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Original Research Article

Enhancing student's learning by introducing various interactive teaching-learning methods in large group

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Abstract

Introduction: The factual knowledge says that interactivity leads to better learning outcomes. MCI has recommended interactive and innovative teaching but it is rare to find studies that have emphasized on faculty development and so this research work is a step-stone in medical education.

Aim and objectives: To compare the educational effectiveness of interactive lectures with didactic lectures as well as to acknowledge the preferred mode of teaching in a large group through the perception of students and faculties.

Methods: Randomized controlled Trial with cross-over was conducted among the 7th semester students (112) in RMCH, Bareilly for a period of 3 months. Each group (56) were taught interactive (by Think-Pair-Share, buzz groups, peer instructions, questioning) and didactic lectures respectively with cross-over. Pre and Post tests were conducted in each session using MCQs. Feedback from the students (112) and faculty (11) were filled subsequently using Likert's scale. The data was analyzed by using the SPSS and P values <0.05 considered significant.

Results: Statistically significant difference ($p < 0.01$) was found in pre-test and post-test scores of both groups. Also, the gain through the two was also found to be statistically significant (p-value <0.001).

Interactive teaching in medical education was agreed upon by the students and faculties as a more active and better way of learning for attaining the specific learning objectives.

Conclusion: Learning was enhanced through interactive lectures as compared to didactic ones and there was positive perception among students and faculties, so it is strongly recommended to train the faculty members in the various interactive methods but still further research is needed on a larger sample to improve external validity.

Keywords: Interactive teaching, faculty perception, Medical education

1. Introduction

Educational research has identified the potential benefit of interactivity that promotes mentally active learning and improved learning outcomes. There is lot of criticism on traditional lecture as a teaching method [1]. If properly planned and organized lectures can be very effective [2, 3] and can clarify difficult concepts, motivate thinking, foster enthusiasm and motivate for learning [4, 5]. It is clear from the recent research that students need to be taught by interactive lectures and therefore it is not surprising that traditional information imparting lectures are characterized by poor attendance rates[6]. Learning is an active process and interactive lectures are considered as educational best practice [7].

Rao and DiCarlo have demonstrated that the interactive-learning technique develops critical-thinking [8, 5]. Increased interactivity leads to increased student satisfaction and better learning outcomes [9, 10]. Students need to actively participate in lectures to maintain their engagement with the content [11]. Indeed, structured interactive session is a better lecture format as compared to didactic lectures [7].

In engaging lectures, students are given short periods of lecture followed by "breaks" that may consist of 1min papers, problem sets, brainstorming sessions, or open discussion. These breaks are incorporated into the lecture to improve student performance, increase alertness, promote engagement, and allow immediate application of course material [12-14].

Recent review of the literature regarding active learning at the undergraduate level concluded that active learning is beneficial because it helps students tackle difficult subjects [15]. The novelty of this study design allowed a

direct comparison of the success of interactive lectures versus didactic lectures with the same student.

1.1 Aim and objectives

1) To implement the interactivity in didactic lectures.
2) To acknowledge the preferred mode of teaching in a large group through the perception of students and faculties.

2. Materials and methods

The study was carried out after obtaining the permission of the institutional ethical committee in Rohilkhand Medical College and Hospital, Bareilly. Students in third year of M.B.B.S. who were present on the day of the study, after obtaining the informed consent participated in the study.

The previous professional examination scores of the students were recorded and they were stratified into three groups according to the mean marks which were obtained during the previous two professional examinations and thereby shuffled in between average, below average & above average in order to have a balance of mixed ideas.

These students were further randomized into two groups [A and B] by using computer generated random numbers. Each group was taught two topics in epidemiology. When one group was taught through didactic lectures, the other group was delivered interactive lecture using various methods like Think-Pair-Share, buzz groups, peer instructions, questioning etc. The cross –over was done between the two groups so that each group had a chance of didactic and interactive lectures both [Figure 1].

