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Original Research

To Study The Outcome Of Jigsaw Classes In Physiology Department

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ABSTRACT

Background:CBME based curriculum is learner based that include on **interactive & innovative teaching** methods. One of the **interactive & innovative teaching method is Jigsaw.** The jigsaw method has not only shown to build comprehension, it also encourages cooperativity among students. It is further known to improve listening and communication skills

Aim and Objectives: To study the outcome of jigsaw classes in Physiology department

Methodology: This study was carried out in the Department of Physiology in a GS Medical College and Hospital. A topic was chosen and taught using jigsaw technique. Pre and post-test was conducted in the form of MCQ. The students were asked to give feedback in a Google form on a five-point Likert scale. That was kept anonymous. Faculty also gave their feedback in a separately provided separate link of Google form for feedback. The data were collected, compiled and analyzed.

Findings: The majority of the students did welcome the introduction of new Teaching learning Method (TLM) and strongly recommended the use of such methods in teaching many more topics in future. Faculty members were of the opinion that many more topics shall be taken up using new TLMs.

Conclusions: This study establishes the fact that both the medical students and faculty want active teaching-learning techniques.

Keywords: Teaching learning Method (TLM), jigsaw classes, Likert scale, teaching methodology

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INTRODUCTION

As we know that from 2019, medical education is CBME based. Due to this whole scenario of teaching method is changed. CBME based curriculum is learner based that include on **interactive & innovative teaching** methods. One of the **interactive & innovative teaching method is Jigsaw.** Jigsaw is a research-based cooperative learning technique invented and developed in the early 1970s by Elliot Aronson and his students at the University of Texas and the University of California[1,2]. Jigsaw has been increasing positive educational outcomes such as improved test performance, reduced absenteeism, and greater liking for classes. Just as a jigsaw puzzle is a collection of various pieces that come together to make a complete picture, the jigsaw method of teaching is a collection of topics, which will be fully developed by students before coming together to make a complete idea[2]. To be more specific, this type of cooperative learning strategy allows individuals or small groups to become responsible for a subcategory of a larger topic. After researching and developing their idea, each individual or small group then has the responsibility to teach it to the rest of the group or class[2]. The 'SPICES' model of medical curriculum recommends a paradigm shift from teacher-centred to student-centred learning. Active engagement of learners has shown to improve long-term retention of acquired knowledge[3,7]. Incorporation of active learning strategies into conventional passive learning approaches has resulted in improved students' performance [6,7]. The jigsaw method has not only shown to build comprehension, it also encourages cooperativity among students. It is further known to improve listening and communication skills[4,5] .

METHODOLOGY

The present study was conducted with MBBS Phase1 students in the Department of Physiology at GS Medical College and Hospital PilkhuwaHapur. The task was a part of routine unconventional activity during tutorial hours. The activity was commenced

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after approval from the Institutional Ethics Committee. Faculty members were sensitized by discussing with them the proposed plan of study. The activity was completed during tutorial hours in 4 sessions spanning 5 weeks. The whole task was executed in the presence of the facilitators. The unit selected for Jigsaw activity was Nerve and Muscle Physiology; the topic was Nerve Physiology. The sub-topics assigned to the members of the "parent group" were –

1 Structure of Neuron
2 Functions of the Neuron
3 Myelinated and unmyelinated Neuron
4 Glial cells
5 Neurotrophins
6 Physiological properties of the Nerve fibres
7 Classification of Nerve fibres
8 Properties of Nerve fibres
9 Degeneration of nerve fibres
10 Regeneration of nerve fibres
11 The sessions were divided as follows:

Session 1: Students were explained in detail about the strategy. We have150 students in phase 1. So 15 groups, each consisting of 10 randomly selected members, were created. These were the "parent groups" which were named "A to O". Each member of the "parent group" e.g. parent group A with members A1 , A2, A3,.., A10, was assigned one of the above mentioned sub-topics, such that each of the parent groups has members with 10 different subtopics. Next, the students who were assigned same sub-topics in all the 15 parent groups collected to form "expert groups". Thus we had 10 "expert groups', named "1 through 10" (e.g. Expert group 2 constituted members- A2, B2, C2… O2). The students were asked to prepare the subtopics for discussion in their respective "expert group" in the next session Pre-test by means of MCQ was conducted at the end of the session.

