education, Student Satisfaction, Clinical Teaching Methods, Problem-Based Learning

How to Cite:
Khaleeq, F., Zulfiqar, R., Naz, A., Bibi, T., Zubairi, A., & Khalid, A. (2025). Comparing the Learning Experience of Student LED CBL (S-CBL) and Instructor Led CBL (I-CBL) in BDS Clinical Years: Case Based Learning in Dentistry. Pakistan Journal of Health Sciences, 6(5), 275-280. https://doi.org/10.54393/pjhs.v6i5.2910

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Received Date: 26th February, 2025
Revised Date: 11th May, 2025
Acceptance Date: 21st May, 2025
Published Date: 31st May, 2025

ABSTRACT

Literature suggests that in instructor led CBL, where clinical cases are delivered by the facilitators, student's ability to view the authentic context of oral diseases from multiple sources of real world is hampered. **Objective:** To compare the level of satisfaction regarding instructor led CBL (I-CBL) and student led CBL (S-CBL) of dental students in their clinical years and the test exam score of dental students gone through instructor led CBL (I-CBL) and student led CBL (S-CBL). **Methods:** Comparative cross-sectional study was carried out at Bahria Dental College Karachi for 1 year after approval of synopsis. Non-probality Sampling Technique was used for sample collection. Inclusion criteria included dental students in five clinical rotations for two months and students who provided consent to participate in study. Data were analyzed using SPSS version 25.0 and chi square test was applied. **Results:** Among total subjects 22% were females and 78% were males. Both S-CBL and I-CBL received high ratings for satisfactory sessions, but S-CBL participants (69%) experience was slightly higher, that indicated a preference for the student-led approach. Prioritized teaching method using it was recommended by 65% of the students, especially in clinical years of dentistry. **Conclusions:** It also brought students and faculty together to create a healthy communication flow. A strong preference for CBL as a better learning strategy especially for clinical knowledge was found among many dental institutions by dental undergraduates. PBL was also recommended by many students in problem solving, communication skills and sharpening critical thinking.

INTRODUCTION

Small Group Teaching (SGT) is an educational session for students with a facilitator to guide. It is well established in higher education as commonly used teaching method for undergraduate medical and dental students [1]. SGT is characterized by student involvement in the discussion, sharing of ideas and reflects upon their practice. However, it is one of the most challenging and highly skilled teaching technique which needs to be planned and organized carefully [2]. Looking at literature, small group teaching approaches were developed, evaluated and modified to use in health profession education curricula considering the needs of students and handy resources. The chart topping pure SGT methods that are based on active learning and authentic clinical scenarios evidence were problem based learning (PBL) and Case Based Learning (CBL) [3, 4]. However, researchers revealed numerous drawbacks and issues related to PBL [5-7]. Wang *et al.*, evaluated the effectiveness of integrating problem-based learning with a flipped classroom model to enhance ophthalmic clinical skill training. [8]. Owing to the above mentioned fact, CBL is

