Original Article

Effectiveness of Collaborative Versus Traditional Teaching Methods in a Teaching Hospital in Gujarat

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Abstract

Background: Collaborative learning (CL) strategies are grossly underused in medical education. The present study aims to compare the effectiveness of students' preferences for collaborative and traditional learning (TL) strategies. **Objectives:** The objective of the study is to compare the effectiveness and students' preference for CL and TL methodology for small groups learning's in community medicine. **Methodology:** This was a crossed over experimental study design with students being taught two separate topics using collaborative and TL methods. Pre- and Post-test scores and students' reflections were recorded. **Results:** The mean pretest scores of participants were comparable and posttest scores for collaborative method were significantly higher. The effect size for control group was 0.26 and for intervention group was 0.49. **Conclusion:** Collaborative method was highly effective in improving the performance of participants. Participants' expressed their preference toward collaborative methods over traditional methods of teaching.

Keywords: Collaborative learning, educational research, effectiveness, medical education, teaching method

Introduction

Collaborative learning (CL) is a student-centered active learning strategy that provides students with the opportunity to learn several skills besides the subject. In CL, students work as a team, participate in small mutually dependent group activities, share their knowledge and expertise and are also individually accountable. CL activities range from debates, assignments, problem-solving activities, poster making, collaborative report writing, projects, and online discussions on a given topic.[1]

While the primary education systems have incorporated the principles of student-centered learning, the higher education and in particular the medical education system largely relies on age old traditional learning (TL) methods of teaching, i.e., lecturing.[2] The recently launched medical curriculum by Medical Council of India that is to be implemented from August 2019 stresses for competency-based education and demands active learning methods.[3] The medical education system can form the base for enhancing the competencies of medical practitioners by incorporating active learning strategies.[4-6] However, these methods particularly CL strategies are grossly underused in medical education.[7,8]

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There is paucity of research showing the effects of CL in medical education, particularly in India. Hence, the present study was conducted with the aim to compare the effectiveness and students' preference for CL and TL methodology for small groups learnings in community medicine.

Methodology

This was an interventional study design with students as participants and teaching methodology as intervention. This study was conducted at the Department of Community Medicine, GMERS Medical College, Junagadh, Gujarat, from April 2018 to September 2018.

Ethical clearance was obtained from Institutional Ethical Committee. A written informed consent with permission to leave the study anytime if they feel was obtained from the student.

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Participants

Students of MBBS VII semester were divided into four batches (Batch A, B, C, and D) of 33 each for the purpose of clinical postings. For the purpose of study, additional sessions were planned for the students of each batch after obtaining permission from college curriculum committee.

Intervention

The study topic 1 (e.g., health system in India – Part I) and topic 2 (e.g., health system in India – Part II) were taught to students of batch A and B by the same faculty by altering CL and TL methodologies for either topic. The learning materials for the topics finalized with department head, and other senior faculties were shared with the students a week before the sessions which were held on consecutive days. Students were asked to prepare for both the topics and were blinded of the teaching methodologies for each of the topics.

For CL session, batch A (Roll 1–33) was further divided into five teams of six to seven students each. The topic 1 was divided into five subtopics, and all the five teams were randomly allocated one of the subtopics and its relevant problem-solving activities (one problem-solving activity per team). They were provided with a 30-min preparation time following which each team was asked to present their work to the rest of the teams in the sequential order of subtopics. One of the members from each team volunteered to present their work to the entire batch. All the teams discussed and clarified various concepts along with brainstorming and further refinement of allotted problem-solving activities to the presenting teams during their presentations. In a similar manner, all the subtopics of topic 1 were discussed by the entire batch A in the presence of the teacher who acted as a facilitator, only providing direction to the discussion.

In the next session, topic 2 was taught to batch A students using traditional (Didactic) teaching–learning methods by the same teacher. The same procedure was repeated with students of batch B, but the teaching methodologies for the topic were crossed over, i.e., topic 1 by traditional method and topic 2 by collaborative method.

Students of batch C and D were taught using a similar methodology as above but with different topics (e.g. tuberculosis and RNTCP) [Figure 1].

