Effectiveness of Modified Jigsaw as an Active Learning Strategy In Physiology.

Monika Bansal*, Anshu Gupta, Manoj Goyal***,**

*Professor, Physiology, ** Professor, Pharmacology, ***Professor, Pharmacology

Maharishi Markandeshwar Institute of Medical Sciences & Research, Mullana, Haryana, India

Abstract: Background & Introduction: Teaching in the subject of physiology is undertaken with the help of didactic lectures, practical demonstrations and tutorials. Essence of tutorials is bilateral discussion, many times the students don't participate and it becomes a unilateral flow of information. In order to address this problem, active learning strategies are required where the students are engaged and they are made to participate actively. One such strategy is JIGSAW, which promotes active learning, critical thinking, problem solving and communication skills. The current paper describes the experience of using the technique for the tutorials. Methods: The method was implemented in the class of first professional MBBS students (N=150) in the practical (tutorial) sessions. The pre-assigned topic (for tutorial) was divided into five subtopics. Students were also divided into subgroups. Number of students in each subgroup was equal to the number of subtopics. First of all, one subtopic was given to individual students in each subgroup (home group), then the students who are given same topic assembled (expert group) and discussed the subtopic and developed common understanding about the subtopic. After that they returned to the home groups, and taught each other. Later on the subtopic was presented to the whole class. Perceptions of the students were taken using a questionnaire. Results: Most of the students felt that it provided them an active learning opportunity. Majority also felt that they were able to understand the subject better, it was an enjoyable learning experience and they would like to have more such sessions. Conclusions: Jigsaw is an active learning strategy, which can be used for providing meaningful and significant learning opportunities for the students. [Monika B NJIRM 2016; 7(6): 93-96]

Key Words: Jigsaw, Active learning strategies, cooperative learning, feedback.

Author for correspondence: Dr Monika Bansal, Professor, Physiology, Mmimsr, Mullana, Haryana, India.
E- Mail: drmonikaphysiology@gmail.com M: 9996670146

Introduction: Teaching in the subject of physiology is undertaken with the help of didactic lectures, practical demonstrations, group discussions, seminars and tutorials. In the tutorials the students are given a topic before hand, for which they are required to come prepared to be able to participate in the discussion. Tutorials enjoy a special place in the teaching learning sessions for the advantages of small group learning.[1] They have also been found useful by the students.[2,3] Essence of tutorials is active participation of the students and bilateral discussion. But, many times it becomes an exercise where the discussion is dominated by only a few students and others don't participate at all. This on one side reduces the effectiveness of the tutorials and at the same time the teachers are compelled to take the lecture to cover the topic. In order to address this problem, active learning strategies are required where the students are engaged and they are made to participate actively. One such strategy is JIGSAW,[4] which promotes active learning, critical thinking, problem solving and communication skills.[5] We used the basics of this technique along with a little modification towards the end of the sessions. The current paper describes the process and experience of using the modification of this technique for the tutorials in a class strength of 50 students for Ist professional M.B.B.S course, so that it can serve as a guide for the use of this technique in tutorials. Medical Council of India (MCI) also advocates learner centric approaches.[6] Apart from making them participate actively it also motivates the students to learn. So, a study was contemplated where the students were made to participate in modified tutorial sessions in the subject of physiology.

Aim and objectives: To incorporate Jigsaw in the tutorials and to elicit students feedback on effectiveness of the strategy.

Methods: (Table-I) The study was done in the department of physiology at MMIMSR, Mullana, Haryana in the practical sessions after the approval from the Institutional Ethics Committee. In routine, practical sessions are designed in such a way that total number of students (N=150) come in a batch of 50 students per day for three days in a week. The students were communicated about the tutorials and they were also asked to bring the text books of physiology along. In the beginning of the session they were told that they would have a different kind of session and briefed about the new activity. The interest and enthusiasm was instant and they got curious to be a part of the activity. The chosen topic was diabetes mellitus, which was subdivided into five subparts i.e. Etiology, Pathophysiology, manifestations including complications, drug treatment and

