10.5958/2320-608X.2019.00178.1

Introduction and Assessment of Jigsaw Method of Teaching on Challenging Topics in Physiology for First Year Medical Students

Suman Sharma[1], Sangita Chauhan[1], Manjinder Kaur[2]

[1]Associate Professor, [2]Professor & HOD, Department of Physiology, Geetanjali Medical College & Hospital, Udaipur

Abstract

Introduction: Working with active participation in a group results in success. It has been observed that the attendance and performance of the students is reducing in small group teaching because of their lack of interest. 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.

Objectives: The present study is aimed for introducing and assessing the effectiveness of Jigsaw method in enhancing cognitive and communication skills in M.B.B.S. students and it also attempts to train the faculty for this teaching learning method.

Methodology: A didactic lecture on the topic "Auditory system: EAR" was taken by the faculty of the Department of Physiology for 150 first year MBBS students. A prevalidated questionnaire based pre-test was taken in the tutorial hours. Students were randomly divided into 4 expert groups. Each group was given 4 subtopics of ear and they had 30 minutes to prepare it. After that, one student from each expert group was selected and a new mixed group of 4students each was made. The new group was asked to discuss the topic in 30 minutes. Now a Post-test was taken. Student feedback was taken by a prevalidated questionnaire of feedback Reflection writing of the faculty and students were also taken.

Result: It was observed that there was a 118% gain of knowledge in the students $P< 0.0001$ 120.88% students agreed that this teaching learning method was helpful, time saving and doubt clearing. 23.96% students strongly agree that this method should be conducted more frequently in future and in the other departments also. 57.14% faculty suggested that this method needs more planning to execute but at the same time they agreed that it involved active participation of students and faculty both.

Conclusion: Cooperative learning like Jigsaw facilitates learning in small groups with fellow learner and encourages team work which ultimately enhances the teaching learning experience.

Keywords: *Cooperative learning, small group teaching learning method, Jigsaw.*

Introduction

A medical educational institution plays a key role in training a generation in knowledgeable and skilful manner, enhances the critical thinking of the students and develops a problem solving attitude in them. All this together transforms the students from a dependent learner to an active, self directed, lifelong learner. The effectiveness of an educational system greatly depends on the method of teaching they choose to teach their students.[1,2,3] Learning is an active process in which the student and teacher have to work mutually to make the knowledge-sharing process enjoyable and easier for comprehension. For an effective learning teaching should facilitate development of analytical approaches to a problem and to address areas which pose difficulties

Corresponding Author:
Dr Sangita Chauhan
Assistant Professor, Department of Physiology,
Geetanjali Medical College & Hospital, Udaipur
e-mail: docsangitachauhan@gmail.com

for the students. Thus, it becomes essential to design an approach to teaching and learning that is best suited to the needs of the students.[4]

Hence, the role of teacher from "Sage on Stage" as information dispenser needs to be shifted to "Guide by Side" facilitating active learning. Cooperative learning is an active learning approach, in which students improve comprehension, knowledge, critical thinking, problem solving, clinical skills, self confidence and communication including listening. Jigsaw is one of the method which teaches cooperation rather competition..[5] ·This method promotes students motivation in learning positive attitude, develops interpersonal skills, leadership qualities and improves communication by peer- peer teaching.[6]

A good teacher exposes the students and prepares them for the challenging situations in life and trains them with the opportunities for interaction, consultation, cooperation, discussion, and develops skills that helps them debate with themselves and with their teachers so that they can develop the power of thinking and participation. By critical analysis students can recognise their gap of knowledge and areas of difficulties.

Physiology is the basic subject taught in I MBBS forming base of Pathology, Pharmacology and Medicine. The in depth knowledge of all these three subjects with skill can make a Indian Medical Graduate (IMG) more compatible for the society. In Depth knowledge of basic sciences in Physiology with vast syllabus makes some topics complex and difficult to understand and learn. Student's lack of interest and poor participation in small group teachings by didactic lectures inspires us to take the more difficult and challenging topics in an innovative manner.

