



'JIGSAW METHOD'- A UNIQUE APPROACH TO PEER LEARNING IN ANATOMY.

Medical Education

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ABSTRACT

Background: With the Introduction of CBME curriculum, the Teaching learning has a paradigm shift from teacher centric to student centric and role of teacher has become a facilitator in providing the holistic approach to the learning activity by involving students in all the three domains. Innovative teaching and learning methods are quintessential in catering the needs of modern education. The traditional teaching learning methods have to be modified or replaced to provide wholesome education to students. **Methodology:** To evaluate the effective of Jigsaw method over traditional tutorial method and to evaluate the perception of students towards jigsaw method. The 75 students were divided into study and control groups. Pre test was done on a topic after a traditional didactic lecture. The study group of 30 Students was further divided into 6 Principal sub groups of 5 students each and each student was assigned with a subtopic. The student with same subtopic were formed into master groups. Control group of 40 students were taught or engaged with traditional tutorial method. Study group was provided with models, specimens and study material to discuss the sub topics in master group, in next session the students of master group moved to principal group to exchange their mastery over the subtopic with other peers using model, specimen and study material. Control group was engaged in tutorial methods. Post test was done to compare the impact of Jigsaw method with MCQ'S and practical viva and perception was evaluated with questionnaire. **Results:** Mean values of academic scores of tests conducted were statistically significant with Jigsaw method compared to classical tutorials with p value < 0.001 . Analysis of students' perceptions revealed that Jigsaw method of self directed learning had advantages over tutorials in terms of better opportunities, interaction and involvement by students. **Conclusions:** Jigsaw method is an effective way to engage students in their learning, and can be incorporated in medical college with new CBME curriculum with proper planning and implementation.

KEYWORDS

Jigsaw, Tutorials, students perception, self-directed learning.

INTRODUCTION

The Jigsaw method is a type of peer learning where students are actively involved in the teaching-learning process^{1,2}. The 'SPICES' model of medical education administers a paradigm shift from teacher-centered to learner-centered approach. Active involvement of students has great effect on retention³. Use of active /teaching learning strategies into traditional passive learning approaches has resulted in improved students' performance^{4,5}. The CBME curriculum categorically emphasizes self-directed learning and encourage learner centric approaches. This method has been successfully tried in various areas of education like elementary⁷ or primary education nursing education⁸ but less so in medical subjects⁹. The jigsaw method has multidimensional role in teaching and learning process. The principal role of this method is to create an environment of learning in groups, with peer interaction¹⁰. Literature search could not yield much published articles on the use of Jigsaw method for Anatomy teaching.

Objectives

To evaluate the effect and perception of students towards jigsaw method.

MATERIALS & METHODS

Study Center – Department of Anatomy, SSIMS& RC, Davangere

Study Design– Comparative study

The present study was conducted for 75 first year MBBS students after institutional ethical clearance following a conventional didactic lecture on a given topic. The activity was conducted during tutorial hours in two sessions extending over 4 weeks under the supervision of faculty. One topic with ten sub topics was selected. In this study we have selected the Topic of Anatomy of hand with 10 different Specific Learning Objectives.

Session 1

The students were briefed regarding the entire plan of the study after a pre-test on the selected topic and 75 interested students were divided

into two groups as study and control groups consisting of 30 and 45 students respectively. Further study group was divided into six Principal groups each consisting of five students and each student was assigned the number 1A, 1B, 1C....so on. Each student in the group was given one sub topic for study. Next, students with same sub topics were forming Master groups and consists of 1A, 2A, 3A, 4A, 5A. The students were asked to discuss over the sub topic in their master group during next session and control group of 40 students (5 students were absent) were given same topic without any division similar to a conventional tutorial method.

Session 2

The Master group students discussed subtopic in all aspects using available resources and help by facilitators with models and specimens. The members of Master group returned to their Principal group and discussed regarding their sub topic with fellow members and were asked to discuss or present any sub topic using specimens and models. Control group students were engaged in a traditional tutorial method. A post test was conducted on the same topic using MCQ for both study and control group followed by practical demonstration examination for few (15) randomly selected students in both study and control group. At the end, a feedback was obtained by a questionnaire from students regarding the conduct of Jigsaw method (Graph-1) and Jigsaw method as T/L tool in anatomy (Graph-2) by using Kirkpatrick model of evaluation. Faculty Perception regarding Jigsaw method was also recorded by questionnaire. Data was analyzed using SPSS software.

Table 1: Students' Perception Regarding Conduct Of Jigsaw Method In Anatomy

Item No	Items	Strongly disagree	Dis-agree	Un-certain	Agree	Strongly agree
1	Jigsaw activity was beneficial in understanding the given topic					

2	The activity was good enough to cover all the aspects of the topic.				
3	The activity helped in improving communication skills.				
4	A thorough discussion on the topics increased analytical thinking ability				
5	The activity helped in improving presentation skills				
6	This type of activity should be applied for vast topics in Anatomy				
7	The activity inspired teaching qualities in students.				
8	The activity helps to apply the knowledge in clinical setting				
9	The activity is innovative and involved fun learning				
10	This is an effective alternate way of learning.				

