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**Research Article**

# Shall We Teach Anatomy with Chalk and Board or Power Point Presentations? - An Analysis of Indian Students' Perspectives and Performance

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**Abstract:** Traditionally, most of the lectures are taken with chalk and board (C&B) in India. However with the economic growth, the use of computer assisted techniques in teaching is inevitable. The use of power-point presentations (PPT) has been increasingly adopted by many of the medical colleges. Present study assesses the students' perspectives and preferences for chalk and board and power point presentations. Also it evaluates efficacy of these tools as far as examination performance is concerned. Twelve lectures of Head-Neck-Face were delivered to Ist MBBS students, each of 45 minutes, – six by C&B and six by PPT. The standard of lectures was kept good and uniform for both methods. Students were given a questionnaire seeking their opinions about helpfulness of the teaching tools for reproducibility of diagrams and text in examination, retention of lecture information in memory and understanding of simple and complex concepts. After each lecture, examination was conducted to evaluate the reproducibility of diagrams, retention of lecture information in memory and understanding of simple and complex concepts. The answers were evaluated on 10 – point scale. Most of the students opined that C&B is more helpful than PPT for all the three parameters. More than 2/3rd of them preferred chalk - board over PPT. The post lecture test performance endorses the same. We feel that PPT should not replace chalk & board, but be used as a supplementary to enhance the efficacy of teaching. As suggested by recognizable number of students, both methods should be used in combination, as per need of the topic.
**Keywords:** Lecture, teaching, chalk and board, PPT, efficacy

## INTRODUCTION

Lecture is the commonest form of teaching since ancient times [1]. It has been a universally accepted way of teaching, and adopted in almost all universities, including medical ones. Although discussion in small groups appears to be a superior method of attaining higher-level intellectual learning [2], it is almost inevitable that the medical students will experience lectures, as the number of students attending is too large in comparison to the teaching staff available. Hence, as Walton, 1972notes, the lecture is here to stay, so it is imperative that it should be as effective as possible [3].

Traditionally, most of the lectures are taken with chalk and board (C&B) in India. With the advancement of technology and concurrent economic growth of India, the use of computer assisted techniques in teaching is inevitable. The use of power-point presentations (PPT) has been increasingly adopted by many of the medical colleges. The young generation teachers are more fascinated by it. Various researchers in the world have assessed the preferences amongst the teachers and students for these teaching tools. Notable amongst them are Szabo and Hastings; Garg*et al.*; Novelli and Fernandes ; Thomas and Appala, Seth *et al.*,2010a; Seth *et al.*, 2010b [4-9].

Performance in examination evaluates the level of knowledge and skills achieved during a particular course. It is of vital importance for medical students, as it affects the quality of service to the patient and thus in broader perspective, the public health. Hence the assessment of impact of the teaching tools on performance in the examination is important. Various researchers in the world have studied the effectiveness of teaching tools (e.g.PPT) in different disciplines, like I.T. , organic chemistry, chemistry, mathematics, business, and management [4, 10-14]. In medical sciences, similar work has been done in its different branches [5,6, 9,15, 16]. Szabo and Hasting;Bartsch&Cobern; Susskind *et al.*; Apperson; Seth*et al.* 2010c; assessed the impact of the teaching methods on grades obtained in examinations [4, 17 – 20]. However this area appears to be underexplored as far as teaching in anatomy is concerned.

Ability to explain-i.e. make students understand a concept is an important skill of a good teacher. In addition, while learning anatomy, some facts need to be remembered as they are, as no logic is applicable to them. Assessment of students' performance in anatomy cannot be complete without assessing the ability to draw accurate, proportionate and well labeled diagrams. Thus we feel that the efficacy of any teaching sessionor teaching method for anatomy should be assessed under three domains -- understanding the concept, retention of lecture information in memory and reproducibility of diagrams. So also, the students' perspectives and preference to a particular method should be considered.

**Aims and Objectives**

With this thought in mind, the present study was undertaken to

- To assess students' perspectives for chalk-board and PPT for gross anatomy lectures.
- To assess students' preference for chalk-board and PPT for gross anatomy lectures.
- To assess the effectiveness of these teaching tools by post lecture examination performance.

## MATERIAL AND METHODS

The study was conducted in Department of Anatomy, in a Government Medical College. Ethical committee approval was obtained from the institute. The I$^{st}$ MBBS students were briefed about the study and were appealed to participate. All the 200 students participated in the study, voluntarily.

