



## Effect of Innovative Large Group Teaching Methods on Students Learning Compared to Traditional Lectures

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### ABSTRACT

A variety of methods are available for teaching students. The lecture is the most common large group teaching method. Common alternatives to Traditional lectures are Small group discussions, Seminars, Symposium, Tutorials, Case based learning which are suitable only for small groups. So there is a need for designing newer teaching methods for a large group of students. To design five innovative ways in teaching methods for large group teaching and conducting teaching sessions with those methods to determine the effect in terms of student's perception, participation in innovative interactive teaching methods when compared to the traditional lecture method. The study was carried out in the Pharmacology Department, Tirunelveli, and Thoothukudi Medical College for 3 batches of second MBBS students. Out of 10 topics, 5 were assigned for Innovative methods and five for the traditional lecture. Totally 30 sessions were conducted for all the 3 batches. Innovative methods designed included Debate, Playing cards, Role play, and Treasure hunt, Mind mapping. DEEP ROOT MIND was the special name given to the teaching methods. A 10 item semi-structured questionnaire comparing innovative versus traditional methods was given to students and graded using the Likert scale. Chisquare test and Mann Whitney U test were used for statistical comparisons. Out of 450 students, 338 responses were obtained. Most students preferred the Innovative method and results were statistically significant ( $p < 0.001$ ) Debate and Role play were the most preferred methods. DEEP ROOT MIND method was more useful for large group teaching when compared to traditional lecture enhancing critical thinking, creativity, and communication skills.

**Keywords:** Large group teaching, Medical education, Innovative teaching methods

### INTRODUCTION

Education is not just learning facts but making the minds think and analyze. Medical education is somewhat unique in that it needs lifelong learning to improve the skills and apply them with confidence [1]. One of the major challenges in medical education is to provide an effective learning environment [2].

Teaching methodologies in current medical education can be classified as traditional Socratic lecture methods, group discussions, problem-based learning, simulation, and self-directed learning [3]. Lecturers play a major role in teaching in medical education. Teaching methods also depend on the number of participants. Lectures are a simple and easy way of conveying information to a large group of students [4]. The common alternatives to Traditional lectures are Small group discussions, Seminars, Symposium, Tutorials, Case based learning, etc. which are suitable only for small groups. So there is a need for designing newer teaching-learning methods to apply to a large group of students.

The traditional teaching methods like lectures using PowerPoint are subject-centered and time-based. It is an economical way of covering topics [5]. In the lecture, the students remain passive [6]. There is a constant need for change in teaching methodologies to facilitate the learning process.

In traditional teaching methods, the focus is on the teacher and the student remains passive. Competency-based Medical Education focuses on student-centered learning [7]. Different teaching methodologies should be used to make

the subject appealing to the students. It is important for the medical educator to create interest and liking towards the subject so that they can apply their knowledge in future practice.

The facilitators are challenged to motivate the students for learning the subject and also to make learning simpler. Teaching is an ever-evolving process [8]. Introducing new teaching methods can make the students be active participants in the class. Innovative interactive methods shift teaching from a teacher-centered and product-based activity to a student-centered and process-based activity.

Pharmacology is one of the basic and most important subjects in the medical curriculum. Learning Pharmacology is quite difficult without proper understanding and also it contains a lot of drug names that are difficult to remember. Students feel bored if the subject is taught in a monotonous way and perceive pharmacology as a very volatile subject. If innovative methods were introduced, it will help in active learning and creating more interest in the subject. We have chosen pharmacology as a prototype subject so that if these methods were beneficial the results can be generalized to all medical subjects.

Designing exclusive teaching methodologies for medical education is the novelty of our study. We introduce certain innovative teaching methods after proper designing of the methods and assess the student's participation and various parameters in innovative interactive teaching methodologies and comparing them with traditional PowerPoint lecture methods.

### **Objective**

To determine the effect in terms of student's perception, participation in innovative interactive teaching methods when compared to the traditional lecture method.

