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Effectiveness of Jigsaw Technique of Interactive Learning in Physiology Among I MBBS Students

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ABSTRACT

BACKGROUND: An Indian Medical Graduate needs interactive teaching-learning methods to be integrated with traditional teaching approaches as part of the MBBS curriculum, as outlined in the new Competency-Based Medical Education (CBME) framework. The Jigsaw method of teaching is an innovative, cooperative learning technique that has gained significant importance. The present study was conducted to assess the effectiveness of the interactive teaching technique, the "Jigsaw method," in learning physiology, as well as to evaluate students' perceptions of using this method

MATERIALS AND METHODS: A lecture on the Basal Ganglia was delivered as part of large group teaching, followed by a pretest consisting of 20 multiple-choice questions (MCQs). Based on their roll numbers, 150 children were randomly assigned to two groups of 75 each (control and Jigsaw). On the day of the intervention, both groups were given a pretest after being instructed on the research design. The Jigsaw group learned the concept using the Jigsaw method, while the control group was taught using the traditional Small Group Teaching (SGT) method. A post-test, identical to the pretest, was administered to both groups, and feedback was collected from the Jigsaw group.

RESULT: The Jigsaw group had a higher mean post-test score (15.42 ± 3.24) than the control group (10.12 ± 3.42). The Jigsaw group had a much higher mean post-test score than the control group, and the difference was statistically significant. Additionally, students offered good comments regarding the Jigsaw style of interactive teaching, according to the Likert rating scale.

CONCLUSION: Interactive teaching employing the Jigsaw approach has been demonstrated to be highly effective in boosting knowledge and promoting long-term retention of physiology concepts, when compared to the traditional way of small group instruction.

KEYWORDS: Co - operative learning, Interactive learning, Jigsaw technique, Self-directed learning, Small Group Teaching, Traditional teaching.

INTRODUCTION

Current trends in medical education demand a shift from traditional teacher-centered methods to student-centered learning, [1,2,3] where the teacher transitions from being a "Sage on Stage" to a "Guide by the Side" [4,5]. This change aims to foster the transition of Indian medical graduates from dependence to active, self-directed, lifelong learners, as outlined by the Medical Council of India (MCI) in the "Vision 2015" document [5].

Traditional large group didactic lectures and small group discussions, while effective, have limitations in student participation and interaction with the teacher. A growing concern among medical educators is the need to equip graduates with the competencies required to be lifelong learners. This involves active learning, where students search medical literature and apply knowledge to problem-solving and are trained as per professional competencies. The Jigsaw learning technique by Aronson and Bridgeman et al [1, 2,3] is an accepted student-centered [3] cooperative [6] and equal opportunity

learning method that encourages students to work towards a common goal that enhances knowledge, problem -solving, self-confidence, communication with peers, earning knowledge on in depth difficult topics and their listening skills [7].

Newer learning methods, such as the Jigsaw technique, have demonstrated effectiveness across various educational fields, including school education, biology, nursing, dentistry, pharmacy, and medicine, though student perceptions remain mixed [3].

The transition from passive tutorial sessions to active, cooperative [6] and collaborative learning, where students engage collectively and foster teamwork, has emerged as a highly effective and refined alternative. Although Jigsaw offers significant benefits for student learning, many teachers remain unfamiliar with it.

This article explores Jigsaw, its variations, effects, and applications to enhance teacher awareness and is aimed to encourage its adoption in the classroom of 1st year MBBS students to evaluate its effectiveness, and analyse student and faculty perceptions through a structured feedback questionnaire.

MATERIALS AND METHODS

This randomized interventional study was carried out in the Department of Physiology, Viswabharathi Medical College, Kurnool, after obtaining clearance from the Institutional Ethics Committee. Participation of first-year MBBS students was completely voluntary and anonymity was ensured.

Inclusion criteria: All first-year MBBS students enrolled in the academic year 2023–24, regardless of gender.
Exclusion criteria: Students unwilling to take part in the study.

A total of 150 first-year MBBS students participated in the study on the topic *Basal Ganglia*. They were randomly divided into two groups of 75 each, forming the **control group** and the **jigsaw group**.