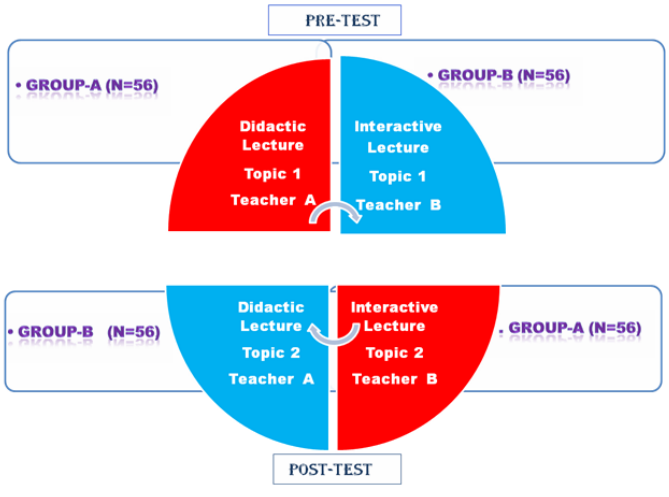

Figure 1: Cross -over study to compare didactic and interactive lectures

Two teachers who participated in the study had a comparable experience of teaching students and also the same designation. The teachers were calibrated by predeciding the contents of both the chapters which were taught using the same teaching material.

The pre-test was conducted. The teacher who took didactic lecture of topic 1 in first session was assigned to teach topic 2 to the other group in the second session also through didactic lecture only while the other one taking interactive lectures of topic 1 and 2 of both the groups.

At the end of each of the classes, the students were tested through objective type of questions which were prepared by a teacher not involved in the study.

The gain in the mean marks between pre and post test of each group were calculated and compared. Feedback from the students and faculty regarding their preference for interactive lectures as compared to didactic were filled subsequently as well as their preferred mode of interactive method in large group.

2.1 Statistical analysis

The Student's paired t-test was employed to compare the mean marks of the different groups. The data was analyzed by using the SPSS and P values <0.05 was considered as significant.

3. Results

The study was carried out among the students of medical college to know the gain in learning through the introduction of interactivity in lectures. Table 1 depicts the perception of the students on the Likert's scale. It is evident that 51.8% of the students strongly agreed that interactive lectures make learning enjoyable and fun while 35.7% agreed to it, 11.6% being neutral about it and only 0.9% disagreed to it. Similarly, 70.5% agreed that there is increased enthusiasm through interactive lectures while 24.1% were neutral and 5.4% disagreed to it. Interactive lectures increase active participation was perceived by 50.8% students, 37.5% agreed to it, 9.8% were neutral about it and just 1.8% disagreed to it. It was found that 50.9% strongly agreed that teaching environment is livelier while 31.2% agreed to it and 16.1% were neutral and 1.8% disagreed to it.49.1% strongly agreed that interactive lectures improve the attention span, 35.7% agree to it, 12.5% were neutral and only 2.7% disagreed to it. Almost 60% students agreed that interactive lectures break the monotony, 25% were neutral to it while14.3% disagreed to it. Development of interest in learning through interactive lectures was found by 51.8% of the students, 37.5% strongly agreed to it while 8% were neutral and 2.7% disagreed to it. Learning through interactive lectures was well-defined was agreed by 79.5%, 19.6% were neutral and rest disagreed to it.

As far as in-depth learning is concerned, 66% students agreed to it, 28.6% were neutral and 5.4% disagreed to it.47.3% strongly agreed that there is better retention of knowledge through interactive learning, 34.8% agreed to it, 15.2% were neutral and 2.7% disagreed to it. Recall of the matter is better in interactive lectures was strongly agreed by 50.9% students, 36.6% agreed to it, 10.7% were neutral while 1.8% disagreed to it. 85.7% agreed to better understanding of the subject by the students through interactive lectures, 12.5% were neutral and 1.8% disagreed. Clearing of doubts is more in interactive lectures was strongly agreed by 42.9%, 31.3% agreed to it while 18.8%

were neutral and 7% disagreed to it. Interactive lectures broaden thinking and improve critical thinking was strongly agreed by 42%, agreed by 34.8% followed by 17.9% as neutral and 5.1% disagreed to it. As far as interactive teaching facilitates self-directed learning is concerned, 66.9% agreed to it while 22.3% were neutral and 10.8% disagreed to it. 49.1 % strongly agreed that interactive lectures improve the confidence level, 37.5% agreed to it while 8.9% were neutral and 4.5% disagreed to it. Communication skills were found to be improved by interactive lectures was strongly agreed upon by 54.5%, agreed by 34.8%, 7.1% were neutral and 3.6% disagreed to it. The need of prior preparation of the topic in interactive lectures was strongly agreed by 40.2%, 36.6% agreed, 16% were neutral and 7.2% disagreed to it. The students who strongly agreed to incorporate interactive methods in lectures were 38.4%, 30.4% agreed to it, 24.1% were neutral and 7.1% disagreed.

