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ORIGINAL RESEARCH

Effectiveness of jig-saw classroom versus tutorial method of small group teaching in improving the learning of undergraduate students

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ABSTRACT

Introduction: The paradigm shift in medical education from teacher-oriented teaching to student-centered learning has introduced many innovative teaching-learning methods. Jigsaw classroom is one such method for small group learning. Here, each students' part is essential for completion of the topic. This study was undertaken to assess the effectiveness of Jig-saw technique over tutorial method and perception of students towards jigsaw.**Methods:** 2nd Professional Year medical students were briefed regarding procedure, purpose of study. Four topics allotted for small group learning were selected for this study. Students were divided into Tutorial group (control) and jigsaw group (Intervention). Overall, 118 students underwent jigsaw classroom and 151 students underwent tutorial teaching. Pre and post-test were collected from both students to assess the knowledge gained. Perception of students undergoing jigsaw classroom was also obtained.**Results:** The mean marks obtained by students of jigsaw classroom was higher compared to tutorial teaching. This difference in marks was statistically significant. Majority students perceived jigsaw classroom helped them understand topic completely, improved communication skills and teaching ability. Some students perceived it to be time consuming.**Discussion & Conclusion:** Onus of learning was more on individual student in jigsaw classroom hence, these students scored better during the assessment. Jigsaw thus helped improve learning ability, teaching ability, communication skills and team-work among students. Inculcating different teaching learning methods into the academic activities will make students become active participants, engaged in the process of learning and take responsibility of their learning.

Key words: Medical education, perception, team-based learning

INTRODUCTION

Medical education is a complex blend of theoretical teaching and practical skill learning. Large group teaching is centered around lecture classes where transfer of knowledge to students is the main goal of the teacher.On the other hand, small group teaching involves three key elements: active participation of students, 'face-to-face' contact between participants, and purposeful activities for students[1].Small group learning provides opportunities for learners to work collaboratively with their peers and promotes team building skills that are essential to working within healthcare settings. The 'SPICES' model of medical curriculum recommends a paradigm shift from teacher-oriented teaching to student-centered learning[2].Focus is on the learner and learning techniques.Learners must talk about what they are learning, write about it, relate it to past experiences and apply it to their daily lives[3].

It is also noted that, learning is enhanced when it is more a team effort, as working with others often increases involvement in learning, improves thinking and deepens understanding[3].

Cooperative learning is the instructional use of small groups so that students work together to maximize their own and each other's learning[4].The jigsaw technique is a cooperative learning technique invented and developed in the early 1978s by Aronson *et al.* at

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the University of Texas and the University of California. Just as in a jigsaw puzzle, each piece i.e., each student's part, is essential for the completion and full understanding of the final topic. If each student's part is essential, then each student is essential. This is precisely what makes this strategy so effective[5].This study was taken up keeping in mind the objective to assess the effect of Jig-saw technique over tutorial method of teaching and to assess the perception of students towards jig-saw classroom.

MATERIALS & METHODS

A Quasi-experimental study was done among 2nd Professional year MBBS students of a medical college. Institutional ethical clearance was obtained before starting the study. The study was conducted for the same batch on four different occasions. Each time a different topic was covered (i.e., Acute diarrhoeal disease, Cholera, Community Nutrition program, ICDS). The students were randomly divided into tutorial group (Control group) and Jig-saw group (Intervention group). All students present for the class were included in the study. The students were briefed about the study procedure, its purpose and their consent were obtained.

METHODOLOGY

Learning objectives were framed for each topic and kept same for both groups. Tutorial and Jigsaw classroom was conducted for the respective groups to cover all the set objectives. The class was divided into two groups. One group underwent the regular tutorial type of teaching (Control group). Here, the teacher explained the topic, asked relevant questions and discussed the topic in detail. While the other group underwent jig-saw classroom (Intervention group). Here, study material for every subtopic was provided to the students undergoing jigsaw classroom. At the end of the session, assessment was conducted for both groups. This was repeated for four topics at various time intervals during the academic year. A facilitator/teacher was present for every jig-saw classroom. They would sensitise the students regarding the jig-saw classroom, assign roles and responsibilities to students for smooth functioning of the group. A flowchart and figure depicting the steps of a Jigsaw classroom is given for better understanding. (Figure 1 and 2)

SAMPLE SIZE: A total of 269 students participated in the study. Of these, 118 underwent Jig-saw classroom while 151 underwent tutorial teaching.