Study Procedure

On the day of the intervention, A lecture on the Basal Ganglia was delivered as part of large group teaching to all the students and both the groups were given pretest, after being briefed about study design. Students were reassured that their scores would be used solely for research purposes and would not affect academic grading. The pre-test consisted of 20 faculty-prepared multiple-choice questions (MCQs), validated by the Medical Education Unit. Each question carried one mark, with a maximum score of 20.

- **Control group:** Students in this group attended a conventional tutorial on *Basal Ganglia*, delivered in a traditional small-group format. The instructor conducted the session and students were allowed to ask questions at the end. A post-test, identical in format to the pre-test, was administered immediately after the tutorial.
- **Jigsaw group:** Students in this group were further divided into 15 "parent groups," each containing 5 members (labelled A to O). Within every parent group, students were numbered 1–5 (e.g., A1–A5, B1–B5, etc.), and each member was assigned one subtopic. Now the students assigned with the same subtopic were grouped together, called Expert groups. The expert groups were assigned subtopic for the topic "Basal Ganglia" for the learning session
- The five expert groups were assigned the following subtopics:
    1. Components of the Basal Ganglia
    2. Connections of the Basal Ganglia
    3. Direct and Indirect Pathways
    4. Functions of the Basal Ganglia
    5. Disorders of the Basal Ganglia

Each expert group was given one hour to study and discuss their assigned subtopic with faculty guidance and available resources. After this, students returned to their respective parent groups, where each member taught their peers the subtopic they had mastered, ensuring the entire group received complete coverage of the topic. Another hour was allotted for this peer-teaching session.

Following the intervention, the jigsaw group also completed the same post-test as the control group. Additionally, students in the jigsaw group were asked to provide feedback through a Likert-scale questionnaire (validated by the Medical Education Unit). The feedback form contained eight close-ended items scored from 1 (strongly disagree) to 5 (strongly agree).

Statistical Analysis

Data were compiled in MS Excel and analyzed using SPSS version 20.0. Pre-test and post-test scores were expressed as mean ± standard deviation. Comparisons of pre-test scores between the two groups were made using the unpaired t-test, while within-group comparisons (pre-test vs. post-test) were analyzed using the paired t-test. A p-value <0.05 was considered statistically significant. Responses to Likert-scale items were analyzed as frequencies and percentages.

RESULTS

A total of 150 undergraduate students participated in the study. All of them were in the age group of 17–20 years. The pre-test between the two groups did not show a statistically significant difference. The mean score of post-test in the jigsaw method was 15.42±3.24 and 10.12±3.42 In the control group. The Mean post test score in the study group was high when compared to the control group and it was found to be statistically significant as shown in Table 1.

Table 1: Comparison of Pre-test and post-test scores

Type of group	Pre-test	Post-test	p-value
Study group	7.29±1.92	15.42±3.24	<0.001*
Control group	7.31±1.74	10.12±3.42	<0.003*
p value	0.174	<0.002*	-

*significant

Students gave satisfactory feedback based on Likerts rating scale about Jigsaw method of Interactive teaching as shown in Table 2 & Fig. 1

TABLE 2: Student responses on feedback questionnaire, towards the Jigsaw technique

	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)
Jigsaw method helps in long term retention	1.33	6.67	13.33	57.33	21.33
This new method generated interest in learning Physiology	5.33	2.67	12.00	34.67	45.33
Jigsaw method motivates me to learn better	1.33	1.33	9.33	44.00	44.00
Jigsaw method improved peer interaction	2.67	4.00	13.33	38.67	41.33
Jigsaw method was interactive	2.67	8.00	10.67	40.00	38.67
Jigsaw method guided me to take responsibility of my learning	0.00	6.67	10.67	45.33	37.33
Jigsaw method promoted critical thinking and decision making	6.67	8.00	12.00	44.00	29.33
This method can be applied for other concepts in physiology	8.00	8.00	9.33	44.00	30.67