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one of the most commonly used vigorous learning approaches in recent times. Introduced as a student centered and ground breaking strategy, it works on the principles of constructivism theory as it helps the learners to actively participate in learning using their background knowledge to resolve the problems and challenges. It also prompt students to formulate their own questions, allow multiple interpretations and expressions of learning and encourage group work and the use of peers as resources that results in collaborative learning [9]. Keeping in view the above stated principles of constructivism theory, CBL approaches usually focus on using varieties of medical and clinical cases to teach students regarding real patient care circumstances. In this approach, the teachers play role as a guide to the students to instrument their acquired information based in making conclusions on real life cases that they may face in practice [10, 11]. Studies also suggest that CBL involves students in research and investigation, collaboration, creativity, communication, critical thinking, and team work [12]. Students absorb and remember material better and for longer when they are energetically involved in their own learning in an environment that is designed to inspire them [13]. There is no doubt that CBL has a lot of benefits mentioned above, but in spite of that there is multiple potential challenges which cannot be understood [14]. The first and the foremost one is the time required to develop authentic cases by teachers leading them to put in a lot of efforts for making clinical cases bank to conduct CBL [15]. On that account to avoid this arduous and time consuming activity, teachers mostly use old clinical cases without reviewing them [16]. Furthermore, students are dependent on the facilitators to develop the cases and objectives or questions to solve the cases which are developed from their own knowledge but not from the recent clinical experience [17, 18]. This hampers the ability of the students to think critically out of the box and they may not be able to relate the cases with the real clinical patients that they experience meeting at present which culminates the students, willingness and the concern to involve in energetic case debates [19]. CBL is based, in part, on vital argument and debate of the case issues and the array of the possible resolutions for the vocal students [20]. It is occasional that all the students in a case conversation will be enthusiastic to contribute and state their opinions without reluctance specifically when it comes to undergraduate students. Some of these students may contribute after a few sitting when encouraged to do so by their peers or instructor. Nevertheless, minimal or nonparticipation stays to be problematic issue that prevents fellow students from benefitting from each other's insight and instructors will be unable to evaluate progress unbiasedly [21]. In view of the above mentioned challenges of case based learning, the aim of this study is to develop an innovative approach of teaching and learning called "student led case based learning (S-CBL)". Unlike CBL that is led by the instructors, this approach was led by and for dental students where they were asked to develop and present a clinical case in a small group of 10 students. This was foster their learning as student led CBL was perceived as more effective way of learning when delivered by a peer educator. S-CBL stimulates students need learning independently and presenters were gained confidence in leading the case based discussions and so were more engaged in their dental education. Students were exposed to real life clinical cases in OPD helped them to had a clearer picture of single disease. There is short literature found on this study to foster student's active contribution, improved thinking process and helped in better retention of knowledge.

METHODS

Comparative cross-sectional study was carried out at Bahria Dental College Karachi for 1 year (i.e from 1-03-2023 to 28-2-2024), after getting approval from research ethics committee of BUHS Karachi (ERC-18/2023). Sample size was calculated by the following equation The following formula is used to compute the sample size for this research:

$n = Z^2 \times p \times q / e^2$

Where z represents the confidence interval, e is the margin of error, p is the estimated prevalence (6.6%), and q is 100 – p (93.4%).The calculated sample size was 94; however, it was increased to 100 to enhance the strength and reliability of the study [13]. Clinical posting of third and final year BDS having age range of 21 to 24 years. Non-probability Sampling Technique was used for sample collection. Inclusion criteria included dental students in five clinical rotations for two months each and students who provided consent to participate in study, While, the exclusion criteria included students who had attendance percentage less than 75% in the S-CBL sessions. Dependent variables were scores of satisfaction on I-CBL and S-CBL, and having test exams scores of each clinical rotation. Independent variables were instructor led CBL sessions and student led CBL sessions. Data collection procedure was as third year BDS 2022 (50 students) were asked to fill I-CBL questionnaire and their scores were recorded. The third year BDS students were promoted to final year BDS in January 2023(50 students) and S-CBL sessions were conducted throughout the year. Distribution of students for S-CBL was as; in S-CBL sessions, these students were further divided into five groups according to their roll numbers and each group was posted in its respective dental OPD's i.e. (Oral surgery, Prosthodontics, Orthodontics, Periodontology, and Operative Dentistry) for the clinical rotations of two months each. Each group comprising of 10 students in their clinical rotations were further divided into 2 groups (Group A and B) of 5 students

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each. According to their clinical rotations a topic from their subject was allocated to both the groups and were given a task to prepare a clinical case within 2 weeks. Once the clinical case was prepared, group A lead the case based learning session with group B in the presence of facilitator and vice versa. Training for implementation of S-CBL was guidance and support provided to the students and the faculty involved in S-CBL via training sessions, workshops and a mock conducted by the subject experts and medical educationists in the campus with principal's permission. Students satisfaction level for I-CBL and S-CBL was by the end of their professional exams in year 2023, all the students of final year BDS who has experienced S-CBL sessions were asked to fill the S-CBL questionnaire and their scores were recorded and compared with the scores obtained from I-CBL questionnaire of the same cohort in year 2022.inal year BDS 2022 test scores were compared with test scores of final year BDS 2023, after each S-CBL session an assessment consisting of 15 one best MCQ's were conducted. Data were analyzed using excel and SPSS version 25.0. Descriptive data like age and gender of the students were presented as frequencies and percentages. The chi-square test was applied to determine association between variables. A p-value of ≤ 0.05 was taken as significant.