## **MATERIALS AND METHODOLOGY**

### **Study Design and Setting**

**Type of study:** Cross-sectional study

It was carried out in the Department of Pharmacology in Tirunelveli and Thoothukudi Medical College.

**Study population:** Students undergoing II MBBS in both Thoothukudi and Tirunelveli Medical Colleges were included in the study.

**Inclusion criteria:** Second MBBS students who gave informed consent and voluntarily participate were included in the study.

**Age:** 18 to 20 years.

**Gender:** Both male and female students.

**Exclusion criteria:** Students who did not attend at least two innovative teaching methods.

The study commenced after getting approval from the ethical committee. Ten topics were selected randomly from Systemic pharmacology as prototype topics. Five topics were assigned for traditional lectures and another five topics were assigned for Innovative teaching methods for the same set of students. All these topics were taken by the same faculty. The study was conducted for 3 batches of students and each batch had 150 students. Totally 30 sessions were conducted for all the 3 batches.

**Innovative teaching methods designed:** Debate, Playing cards, Role play, and Treasure hunt, Mind mapping. DEEP ROOT MIND was the special name given by us to this group of teaching methods.

**Debate:** 6 students were selected from those who volunteered. Topics were given one week before the session. The participants were guided by the faculty regarding the preparation of their debate topics. Before the start of the debate, a ten-minute overview of the topic was highlighted by the faculty. 6 students were divided into 3 groups of two students each. Each group argued supporting the drug given for them and also the demerits of the drugs supported by the other groups. The students were allowed to use local languages for the arguments. The students who were in the audience group were asked to vote for the best performer by carefully observing the performance of all three teams. Debriefing was done by the faculty after the debate. The best team was awarded.

**Playing cards:** Students were asked to read about the topic one week prior. Totally 4 teams were selected randomly for this method which involved 12 students. In each team, 3 students participated. A ten-minute briefing about the topic was done by the faculty. A set of few drugs and salient properties of those drugs were written on the cards. The cards containing the drug names have to be matched with the cards containing their salient properties. The teams have to play like playing cards routinely. The students in the audience group were also given chance by displaying the same questions in PowerPoint and they were asked to match it by writing in their notebooks. Debriefing was done at the end of the session.

**Role play:** Students who volunteer were given the topic one week before. They were asked to prepare a skit and enact role play in front of other students regarding the application of the drug in the concerned problem. A 10 min brief introduction of the topic was given. The students were asked to enact role play as a real-life case scenario and decide treatment accordingly. Debriefing was done after the end of Role-play.

**Treasure hunt:** A short description of the topic was given for 10 min followed by this method. The volunteering students were divided into 4 teams consisting of 4 members in each group. 4 clues were given for all 4 teams. The clues were kept hidden in 4 places. They were asked to solve the clue one by one. They should not bypass the clues. The clues were hidden at various places in the auditorium. In each clue, there was a question related to a particular drug. They were asked to find the drug by searching all the clues which contained questions related to the drug. The ultimate treasure is the drug that has to be found out by the teammates. The questions were displayed for the audience one by one after the clue was given to the teammates. Debriefing was done following the Treasure Hunt activity.

**Mind mapping:** All the students were divided into small groups of 15 members each. A total of 10 groups were formed. A short description of the topic was given for 15 minutes followed by a group activity. Students were asked to picture the concepts. After that, the pictures were displayed and students were asked to go through the pictures of other groups. Students got 10 different views from each group. One student volunteer consolidated the salient points.

**Traditional lecture method:** Five topics were randomly selected for the traditional teaching method. All the students were given topics one week prior. Powerpoints slides were prepared for the given topics by the faculty and presented to the students. The faculty plays a major role in delivering the concepts to the students. Questions were asked in between the sessions.

After completing all the teaching sessions of the topics, a 10 item semi-structured questionnaire comparing both innovative teaching methods versus traditional teaching methods was given to students. A pilot study was initially done for each question for 20 participants to validate the questionnaire.

**Statistical analysis:** Data collection tools included 10 items questionnaire. The questions were graded using a five-point Likert scale (1 to 5). Great care was taken to preserve the anonymity of survey participants.

