

## EFFECTIVENESS OF JIGSAW TEACHING METHOD ON DEVELOPING CORE COMPETENCY OF SHOCK AMONG FIRST YEAR MEDICAL STUDENTS

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### Abstract

**Background:** Jigsaw method is an innovative and cooperative method of teaching and learning as it involves active participation of students, focuses on fellow learners' co-operation and reassures team work. The objective is to conduct a jigsaw method of teaching for case-based learning for first-year medical students and assess the students for the topic taught by this method and to obtain the students' and teachers' perception for this newer teaching methodology in applied physiology. **Materials and Methods:** It was a Cross-sectional interventional study conducted at Father Muller medical college, Mangalore among 150 first-year medical students. Inclusion criteria: 150 first-year medical students with consent. There was no specific recruitment of subjects as this was a mandatory activity for all students and no incentives were offered. The data of students who have given informed consent was used for analysis. 150 first year students were divided into 4 parent groups namely A, B, C, and D by random sampling technique. Each parent group will have 37-38 students. Each parent group were further divided into 4 subgroups by random sampling technique (Group A: A1+A2+A3+A4). Each subgroup now have 9 -10 members and one person was selected as the team leader to keep the team on task focused and to manage time effectively. SPSS was used for analysis. **Result:** It is observed that post-test scores are significantly higher as compared to pre-test scores in all 4 cases scenarios. This suggests that both methods are effective in teaching applied. 118% gain of knowledge was found in students from pre-test to post-test with the Statistical significance of  $P < 0.001$ . Students showed significant improvement by the introduction of Jigsaw method as the post test mean in all 5 scenarios are higher than pre-test mean and it was highly significant and students strongly agreed that this method is more effective if combined with traditional teaching method in terms of understanding because it makes the topic easier and interesting to understand and retain in the mind which in turn will help in better preparation for the exams. **Conclusion:** Jigsaw is one cooperative learning tool that supports learning in small groups with other students and promotes teamwork, both of which improve the teaching and learning process.

## INTRODUCTION

Medical education has undergone significant changes all over the world and the new competency-based medical education (CBME) in India also emphasizes early clinical exposure and student-centred methods to achieve a better understanding of concepts, retrieving and applying the information learned in solving real cases, develop teamwork and build effective communication skills.<sup>[1]</sup> Professional competency can be achieved by encouraging active

participation of all students, promoting discussions, use of critical thinking skills and as educators, we struggle to maintain learners' engagement using traditional didactic lectures which is pedantic and structured around faculty authority. Traditional Jigsaw learning typically involves a parent group whose members learn a specific subject in an expert group and then return to the parent group to teach them about the subject.<sup>[2]</sup> The addition of flipped classroom in our approach ensures that students have adequate knowledge on the subject so that

during the session of jigsaw teaching they can focus on application, analysis, synthesis, and evaluation.<sup>[3]</sup> Case-based clinical problem solving is also included to stimulate the higher order thinking necessary for health professionals. The topic of shock was selected for several reasons. Shock is a life-threatening manifestation of circulatory failure often encountered in the casualty and a proficient Indian medical graduate should be able to identify the type of shock based on the clinical signs and effectively initiate initial treatment due to the high mortality rate of the disease.<sup>[4]</sup> The CBME curriculum has included the topic of shock under the core competency with domain as knowledge and level of competency based on the Miller's pyramid as knows how. Secondly, they can also develop the spirit of teamwork which plays a crucial role in the management of shock in the clinical setting.<sup>[5]</sup> This study is undertaken to study the effectiveness of combining innovative methods like the modified jigsaw method along with conventional methods in achieving active learning and to assess the perception of students and faculty towards this activity.

## MATERIALS AND METHODS

It was a Cross-sectional interventional study conducted at Father Muller medical college, Mangalore among 150 first-year medical students.

### Inclusion Criteria

150 first-year medical students with consent. There was no specific recruitment of subjects as this was a mandatory activity for all students and no incentives were offered. The data of students who have given informed consent was used for analysis.

### Exclusion Criteria

Students who are absent that day and those not willing to participate in the study were excluded from the study.

**Methodology:** A conventional didactic lecture for one hour on the topic of Shock was conducted one week before the session by the subject expert. For the implementation of the session, specific learning objectives, and preparatory resources on shock (class ppt, recorded session of class) was distributed to students through the learning management system LMS "Get my marks" 1 week ahead of the classroom activities. The flipped classroom approach was allowing students to come prepared for the session. The students were informed about the tutorial session a week earlier and they were also be instructed to bring the textbooks of physiology along. During a three-hour tutorial session, the students were asked to self-report their confidence in their ability to achieve each learning objective on a 4-point Likert scale and a pre-test consisting of 10 multiple choice questions was administered to all 150 students. Each question carries one mark. The correct answer was awarded one mark and no marks will be given for incorrect or multiple responses. The students were not provided with the correct answers to the MCQ as the same questions were given in the post-test.

