



## INTRODUCTION OF JIGSAW LEARNING IN MICROBIOLOGY FOR THE MBBS UNDERGRADUATES.

### Microbiology

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### ABSTRACT

**Introduction :-** For many decades, traditional lectures were the predominant mode of teaching and learning. The traditional lecture, where a teacher delivers a monolog to a large audience of students who passively receive the information, has been a popular mode of instruction for centuries.<sup>1</sup> The Jigsaw method is a form of cooperative learning, in which students are actively involved in the teaching-learning process.

**Aim and Objectives :-** To assessing the student's perception about the jigsaw method of teaching-learning in the subject of microbiology.

**Methodology:-** This was prospective, interventional study in 2<sup>nd</sup> MBBS Students. Students with sensitization & obtaining informed consent for voluntary participation in this study. The task was a part of a routine unconventional activity during tutorial one hour. This was an open-label study on 50 (n=50) undergraduate students.

**Conclusion :-** Students perceived the jigsaw procedure as being very positive especially as an alternative learning experience. Students appreciated the technique as a time-saver and viewed it is a change of pace.

### KEYWORDS

Traditional Lectures, Teaching-learning Process, Jigsaw Method.

#### Introduction :-

For many decades, traditional lectures were the predominant mode of teaching and learning because students could not practically obtain full access to content central to the course.

The traditional lecture, where a teacher delivers a monolog to a large audience of students who passively receive the information, has been a popular mode of instruction for centuries.<sup>1</sup>

Many researchers have affirmed that when the focus shifts from the individual to the group, individual learning is enhanced, not diminished.<sup>2</sup> Recent evidence suggests that learner-centered, active teaching strategies can be more effective learning tools than traditional lectures. In recent years numerous studies have demonstrated that traditional lectures that really on passive learning are not as effective as active, student-centered learning strategies.<sup>3</sup>

The jigsaw strategy serves several purposes in the learning process. The primary purpose of the strategy is to facilitate learning in groups, with co-operation from fellow learners and to encourage team work, ultimately enhancing the teaching-learning experience.<sup>4</sup>

The Jigsaw method is a form of cooperative learning, in which students are actively involved in the teaching-learning process. Active engagement of learners has shown to improve long-term retention of acquired knowledge. The jigsaw method has not only shown to build comprehension; it also encourages cooperativity among students. It is further known to improve listening and communication skills.

In the present study, a student-centric learning intervention through Jigsaw strategy in microbiology was done with 2<sup>nd</sup> year MBBS medical students so as to determine the impact of intervention & perceptions of jigsaw cooperative learning through student's feedback using validated feedback questionnaire.

#### Methodology :-

The present prospective, interventional study was conducted in second year MBBS students in Department of Microbiology at our institute. The task was a part of a routine unconventional activity during tutorial one hour. They were asked not to record their names, and no personally identifiable information was obtained in the questionnaire to preserve anonymity.

The steps involved in the jigsaw strategy was adapted from Aronson. Student's informed consent was obtained after formal introduction to the framework of jigsaw educational method. There was an open-label study on 50 (n=50) undergraduate students. Students were divided into 5 Jigsaw groups (parent group) each consisting of 10 randomly selected members accordingly allotted the roll no. of the class, were created. Which was named "A through E"(Parent groups). Then assignment of microbiology topics (Immunology) with predetermined competency and learning objectives for Jigsaw intervention.

Then, Different topics of an assignment were given to each parent group as learning tasks along with material & suggested resources necessary to learn it. A day was given for parent groups to read, research, discuss and prepare the topic. Each member of the "parent group" e.g. parent group A with members A1, A2, A3...., A10, were assigned one sub-topics, such that an each of the parent groups had members with different subtopics. Next, the students who were assigned same sub-topics in all the five parent groups, take one student from each parent group and club in the 2<sup>nd</sup> group. We were select the students randomly 2<sup>nd</sup> group with chit method (A1, B2, C1.....E10) and they were teaching each other with assigned subtopics. Each group was monitored by facilitators.

