

# Assessment of Lecture Strategy with Different Teaching Aids

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## ABSTRACT

**Background and Objectives:** Medical/dental colleges in Northern India cater to students with diverse backgrounds, mother tongues, levels of comprehending English, and intelligence levels. This study was conducted to identify lecture strategy and teaching aid best suited for North Indian dental and medical students. It was conducted in two parts – 1. Survey of teachers' and students' opinion to obtain their preferences in teaching-learning practices followed in a conventional lecture, and 2. Comparison of students' performances after a single trial lecture with different groups of students, using different teaching aids (TAs).

**Materials and Methods:** Opinions of 33 faculty teaching first year dental/ medical students and 506 volunteer students (320 female) were compiled. Students were divided into four groups. A single trial lecture was held with each group (on the same topic, using identical lesson plan, by the same teacher) using a different teaching aid with each group. Lecture strategy was designed according to students' preferences (as obtained from opinion survey) regarding language of instruction and the number of mental breaks. TAs used with different groups were

chalk and board (C&B), PowerPoint (PPT), overhead projector (OHP), and a combination of C&B and PPT. Pre- and post-tests using multiple choice questions were conducted with each group. Results of post-test questionnaire and feedback from faculty attending the lecture were assessed for students' satisfaction and attentiveness in all four groups.

**Results:** Survey results indicated that although 97.6% students believed they had good/fair proficiency in English, 83.6% preferred being taught in a combination of English and Hindi; 44.3% students preferred C&B, 40.1% preferred PPT and 15.6% preferred the use of OHP as TA. After conducting a trial lecture with different TAs with each group, more than 90% students expressed satisfaction with the TA used for that group. Significantly better performance was observed in the post-lecture test when C&B was used.

**Conclusion:** The needs of students in India are different from those of their Western counterparts, and should be considered during didactic lectures to improve the students' understanding. Post-test results were better when C&B was used, as more students were attentive and/or took notes.

**Keywords:** Chalk and board, Medical education, North Indian medical/ dental colleges, Overhead projector, Power point

## INTRODUCTION

A didactic lecture is a consistent oral presentation of facts with organized thoughts and ideas by a qualified person. It is probably the oldest method of teaching, and remains the most common (if not the most popular [1,2]) method of imparting information till date. Since it is difficult to discard the lecture method of teaching due to its strong advantages (it is economical, efficient, easily comprehensible, and needed for the timely completion of the syllabus), the need of the hour is to improve upon the lecture technique [3-5].

Lecture strategies should suit the needs of the students to whom information is being imparted. Changes can be made in the style of lecture delivery as well as in the teaching aids used. Medical students in India differ from their Western counterparts as the teaching-learning style at school level is different. Also, the medium of instruction is usually the mother tongue of the student in Western countries, while it is invariably English in India, irrespective of the mother tongue of the student. Lecture strategies and teaching aids used in dental/ medical colleges in India are usually the same as those used for the students in Europe and the US. Some teachers modify their lecture strategy (e.g. by providing the names of diseases, conditions, and symptoms in the local language also) to suit the needs of the Indian students. To the best of our knowledge, such modifications have not been documented.

The teaching aids usually used during lectures are chalk and board (C&B), overhead projectors (OHP), power point presentations (PPT), and video clips or animations. Since animations/ video clips are not available on every topic, or are often too fast/ slow, their use is restricted. Though every teaching aid has its own advantages and disadvantages, many comparative studies have not been documented, keeping in mind the heterogeneity of the Indian medical/ dental student population.

## MATERIALS AND METHODS

This observational study was carried out on volunteer students enrolled in admission batches 2010, 2011 and 2012 of BDS and MBBS courses at Teerthanker Mahaveer University (TMU) Moradabad. Opinion survey as well as trial lectures using different teaching aids were conducted 2-4 months after the admission of students in BDS or MBBS course.

Approval from the Institute's Ethics Committee was obtained. Each batch of BDS and MBBS at TMU has 100 students; therefore 200 students were potentially available each year.

### A. Plan of Study

**Opinion Survey of Faculty and Students:** Faculty involved in the teaching of first year BDS and MBBS students (33 persons agreed to participate) were interviewed regarding the students' general performance as well as methods to improve the quality of teaching.

General information about the volunteer students and their preferences was obtained in the form of unsigned questionnaire from the selected volunteers at the beginning of the study.

Of the total 600 students enrolled in three admission batches, 506 students agreed to participate in the study.