Session 2: The expert group worked together for an hour, discussing all the aspects of the given sub-topic, using all the available resources, and clearing their doubts, if any, from the facilitators

Session 3: The members returned to their respective "parent group". Subsequently, each expert provided the fellow members with all the information gathered through the discussion in the "expert group." Students were informed in advance that "parent group" members need to learn all the sub-topics from one another and any of the members could be asked to speak on any of the sub-topic.

Session 4: The last session was of 4 hours duration, in which one member from each "parent group" was randomly selected and asked to teach a particular topic to the whole class. The student was permitted to use chalk and board for the same. Since all topics could not be discussed the same day, this session was continued in the subsequent tutorial class. The students were also encouraged to ask questions from the presenter if they had any, at the end of the presentation. The presentation session was not recommended in the original jigsaw method; it has been added in the modified version, to overcome hesitation/ shyness and improve communication skills among students. Post-test by means of MCQ was conducted at the end of the session. At the end of session link of Google form for feedback from students as well as faculty was sent.

The data collected was analysed by using IBM SPSS 27 version software.

OBSERVATIONS AND RESULTS

Comparison of Pre and Post-test scores of all the participants those present gave both Pre and Post-test was done by using paired t-test using IBM SPSS 27 version software.

Each test included 40 multiple choice question and a total of 101 students participated in both Pre and Post-test. Those students were absent either in pre or posttest were excluded. The mean value± SD for Pre and Post- test was 13.0416± 2.8687and 21.6770± 5.8228 respectively was statistically significant which denotes that students performed significantly better in the post –test.(t value=13.03 & p value 0.00001.).

The link of Google form for feedback questionnaire was provided to the students as well as the faculty had options to respond on a five point Likert scale**.**

The response of the students to the feedback questionnaire (table1,fig 1) is as follows (percentage)

Table: 1 (Feedback form for students)

SN.	Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1	This new method generated interest to physiology	5.6%	1.1%	36.7%	44.4%	12.2%
2	The activity enabled in-depth coverage of the topic	4.5%	14.4%	23.3%	47.8%	10%
3	This method enhanced my referral habits	5.8%	2%	22.2%	53.3%	16.7%
4	The activity helped in enhancing communication skills	2.5%	0%	12.2	53.3%	32.2%
5	A thorough discussion on the topics increased analytical ability.	2.1%	2.2%	23.3%	51.3%	21.1%
6	The activity helped in overcoming shyness and hesitation in the class	2.3%	2.1%	15.6%	47.8%	32.2%
7	The exercise ingrained teaching skills in the participants	0.4%	2.9%	21.1%	60%	15.6%
8	The exercise was enjoyable	2.8%	6%	37.8%	35.6%	17.8%

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9	This is an effective way of learning.	5%	5.1%	33.3%	44.4%	12.2%
10	This method will be applied for other topics in Physiology	14.4%	18.9%	25.6%	28.9%	12.2%

As is evident from the table above 56.6 % of the students either agreed or strongly agreed that this new method generated interest to physiology while 36.7% are students neutral and 6.7% students are disagreed or strongly disagreed.

47.8% of the students agreed and 10% strongly agreed that this activity enabled in-depth coverage of the topic while 23.3% are students neutral and 14.4 % students are disagreed & 4.5% are strongly disagreed.

53.3% of the students agreed and 16.7%strongly agreed that this method enhanced their referral habits 22.2% are students neutral and 2 % students are disagreed & 5.8% are strongly disagreed.

53.3% of the students agreed and 32.2%strongly agreed that the activity helped in enhancing communication skills 12.2% are students neutral and 2.5 % students are disagreed or strongly disagreed.

51.3% of the students agreed and 21.1%strongly agreed that A thorough discussion on the topics increased analytical ability.23.3% are students neutral and 2.2 % students are disagreed & 2.1% are strongly disagreed.

47.8% of the students agreed and 17.8%strongly agreed that the activity helped in overcoming shyness and hesitation in the class 15.6% are students neutral and 2.1 % students are disagreed & 2.3% are strongly disagreed.