All the data were entered into an SPSS database. Data were analyzed using SPSS software. Chi-square test and Mann Whitney U test were used for statistical comparisons.

All Quantitative variables were checked for normal distribution within each category of an explanatory variable by using visual inspection of histograms and normality Q-Q plots. Shapiro-Wilk test was also conducted to assess normal distribution. Shapiro Wilk test p-value of  $>0.05$  was considered as a normal distribution.

For Quantitative parameters, Medians and Interquartile Range (IQR) were compared between study groups using Mann Whitney U test (2 groups).

## RESULTS

Students enthusiastically participated in all the methods. Responses of 338 students were included in the final analysis. Responses of 8 students were not included as they didn't fill in both traditional and Innovative questionnaires which ultimately affect the comparison of both the groups.

Categorical outcomes were compared between study groups using the Chi-square test.

p-value $<0.05$  was considered statistically significant. IBM SPSS version 22 was used for statistical analysis [9].

Table 1 and Table 2 shows that Innovative teaching methods created a significant difference in all aspects of learning compared to traditional teaching methods.

Among the students, who attended Traditional teaching methods, 156 of them have said that this method creates sometimes interest in the topic whereas, in the Innovative teaching method, 156 students have said that it created often an interest in the topic. The majority of the students in the Traditional teaching method (159) agree that it was easy to understand the concepts of this method, whereas in the Innovative teaching method majority (171) strongly agree with this.

In enhancing creativity, most of the students (160) in the Traditional teaching method say it's undecided, whereas in the Innovative teaching method students (170) strongly agree that it enhances their creativity. The majority of students (45.45%) gave a rating score of 3 for Traditional teaching methods and (50.74%) students in the Innovative teaching method gave a rating score of 5.

**Table 1 Responses to the questions for both Traditional and Innovative methods**

<b>1. Does this teaching method help in creating interest in this topic?</b>	<b>Never/rarely</b>	<b>Sometimes</b>	<b>Often</b>	<b>Always</b>	<b>p-value</b>
Traditional (N=332)	44 (13.25%)	156 (46.99%)	103 (31.02%)	29 (8.73%)	<0.001
Innovative (N=338)	2 (0.59%)	27 (7.99%)	156 (46.15%)	153 (45.27%)	
<b>2. Was it easy to understand the concepts in this method?</b>	<b>Strongly disagree/Disagree</b>	<b>Undecided</b>	<b>Agree</b>	<b>Strongly agree</b>	<b>p-value</b>
Traditional (N=330)	22 (6.67%)	115 (34.85%)	159 (48.18%)	34 (10.3%)	<0.001
Innovative (N=337)	4 (1.19%)	26 (7.72%)	136 (40.36%)	171 (50.74%)	
<b>3. Does the session enhance your creativity?</b>	<b>Strongly disagree/Disagree</b>	<b>Undecided</b>	<b>Agree</b>	<b>Strongly agree</b>	<b>p-value</b>
Traditional (N=329)	94 (28.57%)	160 (48.63%)	65 (19.76%)	10 (3.04%)	<0.001
Innovative (N=337)	2 (0.59%)	14 (4.15%)	151 (44.81%)	170 (50.45%)	
<b>4. Are you able to listen throughout the session?</b>	<b>Never/rarely</b>	<b>Sometimes</b>	<b>Often</b>	<b>Always</b>	<b>p-value</b>
Traditional (N=328)	73 (22.26%)	161 (49.09%)	79 (24.09%)	15 (4.57%)	<0.001
Innovative (N=338)	8 (2.37%)	40 (11.83%)	138 (40.83%)	152 (44.97%)	
<b>5. Does this teaching method help you to apply your knowledge practically in any real-life situation?</b>	<b>Never/rarely</b>	<b>Sometimes</b>	<b>Often</b>	<b>Always</b>	<b>p-value</b>
Traditional (N=330)	100 (30.3%)	137 (41.52%)	79 (23.94%)	14 (4.24%)	<0.001
Innovative (N=337)	7 (2.08%)	73 (21.66%)	159 (47.18%)	98 (29.08%)	
<b>6. How often you would like to have this session in the routine schedule?</b>	<b>Never/rarely</b>	<b>Sometimes</b>	<b>Often</b>	<b>Always</b>	<b>p-value</b>
Traditional (N=330)	61 (18.48%)	147 (44.55%)	77 (23.33%)	45 (13.64%)	<0.001
Innovative (N=334)	11 (3.29%)	59 (17.66%)	186 (55.69%)	78 (23.35%)	
<b>7. Does this teaching method created a love for the subject?</b>	<b>Never/rarely</b>	<b>Sometimes</b>	<b>Often</b>	<b>Always</b>	<b>p-value</b>
Traditional (N=330)	72 (21.82%)	143 (43.33%)	104 (31.52%)	11 (3.33%)	<0.001
Innovative (N=338)	2 (0.59%)	34 (10.06%)	106 (31.36%)	196 (57.99%)	
<b>8. Give your rating for innovative teaching methods compared to traditional teaching methods?</b>	<b>1 and 2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>p-value</b>
Traditional (N=330)	64 (19.39%)	150 (45.45%)	94 (28.48%)	22 (6.67%)	<0.001
Innovative (N=337)	4 (1.19%)	23 (6.82%)	139 (41.25%)	171 (50.74%)	