STATISTICS: Descriptive statistics were applied to express the data as percentage. Mean and standard deviation was applied to assessment scores. These were compared using unpaired t-test and $p<0.05$ was considered significant value. The mean score of a close-ended questionnaire with Likert's scale response was used to assess perception of students,

Figure 1: Flowchart depicting the steps of a Jigsaw classroom

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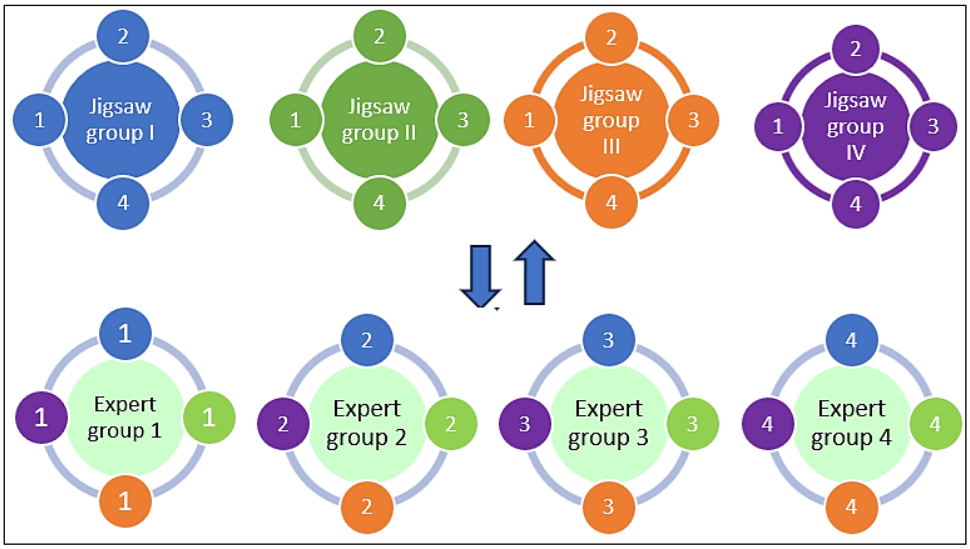

Figure 2: Formation of Jigsaw group and Expert group

RESULTS

The study was conducted among 2nd year MBBS students during small group discussion class. The study was conducted for 4 topics namely, Acute diarrhoeal diseases (ADD), Cholera, Community Nutrition Programs and ICDS. Students present for the class were randomly divided into jigsaw group and tutorial group. Every time different students took part in either of the groups. A total of 118 students underwent jigsaw classroom learning and 151 students underwent tutorial teaching. 58% students were male and 42% were female. The mean age of students was 20.56 ± 1.85 years.

A comparison of the mean marks obtained by both group shows that the students of jigsaw group scored higher than tutorial group this result was similar for all four topics and this difference in mean scores was statistically significant.

The perception of students regarding Jigsaw classroom was assessed using a close-ended questionnaire with Likert's scale response (the five-point Likert's scale used:

1 = Strongly disagree.
2 = Disagree.
3 = Neutral.
4 = Agree.
5 = Strongly agree.

Majority of students had overall positive feedback regarding Jigsaw classroom. 72 (61%) students perceived Jigsaw classroom was beneficial in understanding the topic. Majority students perceived that Jigsaw classroom improved their communication skills 68 (57.6%) and teaching ability 63(53.4%). Though some students 35 (29.7%) felt that the whole process was time consuming, majority 57 (48.3%) felt it was an innovative and fun way to learn.

DISCUSSION

Interactive small group teaching provides the students a stress-free environment to maximise their learning. It is an opportunity for them to team up with their peers, learn and understand the topic together thus promoting team building skills. Team-based learning (TBL) is an innovative interactive teaching learning technique. It provides an active, structured form of small group learning[6].

Jigsaw classroom is co-operative team-based learning. Here students cooperate with each other forming teams to learn and understand a topic. It encourages students to listen, engage and teach each other as each member is essential to complete the academic activity. Each student is held accountable to complete his task so that his team is able to complete the activity.

Jigsaw classroom was conducted in this study for 2nd year students. Four topics were covered applying jigsaw technique. As a prerequisite, a detailed study material for all the topics was prepared by the faculty. Each topic was further divided into five-six subtopics depending on the complexity and weightage of the material. The number of subtopics aligned with the number of students per jigsaw group. Each student was assigned their subtopic and student with same subtopic formed the expert group. Students studied their subtopic, discussed among their expert group and thus mastered it. They then returned to their main jigsaw group, taught and discussed their subtopic to their peers, ensuring everyone understood their material. As each student completed this teaching, the whole jigsaw group completed the discussion of the topic.