Twelve lectures of gross anatomy were selected randomly, six of which were taken using chalk and board and six by using PPT. To keep the variables constant, same teacher delivered all lectures. Lectures selected were of same region (HNF) and more or less of same difficulty level. Respondents were from same group of students and the answers were evaluated by same teacher. The teacher was well versed for the use of both teaching tools. During this study, all the lectures were conducted taking into account the various good teaching skills i. e. set induction, student teacher interaction, content, summarization, etc as described by Rokade*et al.*[21]. The standard of lectures was kept optimum for all lectures and it was confirmed through students' feedback. The feedback was collected by administering a prestructuredpretested questionnaireto students, who assessed the teaching on ten-point scale. Through the same questionnaire, opinions of students were also sought about helpfulness of these tools as far as reproducibility of text and diagrams in examination, understanding and memorization of lecture information is concerned. Keeping in mind the attention span of students, all the lectures were taken for 45 minutes each. The post lecture performance of the students was assessed for all twelve lectures by conducting theory examinations immediately after each lecture. The students were assessed for reproducibility of diagrams, retention of lecture information in memory and conceptual understanding. The diagrams were assessed for their content, accuracy and proportion. The memory was assessed for obvious facts and minute details and understanding, for simple and complex concepts. Thus 1850 responses were collected at the end of 12 lectures. To have precision, each parameter was assessed on a ten point scale, 0 being poorest and 10 being excellent.

The data was analyzed statistically. Unpaired t test was applied wherever necessary.

## RESULTS

We maintained the quality of teaching at optimum (92.5%) as assessed by students (Table 1). In all parameters studied, scores for C&B and PPT are comparable; the differences between them being statistically insignificant.

**Table 1: Overall standard of the study- lectures as assessed by students (No. of responses=159)**

| Parameter | C&B (score out of 10 ) | PPT (score out of 10 ) | Mean (score out of 10 ) | p-value |
|---|---|---|---|---|
| 1. Beginning of lecture was interesting | 7.10 | 7.35 | 7.225 | 0.131 |
| 2.The topic of lecture was arranged in logical sequence | 7.36 | 7.89 | 7.62 | 0.005 |
| 3. Quality of content | 7.65 | 7.41 | 7.53 | 0.246 |
| 4. Quantity of content | 7.57 | 7.58 | 7.57 | 0.937 |
| 5. Fluency of language | 8.05 | 7.61 | 7.83 | 0.034 |
| 6. Language was easy to understand | 8.20 | 7.62 | 7.91 | 0.001 |
| 7. Pronunciations were clear | 8.07 | 8.11 | 8.09 | 0.768 |
| 8. Voice audibility | 8.20 | 8.06 | 8.13 | 0.393 |
| 9. Visibility of drawings/text | 7.54 | 7.76 | 7.65 | 0.253 |
| 10. Punctuality | 7.42 | 7.4 | 7.41 | 0.908 |
| 11. Coverage of all aspects of topic | 7.65 | 7.36 | 7.50 | 0.243 |
| 12. Ease & confidence of teacher during lecture | 8.81 | 8.49 | 8.65 | 0.139 |
| 13. Overall simplification of topic | -- | -- | 8.61 | -- |
| 14. Complex concept made easy to understand | -- | -- | 8.60 | |
| 15. Student – teacher interaction | -- | -- | 7.96 | -- |
| 16. Overall effectiveness of presentation | -- | -- | 8.31 | |
| 17. General impression about study lectures | -- | -- | 9.25 | -- |

**Table 2: students' perspectives about C & B and PPT (No. of responses – 159)**

| Parameters | C&B (score out of 10 ) | PPT (score out of 10 ) | Mean (score out of 10 ) | p - value |
|---|---|---|---|---|
| 1. Help to Understand concept | 8.35 | 7.10 | 7.72 | <0.0001 |
| 2. Help to memorize the topic | 8.18 | 6.89 | 7.53 | <0.0001 |
| 3. Reproducibility of text information during theory examination | 7.69 | 6.35 | 7.02 | <0.0001 |
| 4. Reproducibility of text information during viva | 7.31 | 6.33 | 6.82 | <0.0001 |
| 5. Reproducibility of diagrams | 8.16 | 5.65 | 6.905 | <0.0001 |
| Response sought for- | C&B (% ) | PPT (%) | Both( %) | Any (%) |
| 1. Which method was interesting? | 58 | 21 | 21 | 00 |
| 2. Which method should be used? | 68.9 | 16 | 26.7 | 04 |