Because of lack of active learning participation, the IMG is not competent enough to understand the subject thoroughly and is not able to acquire this knowledge up to its affective domain. This makes the student incompetent and is not able o diagnose and provide primary care even for common public health problems which later on become a cause of great disability, morbidity and mortality in the general population.

So the aim of the present study is, to introduce, apply and assess the jigsaw method on the challenging topics in Physiology for first year students. By the active learning process students may correlate the basic science up to cognitive level and start taking keen in depth interest in the subject so that IMG becomes competent enough to diagnose and provide primary health care services.

Aim and Objectives

Goal:

- To improve the competency of IMG.
- To develop interpersonal skills of IMG. i.e. interaction, consultation, cooperation.
- To develop problem solving skills of IMG.
- To develop the power of thinking and meaningful learning of IMG.
- Enhance Peer – peer interaction.

Objective:

- To conduct jigsaw method on challenging topics of physiology for first year medical students.
- To train the faculty for jigsaw method.
- To obtain the students and teachers perception for this newer teaching methodology in physiology.
- To assess the students for the topic taught by the jigsaw method.

Material and Method

Methodology:

Study area: Geetanjali Medical College & Hospital, Udaipur (Raj.).

Study population: 150 first year professional MBBS students (preclinical year semester II) in the Department of Physiology.

Study design: Cross sectional interventional study.

Inclusion criteria: Participants were randomly selected from the whole class who volunteerd for attending the study. The study was conducted on 150 MBBS first year professional students batch 2017-18 (preclinical year semester II) in the Department of Physiology, Geetanjali Medical College & Hospital, Udaipur (Raj.).

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

The activity was performed after obtaining the permission of the Institutional Ethical committee ref. no.

GU/HREC/EC/2018/1523 dated 16/04/2018, HOD of Department of Physiology and from the Dean. A written informed consent was signed by the participants. The names and identifiable information was not recorded in all sessions in order to preserve anonymity. The faculty members were sensitized by discussing the proposed plan of study with them. The whole task was executed in the presence of facilitators. The plan and objectives of the study was explained before the study began.

The proposed work was started after delivering the conventional didactic lecture for 2 hrs to the students on the topic "Auditory System: Ear"

The teaching methodology was applied on the tutorial hours spanning over a period of 3 hours. The feedback of students and reflection writing by students and faculty members were taken and analyzed by statistics.

On the next day participants came to the Department for Jigsaw teaching [7] on the topic "Auditory system-EAR". A structured questionnaire including 10 questions was prepared and validated for pre-test and post-test which was used to assess the students learning experiences. The pre-test was taken for all 150 students. The students were then divided into 4 groups namely A, B, C, and D. Each group had 37 students. Now this A group further divided into 4 Parent groups i.e. A_1 A_2 A $_3A_4$ .Each group now had 9 members. Topics were also divided into 4 subtopics. All the topics were having specific learning objectives (SLO). These subtopics were assigned to each group & the group was given a time period of 30 minutes to prepare. After 30 minutes, expert groups were formed by including students from each parent group i.e. A_1 $C_1$$D_1$ B_I. The Expert group now explains their topic and helps the peers to understand the topic for 30 minutes with the help of available resources, and clearing their doubts if any from the facilitators. After 30 minutes the expert went back to their parent group. Each expert now provided all the information gathered through the discussion and tells them the depth and specific point on the same topic. After that the students gave the post-test.