Table 2 Comparison of different questioner with two different methods

Different questioner	Traditional method	Innovative method	Mann Whitney U test (p-value)
	Median (IQR)	Median (IQR)	
Does this method help in creating interest in this topic?	2 (2,3)	3 (3,4)	<0.001
Was it easy to understand the concepts in this method?	3 (2,3)	4 (3,4)	<0.001
Does the session enhance your creativity?	2 (1,2)	4 (3,4)	<0.001
Are you able to listen throughout the session?	2 (2,3)	3 (3,4)	<0.001
Does this method help you to apply your knowledge practically in any real-life situation?	2 (1,3)	3 (3,4)	<0.001
How often you would like to have this session in a routine schedule?	2 (2,3)	3 (3,3)	<0.001
Does this teaching method create a love for a difficult subject like Pharmacology?	2 (2,3)	4 (3,4)	<0.001
Students rating comparing Traditional lecture sessions versus innovative methods for same topic	2 (2,3)	4 (3,4)	<0.001

As per Figure 1 Debate was the most common method preferred followed by Role play.

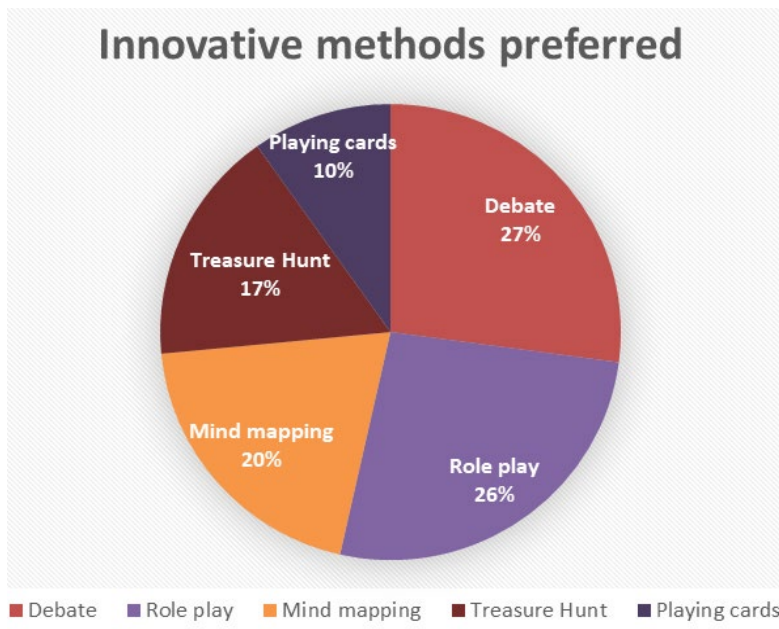


Figure 1 Students preference of Innovative methods

**DISCUSSION**

There has always been a need for a variety of teaching-learning methods so that concepts can be applied in various aspects of medicine. Healthy arguments often lead to a better understanding. Hence Debate was introduced in our study. Games are often liked by students and using them in teaching makes learning enjoyable. So we designed Playing cards and Treasure Hunt as an exclusive teaching method. Communication skills and performing roles in real case scenarios are core competencies needed for medical graduates. We designed role play with case scenarios and treatment options to be enacted by students. We used Mind mapping methodology as visualization enhances creativity.

