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Original Research Article

Jigsaw Method of Interactive Teaching to Unpuzzle Neuroanatomy

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ABSTRACT

Introduction: Student driven interactive methods of teaching are a major part of andragogy, which drives them to professional competency. Jigsaw method is one such interactive teaching modality which fosters self-directed learning and peer interaction. The aim of this study is to access the effectiveness of Jigsaw method of interactive teaching qualitatively and quantitatively among 1st year MBBS students.

Materials and methods: this study was done in 1st year medical students. The students were exposed to jigsaw method of interactive teaching in small groups and the program was evaluated by assessing the short and long term memory of the students. Feedback also was obtained from the students.

Results: There was a statistically significant difference in the mean scores as compared to traditional teaching methods. The perception of students also showed promising results.

Discussion: there have been many studies on student perception on such interactive teaching methods which revealed that the students were showing better academic performances. A few studies like the present one, on quantitative assessment of students score after Jigsaw method of interactive teaching has also shown good results.

Conclusion: the jigsaw method of interactive teaching encourages student participation and enhances self directed learning and peer assisted learning.

KEY WORDS: Neuroanatomy, jigsaw, peer learning, androgogy.

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INTRODUCTION

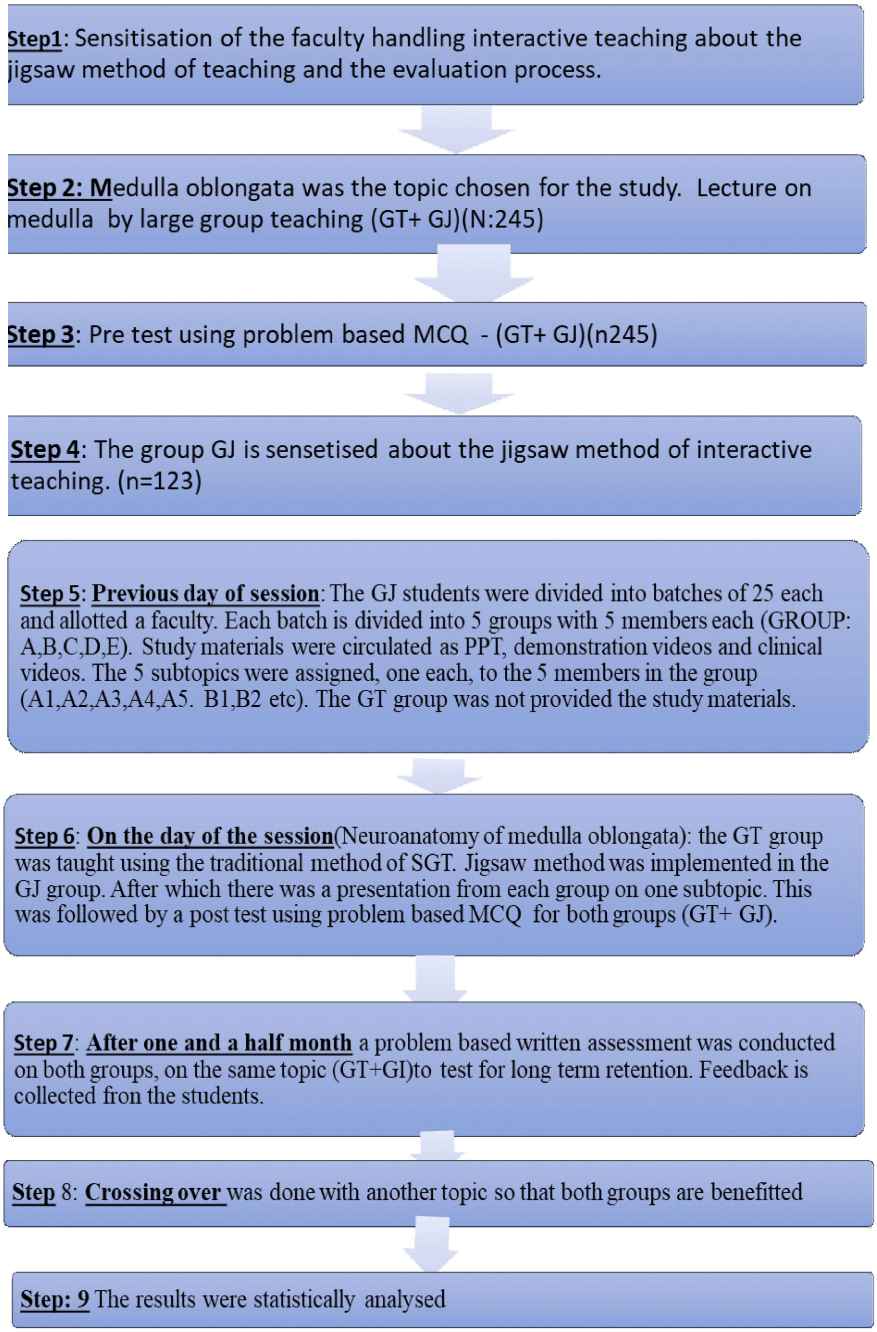
Student driven interactive methods of teaching are a major part of andragogy, which drives them to professional competency [1]. Jigsaw method is one such interactive teaching modality which fosters self directed learning and peer interaction. Teaching is the best method of learning, hence peer teaching enhances learning [2]. The jigsaw method has been employed since the seventees and has proven to be effective in high school and a few recent studies prove its role in medical