A prevalidated questionnaire for feedback comprising both closed ended and open ended 10 questions prepared on the basis of 5 point Likert'scale (1= strongly disagree,2=disagree,3=neutral,4=agree,5=strongly agree) were used to assess the learning experience of the students, their perception towards the activity and the level of satisfaction. Feedback was taken by both students and from faculties also. Students submitted their response for newer methodology in the form of reflective writing in WWW model e.g. what happened, so what, and what next. (**The planning chart for methodology is shown in Figure : 1)**

Stastical analysis: Appropriate Stastical analysis was done on the quantitative and qualitative data. Descriptive statistics were used and data was expressed as percentage. Gain % and range of score was performed on the data of pre-test and post-test and a $p<0.0001$ was considered as significant. Mean and standard deviation was used to measure the quantitative variables. Mean score was calculated for the close ended statement with Liker's Scale response. The open ended questions were analysed by content analysis for identifying, interpreting and obtaining themes for student's responses.

Feasibility: Project was feasible and was conducted during tutorial hours in the Department with the help of all teaching and non-teaching staff members.

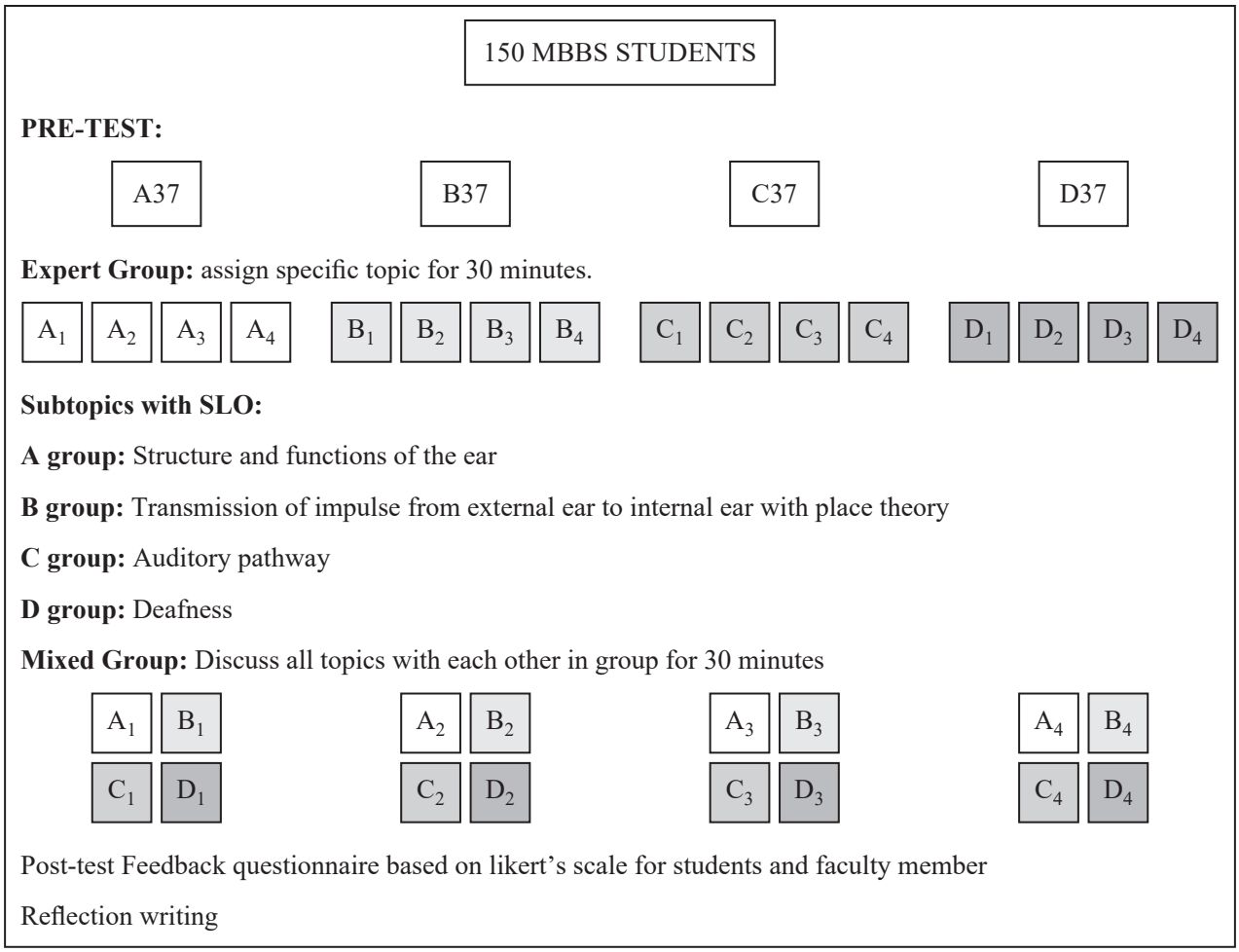

Figure: 1 Planning chart of methodology

Result

The present study included 146 Ist year MBBS student of batch 2017-18 of Geetanjali Medical College & Hospital Udaipur (Raj). Out of 146 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.

118% gain of knowledge was found in students from pre-test to post-test with the Stastical 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 to retain the knowledge which shows active participation of the students.

120.88% students agreed that this teaching learning method was helpful, time saving, doubt clearing. 25% students agreed for peer-peer interaction. 23.96% students strongly agreed that this should be conducted more frequently in future and should also be used by other departments for difficult and challenging topics.

57.14% faculty suggested that although this method needs more planning to execute but it involve active participation of students and faculty.

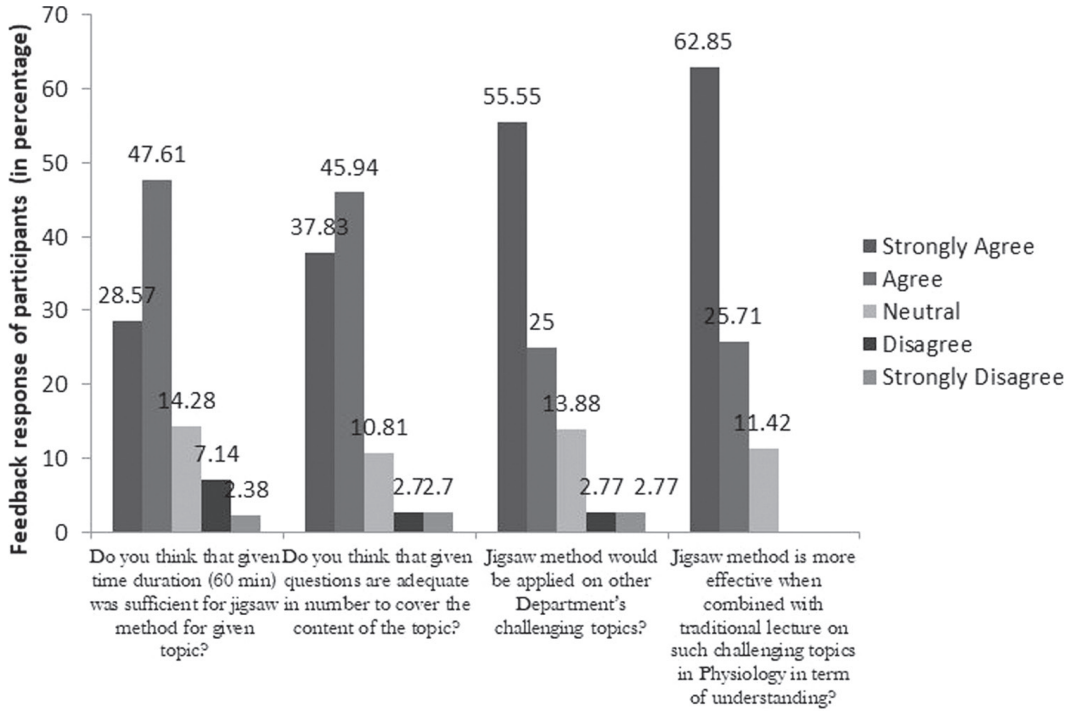

Fig. 2: Feedback of the participants of jigsaw method measured using 5 point likert scale

Above figure describe that 62.85% 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.