Thereafter, the effectiveness of this learning experience will be evaluated by students through administering pre-validated feedback questionnaire. The questionnaire were two types of questions: 1) questions with a 5-point Likert scale (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree) to assess their learning experience, perception towards the activity, and the level of satisfaction with the activity and 2) open-ended question directed at suggestions/ comments with regards to the use of the Jigsaw technique to learn new concepts in Microbiology.

#### Observations and Results :-

The study was intended to evaluate impact & perceptions of jigsaw intervention. Without any prior experience of the Jigsaw method, 2<sup>nd</sup> year MBBS Fifty students were volunteered to participate in study on first day. On another day, 50 students were present; when members of each 5 groups of both clusters were merged within their clusters for final presentations to learn their assignments. In that session on another day, both clusters could discuss given topics out of 5 from their assignments. Thereafter, completion of the study protocol was declared & students were asked to provide their feedback through a pre-validated questionnaire, comprising of responses on Likert rating scale & open-ended questions.

Students' feedback about their perception & experience pertaining to jigsaw intervention obtained on Likert rating scale is shown in Table - 1.

**Table- 1: Students' feedback on jigsaw intervention (Likert rating)**

S.No.	Questions	1	2	3	4	5	Satisfaction Index
1.	The Jigsaw method guided me to take responsibility for my learning.	0	0	10	25	15	87.5
2.	The Jigsaw method helped in understanding the topic in a sequential orderly manner.	0	2	15	23	10	83.42

3.	The activity helped in enhancing communication skills.	0	1	12	20	17	87.89
4.	The activity helped in overcoming shyness and hesitation in the class.	0	0	20	10	20	93.33
5.	This form of exercise should be incorporated into all the topics in microbiology.	1	5	8	14	22	84.28
6.	The exercise was enjoyable.	0	0	5	25	20	88.88
7.	This is an effective way of learning.	0	0	4	21	25	90.86

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

**Table- 2: Students’ feedback on jigsaw intervention (Open-ended questionnaires)**

Core Idea	Representative comments
<b>Opinion about Jigsaw Method:</b> <b>An effective way of learning and comprehending.</b>	It is easy to approach by discussion. I was able to understand the difficult aspect of the given topics. It helps to learn more than the book.
<b>It improves communication skill</b>	Please keep us doing such activity. I am inspired to learn more because of responsibility
<b>It is Innovative teaching-learning method</b>	We get personal attention by the teacher
<b>Disadvantages</b>	A good break from conventional tutorials. Help in studying boring topics. It's a novel way of teaching-learning. Not nice that some contributed too less. Some students are not cooperative discussion & understanding. Time limitations do not allow learning of full topic .
<b>Suggestions about:</b> <b>Activity should be research-oriented also</b> <b>All the students should be encouraged to present the topic</b>	Research oriented topics should be included. Newer advances should be discussed. Shorter topics should be included so that no student is missed. Hindi-medium students should be persuaded for the presentation.

Summary of results:

**As in Table-1:**

The average rating of each item in the questionnaire ranged from 3.8 to 4.42. The minimum average score was 3.8 for item 2, which stated that The Jigsaw method helped in understanding the topic in a sequential orderly manner; a maximum mean score of 4.42 was obtained for item 7, which stated that This is an effective way of learning.

The satisfaction index for each item was calculated using the formula:

$$\frac{[(n1 * 1) + (n2 * 2) + (n4 * 4) + (n5 * 5)] * 20}{(n1 + n2 + n4 + n5)}$$

Where, n is the total number of students gaining the score mentioned in the subscript for that particular item. The scores were rated on a 1–100 satisfaction index scale. It was highest (93.33) for item 4, emphasizing The activity helped in overcoming shyness and hesitation in the class and lowest (83.42) for item 2, indicating that The Jigsaw method helped in understanding the topic in a sequential orderly manner. It reflects that students lack the confidence to learn independently without teacher's guidance. Overall, the study observed high satisfaction scores of students towards different aspects of learning the topic, on a five-point Likert scale.