60% of the students agreed and 15.6%strongly agreed that the exercise ingrained teaching skills in the participants 21.1% are students neutral and 3.3 % students are disagreed or strongly disagreed.

35.5% of the students agreed and 32.2%strongly agreed that the exercise was enjoyable 37.8% are students neutral and 6 % students are disagreed & 2.8% are strongly disagree.

44.4% of the students agreed and 12.2%strongly agreed that this is an effective way of learning33.3% are students neutral and 10.1% students are disagreed or strongly disagreed.

28.9% of the students agreed and 12.2 %strongly agreed that this method will be applied for other topics in Physiology 25.6% are students neutral and 18.9 % students are disagreed & 14.4% are strongly disagreed

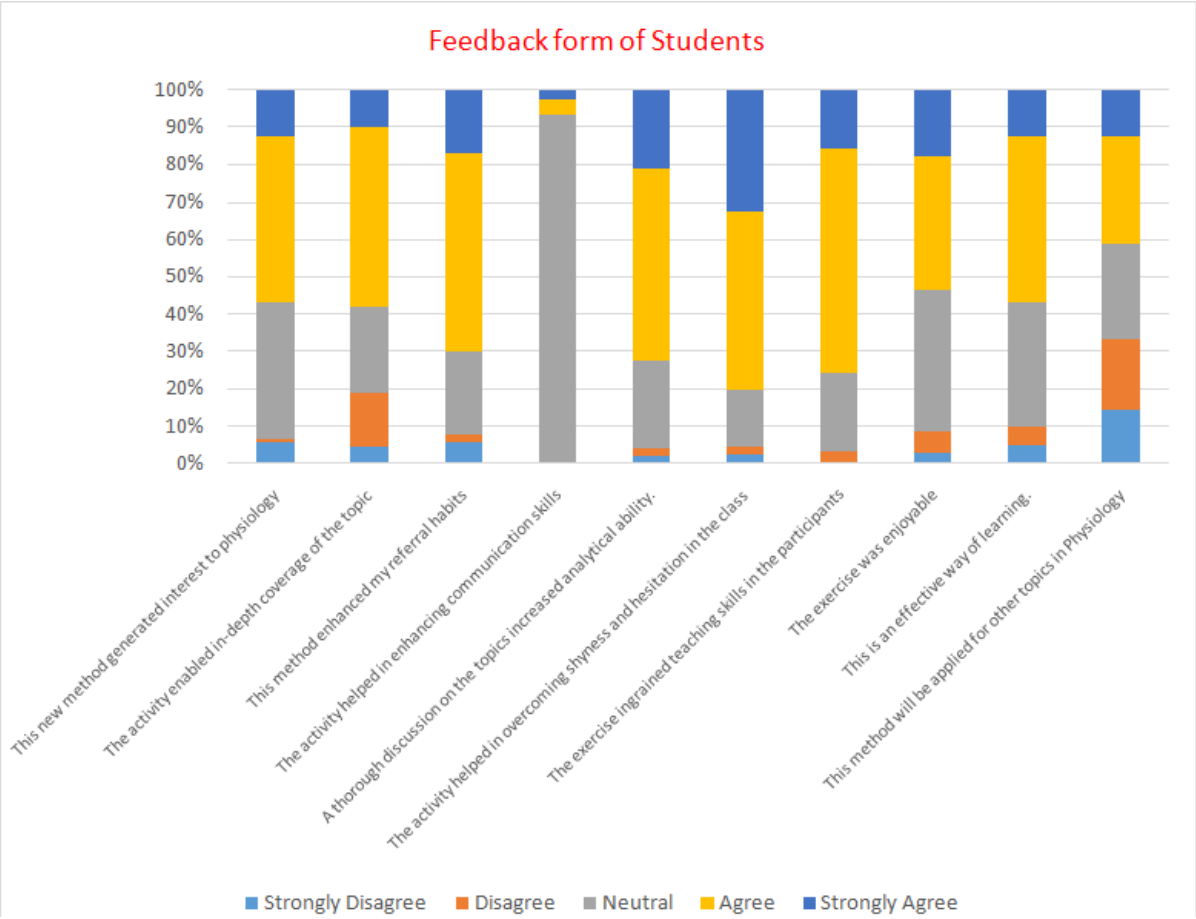

Figure 1

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Table 2- Feedback by Faculty on concept maps