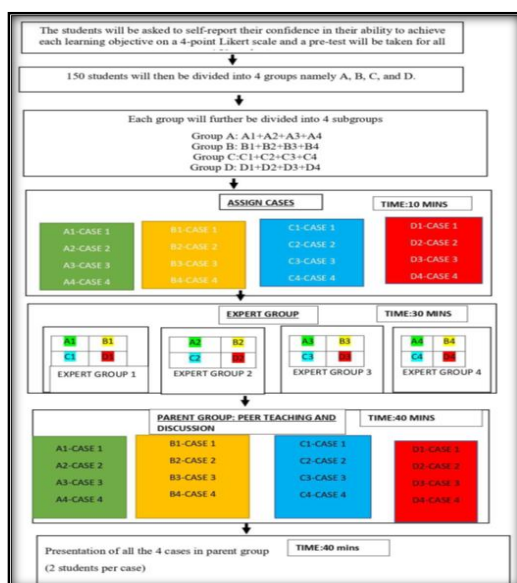
150 first year students were divided into 4 parent groups namely A, B, C, and D by random sampling technique. Each parent group will have 37-38 students. Each parent group were further divided into 4 subgroups by random sampling technique (Group A: A1+A2+A3+A4). Each subgroup now have 9-10 members and one person was selected as the team leader to keep the team on task focused and to manage time effectively. Topic of shock was divided into 4 subtopics using cases.

Case 1- Hypovolaemic shock

Case 2- Anaphylactic shock

Case 3- Septic shock

Case 4- Cardiogenic shock



**Figure 1: The sequence of events planned in Jigsaw method of teaching is depicted**

These cases were divided to each group to maintain uniformity (Eg:GROUP A:A1-CASE 1,A2-CASE2,A3-CASE3,A4-CASE 4) and the each group were given a period time of 10 minutes and students were instructed to work on the case individually. Expert groups were formed by including students who have got the same case from all parent groups (Eg. A1 B1 C1 D1). The Expert groups discuss with their peers to understand the case provided for 30 minutes with the help of available resources and cleared their doubts if any from the facilitators. After 30 minutes the experts will go back to their parent group. Each expert provided all the information gathered through the discussion and told them in depth and highlight the points which help them come to a diagnosis for the case provided and this peer teaching is a pivotal aspect of this activity. Four subject faculties with 10 years of teaching experience in clinical physiology were to behave as facilitators and circulate around the classroom to answer any questions that may arise from the discussion. The students are

encouraged to conduct thought-stimulating discussions with their teammates about the various aspects presented in the case. Two students from each subgroup were asked to present the case. After the session the students were given the post-test and will be again asked to self-report their confidence in their ability to achieve each learning objective on a 4-point Likert scale. The second part of the survey includes feedback on delivery of the session on a 5-point Likert scale and an open-ended comments or suggestions regarding the session. Feedback from faculties was also collected. The suggested time frame for the class is 10 minutes for review of the instructions and division into groups, 5 mins to self-report their confidence in their ability to achieve each learning objective, 10 mins for pretest, 10 mins preparation time, 30 minutes expert discussion, 40 minutes for the group activity in parent group, 40 mins for presentation of all 4 cases (2 students per case), 10 minutes to complete the post test, 5 mins to self-report their confidence in their ability to achieve each learning objective and feedback on the session.

### Statistical Analysis

The session was evaluated using pre-and post-test. Paired t-test was used to compare Pre-test and Post-test results. The first part of the feedback was to assess the ability of the session to meet the specific learning objectives. Fisher's exact test with two-tailed p values was used to compare students who rated themselves as completely confident with those who rated themselves as not, slightly, moderately confident before and after the session was completed.  $P < 0.05$  is considered as statistically significant.

## RESULTS

As per [Table 1] The present study included 150 Ist year MBBS student. Out of 150 students, 61 % were male and 39% were female. 59% were into the age group of 20-25 yrs. All the students did not have previous experience with the Jigsaw method of teaching.