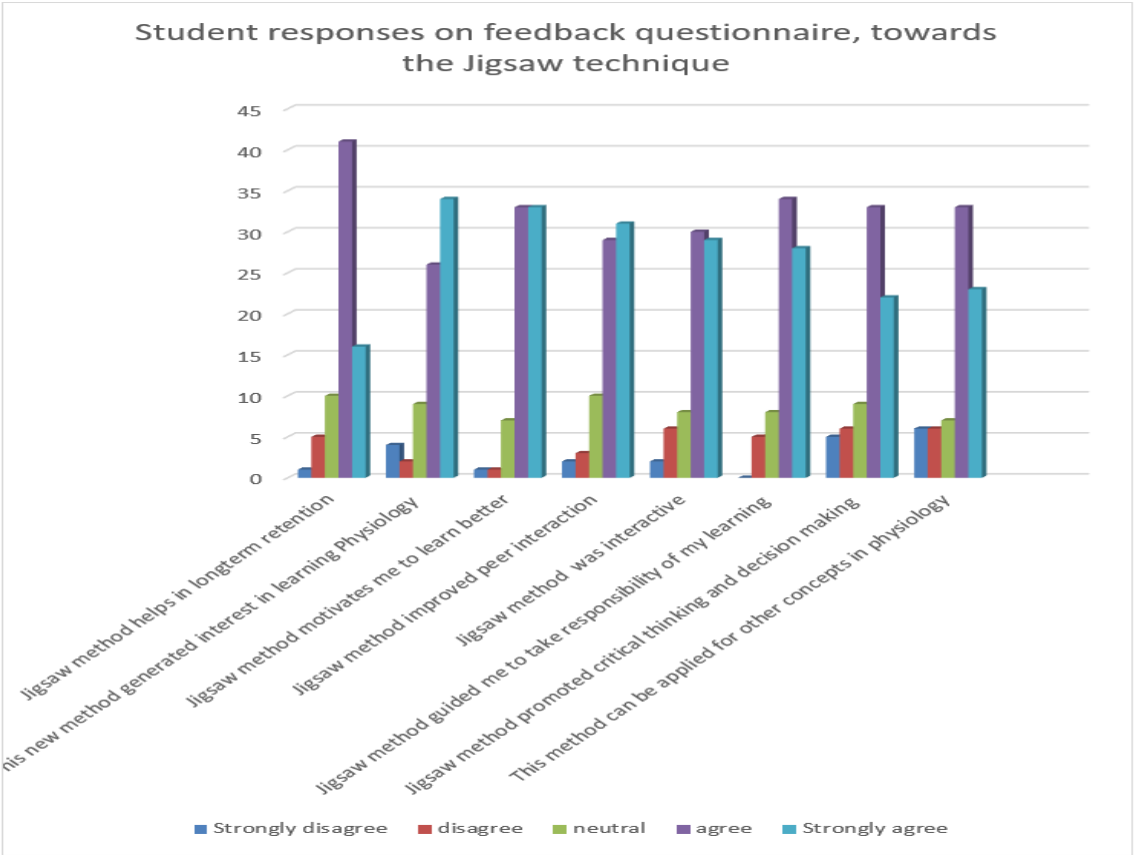

Fig.1: Student responses on feedback questionnaire, towards the Jigsaw technique

DISCUSSION

The present study was conducted to evaluate the effectiveness of the Jigsaw technique of interactive learning in teaching Physiology among first-year MBBS students. The results revealed that students in the Jigsaw group showed significantly higher post-test scores compared to those taught through the traditional method, and they also provided highly positive feedback on their learning experience.

Academic Performance:

In the current study, the pre-test scores between the two groups were comparable, with no statistically significant difference ($p = 0.174$), indicating a similar baseline level of knowledge. After the intervention, the study group showed a remarkable improvement in the mean post-test score (15.42 ± 3.24), which was significantly higher than that of the control group (10.12 ± 3.42; $p < 0.002$). These findings suggest that the Jigsaw technique was superior in improving comprehension and retention of Physiology concepts compared to the traditional teaching method.

Similar results were reported by Aronson, who first introduced the Jigsaw method and demonstrated that cooperative learning promotes deeper understanding and long-term retention of knowledge [8]. Subsequent studies in medical education have also shown that active learning strategies such as Jigsaw improve student performance compared to passive lecture-based learning [9,10]. For example, a study by Vasan et al. in medical students highlighted that the Jigsaw technique significantly improved learning outcomes and fostered collaborative learning [11]. Likewise, Gupta et al. in Physiology teaching found that students in the Jigsaw group scored significantly higher than those in the traditional teaching group [12]. The results of the present study are in agreement with these findings and support the effectiveness of Jigsaw as a teaching-learning strategy.