SN.	Question	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
1.	This new method generated interest of students to physiology			20%	40%	40%
2.	The activity enabled in-depth coverage of the topic		20%		60%	20%
3.	This method enhanced student referral habits				100%	
4.	The activity helped in enhancing communication skills of students		20%		40%	40%
5.	A thorough discussion on the topics increased analytical ability of students			20%		80%
6.	The activity helped in overcoming shyness and hesitation of students in the class			20%	60%	20%
7.	The exercise ingrained teaching skills in the students			20%	60%	20%
8.	The exercise was enjoyable		20%		20%	60%
9.	This is an effective way of learning for students				20%	80%
10.	This method will be applied for other topics in Physiology		20%		40%	40%

As is very clearly evident all faculty (table2, Fig 2) either agreed or strongly agreed that this new method generated interest of students to physiology. They also agreed that this method enhanced student referral habits and helped in enhancing communication skills of studentsthis is an effective way of learning for students would also like this method to be introduced other topics in physiology

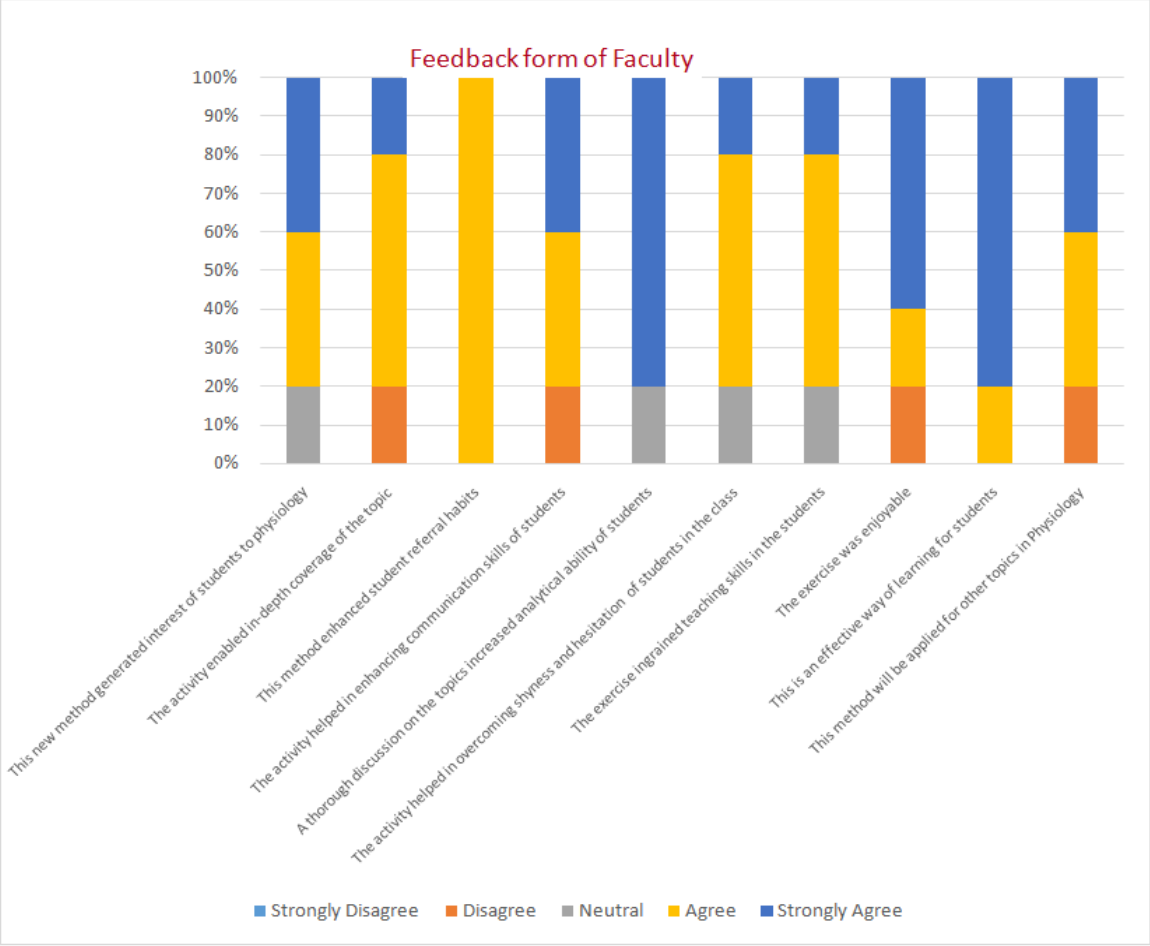

Figure 2

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Thus, the study observed satisfaction from majority of students as well as from faculty towards different aspects of learning the topic, on a five point Likert scale. A positive response was also obtained on feedback regarding this teaching learning methodology.

DISCUSSION

The study aimed at promoting new teaching learning methodology among medical students through a jigsaw method of teaching and learning. It included Group discussion, Peer teaching and seminar Presentations of the learned topic, in front of the whole class.

Comparison of pre and post –test scores in this study, revealed significant difference in the scores; a positive feedback was received from the majority of participants as well as the faculty regarding jigsaw classes.

The similar study was conducted by Suhail Ahmad Gilkar*et.al* concluded that the majority of the students(>90%) did welcome the introduction of ALM and strongly recommended the use of such methods in teaching many more topics in future. 100% faculty members were of the opinion that many more topics shall be taken up using ALMs.: This study establishes the fact that both the medical students and faculty want a change from the traditional way of passive, teacher-centric learning, to the more active teaching-learning technique[8]

Other study also support my study. The study by Bharti Bhandari *et.al*. observed high satisfaction scores of students towards different aspects of learning the topic, on a five point Likert scale. A positive response was also obtained on open ended feedback regarding this teaching learning methodology[9.]