**Table 1: Post-Test and Pre-Test scores based on Jigsaw Method**

	Post				Pre			
	0		1		0		1	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
Q1	11	8.0%	127	92.0%	34	24.6%	104	75.4%
Q2	18	13.0%	120	87.0%	39	28.3%	99	71.7%
Q3	23	16.7%	115	83.3%	55	39.9%	83	60.1%
Q4	13	9.4%	125	90.6%	21	15.2%	117	84.8%
Q5	3	2.2%	135	97.8%	24	17.4%	114	82.6%
Q6	22	15.9%	116	84.1%	61	44.2%	77	55.8%
Q7	34	24.6%	104	75.4%	75	54.3%	63	45.7%
Q8	15	10.9%	123	89.1%	30	21.7%	108	78.3%
Q9	9	6.5%	129	93.5%	39	28.3%	99	71.7%
Q10	2	1.4%	136	98.6%	29	21.0%	109	79.0%

**Table 2: Comparison of Pre and Post- Test Scores through Jigsaw Method**

	Pre 1		Post 1		P-value	
	Count	Row N %	Count	Row N %		
Q1	104	75.40%	127	92.00%	0.000	HS
Q2	99	71.70%	120	87.00%	0.002	HS
Q3	83	60.10%	115	83.30%	0.000	HS
Q4	117	84.80%	125	90.60%	0.144	Ns
Q5	114	82.60%	135	97.80%	0.000	HS
Q6	77	55.80%	116	84.10%	0.000	HS
Q7	63	45.70%	104	75.40%	0.000	HS
Q8	108	78.30%	123	89.10%	0.015	sig
Q9	99	71.70%	129	93.50%	0.000	HS
Q10	109	79.00%	136	98.60%	0.000	HS

**Table 3: Evaluation of Jigsaw by participants on 5 point Likert Scale**

		Mean	Std. Deviation	p value	
	Pre	2.91	0.763		
Con 2	Post	3.57	0.591	0.000	HS
	Pre	2.96	0.763		
Con 3	Post	3.43	0.552	0.000	HS
	Pre	2.53	0.675		
Con 4	Post	3.37	0.58	0.000	HS
	Pre	2.53	0.686		
Con 5	Post	3.29	0.618	0.000	HS
	Pre	2.55	0.736		

**Table 4: Confidence Levels comparison between Pre-test and Post- Test**

	Mean	Std. Deviation	Change(%)	p value	
Pre Know(out of 10)	7.05	2.12	26.413	0.000	HS
Post know(out of 10)	8.91	1.32			
Confidence - over all pre	2.69	0.54	27.380	0.000	HS
Confidence - over all post	3.43	0.48			

**Table 5: Feedback of the participants of jigsaw method measured using 5 point likert scale**

	Mean	Std. Deviation
Feed back 1	4.33	.608
Feed back 2	4.31	.637
Feed back 3	4.44	.651
Feed back 4	4.47	.594
Feed back 5	4.53	.630
Feed back 6	4.51	.653
Feedback 7	4.58	.551
Feedback 8	4.54	.556
Feed back 9	4.51	.607
Feed back 10	4.55	.555
Over all Feed back	4.47	.414

As per [Table 2] It is observed that post-test scores are significantly higher as compared to pre-test scores in all 4 cases scenarios. This suggests that both methods are effective in teaching applied. 118% gain of knowledge was found in students from pre-test to post-test with the Statistical significance of  $P < 0.001$ . The findings showed that the students engaged in co-operative learning like jigsaw had an overall improvement in the knowledge and helped them.

As per [Table 3] students showed significant improvement by the introduction of Jigsaw method as the post test mean in all 5 scenarios are higher than pre-test mean and it was highly significant and students strongly agreed that this method is more effective if combined with traditional teaching method in terms of understanding because it makes the topic easier and interesting to understand and retain in the mind which in turn will help in better preparation for the exams.

As per [Table 4] it clearly suggest that mean confidence levels of post-test were higher than pre-test confidence levels and they were statistically significant.

As per [Table 5] the overall feedback of Jigsaw method was 4.47 out of 5 which is considered as highly significant and concludes that jigsaw method is very effective and efficient in terms of knowledge and skills.