Assessment

Both the teaching methods were assessed for immediate improvement, i.e., up to level 2 of Kirkpatrick's Four-Level Training Evaluation Model.

- Level 1: Reaction was assessed by anonymous structured feedback tool comprising a mix of open-ended and close-ended questions regarding the teaching methodologies after completion of both the sessions
- Level 2: Learning was assessed by comparing the pre- and post-test score of each topic taught by different method. Pretest questionnaires as 20 multiple choice questions (MCQ) were administered before the teaching activity for both the topics. The posttest using short answer questions (SAQ) similar to pretest questions was conducted as a surprise test after a week of completion of the intervention to avoid bias arising due to pretest memory. Students were assured that the pretest or posttest scores will not affect their academic grades.

Statistical analysis

Paired *t*-test was used for comparing pre- and post-test scores in each group while unpaired *t*-test was used for comparing pretest scores and posttest scores between the groups at 5% significant level. Cohen's d was calculated to measure the effect size of the intervention.

Results

Of 132 total students, 122 had completed the study and were considered for analysis.

The mean pretest scores of participants in the intervention group (CL) and comparison group (TL) were 8.41 ± 2.81 and 8.27 ± 2.44, respectively and were not statistically significant (P = 0.68). Posttest scores were significantly higher in the intervention group (9.89 ± 3.13) as compared

Table 1: Comparison of pretest and posttest scores obtained by students out of 20 (n=122)

Method of teaching	Mean test score±SD		Gain in marks (%)	Paired *t*-test	Effect size Cohen's d
	Pretest	Posttest			
CL method	8.41±2.81	9.89±3.13	17.6%	t=5.424, P<0.001	0.498
TL method	8.27±2.44	8.93±2.60	7.9%	t=2.413, P=0.017	0.26
Unpaired *t*-test	t=0.413, P=0.680	t=2.579, P=0.010			

SD: Standard deviation, CL: Collaborative learning, TL: Traditional lecture

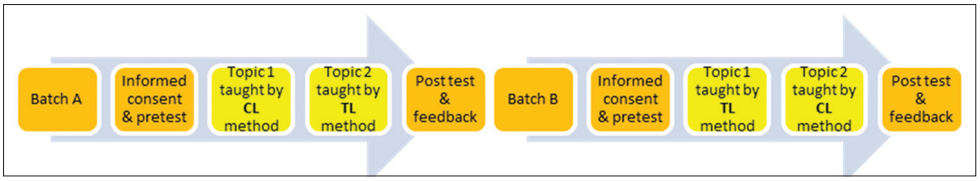

Figure 1: Sequence of activities for Groups A and B

Table 2: Comparison of student's ratings for collaborative and traditional teaching learning methods on a score of 5

Number	Students perceptions	Mean±SD		*t*-test, *P*
		CL method	TL method	
1	Confidence on the topic after the session	3.87±1.05	3.27±0.98	4.59 (<0.001)
2	Engaging ability (interactive and participative) of the session	3.91±0.92	2.81±0.10	8.86 (<0.001)
3	Ability to increase the attention span	3.43±1.11	3.05±1.29	2.45 (0.015)
4	Ability for retention of concepts after the session	3.61±1.06	3.14±0.97	3.57 (<0.001)
5	Overall rating - liking for the session	3.80±1.01	3.41±1.06	3.03 (0.003)

SD: Standard deviation, CL: Collaborative learning, TL: Traditional learning

to comparison group (8.93 ± 2.60). The results of the paired *t*-test showed posttest scores to be significantly higher than pretest scores in intervention ($P < 0.001$) and comparison group ($P = 0.017$). The effect size for control group was 0.26 and for intervention group was 0.498 [Table 1].

Table 2 describes the feedback by participants in the form of scores given by them to various characteristics of CL and TL session. The mean of score out of five, given by the students for various characteristics of CL session in regard to increase in confidence on the topic after the session, engaging ability of the session, increase in attention span during the session, and retention of concepts were 3.87 ± 1.05, 3.91 ± 0.92, 3.43 ± 1.11, and 3.61 ± 1.06, respectively. The corresponding scores for TL session were 3.27 ± 0.98, 2.81 ± 0.10, 3.05 ± 1.29, and 3.14 ± 0.97, respectively. The mean of overall rating given by students for CL session was 3.80 ± 1.01 and for TL session was 3.41 ± 1.06. The mean scores for all the characteristics of CL session were higher than TL session, and this difference was statistically highly significant.