Around 338 students participated in this study. The same group of students was taught with both traditional and innovative teaching methods to avoid perception bias. Same faculty involved in teaching all the methodologies to avoid teaching bias in this study. In interactive sessions, students were selected randomly which stimulated students to read about the topic which was given one week prior.

In our study, Q1 reveals that Innovative teaching methods created significant interest in learning (p<0.001) as compared to Traditional lecture methods.

The majority of students (49.09%) in Traditional teaching method expressed that they can listen sometimes only throughout the session whereas 44.97% of students in Innovative teaching method expressed that they can listen throughout the session always. As students remain passive during Traditional lectures they lose their attention span (Q4) in contrast to Innovative teaching methods ( $p<0.001$ ) as seen with the study by Cashin, et al. [10].

In Traditional teaching methods, most of the students (41.52%) have stated that this method sometimes only helped in applying their knowledge in real-life situations in contrary to the Innovative method where 47.18% of students stated that it helped often. This is on par with the study by Santosa, et al. and Naz F, and Murad, et al. which has shown that innovative methods increase critical thinking and motivation [11,12].

Creativity is enhanced while using innovative teaching methods when compared to traditional lecture methods. It is time to be creative in the field of medical education as stressed by Lee YH, [13]. The majority of students prefer to use the innovative methods often between the traditional lecture methods according to this study. All subjects cannot be loved. But these type of innovative teaching methods creates a passion for this subject as per Q7 of our present study ( $p<0.001$ ).

The present study revealed that among the innovative methods used, debate attracted the majority of the students followed by role-playing and mind mapping. Debate makes the students analyze deeper and improves their critical thinking as stated by Hall D, et al. and Kennedy R, et al. [14,15]. Role play method of teaching in Pharmacology makes the students convert the factual concepts into effective communication with the patient in par with the study by Lavanya SH, et al. [16]. Mind mapping in Pharmacology helped the students to visualize and easily understand the concepts following the study by D'Antoni AV, et al. and Sismulyanto, et al. [17,18].

In our study as per Q8 students gave the highest rating for Innovative teaching methods in Pharmacology compared to Traditional teaching methods which were statistically significant ( $p<0.001$ ).

It can't be understated that lectures have been one of the most effective tools in delivering information without the students having to go through piles of paper or books. Large group lecturing, therefore, saves time and manpower. But introducing innovative methods and increasing the student interactions help in enhancing the effectiveness of the lecture.

Based on the results of our study, we can learn that DEEP ROOT METHOD created a greater impact on students learning process. As per the CBME guidelines by the Medical Council of India, 80 hours is allotted for lectures, 90 hours is allotted for practicals, 25 hours for integration. Out of the 80 hours, 50% of the time can be allotted for Innovative teaching methods [19].

### **Limitations**

Although innovative teaching methods are more effective than traditional teaching methods, students and teachers require additional time to prepare for each session. In this study, we have taken only 10 topics for both Innovative and Traditional teaching methods. This method needs prior student sensitization, more number of faculties, and their active involvement.

### **Recommendation**

This method is useful in imparting relevant knowledge to apply clinically in the minds of students and trimming up the redundant theory content.

## **CONCLUSION**

DEEP ROOT MIND method was found to be a more useful and effective learning tool for large group teaching statistically when compared to Traditional teaching methods. It enhances their critical thinking and improves their communication skills and avoids the monotony seen with routine traditional teaching methods.

## **DECLARATIONS**

### **Conflicts of Interest**

The authors declared no potential conflicts of interest concerning the research, authorship, and/or publication of this article.

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