Table 2: Students' Perception Regarding Jigsaw Method As A Teaching/ Learning Tool In Anatomy

Item No	Items	Yes	No
1	Jigsaw is fair in dividing the vast topics into small sub topics and improves the retention of topics by mutual discussion in students		
2	Jigsaw is good in improving communication skills amongst students		
3	Jigsaw improves my academic performance		
4	Jigsaw is less stressful as compare to traditional T/L method		
5	Jigsaw helps to interact with my peers in a better way		
6	Jigsaw helps to consolidate the concepts of vast topics		
7	Jigsaw improves clinical application		
8	Jigsaw provides fair chance to present my view on the topic/ sub topic		
9	Jigsaw is enjoyable		
10	Jigsaw is less time consuming than other traditional methods		

Table-3: Faculty Perception Regarding Jigsaw Method

Item No	Items	Yes	No
1	Jigsaw method is innovative T/L method		
2	Jigsaw method promotes mutual peer learning and improves communication skills		
3	Jigsaw method improves learning and comprehension		
4	Jigsaw method is student centric approach		
5	Jigsaw method breaks vast topic into small sub topics and help in better learning by students		
6	Jigsaw method improves attendance performance of students		
7	Jigsaw method ingrains the quality of teaching in students		

RESULTS

1. Significant difference was observed in the pre-test and pos-ttest scores of study group & control group
2. Students perceived jigsaw as an effective method of peer learning.
3. Students and faculty found jigsaw method as more interactive and innovative T/L tool compared to tutorials in anatomy.

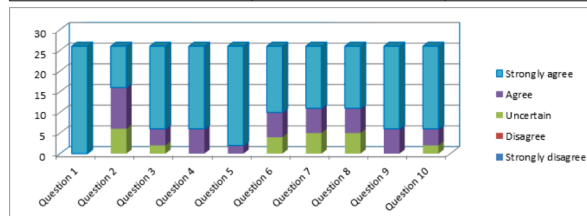
Table-4: Showing Comparison Between The Scores Of Jigsaw Method & Tutorial Method

T/L Method	Evaluation tests (MCQ for 15 marks)	Mean score +/-SD	Significance

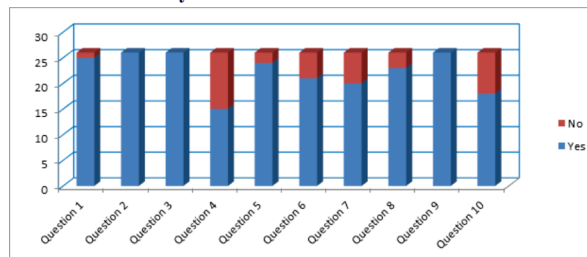
Jigsaw method (N=26)	Pre-test	6.8077 +/- 1.76679	P<0.001
	Post-test	8.9231 +/- 2.11515	Significant
Tutorial method (N=44)	Pre-test	6.7727 +/- 1.96319	P<0.001
	Post-test	8.5455 +/- 2.25630	Significant

Table-5: Showing Comparison Between The Scores Of Study Group & Control Group By Practical Exams

Practical demonstration examination (25 Marks)	Mean score +/- SD	Significance
Study group (N=15)	22.0625 +/- 1.73085	P< 0.001
Control group	14.6875 +/- 4.20664	Significant



Graph 1: Students Perception Regarding Conduct Of Jigsaw Method In Anatomy



Graph 2: Student Perception Regarding Jigsaw Method As A T/L Tool In Anatomy

DISCUSSION

Jigsaw method is one of the novel ways employed in self-directed learning sessions. The present study was an attempt to use peer learning through the jigsaw method for teaching complex topics in anatomy with numerous specific learning objectives. In many institutions classical tutorials are conducted as students learn the topic themselves and get their difficulties clarified at the end by the facilitators. With the jigsaw method, peer learning was facilitated during tutorial hours under the supervision of facilitators, where specific learning objectives for the topic were discussed and clarified. In our study of peer learning, it was noted that there was significant difference in grades of study and control groups between their pre and post-test scores, which was also found in the study by Pai KM et al., who stated that Self Directed Learning sessions could cover a few competencies from the total content areas in the 1st year MBBS curriculum and have explained that since independent SDL sessions are equally impactful as lectures. This helps faculty conserve their time for alternative high yielding teaching learning activity sessions¹¹. According to data faculty in many Indian Medical institutions are having numerous assignments with academic, administrative, accreditation activities, and meetings in addition to others, considering a few topics exclusively for SDL can help to ease the burden. But, it is the other aspects of SDL sessions which have to be considered beneficial with regard to both students and teachers. This is also supported in the CBME curriculum, where some of the topics advised by the University are learnt by students on their own as part of SDL sessions. Fernández-Santander A et al., studied that peer learning improved the communication amongst students and inspired students to learn complex topics better¹². Sreenivasulu K et al., also highlighted the advantages of SDL by jigsaw to enhance student activity in all domains. The student's perception in the present study are in line with the said studies wherein 54% agreed peer learning helped to comprehend the complex topics. Also 52% perceived that sessions helped to ripen communication skills¹³. Parmar and Rathod et al., studied increment in mean post-test score for topics covered by jigsaw method in forensic medicine¹⁴. A positive correlation was observed between student's behavior towards innovative teaching methodology than didactic lectures¹⁵. Srivastava and Waghmare et al., documented that innovative teaching learning methods were impactful as compared to traditional pedagogies¹⁶. The present CBME curriculum demands unique T/L methods like jigsaw methods to cover complex topics in