In the present study, the test scores of students belonging to jigsaw group was significantly higher than those of tutorial group. In a study conducted among 2nd PY students in Kerala, it was noted that the mean score of students who attended small group discussions was higher, with smaller standard deviation, compared to those who attended lectures, though the findings are not statistically significant[7].In a study conducted among 1st PY MBBS students it was seen that test scores of students undergoing jigsaw method was significantly higher than those

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students who were taught the same topic by the traditional method[8].Another study done among 1 PY MBBS students in Saudi Arabia also showed similar results with statistically significant higher test scores among jigsaw students[9].

Students discussed the topic among themselves on multiple occasions throughout this activity. 84.8% students perceived that such discussion improved their analytical thinking ability. They learned different approaches to understand the same topic as opined by 89% students. Analytic thinking was reported to be improved by 80.8%vstudents in study in Jodhpur[10]. Similar results were seen in a study conducted in Belagavi where 87.4% students stated that jigsaw classroom promoted their clinical reasoning and communication skills[12].

As a part of the expert group, students discussed their topic among each other, brainstormed and clarified each other queries. 89.8% believed that through this activity, they enhanced their communication skills. Similar results were seen in studies conducted among 1st year students in Mumbai[8] (80%) and Jodhpur[10] (81%) who reported that they have acquired better communication skills after undergoing jigsaw classroom.

The student assumed the role of teacher when the jigsaw groups were reformed. This improved their teaching ability as they had to teach their peers, clear the concepts and answer their queries. 81.4% conveyed that their teaching ability developed during this activity.Similar study in Mumbai revealed that 91% felt teaching and explaining the content to other students helped them to understand the topic[8].76.5% students agreed that jigsaw classroom ingrained teaching skills in the them[10].

Majority students were able to grasp the concepts thoroughly with jigsaw classroom. This is evident from the test scores obtained after the activity. The test was conducted for both groups after the class (Intervention group and Control group). the students belonging to jigsaw group have scored significantly higher in all four tests. The differences in test scores between jigsaw group and tutorial group was statistically significant. This is proof that students concentrate more and understand the topic much better when they're actively involved, like in jigsaw classroom, rather than being passive listerners, like in tutorial group.

In our study, 72.1% were eager for this activity to be conducted for various other topics in our subject. 89.9% opined that jigsaw classroom was an innovative and fun method of learning.Similar results were seen in other studies where, 86% felt that the Jigsaw method of teaching was better than the traditional T-L method[8]88.6% students were satisfied that jigsaw classroom was an effective way of learning[10] 62.85% students strongly agreed that this method is more effective if combined with traditional teaching method in terms of understanding[11].

Conducting a Jigsaw classroom within the stipulated time is a challenge. We conducted it during two-hour small group teaching slot. Making most of the available time, keeping the material concise and to the point, having timed discussions are a few methods to accommodate and conduct the activity smoothly. Some students will find it a daunting task as they are unfamiliar with this method and it requires their attention to span longer than in a traditional classroom. 45% students opined that jigsaw classroom was time consuming while 26.3% students were still uncertain. The most common disadvantage cited by students in a study BG Nagara was time consuming (11%) and topic coverage was not in-depth (8%)[13].

In spite of a few constraints, Jigsaw classroom is a method of education in which the learner is responsible not only for his learning but also for the learning of others. It is an efficient way to learn the course material in a cooperative learning style.

CONCLUSION

Onus of learning was more on the students in jigsaw classroom hence, these students scored better during the assessment. This indicates that students working as a group can help each other understand concepts better. The jigsaw thus helped improve learning ability and inculcate critical thinking ability in students. It helped improve communication skills of students. Inculcating different teaching learning methods into the academic activities will help in keeping students engaged in the process of learning. Students become active participants and take responsibility of their learning. Jigsaw classroom not only helps in the acquisition of knowledge but also the improvement of interpersonal skills, which will surely become increasingly valuable in the years to come.