55.55% students strongly agreed that this method should be applied on other subjects also like biochemistry in which complicated pathways of metabolism are difficult to memorize.

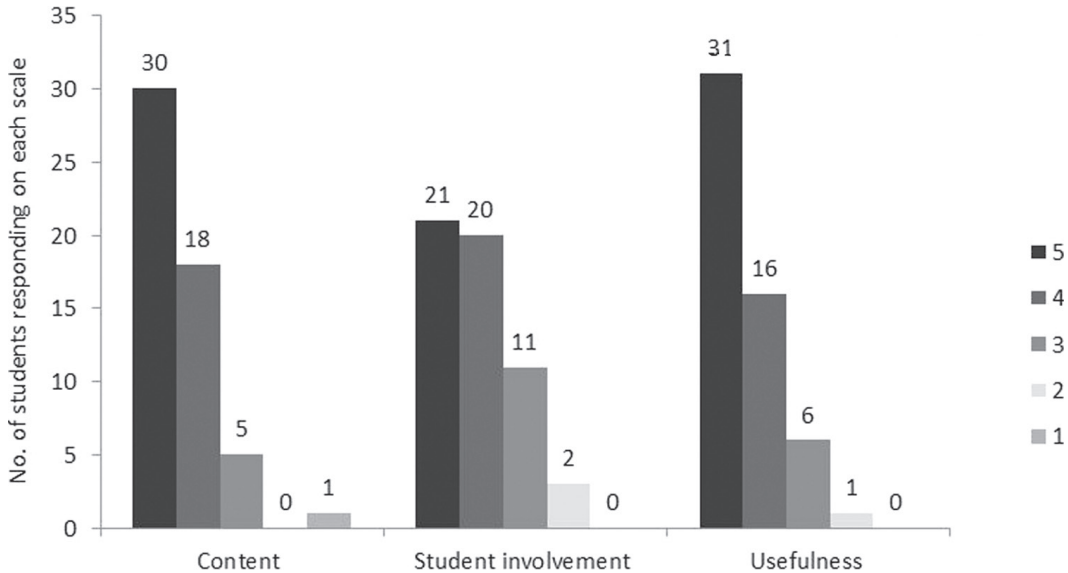

Fig. 3: Evaluation of Jigsaw by participants on 5 point likert sclae where 1 is minimum and 5 is maximum

61% students strongly agreed with content covered in minimum timing and usefulness with active participation by jigsaw method in the department of Physiology shown in figure 3.