education as well [3,4,5]. The strategy of this method is assisted learning from multiple sources followed by peer discussion and teaching, facilitated by a subject expert. The aim of the study is evaluating qualitatively and quantitatively the effectiveness of the Jigsaw method of interactive teaching in learning neuroanatomy, which the students usually find it difficult to understand.

MATERIALS AND METHODS

This study was conducted among 1st year MBBS students of a private medical college in Chennai, India. Due ethical clearance was obtained from Institutional ethical committee. All the 1st year MBBS students (n=250) were included in the study by purposive sampling. They were divided into 2 groups, the traditional small group teaching group (GT) and an interactive small group teaching group (GJ). The methodology of the study is as illustrated in the flow chart 1 and figure 1. After the study a feedback was collected from the students using likert's scale. After this the results were qualitatively and quantitively analysed.

Flow chart 1: Methodology of the study.



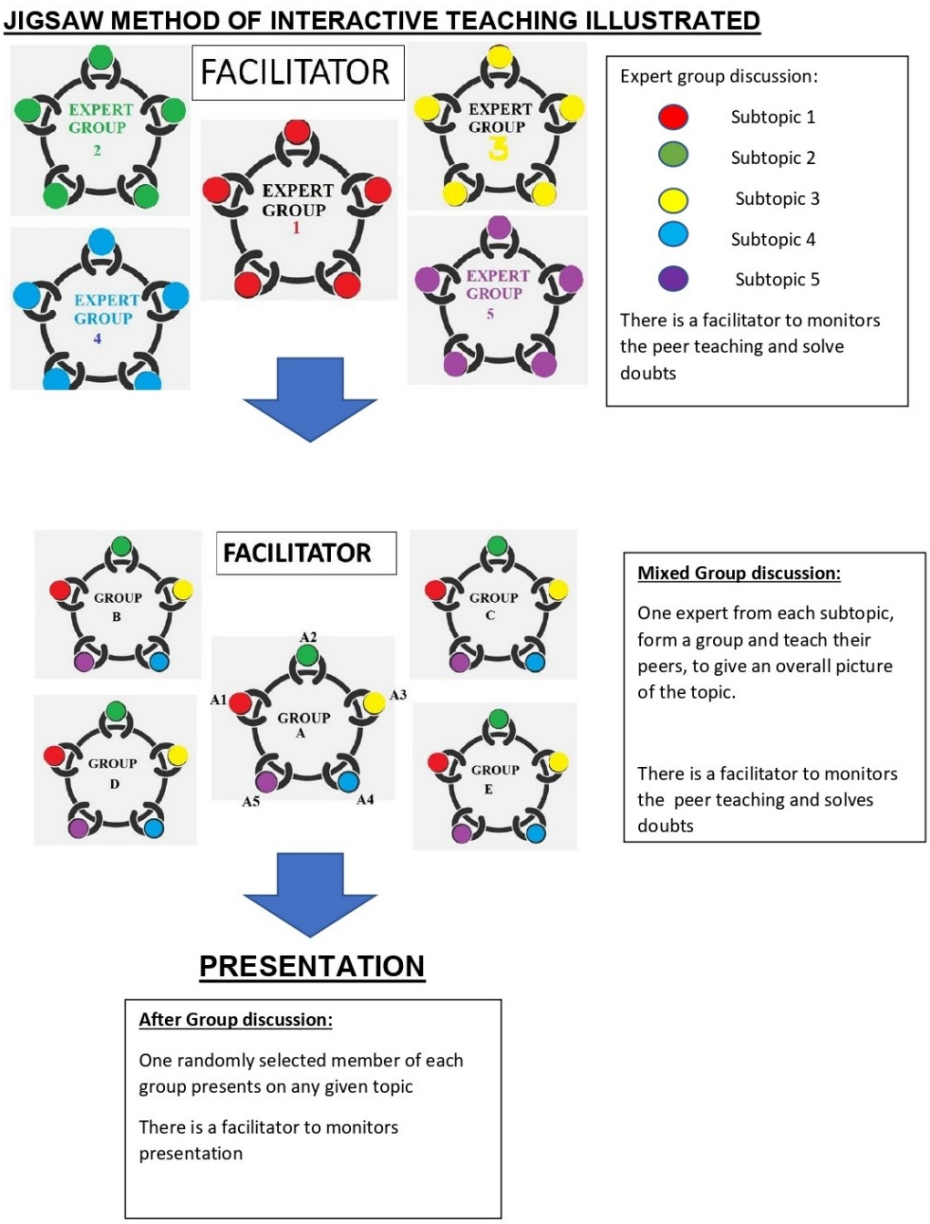


Fig. 1: stages of Jigsaw method method – diagrammatic illustration.

RESULTS

The mean of the pretest of both the methods was found to be 5.5/10, the mean score of post test after traditional method was 7.32/10. The mean score of post test after the jigsaw method was found to be 8.5/10. The independent sample t test was applied in these two groups and p value (0.0000) was found to be statistically significant at 95% Confidence Interval. (Table 1, Graph: 1)

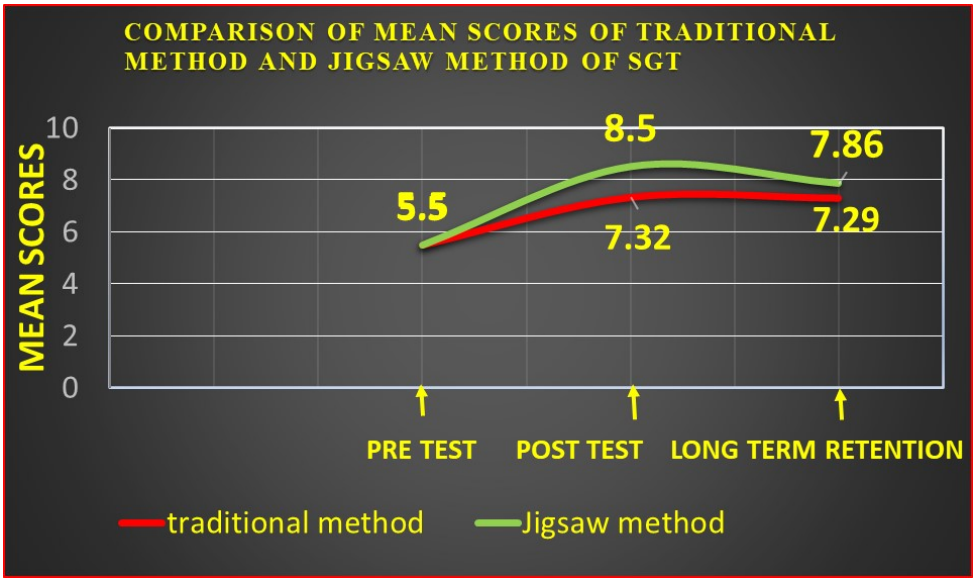
The mean of the scores for long-term retention assessment after traditional method was 7.29/10. The mean score for long-term retention assessment was jigsaw method was7.86/10. The independent sample t test was applied in these two groups and p value (0.0000) was found to be statistically significant at 95% Confidence Interval. (Table 1, Graph: 1)