**As in Table-2:**

Free responses to open-ended questionnaires by students were analyzed by thorough reading of the comments for purpose of

understanding & exploring their feelings towards Jigsaw learning. All such comments of were segregated in to various core ideas & suggestions along with relevant representative statements. They suggested modifications like pre planned organization of method, liberty to choose groups. The students were positive perceptions with Jigsaw learning by being responsible for learning & retaining more by reinforced reading, searching & teaching of topics.

**Discussion :-**

The present study aimed to introduce a Jigsaw method as a teaching-learning tool among 2<sup>nd</sup> year MBBS medical students in Microbiology. It included Group discussion, Peer teaching, and Presentations of the learned topic, in front of the small group. So the students accountable for their own learning while in chorus evaluating their experience about improved active engagement, peer interaction & cooperative learning. There was no intention to make any comparison with traditional teaching-learning methods or to state anyone as superior to other.

Jigsaw intervention kindled the accountability of learning a topic among group members so each student actively read (Response score of 87.5 for item 1), & in collaborative discussion prepared the topic well. The activity promoted better bonding among the students and also among the students and teachers. It brings all the students close to each other, even those who would not otherwise share any rapport with each other.<sup>3</sup> In Jigsaw learning, students must work together in a group to accomplish a common goal. Such "cooperation by design" facilitates interaction among all students in the class, encourages listening, engagement and empathy, and leads students to value each other as contributors to their common task.<sup>7</sup>

Same is evident from student's highest satisfaction index of 93.33 for item 4. This rating is further strengthened by open ended responses suggesting that such active interaction helped them to share new things & exchange of their learning methods. Group discussion has been shown to improve comprehension and learning.<sup>3</sup>

In jigsaw strategy students are required to learn through reading, hearing, seeing, talking over with others, and teaching someone else which can maximize the students' learning skills which is apparent in the current scenario by 87.89 response score on item 3. Matching open-ended responses supporting this is through Students' perception that responsibility of teaching inspired them to learn, read, memorize & understand the topic thoroughly. It is well-known reality that the best way to effective learning is to prepare it to teach or in other words whoever explains learns.<sup>6</sup>

Sousa (2006) in his reports indicated that there is retention of 50% of material learned in a discussion group, 75% as a result of practice & 90% when students' teach others. When people learn to teach, they learn more actively wit intrinsic motivation and have higher conceptual learning scores than the students who learn to test.<sup>7,8</sup> It is evident in response score of 90.86 for item 7 underpinned by the open-ended response suggesting that Jigsaw helped to learn more than a book & that they were able to remember more than self-study.

Almost all students experienced enjoyment & satisfaction with Jigsaw learning environment as revealed from their feedback describing Jigsaw experience as fun, allowing better concentration & refreshing as well helping to learn boring topic along with response score of 88.88 for item<sup>6</sup>.

Present study results make it over that the jigsaw learning is effective in transforming our students from passive to active learners. It is effective in helping students in obtaining practical learning skills, abilities for effective communication and proficiency in term of understanding knowledge, and it promotes positive student attitudes towards their own learning.<sup>9,10</sup> This approach has been claimed to minimize the competitiveness in the learning environment by encouraging students to work together. Self-directed learning of Jigsaw will give a sense of leadership & accomplishment apart from gaining & refining knowledge.<sup>11</sup> Such active learning methods are believed to improve critical thinking, problem-solving abilities, and information retention; thereby fostering lifelong learning skills among medical students.<sup>3</sup>

The students preferred jigsaw over the tutorial. Jigsaw strategy is a robust instructional tool, well perceived by the students to enhance cognitive skills as inferred by the results and can be tailored to the needs of varied topics across different disciplines.

However, positive rating & feedback about Jigsaw intervention by students has encouraged us to extend this mode of teaching-learning to other topics in microbiology as well.

### Conclusions :-

The jigsaw learning technique active learning methods are believed to improve critical thinking, problem solving abilities and information retention; thereby fostering lifelong learning skills among medical students. Knowledge, team work and communication skills are keys for being a successful medical practitioner. Thus the present study facilitated the students to comprehend better, improve their analytical abilities and hone their communication skills.

However, students need to overcome the barriers of time limit & problems of group dynamics & need of teacher felt by them.

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