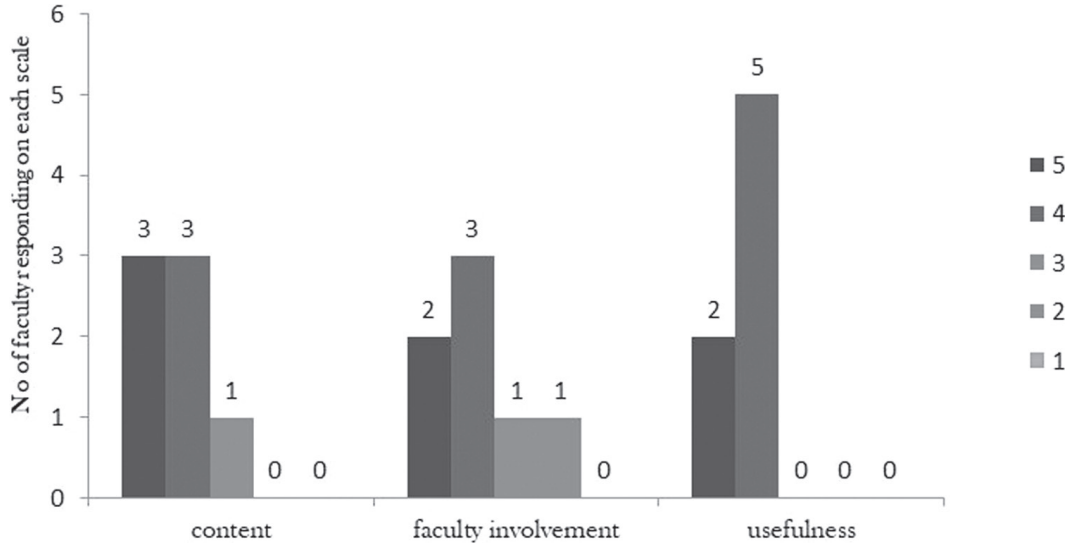

Fig. 4: Evaluation of Jigsaw by faculty members on 5 point likert sclae where 1 is minimum and 5 is maximum

Above figure shows the evaluation done by the faculty for jigsaw method of teaching learning method .They gave maximum support for usefulness in teaching and it is helpful in active participation of students and faculty both so it will be helpful as a part of faculty development programme also.

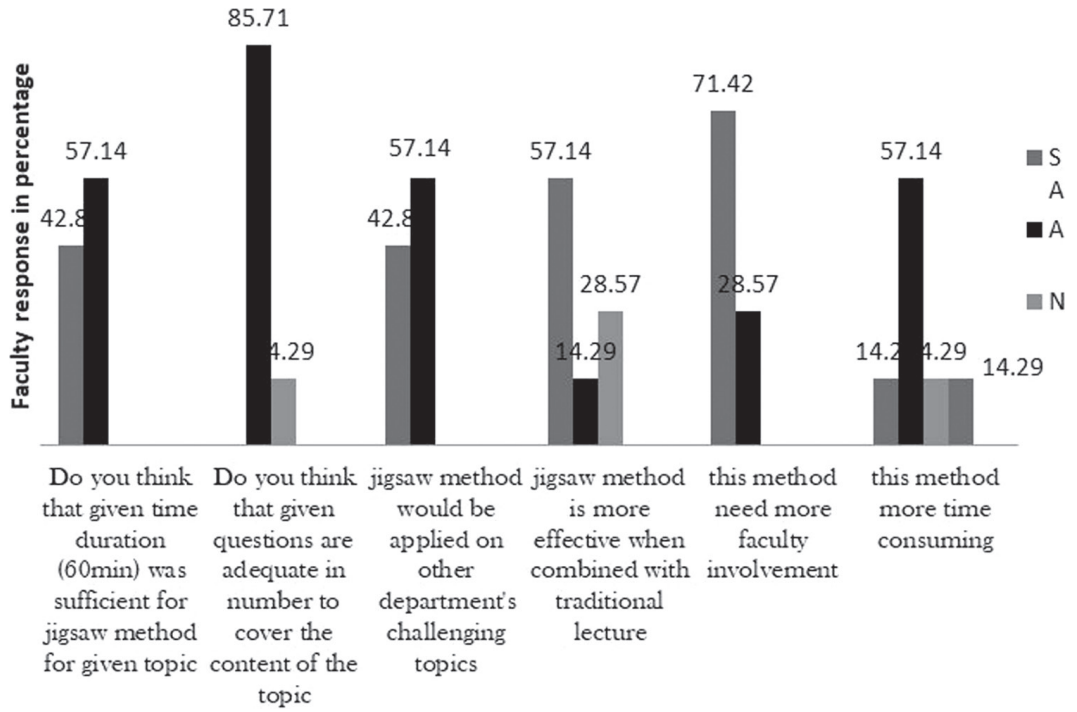

Fig. 5: Feedback of the faculty regarding jigsaw method using 5 point likert scale

57.14% agreed on the point that this method was very time consuming and needs more planning to execute as well as more faculty members are needed.

However they agreed that it was actually an effective and interesting way of teaching to cover more content in less time. It will also help the students to retain the knowledge for long term benefits as shown in figure: 5.

Discussion

Education is a basic need for human communities for survival nowadays. Active learning method emphasize on a new curriculum in which knowledge becomes skill and reaches up to the level of cognition. Cooperative learning like jigsaw improves teamwork and interpersonal communication, thinking & problem solving skills.