The results of qualitative assessment in the form of feedback also showed positive responses from the students. 49% of the group strongly agreed that jigsaw methods helped in long term retention. 49% strongly agreed that that they would like to have such sessions in future. 47.1% of students opined that jigsaw method motivates them to learn better. 45% of students opined that this method improves peer interaction. 47.1% strongly agreed that jigsaw method of teaching was interesting. (Graph 2)

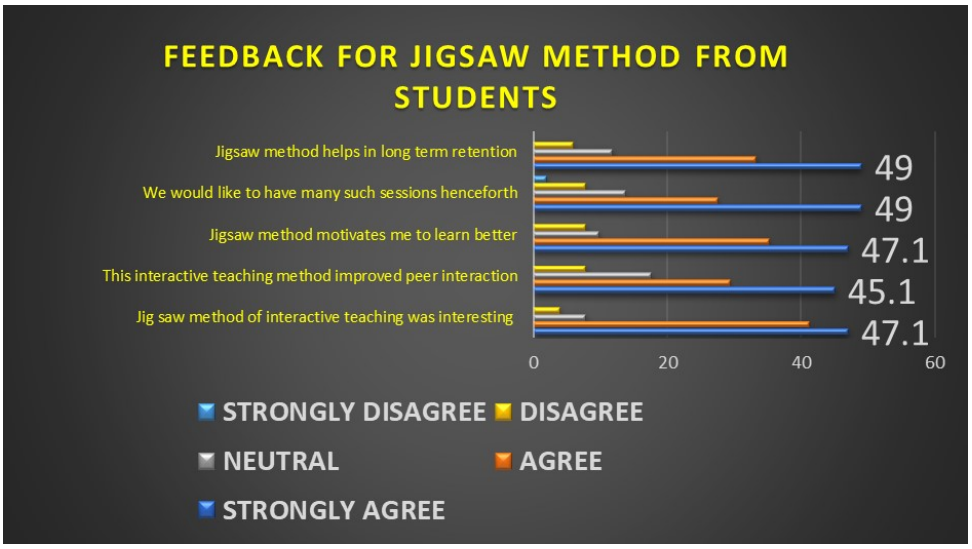
Table 1: Comparison of the scores of pre-test, post-test and long term retention in GT and GJ groups.

S.No	Variable	Mean	SD	P Value
1	**Post Test Scores (Novel and Traditional)**			
	Jigsaw method	8.5	1.4	0.000*
	Traditional method	7.32	1.35	
2	**Long Term Retention**			
	Jigsaw method	7.86	1.04	0.000*
	Traditional method of SGT	7.29	1.38	

* Statistically significant at 95% Confidence Interval



Graph 1: Comparison of mean scores before and after traditional method(GT) and jigsaw method(GJ).



Graph 2: Feedback For Jigsaw Method From Students.

DISCUSSION

Many research studies on the Jigsaw method that was done in diverse fields. In one such study done amongst students of general chemistry at Ataturk University, it was seen that this method was effective with a P value of 0.001 [6]. In another study on Jigsaw method done on 200 students of Midwestern University Chicago College of Pharmacy, this method proved to be very effective and the author opined that this method may be useful in teaching concepts where integration of different types of material is required, and also in situations where the perspective of the student may affect the interpretation and application [7]. A study on Jigsaw method of interactive teaching was done in 2016 amongst Nursing students of University of Barcelona,

Spain, the results of which was quite deviant from the present study. They reported that attitude analysis gave a positive result but qualitative analysis gave a negative result [8].

In 2017 a research was done in All India Institute of Medical Sciences, Jodhpur, which concluded that, by using this method the satisfaction scores was greater than 80 in feedback on comprehension, communication skills, peer interaction, in depth analytical skills etc. [5]. A study conducted in the nursing students, University of Medical Sciences, Mashhad, Iran concluded that Jigsaw method is one of the most important teaching methods which promote learning among postgraduate and undergraduate students. In addition, it also helps in improving teamwork, thinking, problem-solving skills and interpersonal communication [4,9]. Jigsaw methods has been used in many other fields like engineering, primary school, language teaching and other science fields and proved to be of great significance [10,11,12,13].

CONCLUSION

Interactive teaching by jigsaw method is found to be very useful in enhancing the knowledge and in long term retention in Anatomy, as compared to the traditional method of small group teaching. It makes learning simpler, wider, interesting and improves peer learning. Further the stakeholders and the medical council can recommend such methods of interactive learning as a routine part of curriculum after further research.