RESULTS

Out 100 students 22 (22%) were females and 78 (78%) were males.

Table 1: Gender of Students

Gender	Frequency (%)
Male	78 (78)
Female	22 (22)

There were 50 students from third year and then 50 were those who were promoted to final year.

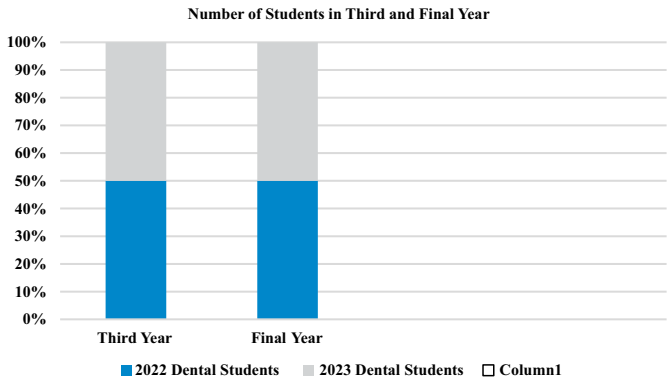

Figure 1: Number of Students in Third and Final Year

In a survey of 100 dental students, among which majority of the students 69 (69%) found out that student led CBL (S-CBL) was more interesting teaching strategy as compared to the instructor led CBL (I-CBL), and 65 (65%), were satisfied with CBL teaching strategy. Thus, CBL was recommended to include more in the curriculum. On further research, many 35% of the students suggested that PBL should be included in the pre-clinical curriculum of dentistry, while 65% of the students recommended and suggested that CBL should be included in the clinical years of the dental education. As CBL was found more efficient when used in teaching strategy in achievement of maximum levels of knowledge 52%, encouraged learning about the practical cases and scenarios 58%, reduce the amount of time needed for self-study 59%, helped in understanding the course objectives 56%, accelerated decision making potential 50%. It also helped students to manage their time accurately. On the other hand, I-CBL was found more effective in problem solving skills 62%, improving critical thinking 55%, in a way that they can achieve best learning outcomes and on improving their communication skills, as compared to S-CBI. However, I-CBL has to require more learning terms as compared to the S-CBL. While, the learning attitudes shows maximum level of knowledge (0.05) students for S-CBL as compared to I-CBL, encouraged learning for practical cases (p=0.01),helps in understanding course objectives (0.01) and decision potentials (p-value 0.06) that indicates non-significant association.

Table 2: Percentage Learning Terms for S-CBL and I-CBL

Learning Terms	S-CBL (%)	I-CBL (%)	p-Value
Maximum level of knowledge	52%	62%	0.05
Encouraged learning about the practical cases and scenarios	58%	55%	0.01
Reduce the amount of time needed for self-study	59%	54%	0.04
Helped in understanding the course objectives	56%	51%	0.01
Accelerated decision making potential	50%	47%	0.06

DISCUSSION

Teaching methods which were inquiry based increased the ability of learning. To enable to define their goals, set learning objectives, and actively seeking resources students direct learning puts students in driver seat. Theoretical knowledge seems connecting less likely to the practical world as CBL and PBL acts as bridges, enhancing understandings and make students ready for the real world challenges [15, 16]. As indicated in this research CBL was found more efficient in teaching strategy in achievement of maximum levels of knowledge 52%, encouraged learning about the practical cases and scenarios 58%, reduce the amount of time needed for self-study 59%, helped in understanding the course objectives 56%, accelerated decision making potential 50%. It also helped students to manage their time accurately. CBL was preferred as more effective learning strategy shown by the results explored by the students. S-CBL was considered more beneficial