"When you teach, you learn twice" this task will be justified by the use of jigsaw by peer-peer interaction and teaching of peer will enhances self confidence among students, logical thinking with motivation of peer and reinforces group dynamics. Majority of the students agreed that jigsaw method improves communication skill, helps to overcome shyness/hesitation and stage fear.

The effectiveness of newer methodology was done using Kirkpatrick's model of training program evaluation. Student's feedback showing their positive response to accept this method proves that it was helpful, innovative and fun way of learning with their peers. Students construct or build their own concepts and they reinforce each other to study and participate actively result of the same shown in Figure 5. Similar studies also gave same results[8,9]

% gain of score from pre-test to post-test was 118% which showed the increase in knowledge score after using jigsaw method. Similar results were also found in studies carried by Phillips J, Kumar VCS & Azmin NH.[10,11,12]

Post-test assessment revealed that students gain knowledge with retention power and now they can prepare themselves in a better manner for their examination as compared to the previous exam preparations. . The students answered that this method takes less time to prepare for exam because individual work load was reduced and reading material was distributed equally to each other group members. In addition, they also noted that sharing the work in groups saved their time for extensive topic and topic could be studied in detail in a comfortable environments created by peers. It also provided an opportunity to be as a leader for that topic.

The assessment of Jigsaw method by Kirkpatrick's evaluation framework suggested that it is an effective teaching learning tool and its impact on learning outcome among the students and faculty both are acceptable and feasible. However it needs more planning to execute with more faculty members.

Conclusion: The Jigsaw method is an active and interesting way of learning. In groups, with fellow learner co-operation and team work students prepare for exams without stress. Though, jigsaw method is time consuming in term of planning and execution, it is still very effective in bringing out operational outcome for students & faculty.

The positive results may motivate the faculty and students to implement new teaching learning method on a regular basis. Hence, boring but important topics in Physiology will be better understood and will become more interesting. This will encourage both the faculty and the students to adopt more innovative and interactive environment at work place.

Conflict of Interest: None.

Source of Funding: The project is affordable at all levels. There is no extra burden to the students in terms of expenses at either the institutional or students level Program.

Recommendations: Challenging topics of any subject should be made interactive by promoting self directed learning so that students identify their learning gaps and work together with peers and faculty to address them.

Limitation:

- Time consuming and require more planning for execution of jigsaw.
- Long term outcome of students learning with jigsaw was not measured.

References

1. Gulpinar MA, Yegen BC. Interactive lecturing for meaningful learning in large groups. Medical Teacher. 2005; 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. Saville B, Zinn T, Neef N, Van NR, Ferreri S. A comparison of inter-teaching and lecture in the college classroom. Journal of Applied Behavior Analysis. 2006; 39:49–61.
5. Rao VD. Understanding jigsaw cooperative learning: influence on scholastic achievement and learning experiences of students in mathematics education. The International Journal of Indian Psycology.2016; 3(3):100-06.
6. Johnson J H. Importance of dissection in learning anatomy: personal dissection versus peer teaching. Clin Ana.2002; 15(1):38-44.
7. Bhandari B. Mehta B, Mavai M, Singh YR, Singhal A. Jigsaw method: an innovative way of cooperative learning in physiology.IJPP.2017;61(3):315-21.
8. Persky AM, Pollack GM. Ahybrid jigsaw approach to teaching renal clearance concepts. Am J Pharm Educ.2009; 73(3): article 49.
9. Earl GL. Using cooperative learning for a drug information assignment. Am J Pharm Edu. 2009; 73(7): article 132.
10. 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.
11. Kumar VCS, Kalasuramath S, Patil S, Kumar RKG, Taj SKG, JayasimhaVL,ET AL. Effect of jigsaw cooperative learning method in improving cognitive skills among medical students. Int J Current Microbiol. 2017;6(3):167-73.