**Conduction of Trial Lecture: Division of students into groups:** Students were randomly assigned to four groups, taking care that each group had almost the same number of BDS and MBBS students, and female and male students [Table/Fig-1].

**Topic of the lecture (Hormones:** Chemical nature, transport, mechanism of action, and classification) was intimated to each group seven days before conducting the study. The students were

Batch		Group	I	II	III	IV
		Teaching Aid	C&B	OHP	PPT	C&B + PPT
2010	Female	107	27	27	26	27
	Male	45	11	11	12	11
	Both	152	38	38	38	38
2011	Female	100	25	25	25	25
	Male	67	16	17	17	17
	Both	167	41	42	42	42
2012	Female	113	28	29	28	28
	Male	74	19	18	19	18
	Both	187	47	47	47	46
Students in all 3 batches	Female	320	80	81	79	80
	Male	186	46	46	48	46
	Both	506	126	127	127	126

**[Table/Fig-1]:** Distribution of dental and medical students of all three admission batches into groups

Question	Number of Faculty Answering		
Proficiency of students in speaking and understanding English	Good: 0	Fair: 26	Poor: 7
Students prefer which medium of instruction	Only English: 5	Combination of Both English and Hindi: 28	
For what % time are students attentive in class	<50%: 28	50-70%: 5	70%: 0
After how much time do students usually require a mental break	10min: 24	20-30min: 9	Not required: 0
How many mental breaks do you usually give in a 1h lecture?	None: 19	1 or 2: 11	3 or 4: 3
Which TA do students usually prefer?	C&B: 11	PPT: 13	OHP: 9
Which TA do you usually use?	C&B: 8	PPT: 12	OHP: 13
Do you prepare a written lesson plan?	Yes: 0	No: 29	Sometimes: 4
Should faculty feedback be obtained from students?	Yes: 29	No: 4	
Should incentives be given to faculty to improve teaching quality?	Yes: 29	No: 4	
Type of incentive that you would prefer:	Award: 5	Promotion: 7	Increment: 21

**[Table/Fig-2]:** Results of faculty interview (obtained from faculty involved in teaching BDS/ MBBS First Prof students)

asked to study the topic from the reference material provided and come prepared with their queries. Students were not informed about which teaching aid would be used with their group.

Lecture session of each group was of 70 min duration. The first ten minutes were allotted to pre-lecture questionnaire and pre-test; the next 50 min to the lecture (including 8-10 min summarization); and the last 10 min were used for conducting post-test and obtaining post-lecture questionnaire.

**Lecture strategy:** Lecture strategy was designed according to the students' preferences regarding the language of instruction and required number of mental breaks, as obtained from the opinion survey of students. In all four groups, a combination of both English and Hindi was used, taking care that all definitions and salient points were spoken in English, and Hindi was used occasionally during explanations. Three mental breaks were given during the lecture. Since the students' preferences remained unchanged in the consecutive admission batches, the lecture strategy was not altered over the period of study.

Identical lesson plan but different TA was used with each group [Table/Fig-1]. The lesson plan was designed according to Ananthakrishnan et al., [6]. Lecture content was designed keeping in mind the amount of course material usually taught in equivalent time duration for the timely completion of syllabus.

Parameter		Female	Male	Total
Students in all three batches		343	257	600
Students participating in this study		320	186	506
Age	17-19y	174	80	254
	19-21y	95	55	150
	>21y	51	51	102
Mother tongue	Hindi	267	160	427
	Other	53	26	79
Medium of education in class 10th	English	256	137	393
	Other	64	49	113
Proficiency of speaking and understanding English	Good	256	86	342
	Fair	61	91	152
	Poor	3	9	12
Preferred medium of instruction	Only English	61	22	83
	English + Hindi	259	164	423
% Time attentive in class	<50%	32	29	61
	50-70%	203	117	320
	>70%	85	40	125
Mental break required after	10 min	76	26	102
	20-30min	183	96	279
	Not required	61	64	125
Teaching aid preferred	C&B	139	85	224
	PPT	126	77	203
	OHP	55	24	79
Did you study the allotted topic before coming to class	Thoroughly	27	17	44
	Briefly	140	78	218
	No	153	91	244

**[Table/Fig-3]:** Information obtained from students from Questionnaires 1 and 2

Lecture sessions of all four groups of a specific admission batch were conducted in the same environment, by the same teacher (who was well-qualified to teach the subject) (to rule out comparison of teaching efficiency of different faculty members). Each lecture session was also attended by 5-6 faculty members as observers, who were seated behind the students. One of the observers indicated different time zones to the lecturer by holding up cards of different colours: mental break (three times during the lecture) (blue), completion of subtopic (four times) (yellow), summarization of lecture (once) (green), and end of lecture (once) (red).