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than I-CBL, so CBL was recommended to incorporate into the study than in the traditional methods shown. Conceptual understanding, real world application, knowledge acquisition and discipline learning objectives were considered more significant by students with CBL than by PBL. Student's perception on comparison across many teaching institutions provided similar results for the investigated aspects. However, an interesting exception was demonstrated by Ranabir Pal *et al.*, assessed the impact of small group teaching on student learning outcomes in community medicine [3]. Significant a variations were seen in a study which showed both teaching methods in the institutions [3]. An overwhelming majority of the faculty and students shown in another work which represented proclivity for CBL over PBL as 89% and 84% respectively. For both faculty and learner, it was consistent [4]. Doctoring courses from PBL to CBL were converted in another study conducted in a medical school. A 24 items questionnaire was prepared by the students and faculty after ten months as they gained experience in both modes of instructional methods. Learning inter-professional curriculum through CBL as compared to PBL was considered more effective. Student's satisfaction was also improved in this learning style [5]. Another study was done for prosthodontics education among dental interns check the efficacy of CBL. 45 dental interns purposive sample was taken for the study. CBL effectiveness was found in the overall findings that were demonstrated [6]. Three instructional strategies as lectures, PBL, CBL were compared in a study, where CBL shown great result as traditional learning modes in interns, to enhance their performance, while its effectiveness showed a short problem based learning [3]. Study finding parallel to the traits of mentioned findings were similar with the exceptions of problem solving skills and critical thinking which makes PBL more efficient. A fact that CBL has ability to improve the diagnostic interpretations, student's critical thinking and logical thinking skills, it was all found out by Aldabbus [7]. Singh P argued in a case based learning of proponents where he mentioned that learning outcomes enhanced, attendance in class increased, positive attitude among students and faculty inculcates, ethical issues awareness, multiple perspectives recognition, relevant issues identity, objective judgement making ability, problem solving and reasoning skills, cognitive skills and positive learning environment through knowledge retention all are boosted and is superior strategy than problem based learning [8]. Aldabbus discussed the implementation of project-based learning and highlighted the key challenges faced during its application in educational settings [7]. Perna et al., conducted a comprehensive literature survey on challenge-based learning, exploring its principles, implementation strategies, and educational impact [9]. Compared to CBL, PBL demands independent approach to learning, and has unguided inquiry approach. Developing communication skills and guided learning approach to facilitate the additional influence on learner CBL is much more supported by some studies [6, 10]. Revealed in present study that CBL is an interesting learning strategy with higher knowledge, to make understand the coarse objective much easier than PBL. Where a study done by Perna *et al.*, where students said that PBL is more engaging technique of learning and is more stimulating as it created situational interest, and heightened more motivation in learning the objectives of the study as compared to the CBL [9]. A strong preference for PBL was also shown by the Nigerian participants. In learning process they perceived it as more reliable in fostering a deeper understanding and effective in accomplishing learning objectives [11]. Ribeiro examined the advantages and disadvantages of problem-based learning (PBL) from the teacher's perspective, highlighting both its educational value and instructional challenges [6]. Tang *et al.*, explored the preliminary effects of challenge-based learning in enhancing multidisciplinary collaboration among nursing students in community health care settings [12]. Pu *et al.*, investigated how critical thinking disposition influences the learning efficiency of problem-based learning in undergraduate medical education [13]. Das *et al.*, analyzed faculty perspectives on case-based learning as a modern teaching approach aligned with current curriculum needs [14]. While in this study, training for implementation of S-CBL was guidance and support provided to the students and the faculty involved in S-CBL via training sessions, workshops and a mock conducted by the subject experts and medical educationists in the campus with principal's permission. Student's satisfaction level for I-CBL and S-CBL was by the end of their professional exams in year 2023, all the students of final year BDS who has experienced S-CBL sessions were asked to fill the S-CBL questionnaire and their scores were recorded and compared with the scores obtained from I-CBL questionnaire of the same cohort in year 2022. In this study, students led CBL for the first time was improved on developing critical thinking and increase confidence. It also brought students and faculty together to create a healthy communication flow.

CONCLUSIONS

A strong preference for CBL as a better learning strategy especially for clinical knowledge was found among many dental institutions by dental undergraduates. PBL was also recommended by many students in problem solving, communication skills and sharpening critical thinking. Furthermore, future research for cross-disciplinary comparisons recommended.

DOI: https://doi.org/10.54393/pjhs.v6i5.2910

Authors Contribution

Conceptualization: FK
Methodology: FK
Formal analysis: FK, RZ
Writing, review and editing: FK, RZ, AN, TB, AZ, AK

All authors have read and agreed to the published version of the manuscript

Conflicts of Interest

All the authors declare no conflict of interest.

Source of Funding

The author received no financial support for the research, authorship and/or publication of this article.

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