Table 1a: The descriptive statistics of perception of students about interactive teaching on Likert's scale

	"strongly disagree" = 1	**"disagree" = 2**	**"neutral" = 3**	**"agree" = 4**	**"strongly agree" = 5**	**Total**
L1	0(0.0%)	1(0.9%)	13 (11.6%)	40 (35.7%)	58(51.8%)	112(100.0%)
L2	0(0.0%)	6 (5.4%)	27 (24.1%)	37 (33.0%)	42 (37.5%)	112(100.0%)
L3	1(0.9%)	1 (0.9%)	11 (9.8%)	42 (37.5%)	57 (50.8%)	112(100.0%)
L4	0(0.0%)	2(1.8%)	18(16.1%)	35(31.2%)	57 (50.9%)	112(100.0%)
L5	0(0.0%)	3(2.7%)	14(12.5%)	40(35.7%)	55(49.1%)	112(100.0%)
L6	2(1.8%)	14(12.5%)	28(25.0%)	32(28.6%)	36(32.1%)	112(100.0%)
L7	0(0.0%)	3(2.7%)	9(8.0%)	42(37.5%)	58(51.8%)	112(100.0%)
L8	0(0.0%)	1 (0.9%)	22(19.6%)	48(42.9%)	41(36.6%)	112(100.0%)
L9	0(0.0%)	6(5.4%)	32(28.6%)	41(36.6%)	33(29.4%)	112(100.0%)
L10	2(1.8%)	1 (0.9%)	17(15.2%)	39(34.8%)	53(47.3%)	112(100%)
L11	0(0.0%)	2(1.8%)	12(10.7%)	41(36.6%)	57 (50.9%)	112(100%)
L12	2(1.8%)	0(0.0%)	14(12.5%)	50(44.6%)	46(41.1%)	112(100%)
L13	1(0.9%)	7(6.1%)	21(18.8%)	35(31.3%)	48(42.9%)	112(100%)
L14	0(0.0%)	6(5.1%)	20(17.9%)	39(34.8%)	47(42%)	112(100%)
L15	2(1.9%)	10(8.9%)	25(22.3%)	38(33.9%)	37 (33.0%)	112(100%)
L16	0(0.0%)	5(4.5%)	10(8.9%)	42(37.5%)	55(49.1%)	112(100%)
L17	2(1.8%)	2(1.8%)	8(7.1%)	39(34.8%)	61(54.5%)	112(100%)
L18	2(1.8%)	6(5.4%)	18(16.0%)	41(36.6%)	45(40.2%)	112(100%)
L19	3(2.6%)	5(4.5%)	27(24.1%)	34(30.4%)	43(38.4%)	112(100%)

Feedback on Likert's Scale by Students: Strongly agree-1, Agree to some extent-2, Neutral-3, Disagree to some extent-4, Strongly disagree-5

Table 1b: Likert's scale

No.	**Likert's scale**
L1	Interactive lectures make learning enjoyable and fun.
L2	Interactive lectures increase the enthusiasm in me.
L3	Interactive lectures increase your active participation.
L4	Interactive lectures make the teaching environment more lively.
L5	Interactive lectures improve the attention span during the lecture.
L6	Interactive lectures break the monotony.
L7	Interactive lectures create interest in learning.
L8	Interactive lectures provide well- defined learning.
L9	Interactive lectures facilitate in-depth learning
L10	Interactive lectures add to the retention of your knowledge.
L11	Interactive lectures help to recall the matter in a better way.
L12	Interactive lectures improve understanding of the subject.
L13	Interactive lectures help in clearing of doubts.
L14	Interactive lectures broaden thinking and improve critical thinking.
L15	Interactive lectures motivate for self-directed learning.
L16	Interactive lectures improve the confidence level.
L17	Interactive lectures improve the communication skills.
L18	Interactive lectures need prior preparation of the topic.
L19	Interactive methods should be incorporated in the lectures.

