

A study on the efficacy of a novel technique envisaged toward improvement of traditional lecture

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Abstract

Background: Lectures are still the main stay of teaching, particularly in medical colleges in view of the fact that the sizes of the classes are increasing day by day, and there is a dearth of teachers to care them in small batches. Therefore, new researches are necessary to improve lecture outcome and to make the lectures more useful. A new method of improving lecture outcome in the Physiology Department of MGM Medical College, Bihar, India, has been studied. In this method, a short questionnaire is given before and after the lecture on the lecture topic.

Objective: To identify effective teaching methods for the large class environment.

Materials and Methods: The whole class of first-year students was divided into two equal batches randomly. In the first batch, a short multiple choice questionnaire was given at the beginning of the lecture covering the lecture topic. The same questionnaire was given to both the batches at the end of the lecture. Then, the results were compared.

Results: The result showed that there was a significant improvement in lecture outcome in the batch that was given a prelecture test. The difference was statistically significant. The average marks obtained by the students in initial examination of all the 6 days of the first batch were only 4.87 ± 1.48 of 20. At the end of the class, the marks improved notably in that batch, which was, on average, 15.40 ± 2.50 of 20. However, the second batch, which received only one final examination, received average marks 10.10 ± 2.12 of 20, which was higher than the initial examination of the first batch but significantly lower than the final examination results of the first batch ($p < 0.005$).

Conclusion: This small experiment within the limited background proves that a short pretest on the lecture topic before lecture improves the lecture outcome. However, more elaborate experiments on a greater number of people with more convincing randomization are required to achieve a definite conclusion.

KEY WORDS: Medical education, lecture, prelecture test

Introduction

In recent years, teaching of large number of students together in large lecture halls has become extremely crucial. In Kolkata alone (West Bengal, India), two medical colleges have received permission from the Medical Council of India (MCI) to admit 250 students in a class. According to the U.S. Department of Education's 2005 "Condition of Education" report, undergraduate enrollments in colleges and

universities will continue to increase at steady rate.^[1] Class sizes are reaching unprecedented levels. Concurrently, institutions of higher education are pushing faculty to become better teachers and to deliver higher levels of quality and value in the classroom. Delivering quality and value to a large class presents unique challenges. Therefore, it is crucial for a faculty to identify viable methods of instruction for large classes. Thus, the primary purpose of this exploratory study was to identify effective teaching methods for the large class environment.

Effective management of large classes is a popular topic among faculty in higher education. This is all the more important in Indian medical colleges because of recent trend in upward surges in the number of students admitted in large medical colleges. Carbone^[2] and Stanley and Porter^[3] have written books focussing on the large class environment, offering strategies for course design, student engagement, active learning, and assessment. The advantages of large classes include decreased instructor costs and efficient use of faculty time and talent, availability of resources, and standardization

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of the learning experience. However, there are significant disadvantages to large classes, including strained interpersonal relations between students and the instructors, limited range of teaching methods, discomfort among instructors teaching large classes, and a perception that the faculties who teach large classes are of lower status at the institution.^[4]

Extant research on the relationship between the class size and students' performance has identified conflicting results.^[5] The results of some studies show no significant relationship between the class size and students' performance.^[6,7] Conversely, some studies favor small class environments.^[8-10] Results vary based on the criteria used to gauge student performance and the class size measure itself. When traditional achievement tests are used, small classes provide no advantage over large classes.^[7] However, if additional performance criteria are used (e.g., long-term retention and problem-solving skills), it appears that small classes hold an advantage.^[8,10]

There are many methods of teaching prevalent in medical colleges, namely, lectures, seminars, tutorials, case-based learning, problem-based learning, role plays, using audio-visual aids, movies, literatures, and so on.^[11] But, by far, still now in India, the commonest, most popular, and most readily used method of teaching is definitely lecture.^[12] This is all the more true in nonclinical subjects such as Anatomy, Physiology, and a few others. There are various methods of lecturing also, and every now and then, newer and newer methods are coming up for the improvement of lecturing technique.^[13] One such method over the traditional one was experimented in our study: giving a questionnaire covering the whole of the day's lecture to all the students of the class and asking them to answer the questions before the class starts. In addition, questions were given at the end of the classes too, and the difference was noted. Similar questions were given only at the end of the traditional lectures and the results compared. This is a very simple but easily applicable method of altering lecturing technique and lecture outcomes and is, hence, ventured in our small project.

Materials and Methods

A first-year undergraduate physiology class was selected for the study ($N = 60$). Specific learning objectives were set forth for each of the six chapters, and same teaching method, that is, traditional lecture was applied for each chapter. In the lecture format, the instructor used simple chalk and board method with occasional use of PowerPoint slides and delivered in the traditional manner of the lecture style, with no formal student input/feedback except our test questionnaire. No special time was kept for discussion and debates among the students or between the instructor and the students. Students were made to know beforehand in a formal lecture about the purpose and methods of the study. A verbal and informal consent from the students were also obtained, and they were found to be considerably interested in participating in the study. Students were pretested and posttested using objective, multiple choice questions covering basic

terminology and concepts from each chapter in order to assess knowledge of the material before and after each lecture was given. The same multiple choice questions were used to assess the students' ability, conception, and knowledge. To make matters compact, in addition to multiple choice questions, quite a significant number of single-word answer questions were also selected and applied judiciously. The selection of the students was made at random keeping in mind that there is no bias for merit, knowledge, smartness, religion, race, or sex. Background information regarding these factors was collected beforehand, and judiciously and unbiasedly, the division of the students was made.