Student Perceptions and Feedback

Student feedback in the present study also reflected the effectiveness of the Jigsaw method. A majority of students agreed or strongly agreed that the technique helped in long-term retention (78.66%), generated interest in learning Physiology (80%), and motivated them to learn better (88%). Additionally, more than 80% reported that it improved peer interaction and was interactive in nature. Importantly, students felt that the Jigsaw technique promoted self-directed learning (82.66%) and critical thinking (73.33%).

These observations are consistent with the constructivist learning theory, which emphasizes learner-centered and collaborative approaches to education [13]. Studies in medical education have shown that Jigsaw not only improves academic performance but also enhances interpersonal skills, teamwork, communication, and accountability [14]. Kumar et al. reported that Jigsaw learning increased student engagement and responsibility for their own learning [15]. Similarly, Azmin found that students perceived the Jigsaw method as more enjoyable, interactive, and effective in improving problem-solving skills compared to lectures [16].

CONCLUSION

Interactive teaching employing the Jigsaw approach has been demonstrated to be highly effective in boosting knowledge and promoting long-term retention of physiology concepts, when compared to the traditional way of small group instruction.

REFERENCES

1. Aronson E, Bridgeman D. Jigsaw groups and the desegregated classroom: In pursuit of common goals. Personality and Social Psychology Bulletin. 1979; 5(4):438-46.
2. Aronson E, Bridgeman DL, Geffner R. The effects of a cooperative classroom structure on students' behaviour and attitudes. In D. Bar-Tal, & L. Saxe, Editors. Social Psychology of Education: Theory and Research. Washington, DC: Hemisphere; 1978.
3. Singaravelu V, Madhusudhan U. Jigsaw Teaching vs Small Group Teaching: A Comparative Study Among Phase 3 MBBS Students in the Department of Paediatrics. Journal of Pediatrics Review. 2021; 9(4):347-354.
4. King A. From sage on the stage to guide on the side. College Teaching. 1993; 41(1):30-5.
5. Medical Council of India. Reforms in under-graduate and post-graduate medical education, Vision 2015 [Internet]. 2011 [Updated 2011 March 29]. Available from: https://www.tnmgrmu.ac.in/images/medical-council-of-india/MCI_book.pdf
6. Hanze, M., and Berger, R. 2007. Cooperative learning, motivational effects, and student characteristics: An experimental study comparing cooperative learning and direct instruction in 12th grade physics classes. Learning and Instruction, 17, 29–41.
7. Vinod Kumar, C.S,et.,al. 2017. Effect of Jigsaw Co-Operative Learning Method in Improving Cognitive Skills among Medical Students. Int.J.Curr.Microbiol.App.Sci. 6(3): 164-173.
8. Aronson E. The Jigsaw Classroom. Beverly Hills: Sage Publications; 1978.
9. Prince M. Does active learning work? A review of the research. J Eng Educ. 2004;93(3):223–31.
10. Slavin RE. Cooperative learning and academic achievement: Why does groupwork work? Annu Rev Psychol. 2014;65:41–66.
11. Vasan NS, DeFouw DO, Holland BK. Modified use of the Jigsaw technique for a large group of students. Am J Pharm Educ. 2009;73(6):120.
12. Gupta T, Singh S, Kotru M. The Jigsaw cooperative learning method: An innovative way of teaching and learning Physiology. Indian J Physiol Pharmacol. 2013;57(3):292–6.
13. Bruner JS. The culture of education. Cambridge, MA: Harvard University Press; 1996.
14. Hedeen T. The reverse Jigsaw: A process of cooperative learning and discussion. Teach Sociol. 2003;31(3):325–32.
15. Kumar V, Saini S, Dogra A. Effectiveness of Jigsaw learning on knowledge achievement of medical students. Natl J Physiol Pharm Pharmacol. 2017;7(10):1047–50.
16. Azmin NHA. Effect of the Jigsaw-based cooperative learning method on student performance in the General Certificate of Education Advanced-level Psychology: An exploratory Brunei case study. Int Educ Stud. 2016;9(1):91–106.