Veena Bhaskar Sampangi Rame Gowda *et.al*. concluded that grades between pre and post-tests of both groups implied that tutorial sessions by jigsaw method helped to improve knowledge gain. Students felt the session helped to improve their communication skills and requested to implement other topics which is the need of the hour[10].

The literature is clear on the benefits of active, student-centered learning over a strictly lecture approach. Lecture is not ineffective but active involvement in the learning process is beneficial to students, it reduces the density in the lecture thereby increasing retention, and addresses a wider range of objectives over and above the transfer of content from instructor to student. Very simply put, "there is a great difference between imagining that we have done the problem and actually doing it, active learning provides an opportunity for students to do the problem.[11]

The activity promoted better bonding among the students and also among the students and teachers. It brings all the students close to each other, even those who would not otherwise share any rapport with each other. As quoted by Lom (2012), this activity is a blend of independent acquisition of expertise followed by collaborative teaching. The jigsaw method requires each student to be an instructor as well as an auditor. As quoted by Lom (2012), this activity is a blend of independent acquisition of expertise followed by collaborative teaching[12.] The jigsaw learning technique may be an effective way of transforming the medical students from passive to active learners. Such active learning methods are believed to improve critical thinking, problem solving abilities and information retention; thereby fostering lifelong learning skills among medical students. Knowledge, team work and communication skills are keys for being a successful medical practitioner. Thus the present study facilitated the students to comprehend better, improve their analytical abilities and improve their communication skills.

CONCLUSIONS

Significance in grades between pre and post-tests implies that jigsaw classes helps improve knowledge gained. However based on feedback regarding jigsaw method, maximum of the students felt the session helped them improve communication skills and requested to implement the same to other topics in physiology. With the students giving good response towards learning physiology by jigsaw method, we propose this be incorporated into routine teaching learning activities of the subject. It is also recommended that the facilitators monitor and encourage the students for their active participation throughout. Motivating all students to be present for jigsaw is also recommended.

AUTHOR'S CONTRIBUTION

Dr.NamrataKaushik contributed in concept and design of the study and in analysis of data. Dr.Gunjan Jain and Dr.Taruna. were helped in conduction of study , Drafting and revision of manuscript .

CONFLICT OF INTEREST

Nil

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