A whole class of 60 first-year students was divided into two equal batches on a random basis without considering the merits, sex, or other factors. The lecturer was the same for both the batches. The first batch was given prior questionnaire comprising 20 short answer or multiple choice questions of one mark each. At the end of the lecture of 45 min duration, the same questionnaire was given to both the batches: the first batch that received the questionnaire at the beginning (group A) and the second batch that did not (group B). The results of the two examinations of the first batch and the end of the lecture examinations of both the batches were compared. Similar experimental lectures were carried out on the same class but changing the sequence on alternate days, that is, the second batch received two sets of questions (at the beginning and end) on the second day whereas the first batch received only one questionnaire at the end of the lecture on the second day. The topics were obviously different in different days. In total, the experiments were carried out for six consecutive days. The results were analyzed by taking the mean \pm standard deviation (SD) in each group and then applying paired one-tailed Student's *t* test after determining the *t*-value and *p*-value by usual method and taking <0.05 as the level of significance.

Results

Figure 1 shows the results in the form of three bar diagrams. The comparison results of average marks of groups A and B are given in Table 1.

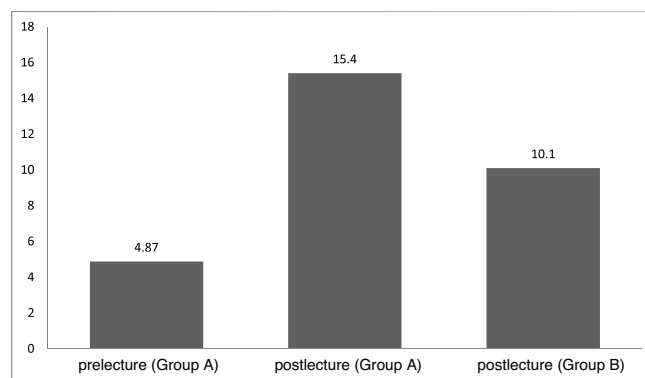


Figure 1: Bar diagram showing the results of the experiment.

Table 1: Comparison of average marks of groups A and B

Groups	Average marks	SD	t-value	p-value
Prelecture (group A)	4.87	1.48		
Postlecture (group A)	15.40	2.50	6.0459	0.005
Postlecture (group B)	10.10	2.12		

Discussion

The average marks obtained by students in initial examination of all 6 days of the first batch were only 4.87 ± 1.48 of 20. At the end of the class, the marks significantly improved in that batch, which was on average 15.40 ± 2.50 of 20. However, the second batch, which received questionnaire after the lecture, received average marks of 10.10 ± 2.12 of 20, which was higher than the initial examination of the first batch but significantly lower than the final examination results of the first batch ($p < 0.005$). Internet search revealed various tools and strategies for improving lectures, which are described in detail elsewhere.^[2,14] Lecture should always be fruitful, as Doyle^[15] says “teaching in the absence of learning is just talking.” The literature on teaching describes various ways in which the teachers can present contents and skills, which will enhance the opportunity for students to learn. It is also equally filled with suggestions of what not to do in the classroom. However, there is no rule book on which teaching methods match up best to which skills and/or content that is being taught. Students often have little expertise in knowing if the method selected by an individual instructor was the best teaching method or just “a method” or simply the method with which the teacher was most comfortable.^[16] There are consistently high correlations between students’ scorings (amount learnt) in the course and overall ratings of the students on the teacher and the course.^[17,18]

Most universities embrace a process by which students provide anonymous feedback at the end of each course they complete. These ratings of instructors effectiveness created a big hue and cry when they were first introduced,^[19] and they create an enormous challenge for nearly every institution that uses them.^[20]

Over the years, student evaluation has changed significantly, especially in the areas of purpose and methodology. They have transformed from being primarily used to assist students, to helping faculty members further develop and improve their teaching skills, to assisting administrators with respect to various decisions.^[21] Today, student ratings are widely used for the purpose of making personnel decisions and faculty development recommendations.^[22] The information derived from these ratings help in making both summative and formative judgments.^[23,24] Braskamp^[25] suggests that instructors use the data formatively to develop and improve their teaching effectiveness.^[25] There is much debate within the higher education community on how teaching or teaching effectiveness may be defined.^[26] For instance, Centra^[27] defines effective teaching as “that which produces beneficial or purposeful student learning through the use of

appropriate procedures.” It has been told that, among the factors affecting students attention, apart from physical environment, bodily condition, length of lecture, and teacher’s appeal, one more important factor is the immediate purpose of the lecture, which is provided by a pretest.^[13] However, no study was found exactly similar to our experiment.

Conclusion

In conclusion, it can be inferred that, within our limited setup and small experiment, it has been shown that giving an initial questionnaire as a short test at the beginning of lecture class significantly improves the lecture outcome. The repetition of the test after the lecture was given for the sake of experiment only; but, if time permits, the same can be given to students regularly to uplift their morale by showing that the lecture has really improved their knowledge. However, more elaborate studies in a larger scale along with statistical analysis using other tests of significance with foolproof techniques are required to establish a definite conclusion.

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