When asked to share their experiences on each of the teaching methods on an anonymous feedback form, several comments were received from participants. Their reflections were paraphrased and summarized in Table 3.

Table 3: Representation of comments from participants on open-ended feedback form

Advantages of CL over TL- *n* (%)	Disadvantages of CL over TL
Learned teamwork skills - 68 (55.74)	More time consuming - 29 (23.77)
Increase in communication skills - 56 (45.90)	Poor presentation skills of a few - 18 (14.75)
Interactive and participative - 40 (32.79)	Unequal participation in team - 14 (11.48)
Increase in self-confidence - 35 (28.69)	
Better clarification of concepts - 28 (22.95)	
Removal of stage fear - 25 (20.49)	
Leadership experience - 7 (5.74)	
Advantages of TL over CL	**Disadvantages of TL over CL**
Superior presentation skills of teacher over students - 39 (31.97)	Monotonous - 42 (34.43)
Felt more relaxed - 12 (9.84)	Less attention - 29 (23.77)
Takes less time - 8 (6.56)	Minimal learner involvement - 9 (7.38)
Suggestions	
More topics to be taught by CL method - 68 (55.74)	Strict time limits for discussion - 25 (20.49)
Teams should not be as per roll numbers - 5 (4.10)	Discontinue CL method - 5 (4.10)

CL: Collaborative learning, TL: Traditional learning

Discussion

No significant difference in pretest scores indicated comparability for baseline knowledge among groups. Posttest showed significant improvement in the performance of students in both the groups. However, the effect size for control group (Cohen's $d = 0.26$) and intervention group (Cohen's $d = 0.498$) showed only small and medium effect, respectively. This relatively low effect size could be explained by higher baseline scores, surprise posttest, and change in the format of posttest from MCQ to SAQ. However, small-to-medium effect sizes based on academic outcomes are considered significant.[9,10] The highly significant difference between posttest scores of students in both the groups in the present study are consistent with studies by authors across the globe[11-13] [Table 1].

The scores given by students to various characteristics of CL session and TL session such as engaging ability of sessions, clarification and retention of concepts, indicated their preference toward CL method of teaching. Visschers-Pleijers *et al*., 2006,[14] in his study concluded that CL helps in greater clarification of concepts along with encouraging academic interactions among students [Table 2].

The students expressed their views regarding pros and cons of both the session in anonymous open-ended feedback form [Table 3].

The CL session had several added advantages in addition to the theory topics, which were discovered by the participants' feedback. In addition to better clarity of theoretical concepts, the CL session improved their communication skills, leadership qualities and abilities to work as a team. The involvement of peers in teaching helped to break the monotony of presentations and learn the topics in an exciting manner. It resulted in a better understanding of other participants' perspectives, removal of stage fears and helped in building self-confidence. The advantages of CL session that were described by the participants are also supported by other authors.[15-19]

However, a few of the participants also highlighted a few flaws in the CL session. The efforts for preparation and/or presentation abilities of a different participants varied which led to fogging of certain aspects of the topics. Not all the participants equally participated in teamwork leading to skewed workload. The assigned time limits for discussions were not followed leading to more time consumption during CL session.

The anonymous feedback exposed serious flows of TL methodology for being teacher centered and students attending out of force rather than the need for learning. In fact, TL methods in the form of lecturing are criticized by several authors as it encourages passive learning with minimal learner involvement.[20]

The participants suggested that more of the topics from community medicine subject such as epidemiology, nutrition, environment, and other examination-oriented topics should be taught using CL methods or using similar kind of student-centered teaching methodology. They also suggested that more topics from other subjects also need to be taught in this manner.

Conclusion

CL was highly effective in improving the performance of participants in terms of posttest scores as compared to TL methodology. Participants' reflections clearly indicated a preference for CL methods over TL methods of teaching.

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Conflicts of interest

There are no conflicts of interest.

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