Faculty attending the lecture session were requested to rate the degree of students' attentiveness during the lecture.

### B. Data Analysis

Opinion of faculty and general information and preferences of students were compiled.

Student feedback and peer feedback from the faculty attending each lecture session were used to assess students' attentiveness and their satisfaction with the teaching aid used for that group.

The pre-and post-test scores of the different groups were compared by ANOVA. p-values less than or equal to 0.05 were considered significant.

## RESULTS

Opinion of faculty involved in the teaching of first year BDS and MBBS students has been summarized in [Table/Fig-2].

While collecting the filled questionnaires, care was taken to ensure that the student had not mentioned the name/ roll number and had answered all the questions. [Table/Fig-3] summarizes the results of pre-lecture questionnaires. Although 77.7% students had passed class 10<sup>th</sup> from English medium schools and 97.6% students reported good/fair proficiency in English, 83.6% students preferred

Parameter	I	II	III	IV	Total	
No of students	126	127	127	126	506	
Students satisfied with TA used	123	120	118	125	486	
% time attentive in lecture	<50%	7	8	11	7	33
	50-70%	86	85	83	87	341
	>70%	33	34	33	32	132
Students satisfied with three mental breaks	99	97	97	102	395	
Students requiring more than 3 mental breaks	21	22	26	21	90	
Students requiring less than three mental breaks	6	8	4	3	21	
Type of mental break preferred	Anecdote	123	127	121	120	491
	Joke	2	0	6	3	11
	Question	1	0	0	3	4
Students in favour of faculty feedback being obtained from them	Not segregated group wise				484	
Students in favour of incentives for teachers to improve teaching quality	Not segregated group wise				484	
Type of incentive	Award					334
	Promotion					21
	Salary increment					151
No of students awarding scores (MM 20)	<12	0	0	0	0	0
	12-15	6	7	9	6	28
	>15	120	120	118	120	478

[Table/Fig-4]: Results of post-lecture questionnaire (Questionnaire 3)

MRI pattern	Group I		Group II		Group III		Group IV	
	F	M	F	M	F	M	F	M
Total Number of Students	80	46	81	46	79	48	80	46
Number of Students Taking Notes in a Lecture Session	62	12	49	9	41	3	64	8
Number of Student-Teacher Interactions	4	2	2	2	1	3	2	3
Number of Student-Student Interactions	9	9	14	10	17	13	10	12
Number of Students Fidgeting or Yawning	5	7	18	17	21	19	9	9
Number of Students Appearing Sleepy	0	1	1	1	2	1	0	0

[Table/Fig-5]: Results of faculty feedback

being taught in a combination of English and Hindi. Three hundred twenty (63.2%) students reported that they were usually attentive for 50-70% of the time in a one-hour lecture and 279 (55.1%) reportedly required mental break after 20-30 min. Different faculty use different TAs during their lectures, therefore the students had been exposed to all three TAs during their routine lectures of the first year course. C&B were preferred as teaching aid by 224 (44.3%) students and PPT slides were preferred by 203 (40.1%) students. Merely 44 (8.7%) volunteer students had prepared for the lecture by studying the reference material provided.

Results of Post-Lecture Questionnaire are summarized in [Table/Fig-4]. Three Hundred forty one (67.4%) students were attentive for 50-70% time during the lecture; 395 (78.1%) were satisfied with the three mental breaks; and 491 (97%) preferred topic-related anecdotes as mental break. 478 (94.5%) students gave 75% or higher score upon rating the lecture. Students were asked to score the appropriateness of the TA used. Students finding the used TA appropriate were obtained for each group. 97.6% Group I students were satisfied with C&B as teaching aid after the lecture session. 94.5 % Students of Group II were satisfied with the use of PPT; 92.9% of Group III expressed satisfaction with the use of OHP; and 99.2% of Group IV liked being taught using C&B with PPT being

	Female	Male	p-Value
Pre-Test	3.04 ± 1.99	3.18 ± 1.85	0.428
Post - test	15.76 ± 4.58	15.19 ± 4.67	0.18

[Table/Fig-6]: Comparison of scores of female and male students obtained in pre-test and post-test by Student's t-test