## DISCUSSION

These days, human groups must have access to education in order to survive. The active learning approach places emphasis on a new curriculum where knowledge develops into skill and eventually reaches the level of cognition. Jigsaws and other cooperative learning activities enhance teamwork, interpersonal communication, thinking, and problem-solving abilities. The introduction of CBME has created a major shift in medical education with an emphasis on active learning which enhances student engagement as well as

critical thinking skills and this has led to a rise in the importance of innovative practices involving cooperative learning like jigsaw teaching.<sup>[4]</sup>

A study done by Swathi A et al,<sup>[5]</sup> showed that jigsaw is one of the teaching methods that also improved teamwork and interpersonal communication, thinking, and problem-solving skills. Similarly, evaluation of the Jigsaw method of teaching by Kirkpatrick evaluation framework done by Vinod Kumar et al suggests that it is an effective teaching-learning tool and has a positive impact on the learning outcome among the students.<sup>[6]</sup>

A study done by Dr. Monika Lalit et al on the subject of anatomy showed active participation of students and positive feedback from both the students and faculty. One of the limitations observed was the time-consuming nature of this activity and they opined that a topic thought in an hour in a didactic lecture took around 4 hrs to complete in a jigsaw method. It also emphasised that the students should know beforehand about the topics so that students come prepared with the topic allotted to them with the help of books, internet, and library.<sup>[7]</sup>

A study done by Suman Sharma et al in physiology also concluded that it is an effective method in teaching boring but important topics in physiology and highlighted the limitation of it being the amount of time needed to prepare and execute a session.<sup>[8]</sup> Bharti Bhandari et al concluded that jigsaw teaching promoted collaborative and cooperative peer-assisted learning and highlighted the importance of selecting smaller subtopics to allow equal participation of all students.<sup>[9]</sup>

In contrast, the study done by Juan Leyva showed very low student satisfaction with jigsaw teaching and most of the students believed that jigsaw teaching should not be used in the future, and it was not more effective than traditional methods of teaching.<sup>[10]</sup>

Post-test evaluations showed that students gain knowledge with retention capacity, and they can now better prepare for their exam contrasted with the prior exam preparations. The Students responded

that it takes less time to use this strategy preparing for the exam because the workload for each person was minimized, and equal distribution of reading material to the other members of the group. Furthermore, they also noticed that group collaboration on the task saved them time for vast topic and issue that could be thoroughly researched in welcoming surroundings made by peers as well provided a chance to take the lead on that subject.<sup>[11,12]</sup>

## CONCLUSION

The Jigsaw method of learning is engaging and dynamic. In groups, with fellow learner co-operation and team work students prepare for exams without stress. However, the jigsaw method takes time. Planning and carrying it out requires a lot of time, but it is still very successful in producing operational results for faculties and students.

The encouraging outcomes might encourage academic staff and students to regularly use new methods of instruction. Consequently, dull but crucial topics in Physiology will be more thoroughly known and developed more fascinating. This will motivate instructors and students to use more creative and active methods surroundings at work.

## REFERENCES

1. Gulpinar MA, Yegen BC. Interactive lecturing for meaningful learning in large groups. *Medical Teacher*. 2015; 27:590-4.
2. Vallori AB. Meaningful learning in practice. *Journal of education and human development*. 2014; 3:199-209.
3. Wolff M, Wagner MJ, Poznanski S, Schiller J, Santen S. Not another boring lecture: engaging learners with active learning techniques. *The Journal of Emergency Medicine*. 2015; 48:85-93.
4. McCoy L, Pettit RK, Kellar C, Morgan C. Tracking active learning in the medical school curriculum: a learning-centered approach. *J Med Educ Curric Dev*. 2018; 5:1-9
5. Swathi A, Rajkumar HRV. An interventional approach “Jigsaw method” in combination with a lecture to improve the understanding of Clinical Microbiology for second MBBS students. *JERMT* 2017;5(2):25-30
6. Kumar VCS, Kalasuramath S, Patil S, Kumar RKG, Taj SKR et al. Effect of Jigsaw Co-Operative Learning Method in Improving Cognitive Skills among Medical Students. *Int.J.Curr.Microbiol.App.Sci*. 2017;6(3): 164-173.
7. Lalit M, Piplani S. Active learning methodology – jigsaw technique: An innovative method in learning anatomy. *National journal of clinical anatomy*. 2021;10(2)97-102.
8. 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.
9. Bhandari B, Mehta B, Mavai M, Singh YR, Singha A. Jigsaw Method: An Innovative Way of Cooperative Learning in Physiology. *Indian J Physiol Pharmacol* 2017; 61(3):315-323
10. Leyva-Moral JM, Riu Camps M. Teaching research methods in nursing using Aaronson’s jigsaw technique. A cross-sectional survey of student satisfaction. *Nurse Education Today*. 2016;40:78-83.
11. Johnson J H. Importance of dissection in learning anatomy: personal dissection versus peer teaching. *Clin Ana*. 2022; 15(1):38-44.
12. Philips J, Fusco J. using the jigsaw technique to teach clinical controversy in clinical skill courses. *Am J Pharm Edu*. 2015; 79(6):1-7.