management. The subtopics were coded A, B, C, D, E respectively e.g. A for etiology and B for pathophysiology and so on. The students were also subdivided into ten groups with five students in each group (numbers 1-5). That means the number of subtopics was equal to the students in each group, which is a prerequisite for conducting Jigsaw. After that the subtopics were allotted to the students in such a way that all the students with number 1 were given subtopic A, students with number 2, 3, 4, 5 were given B, C, D and E respectively. The students were instructed to work on their topics individually sitting in their groups, called as the "home group", so that each group had 1, 2, 3, 4, 5 i.e one of each number. They were instructed to use their books for working out on the topics and also provided books from the departmental library for additional resources. After the students worked on the assigned topics individually, all the students with common topic came together and worked on the topic in a group and developed common understanding about the topic. They could seek clarification or ask doubts from their fellow group members., so that they could become the experts about their topics, thus called "expert group". After that the experts moved back to their home groups, so that each group would have one expert in each group. In the home groups they would teach other about their topic. Once they had taught each other, we improvised from the usual Jigsaw where the participants solve a quiz, but here they were made to present their topics in front of the large group. So, the students were asked to volunteer for presenting their topic in front of the whole class. To begin with two volunteers were invited for topic A, for which initially there was a bit of reluctance from the students. After a bit of encouragement they volunteered, but once it started there was a lot of enthusiasm amongst the students for presentations. The presentations were followed by the large group discussion, doubt clearing and summarizing by the teacher. The same cycle was repeated for other topics i.e. B,C, D and E. Following that, students' feedback was taken using a pre-validated perception questionnaire having 12 items with a five point likert scale from 1 (strongly agree) to 5 (strongly disagree). The item statements are reflecting in the bar diagram (Diagram-I). The questionnaire instrument was prepared keeping in view the attributes of group learning, interactive teaching and peer learning. The content validity of the questionnaire was ascertained by the members of the medical education unit of our institute. They were explained the purpose of taking the feedback and also told that the responses would be kept anonymous. They were not required to write down their roll numbers or the names, in order to make them express freely. They were also told that they could choose not to fill up the questionnaire anytime. The whole session starting from the beginning till filling up the feedback forms lasted for 80 minutes. The similar session was repeated with other batches of the students also, in order to expose every student to the activity. The data collected was analyzed by using Descriptive Statistics with the help of Microsoft Excel 2010. The results obtained were presented in the forms of percentages and frequencies.

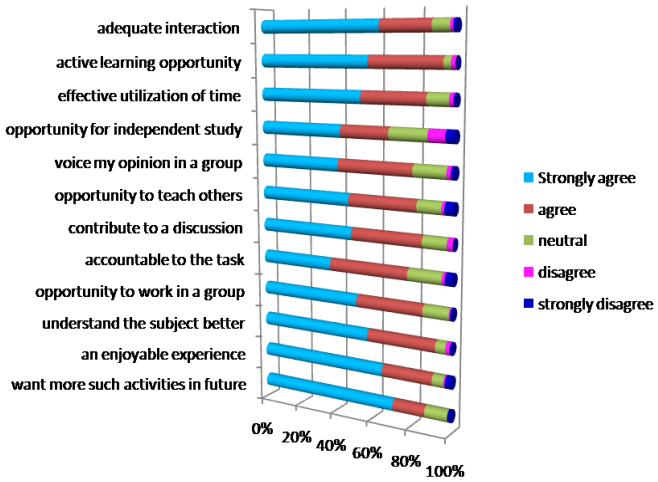
Table-I

Topics	**Expert Groups (Across)**										
A	1	1	1	1	1	1	1	1	1	1	**Home Groups (Down)**
B	2	2	2	2	2	2	2	2	2	2	
C	3	3	3	3	3	3	3	3	3	3	
D	4	4	4	4	4	4	4	4	4	4	
E	5	5	5	5	5	5	5	5	5	5	

Results: As a whole total 140 students participated over three days and filled up the questionnaire. Internal consistency of the questionnaire was calculated by Cronbach's Alpha and was found to be 0.88. The whole activity generated a lot of enthusiasm. The students were actively involved in discussing (in expert groups) and teaching and learning (in home groups). Perceptions related to their experience were captured in the questionnaire and the results are displayed in the bar graph (Diagram-I). More than 88% of the students agreed that the activity provided them an opportunity for adequate interaction, which is one of the strengths of group learning. More than 94% had agreed that it was an active learning opportunity, where as 86% of the students agreed that it was an effective utilization of time. More than 82% agreed that they got opportunity to teach others and 85% of the students also agreed that the activity provided them an opportunity to contribute meaningfully to a discussion. Nearly 80% agreed that they felt accountable to the task. 92% of the students agreed that the activity helped them understand the subject better. The activity provided an enjoyable experience was agreed upon by more than 90% of the students. More than 87% students expressed that they would like to undergo more such activities in future. "It was thoroughly an enjoyable experience. It was a good change from routine

sessions, we liked the concept of learning in groups, I have realized the importance of group study, I liked teaching others, these were some of the responses written in the open ended remarks section. Interestingly, a few wrote that they could do the similar activity in the hostels also, which would help them utilize their time more effectively. Many had expressed that this helped them gain more confidence and increased their skill in expressing themselves. A few students felt that they had a little shortage of time and a very few students had also expressed that it would have been better, had they been told about the topic beforehand. A couple of students also wrote that their group members were not good at explaining, which put them at loss of learning.