**Table 3: Post lecture performance of students (No. of responses - 1850)**

| Parameters | Component | C&B | PPT | p-value |
|---|---|---|---|---|
| Retention of lecture information in memory | Obvious facts | 7.53 | 4.63 | <0.0001 |
| | Minute details | 6.64 | 3.16 | <0.0001 |
| | Overall | 7.09 | 3.90 | <0.0001 |
| Understanding | Simple concept | 5.33 | 4.86 | 0.021* |
| | Complex concept | 3.84 | 3.1 | 0.0086* |
| | Overall | 4.68 | 3.98 | <0.0001 |
| Reproducibility of diagrams | Proportion | 5.07 | 1.49 | <0.0001 |
| | Contents | 6.09 | 1.55 | <0.0001 |
| | Accuracy | 5.37 | 1.42 | <0.0001 |
| | Overall | 5.51 | 1.49 | <0.0001 |

(* - not significant)

From Table 2 it is seen that the students feel that C&B is better than PPT as far as conceptual understanding, memorization of topic and reproducibility of text as well as diagrams is concerned, the difference is statistically significant. 58% of our students felt that C&B is intersting method of teaching compared to 21% favouring PPT. When asked which method should be used, 68.9% students polled in favour of C&B.

In all the three parameters studied—retention of lecture information in memory, conceptual understanding and reproducibility of diagrams -- the students performed better in tests for C&B lectures than those for PPT, the difference being statistically significant (Table 3).

## DISCUSSION

### Students' perspectives about the two methods:

In our study, the students opined that in all parameters studied i. e. conceptual understanding, memorization and reproducibility of text information as well as diagrams in theory examination and viva, the C&B is more helpful than the PPT, the difference being significant statistically (Table 2). Majority of students expressed that the C&B is more interesting than PPT (Table 2). When they were asked about their preference for the teaching method, more than 2/3 of them selected C&B (Table 2). A large number of students (26.7%) also suggested that the combination of both these methods be used, however the proportion remains low compared to Thomas and Appala, [7]. A study by Seth *et al.*, 2010a reveals contradictory opinions of students of different branches of medicine [8]. In their study, majority of medical students preferred PPT while the dental students opted for traditional C&B.

### Why C&B is better?

Seth *et al.*, 2010bin a study to assess the teachers' preference to the teaching methods, observed that 40.47% of teachers in their study group preferred C&B. Thomas and Appala, noted that as per students' opinion, the explanations, clarity of concepts and learning to draw diagrams are better done on C&B than PPT[7]. The C&B method is more students centered while PPT is more teacher centered[22]. Teacher student interaction is better in C&B method. It allows spontaneity, flexibility and nonlinearity [23]. It is flexible enough to allow the teacher to elaborate a particular point, if he wishes so. Students are able to make their notes/diagrams, thus students are active learners. The lectures are not interrupted due to power failure. It also contain natural pauses (e.g. during cleaning of board (Seth 2010c) which provides sufficient time to the students to grasp the new concepts [20]. In C&B method, as the teacher teaches, he/she is a single source for both the auditory as well as visual information for students. This enables them to concentrate easily. This is in contrast to the use of PPT where the students receive inputs from two different sources i. e. auditory inputs from the teacher (usually standing at the computer) while the visual inputs from

the screen. Moreover, as most of our respondents had been taught during their school and college days by C&B, they are more familiar, more acquainted and more used to it. This might have contributed in their preference for C&B.

Along with these advantages, C&B do carry few disadvantages too. It requires more preparation and hence is more strenuous for teacher. Complicated diagrams, 3-D diagrams, photographs, video-clips etc cannot be presented by this method. Only limited material can be conveyed to the students. The drawing skills and handwriting of the teacher need to be good. So also condition of board and poor visibility of the text are the other noteworthy drawbacks pointed out by our students.

**About PPT**

In our study, only 16% of students preferred PPT. According to them, good quality colored 3-D diagrams, good visibility & legibility of text are the points in favor of PPT. Likewise clarity of words, illustrations, real pictures and summarization were some of the attributes described to be best dealt with PPT [7]. From teacher's point, we feel that, teacher is more relaxed, as he can conduct the lecture even though he is not well prepared. So also, large material can be conveyed by this method.

**Reproducibility of diagrams:**

In our study, Students opined that C&B method is much better than PPT as far as reproducibility of diagrams is concerned (scores 8.16 vs 5.65; $p<0.0001$) (Table 2). Many students opined that the diagrams on PPT though attractive, cannot be copied. Their post lecture examination performance also endorses the same (scores 5.51 vs 1.49; $p<0.0001$) (Table 3). Our observation goes hand in hand with Thomas and Appala, who observed that 92% students felt that coping of diagrams was easier with C&B [7].

Many topics in anatomy rely heavily on illustrations for proper understanding. Therefore certain descriptive answers require presence of diagrams. A single diagram is equal to thousand words. Drawing a diagram with proper understanding clarifies many complex concepts. C&B lecture allows the student to follow the hands of the teacher and learn to draw a diagram. The anatomy diagrams used in C&B lectures are usually line diagrams, simplified version of those in text books / atlases, while the diagrams on PPT are usually scanned / photographed from text books /atlases, so may be complicated. Many times these are 3-dimensional. One of our respondents suggested that the diagrams on PPT should be simple, line diagrams. However, others opined that even simplest line diagrams on PPT are difficult to draw. Whereas, any diagram/illustration on a C&B can be copied and reproduced easily.