Group	I	II	III	IV	p-Value
A: Pre-Test Scores					
Female					
N	80	81	79	80	
Mean ± SD	3.23 ± 2.13	2.99 ± 2.08	2.89 ± 1.85	3.08 ± 1.90	0.744
Male					
N	46	46	48	46	
Mean ± SD	3.02 ± 1.56	3.11 ± 2.02	3.46 ± 1.97	3.13 ± 1.82	0.0678
B: Post-Test Scores					
Female					
Mean ± SD	16.89 ± 4.18	15.25 ± 4.77	14.42 ± 4.90	16.46 ± 4.10	0.002
Male					
Mean ± SD	16.67 ± 4.80	14.41 ± 4.52	13.52 ± 4.55	16.22 ± 4.38	0.002

[Table/Fig-7]: Comparison of pre-test and post-test scores of female and male students of the four groups by ANOVA

used to summarize the lecture. In this Questionnaire, suggestions for improvement had been asked. Only 53 (10.5%) students listed their opinion.

Faculty Feedback from peer faculty members attending the lecture session graded the attentiveness of students during the lecture in the form of number of students taking notes, number of student-teacher interactions, number of interactions amongst the students, and fidgeting, yawning, and sleeping amongst students. Slightly higher attentiveness of students was observed during blackboard teaching [Table/Fig-5].

The pre-test scores of the four groups showed no significant difference [Table/Fig-6], however, the post-test scores were significantly higher in Groups I and IV [Table/Fig-7].

## DISCUSSION

**Assessment of Lecture Strategy:** Not many reports have been published citing students' preferences regarding lecture strategies. In medical colleges catering to extremely diverse population of students, it is important to determine the comfort zones of the students, especially in the first year of the course when they are new to the system of education followed at college level. The students' comfort zone was determined from opinion survey.

While 28 out of 33 teachers believed that students understood more when taught in a combination of both English and Hindi [Table/Fig-3], only 15 actually followed this in practice. Those who spoke in English only reasoned that it was easier for them to follow the text book's sentences, the students find it easier to take notes, or the students should learn to speak, write, and understand in English.

Average students were believed to be attentive in class for less than 50% of the time and needed a mental break after 10 min. However, 19 teachers did not give a mental break as they were under stress for the timely completion of the syllabus. Although only 9 persons actually believed that students preferred OHP as teaching aid, 13 used it frequently as it was easy to prepare in a short time. PPT and OHP were preferred by teachers as they eased the burden and could be used year after year. Only 4 teachers occasionally prepared a rough teaching plan, especially for the difficult topics. While some faculty members (4 out of 33) were not in favour of obtaining feedback from students, most faculty (24 out of 33) preferred salary increment/ promotion/ cash reward for teachers securing 60% points or more, since there is only a single award for

the best teacher while there may be many teachers who deserve recognition.

Students preferred a combination of English and Hindi as instruction medium [Table/Fig-3]. This is understandable as most people are more comfortable in using their mother tongue. This is also true for the faculty, who in spite of having an excellent command over English, may still be able to express themselves better and with more emotion while speaking in their mother tongue. Also, the faculty rated the students' fluency in English (on the basis of oral as well as written examination) on a lower scale [Table/Fig-4], indicating that the students may have overrated their prowess. The Medical Council of India has also considered the importance of local language by incorporating a language course in the Foundation Course of MBBS [7].

Most students reported they were attentive for 50-70% time duration in a one hour lecture [Table/Fig-5]. Duration of a period is usually 35-40min at school level, while it is usually of 1h in colleges. Many students therefore require mental breaks after 20-30 min. This amounts to about three mental breaks in a one hour lecture which can easily be managed. Post-lecture questionnaire showed that 97% students preferred topic-related anecdote as mental break. The topic-related question was least preferred, probably because it created anxiety. Teaching aids preferred by students were C&B and PPT [Table/Fig-3]. Seth et al., [8] have efficiently listed the merits and demerits of teaching aids and have mentioned the ease of taking notes with C&B. In this study also, C&B was preferred by students who took notes during the lecture, while PPT was preferred by students who did not. Naqvi et al., [9] have noted that students prefer C&B for understanding complex mechanisms, as the natural pauses in this mode of teaching help students to grasp better. OHP was not preferred [Table/Fig-3], as too much material was often jotted on a single sheet. Since lectures given on PPT or OHP often have fewer or no mental breaks, fewer interactions between teacher and students, and a monotonous delivery of lecture in a dark room [10], students often become exhausted before the lecture is over. Adibifar [11] has reported gender preference in learning from teaching aids, with male students preferring PPT. In this study also, a slightly higher percentage of male students (41.4%, compared to 39.4% female) preferred PPT. Some students explained that illegible writing on the blackboard was a major drawback of C&B.