Diagram-I : The bar diagram shows the degree of agreement/disagreement of students to various attributes of Jigsaw



Discussion: Good teaching session does not guarantee good learning. Learning happens when the learner does something with the information gained during the teaching learning session. The key to learning is the active mental involvement of the learner. Educational research has also shown that the students retain more and learn better whenever they are actively involved in the teaching learning sessions. So, keeping this in mind, we used an active learning strategy during the tutorial sessions in the subject of physiology, where students' non participation is usually a challenge. The aim was to shift the focus from teacher to the students, and to foster long-term Self Directed Learning (SDL) conforming to the "adult learning principles".[7] Throughout the session the students were actively involved, so much so a few students felt that they had a little shortage of time, which speaks volume of the level of involvement they had during the session. Concentration lapse is a major challenge for the students. Interactive teaching learning methods have been advocated to tackle the issue of concentration lapse and non participation. A large body of literature also tells us that when the goal is to foster higher level cognitive or affective learning, teaching methods which encourage student activity and involvement are preferable to more passive methods.[8] Jigsaw as a teaching learning strategy was perceived as interesting, engaging and powerful by the students evident from the perception questionnaire results. The strategy has been shown to be effective in some of the other studies also.[9,10,11] During the study, it was observed that all the students seemed to enjoy the Jigsaw session and were participating actively in the discussion. It also made them work in small teams, which on one side fosters team spirit within the small group, also brings a sense of healthy competition in between the groups. They felt that such kind of sessions should be conducted routinely. The current study is a first of its kind in our Institute. The authors feel encouraged by the results of the study and hope that this study can serve as a precedence to conduct more such sessions in physiology and can be emulated by the other departments also for the benefit of the students. In our study a very few students also felt the activity would have been more satisfying, had they been told about the topic beforehand, but the authors suggest that it is an effective strategy even when the students have not done any prior reading, which also means that the available time is optimally utilized.

Conclusion: Jigsaw is an active learning strategy, which can be used for providing meaningful and significant learning opportunities for the students.

Lessons learnt from the experience and the recommendations by the authors: The authors wish to recommend that the activity can be incorporated in the small and large group teaching learning sessions especially in the tutorial sessions for any type of subjects/topics. If we looked carefully, here using this strategy every student was made to participate, no one could sit idle. In addition to this, while they work on their topics individually, they get engaged in planned purposeful activity, which leads them be accountable to the task. At the same time when they are working in the expert groups, they can develop a healthy sense of competition, which would benefit them in the long run also. However, here the role of

the facilitator is really crucial, who has to motivate the non participating students and at the same time also has to ensure that the discussion is not dominated by some. The teachers also are benefitted as the activity gives them opportunity to evaluate the sessions and learning of students. Presentations at the end session could improve their communication and way of expression.

Acknowledgment: The authors wish to acknowledge the students of Ist Professional M.B.B.S of MMIMSR, Mullana.

References:

1. Small group teaching key theories and methods. Small group teaching OME 2009 UNSW Faculty of Medicine. [Available from http://www.nevadaadulteducation.org/nvrb/SmallGroupTeaching.pdf] [Accessed on 22.12.2016]
2. Badyal DK, Bala S, Kathuria P. Student evaluation of teaching and assessment methods in pharmacology. Indian J Pharmacol 2010;42:287-89
3. Goyal M, Bansal M, Gupta A, Yadav S. Perceptions and suggestions of 2nd professional MBBS students about their teaching and learning process: An analytical study. National Journal of Integrated Research in Medicine. 2010 Vol 1(4):20-4
4. Aronson, E. Jigsaw classroom. [Available from http://www.jigsaw.org] [Accessed on 27.12,2016]
5. Adams FH. Using jigsaw technique as an effective way of promoting co-operative learning among primary six pupils in Fijai. International Journal of Education and Practice, 2013, 1(6):64-74
6. Vision 2015. Medical Council of India. [available from mciindia.org/tools/announcement/MCI_booklet.pdf] [Accessed on 27.12.2016]
7. Knowles' Six Principles of Adult Learning. [Availablefromhttp://www.acu.edu.au/staff/our_university/faculties/faculty_of_health_sciences/professional_practice_resources_for_supervisors/interprofessional_resource_library/Facilitating_Learning/knowles_principles] [Accessed on 27.12.2016]
8. Steinert Y, Snell LS. Interactive lecturing: strategies for increasing participation in large group presentations. Medical Teacher, Vol. 21, No. 1, 1999:37-42
9. Phillips J, Fusco J. Using the Jigsaw Technique to Teach Clinical Controversy in a Clinical Skills Course. American Journal of Pharmaceutical Education. 2015;79(6):90.
10. Buhr GT, Heflin MT, White HK, Pinheiro SO. Using the jigsaw cooperative learning method to teach medical students about long-term and postacute care. J Am Med Dir Assoc. 2014 Jun;15(6):429-34.
11. Dat TV. The Effects of Jigsaw Learning on Students' Knowledge Retention in Vietnamese Higher Education. 2016 Vol. 5 No. 2:236-53

Conflict of interest: None

Funding: None

Cite this Article as: Monika B, Anshu G, Manoj G Effectiveness Of Modified Jigsaw As An Active Learning Strategy In Physiology.. Natl J Integr Res Med 2016; 7(6): Page no: 93-96