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Table 1: Marks obtained for each topic (Mean ± SD)

Method of teaching	Topic			
	Acute diarrhoeal diseases	**Cholera**	**Community Nutrition Programs**	**ICDS**
Jigsaw	9.17 ± 0.76	8.41 ± 0.89	6.55 ± 1.67	6.57 ± 1.63
Sample	30	29	29	30
Tutorial	8.57 ± 1.04	7.33 ± 1.59	4.08 ± 1.52	5.6 ± 1.98
Sample	30	27	49	45
t-value, p value	2.5450, 0.0136	3.0595, 0.0035	2.3096, 0.0254	6.6728, < 0.0001

Table2: Students' perception regarding conduct of Jigsaw classroom in Community Medicine

Sl. No.	Items	Strongly disagree	Disagree	Uncertain	Agree	Strongly agree
1.	Jigsaw activity was beneficial in understanding the topic.	-	3 (2.5%)	10 (8.5%)	**72 (61%)**	33 (28%)
2.	The activity covered all aspects of the topic.	-	-	14 (11.8%)	**68 (57.6%)**	36 (30.5%)
3.	The activity helped in improving communication among group members.	-	2 (1.7%)	10 (8.5%)	**63 (53.4%)**	43 (36.4%)
4.	A thorough discussion among ourselves increased my analytical thinking ability.	-	5 (4.2%)	13 (11%)	**65 (55.1%)**	35 (29.7%)
5.	The activity is time consuming.	5 (4.2%)	29 (24.6%)	31 (26.3%)	**35 (29.7%)**	18 (15.3%)
6.	The activity should be applied for other topics in CM also.	3 (2.5%)	6 (5.1%)	24 (20.3%)	**58 (49.2%)**	27 (22.9%)
7.	The activity helped me develop teaching abilities.	-	5 (4.2%)	17 (14.4%)	**63 (53.4%)**	33 (28%)
8.	The activity is an innovative & fun way to learn.	1 (0.8%)	6 (5.1%)	5 (4.2%)	**57 (48.3%)**	49 (41.5%)

REFERENCES

1. Newble D, Cannon R. A handbook for medical teachers. 4thed. Dordrecht: Kluwer Academic Publishers; 2001.
2. RM Harden, S Sowdwn, WR Dunn. Educational strategies in curriculum development: the SPICES model. Medical Education. 1984 Jul;18(4):284-97.
3. Chickering AW, Gamson ZF. Seven principles for good practice in undergraduate education. AAHE Bull 1987; 39:3-7.
4. David W Johnson and Roger T Johnson. An Overview of Cooperative Learning.
5. Jigsaw Classroom. 2000-2021, Social Psychology Network. (Last accessed on 29.11.2021)
6. Burgess A, van Diggele C, Roberts C, Mellis C. Team-based learning: design, facilitation and participation. BMC Med Educ. 2020 Dec 3;20(Suppl 2):461. doi: 10.1186/s12909-020-02287-y. PMID: 33272267; PMCID: PMC7712595.
7. Roshni M, Rahim A. Small group discussions as an effective teaching-learning methodology for learning the principles of family medicine among 2nd-year MBBS students. J Family Med Prim Care 2020;9:2248-52.
8. Nair DR, Bagade AH, Bhonde MS, Patil SS, Shetty PM, Kini SG. Evaluation of Jigsaw Learning Methodology as An Active Teaching Strategy for First Year Indian Medical Students. European Journal of Molecular & Clinical Medicine (EJMCM). 2020;7(10): 4105-10.
9. Bogam RR, Khan AS. Jig saw technique: An interactive approach to sensitize medical students in Saudi Arabia about type 2 diabetes mellitus. Journal of Education Technology in Health Sciences, September-December, 2016;3(3): 107-110.
10. Bhandari B, Mehta B, Mavai M, Singh YR, Singhal A. Jigsaw Method: An Innovative Way of Cooperative Learning in Physiology. Indian J Physiol Pharmacol 2017; 61(3): 315-321.
11. Sharma S, Chauhan S, Kaur M. Introduction and Assessment of Jigsaw Method of Teaching on Challenging Topics in Physiology for First Year Medical Students. International Journal of Physiology. 2019;7(4): 238-245.
12. Hadimani CP. Effectiveness of Small Group Discussion Sessions in Teaching Biochemistry for Undergraduate Medical Students. South East Asian Journal of Medical Education. 2014; 8(1); 77- 81.
13. Nusrath A, Dhananjaya SY, Dyavegowda N, Arasegowda R, Ningappa A, Begum R. Jigsaw Classroom: Is it an Effective Method of Teaching and Learning? Student's Opinions and Experience. Journal of Clinical and Diagnostic Research. 2019;13(2): JC01-JC04.