**Retention of lecture information in memory**

Our students opined that C&B lectures are more helpful to retain the lecture information in memory (scores 8.18 vs 6.89; $p<0.0001$) (Table2). The post lecture performance of memory for both obvious facts & minute details confirms it (scores 7.09 vs 3.90; $p<0.0001$) (Table 3).

While explaining with C&B, only the important points are written on board. Hence these points get imbibed on students' mind. Moreover, these points are on the board for a longer period, helping the students to learn those. In contrast, the text on PPT is comparatively more, thus the important points, may not be given due weightage. Many a times, students are left searching the point on the PPT that the teacher is explaining (particularly, if a pointer is not available). Moreover, in PPT, a less prepared / experienced teacher instead of getting main points may get a large body of text on slides, and both the teacher and students may be found reading the slides of PPT at the same time. In the end, retention in memory is the end- result of overall effectiveness of the lecture. Thus more is the effectiveness of the lecture, more and long lasting will be the retention of lecture information in memory.

**Conceptual understanding**

In our study, the students opined that understanding of concepts is better by C&B lectures than by PPT (Table 2). The post lecture test results, however, in contrast to one's expectation, indicate that the C&B is only marginally better than PPT, the difference being statistically not significant (Table 3). This is in line with Thomas and Appala, who observed that 80% students were of the view that the explanation and hence understanding was better by C&B [7].

While teaching, it is expected that a series of statements that are understood in relation to each other should unfold a new concept to be taught. A teacher through a series of statements written/diagrams drawn, sequentially, tries to explain a process/procedure on a chalkboard [24]. The student perceives this unfolding in a sequential manner and thereby it impinges on his mind. All sections of the explanation can be seen on the chalkboard at the same time. In a study by Thomas and Appala, 67% students noted that the potential to leave a large portion of the lecture content on the chalk board helps to correlate between facts and helps to give a better understanding of the lecture[7]. This may not be the case with a PPT presentation, where if the student didn't get a particular point when the slide was up, he is left foundering. This can be problematic if later points of the lecture depend on understanding earlier points [22]. This might have given the feeling to the students that they understand the concepts better by C&B (Table 2). However, the PPT facilitates conceptual understanding by some other means. As described earlier, its ability to show proportionate, accurate, good quality 3-D images, clinical photographs, video-clips

results in good understanding. Few authors further noted that PPT lends clarity to the subject [25-27]. Good and well-legible text, good visibility in PPT, compared to C&B definitely adds to better understanding of the topic. This might have resulted in equal post lecture examination performance of students in understanding of simple and complex concepts by PPT and C&B (Table 3). However the overall conceptual understanding is better by C&B than PPT, the difference being statistically significant (Table 3).

From Table 2 and Table 3, it is seen that though the C&B superseded PPT in all of the parameters studied (except understanding of simple and complex concepts, Table 3), the studentsself-perceptions about these methods is much higher than their actual post lecture performance.

We feel that the post lecture examination performance is the end product of conceptual understanding, memory retention and reproducibility of diagrams. Our study clearly unfolds that C&B is better than PPT as far as post examination performance is concerned. However various studies all over the world have varying opinions on this issue. Garg et al., 2004, noted that AV aids though preferred by teachers to be included in lecture, it was not certain whether it increases their understanding and post examination performance [5]. Seth *et al.*,cnoted that though the test performance was better by C&B than PPT, the difference was not statistically significant [20]. Szabo and Hastings, and Shallcross and Harrisonfound that there is no difference in performance of students in tests who were taught by different methods [4, 11].

Few of our respondent expressed that ‘it is not the teaching method but the teacher who is utilizing it, decides the efficacy of the teaching’. Prasad *et al.*notes that ‘a good teacher with lack of audiovisual aids will be better received than the poor teacher with the best audiovisual aids [28]. Ernest *et al.* recommends combination of lectures with PPT to improve the intellectual skills and to do away with the monotony of lectures [15]. Pence, 1997has also noted that the combination of PowerPoint with lecture create an especially effective educational environment [29]. Thomas and Appala,observed that 98%of their students felt that both C&B and PPT should be used simultaneously in all classes [7]. We feel that the PPT should not replace C& B, but be used as a supplementary to enhance the efficacy of teaching. As suggested by a recognizable number of students, a combination of both, C& B and PPT as per the need of the topic would be the right choice.

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