Conflicts of Interests: None

Author Contributions

Rahe Rajan - conceptualization of the idea & manuscript writing

M.R.Renuka & WMS Johnson -

conceptualization of the idea & manuscript writing

Jinu Merlin Koshy -

Data collection and statical analysis

Krishnaveni Sharath -

critical analysis, data collection

Durga Devi G - data collection

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REFERENCES

[1]. Loeng S. Various ways of understanding the concept of andragogy. Cogent Education. 2018 Jan 1;5(1):1496643. https://www.tandfonline.com/doi/full/10.1080/2331186X.2018.1496643

[2]. Montazeri Khadem A, Khoshkholgh R, Vafi Sani F, Dolatabadi Z. Using the Jigsaw (Puzzle) Method in Academic Environments: Benefits and Challenges. Medical Education Bulletin. 2022 Apr 1;3(2):459-67. https://www.medicaleducation-bulletin.ir/article_146209.html

[3]. Tomaswick L. Active Learning–Jigsaw. Kent State University Center for Teaching and Learning. Retrieved [20/01/2023] from http://www. kent. edu/ctl/educational-resources/active-learning-jigsaw/. Available at. 2017 Jun 26. https://www-s3-live.kent.edu/s3fs-root/s3fs-public/file/Teaching%20Tools%20In%20a%20Flash%20-%20Jigsaw%20-%20Final.pdf

[4]. Goolsarran N, Hamo CE, Lu WH. Using the jigsaw technique to teach patient safety. Medical education online. 2020 Jan 1;25(1):1710325. https://www.tandfonline.com/doi/full/10.1080/10872981.2019.1710325

[5]. Bhandari B, Mehta B, Mavai M, Singh YR, Singhal A. Medical education/original article jigsaw method: An innovative way of cooperative learning in physiology. Indian J Physiol Pharmacol. 2017;61(3):315-21. https://ijpp.com/IJPP%20archives/2017_61_3/315-321.pdf

[6]. Doymus K. Teaching chemical equilibrium with the jigsaw technique. Research in science Education. 2008 Mar;38(2):249-60.https://link.springer.com/article/10.1007/s11165-007-9047-8

[7]. Phillips J, Fusco J. Using the jigsaw technique to teach clinical controversy in a clinical skills course. American journal of pharmaceutical education. 2015 Aug 25;79(6). https://www.ajpe.org/content/79/6/90.abstract

[8]. Leyva-Moral JM, Camps MR. Teaching research methods in nursing using Aronson's Jigsaw Technique. A cross-sectional survey of student satisfaction. Nurse education today. 2016 May 1;40:78-83. https://www.sciencedirect.com/science/article/pii/S0260691716000897

[9]. D'Eon M, Zhao R. Five ways for facilitators to get 00-v1-n1-cmej07095/1090343ar/abstract/

[10]. O'Leary N, Wattison N, Edwards T, Bryan K. Closing the theory–practice gap: Physical education students' use of jigsaw learning in a secondary school. European Physical Education Review. 2015 May;21(2):176-94. https://journals.sagepub.com/doi/abs/10.1177/1356336X14555300

[11]. Doymus K, Karacop A, Simsek U. Effects of jigsaw and animation techniques on students' understanding of concepts and subjects in electrochemistry. Educational technology research and development. 2010 Dec;58(6):671-91. https://link.springer.com/article/10.1007/s11423-010-9157-2

[12]. Karimi Moonaghi H, Bagheri M. Jigsaw: A good student-centered method in medical education. Future of Medical Education Journal. 2017;7(1):35-40. http://eprints.mums.ac.ir/731/

[13]. Mengduo Q, Xiaoling J. Jigsaw Strategy as a Cooperative Learning Technique: Focusing on the Language Learners. Chinese Journal of Applied Linguistics (Foreign Language Teaching & Research Press). 2010 Aug 1;33(4). https://search.ebscohost.com/login.a spx? direct =true & profile=ehost&scope=site&authtype= crawler & jrnl=2 1929505& AN=56551220& h=jwUAPz7WtH W3uq0N9bF3tELkw6BG50ysXrODk1t%2BSr%2BR QWdB8 xVE Um96Bl71j62l76DJrk5k3v3cmgZ CM52qCw% 3D%3D&crl=c

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