anatomy with clinical relevance covering all domains and jigsaw can be included in the curriculum along with the traditional tutorial methods¹⁷. In the present study even, faculty opined that Jigsaw method can be inculcated in ever growing curriculum of CBME with emphasis on the goal of creating globally acceptable and locally relevant Indian medical graduate.

CONCLUSION

Jigsaw method is an effective method of peer learning with enhanced communication and practical skills compared to traditional tutorial method in Anatomy. It improves peer learning in students by providing a platform to communicate and express their learning in all domains. It should be planned and implemented depending on the topic.

REFERENCES

1. Aronson E, Stephan C, Sikes J, Blaney N, Snapp M. The Jigsaw Classroom, Sage Publications, Inc., Beverly Hills, California, 1978.
2. Aronson. Jigsaw technique [Internet]. Course Design Tutorial. [Cited 2016 Dec 9]. Available from: <http://serc.carleton.edu/NAGTWorkshops/coursedesign/tutorial/jigsaw.html>.
3. 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* 15: 429–34.
4. Charania NA, Kausar F, Cassum S. Playing jigsaw: a cooperative learning experience. *J Nurs Educ* 2001; 40:420-421.
5. Charlier N, Van Der Stock L, Iserbyt P. Peer-assisted Learning in Cardiopulmonary Resuscitation: The Jigsaw Model. *J Emerg Med* 2016; 50: 67–73.
6. Custers EJ. Long-term retention of basic science knowledge: a review study. *Adv Health Sci Educ Theory Pract* 2010; 15: 109-128.
7. Earl GL. Using cooperative learning for a drug information assignment. *Am J Pharm Educ* 2009; 73: 132.
8. Elora C, Voyles, Sarah F, Bailey, Amanda M, Durik. New Pieces of the Jigsaw Classroom: Increasing Accountability to Reduce Social Loafing in Student Group Projects. *The New School Psychology Bulletin* 2015; 13: 11–20.
9. Freeman S, Eddy SL, McDonough M, Smith MK, Okoroafor N, Jordt H et al. Active learning increases student performance in science, engineering, and mathematics. *Proc Natl Acad Sci* 2014 Jun 10; 111(23): 8410–8415.
10. Jigsaw Steps [Internet]. Jigsaws. [Cited 2016 Dec 20]. Available from: <http://serc.carleton.edu/sp/library/jigsaws/steps.html>
11. Pai KM, Rao KR, Punja D, Kamath A. The effectiveness of self-directed learning (SDL) for teaching physiology to first-year medical students. *Australas Med J*. 2014;7(11):448-53.
12. Fernández-Santander A. Cooperative learning combined with short periods of lecturing: A good alternative in teaching biochemistry. *Biochem Mol Biol Educ*. 2008;36(1):34-8.
13. Sreenivasulu K, Nightingale S, Sarada D, Sree Y, S, Ravi, Ramesh A. Effectiveness of Jigsaw technique in addition to lecture for teaching medical undergraduates. *Int J Med Sc Educ*. 2020; 7(6): 8-11.
14. Parmar P, Rathod GB. Study of innovative teaching methods to enhance teaching and learning in forensic medicine *Int Arch Integr Med*. 2015; 2:78–80.
15. Saleh AM, Al-tawil NG, Al-Hadithi TS. Didactic lectures and interactive sessions in small groups: A comparative study among undergraduate students in Hawler College of Medicine *Br J Educ Soc Behav Sci*. 2013; 3:144–53.
16. Srivastava T, Waghmare L. Interactive intra-group tutorials: A modification to suit the challenges of physiology tutorial in rural medical schools *Natl J Physiol Pharm Pharmacol*. 2014; 4:1.
17. Monika L, Sanjay P. Assessing the Outcome of Implementation of Jigsaw Technique as a Learning Tool and its Effect on Performance of 1st Year Medical Students in Anatomy. *National Journal of Clinical Anatomy* 10(2): p 97-102, Apr–Jun 2021.