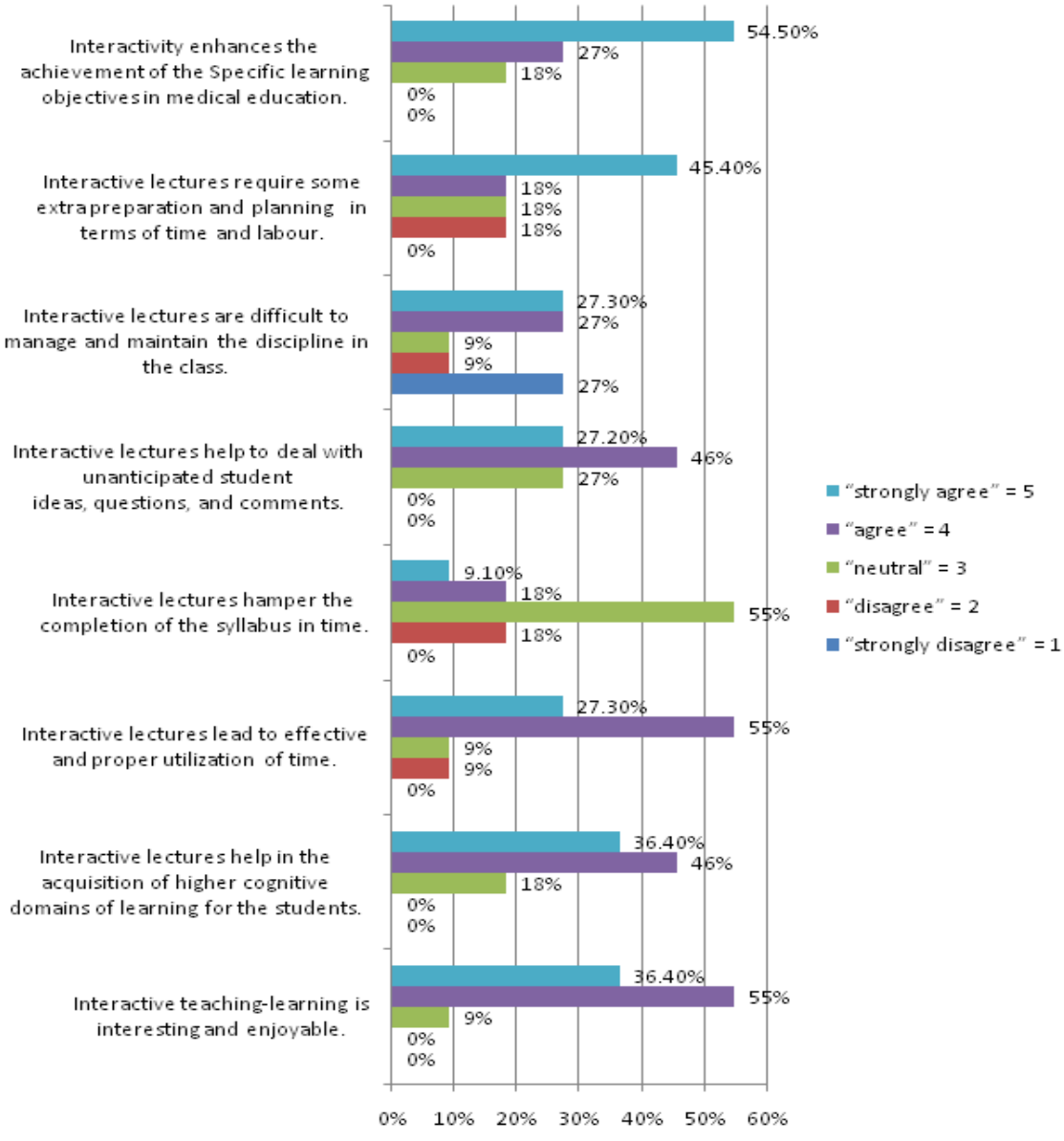

Figure 2: Perception of Faculty about interactive teaching on Likert's scale

Faculty perception of interactive teaching evident from figure 2 as 90.9% agreed that interactive teaching is interesting and enjoyable out of which 36.4% strongly agreed to it, 9.1% were neutral and none disagreed to it. Interactive lectures help in acquisition of higher cognitive domains of learning for the students was strongly agreed by 36.4%, 45.5% agreed to it, 18.1% were neutral and none of them disagreed to it.81.8% agreed that interactive teaching leads to effective and proper utilization of time, out of which 27.3% strongly agreed to it, 9.1% were neutral and 9.1% disagreed to it. As far as the completion of the syllabus in time is concerned, 54.5% were neutral to it and 27.3% agreed to it while 18.2% disagreed to it. Interactive lectures help to deal with unanticipated student ideas, questions and comments was agreed by 45.5%, strongly agreed by 27.2%, 27.3% were neutral while none disagreed to it. It was agreed by 54.5% students that interactive lectures are difficult to manage and maintain the discipline in the class while 9.1% were neutral and 36.4% disagreed to it. 45.4% strongly agreed that interactive lectures require some extra preparation and planning in terms of time and labour, 18.2% agreed to it, while 18.2% each were neutral and disagreed. Achievement of the specific learning objectives in medical education is better through interactivity was strongly agreed by 54.5% while 27.3% agreed, 18.2% were neutral and none of them disagreed to it. The improvement in the communication skills was strongly agreed by 63.6%, 27.3% agreed, 9.1% were neutral and none disagreed to it. 45.5% each of the students agreed and were neutral that interactivity should be introduced in the didactic lectures, only 9.0 %strongly agreed to it and none disagreed to it.