Most of our faculty believed that taking notes during lecture is helpful. The teacher may discuss points that are not mentioned in the prescribed textbook, may tell about the type of questions that may be asked, or may underline the importance of specific topics. Students who take notes usually do not disturb their neighbours and are more focussed on the lecture compared to those who do not take notes.

Since only 44 out of 506 students had come prepared for the lecture [Table/Fig-3]. We asked the students at a later date if they usually attended their course lectures unprepared. Most of them answered in the affirmative. Previous preparation is required for student-teacher interaction during lecture, to decrease the passivity of the audience. The teacher can enforce previous preparation to some extent by beginning the lecture session with questions.

Faculty evaluation is essential for quality assurance and continuous quality improvement. Faculty evaluation should be performed in terms of multiple evaluators [12]: by the teacher him/herself, peer evaluation, evaluation by selected external experts, by the human resource department of the institute, from the students' feedbacks, and from the improvement in students' performances (pre and post-tests). Some educationists favour [13] while others oppose student evaluations [14]. Anonymous evaluation of the lecture session was conducted in this study, which has been favoured by Afonso et al., [15].

95.6% Students believed that faculty feedback should be obtained from the students [Table/Fig-4] for the improvement of teaching skill;

also, faculty with good teaching skill should get recognition so that they may continue to teach well and other faculty may also try to improve their teaching skills.

Each student group was satisfied with the teaching aid used for that group, regardless of the previous preferences of the students [Table/Fig-4]; indicating that C&B, PPT, and OHP are equally good if handled judiciously. Seth et al., [16] have reported a preference of C&B and PPT over OHP. 478 Students gave 15 or more points out of maximum 20 points to the lecture session, indicating satisfaction with the manner in which each lecture session was conducted.

Students were more alert when C&B was used as teaching aid [Table/Fig-5]. More students took notes or interacted with the teacher in the form of queries. Fewer students interacted amongst themselves, fidgeted, yawned, or slept in the C&B lecture sessions. The lecturer must have excellent teaching skills and the topic should be sufficiently fascinating to hold the students' attention during PPT or OHP presentations, otherwise the students lose interest and start fidgeting or yawning [17]. In groups I and IV, time taken by the teacher to clean the black board was mostly used by the students to complete the notes. Often, the teacher continued with the explanation while cleaning the board so that loss of time was negligible.

**Comparison of Teaching Aids:** No significant difference was observed in the pre- or post-test scores of male and female students, indicating similar levels of performances in both genders [Table/Fig-6]. There was no significant difference in the pre-test scores of the 4 groups [Table/Fig-7], indicating similar mental aptitude of the students. The post-lecture scores [Table/Fig-7] were significantly higher in Groups I (C&B) and IV (C&B + PPT). Although the students of Groups II (PPT) and III (OHP) had expressed satisfaction with the teaching aids used for the respective groups, their performance in the post-test was not at par with that of students of groups I and IV.

While different teaching aids have been preferred by different research groups [18,19], this study shows that any of the three teaching aids can be used effectively by a well prepared and qualified teacher to satisfy the students. The students understand better when C&B are used in lectures because C&B is the most commonly used TA at school level, and the students are familiar with them. Novelli and Fernandes [18] have shown that in non-clinical subjects like Biochemistry and Physiology, C&B is preferred by students. However, there are certain topics requiring elaborate diagrams or photographs that need PPT, and it is therefore necessary to wean the students gradually from the C&B learning to the PPT learning. Besides, the students shall attend and present seminars and symposia in future and must therefore become familiar with the use of PPT.

Suggestions by the faculty and students to improve their learning and attention span in class included smaller batch size, more distance between adjacent students, monitoring of students by faculty seated at the back to catch mischief makers, and segregation of female and male students to reduce distraction. Unfortunately, these suggestions are not always practically possible, but may be followed if conditions are suitable.

## CONCLUSION

Teachers can improve their teaching skills by obtaining feedback from the students. Dental and Medical students in North Indian colleges prefer being taught in a combination of both English and Hindi. Advance preparation for the lecture by students can be enhanced by questioning the students before beginning the lecture. This will also produce a more active audience. Three mental breaks, preferably as topic-related anecdotes, may be given in a 1h lecture. Notes-taking skill needs to be imparted to the students when they join the BDS or MBBS Course. This can be encouraged by the C&B method as it reduces distraction.

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