The difference between the pre and post assessment scores after the introduction of interactivity in the lectures was found to be statistically significant on the application of paired t-test [Table 2 & 3].

Table 2: Pre and post test score analysis

Mode of teaching		Quantity	Mean Marks	Std. Deviation	Std. Error Mean
Didactic lecture	Pre-test	112	6.93	2.51	0.23
	Post-test	112	10.15	2.84	0.26
	Gain	112	3.42	1.70	0.16
Interactive Lectures	Pre-test	112	3.77	2.90	0.27
	Post-test	112	13.85	2.56	0.24
	Gain	112	10.08	3.33	0.31

Table 3: Comparison of the pre-test and post-test assessment scores among the students

Mode of teaching	Pre-test scores	Post- test scores	Statistical significance	Pre-test/Post-test difference	Statistical significance
Didactic lecture	6.93±0.23	10.15±0.26	0.001	3.42±0.24	0.001
Interactive lectures	3.77±0.16	13.85±0.27	0.001	10.08±0.31	

4. Discussion

In the present it was observed that 51.8% of the students strongly agreed that interactive lectures make learning enjoyable and fun, similar finding were reported in a study [16] carried out by Buch *et al* among 150 second MBBS students using Likert's scale 1-5, they used interactive methods such as group discussions, brainstorming, question answer sessions, multiple choice questions (MCQs), confusion technique and summaries in which the Majority (73%) of the students agreed or completely agreed to like the sessions of interactive teaching methods.

Also the indexed study reported that the Communication skills were found to be improved by interactive lectures and was strongly agreed upon by 54.5% students; similarly in the study[1] carried out by Buch *et al* the findings were almost same as they reported that the students felt that interactivity improved their communication skills, added to the retention of the knowledge, improved the attention span during the sessions of interactive lectures.

One step ahead the Cochrane review [17] and systematic reviews [18-19] evaluated more than 32 studies on educational activities and observed that such types of educational interventions that include interactive teaching methods can improve both professional practice and health outcomes along with improved retention of knowledge and communication skills.

Another study [20] carried out by Mannison *et al*., 1994 in education had demonstrated that increased attention and motivation enhance memory.

In the present study it was observed that 49.1% students strongly agreed and 35.7% agree to the statement that interactive lectures improve the attention span and these findings were very well supported by certain attention span studies [21-22] as these had shown that students' interest and attention in the traditional lecture diminished significantly after 20 minutes.

As far as the faculty perception about the interactive teaching for medical students in the present study is concerned the majority of the medical teachers agreed (90.9%) that interactive teaching is interesting and enjoyable and out of which 36.4% strongly agreed to it. According to the observations in the present study about faculty perceptions for interactive lectures it was concluded that these lectures help in acquisition of higher cognitive domains of learning for the students and was strongly agreed by 36.4% and agreed by 45.5% medical teachers.

The importance of feedback to learning has been frequently noted by researchers such as Jason & Westberg[23] and Lowman[24] Interactive techniques allow teachers to receive feedback at a number of levels on student needs. Butler [25] found that student satisfaction with the lecture format increased when the students were actively involved in the teaching session.

The difference between the pre and post assessment scores after the introduction of interactivity in the lectures was found to be statistically significant on the application of paired t-test in our study which is comparable with the study conducted by Alexander *et al*[26] in which there is highly significant difference between the groups where interactivity was introduced.

5. Conclusion

Introduction of interactivity in the lectures was agreed as enjoyable and fun, increasing enthusiasm and interest, active participation, making the teaching environment livelier, improving the attention span, breaking the monotony. The students perceived that interactivity improves the recall and retention of knowledge, understanding of the subject, clearing of doubts, better understanding and critical thinking. Also, interactivity improves the confidence and communication skills were agreed by the students as well.

Faculty perception was also favourable in terms of interactivity being interesting and enjoyable and helping to achieve higher cognitive domains of learning including the communication skills. The faculty perceived that interactivity leads to effective and proper utilization of time, does not hamper the completion of the syllabus, helps to deal with unanticipated student ideas, questions and comments and thus helps to attain the specific learning objectives in medical

education. The difficulty in management and maintainance of discipline was overlooked by the faculty.

Recommendations

Interactive lectures can improve the competency of IMGs and so it is strongly recommended to train the faculty members in the various interactive methods but still further research is needed on a larger sample for better evaluation in order to improve the external validity.

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