

Original Research Article

Comparison of two teaching aids: “PowerPoint and Chalkboard” in Undergraduate Anatomy Teaching

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ABSTRACT

Objective: Teaching aids like chalkboard and power point (PPT) have commonly been used in anatomy teaching. With an increasing number of medical seats and introduction of competency-based curriculum, PPT is being preferred. The present study aimed at obtaining the views of medical students on these two teaching aids in learning Anatomy.

Methods: It was a prospective, cross-sectional, questionnaire-based study conducted on medical students of First, second and final professional of a Government Medical College in North India. Students’ perception was assessed on the basis of a questionnaire in Likert scale. Likert scale 4 and 5 were considered favorable responses. McNemar’s test was used for statistical analysis.

Results: The questionnaires were distributed to 420 students but 412 students participated in study. There were 164 males and 248 females. Students perceived that PPT offered significantly (p value <0.001) better visibility of lecture content, more clarity of the diagrams, structural relations and demonstration of applied aspects as compared to chalkboard. However, chalkboard was preferred over PPT by a significantly higher number of students (p value <0.001) as it enhances the ability to take notes and copy diagrams, develop better understanding of topic, provides better opportunity for student-teacher interaction, stimulates interest in the subject and enhances overall satisfaction and effectiveness of lecture delivery.

Conclusion: The present study, based on students’ responses, highlights the areas of strength of chalkboard and PPT and provides a guide for the teachers for an integrated and appropriate use of both teaching aids for effective lecture delivery.

KEY WORDS: Anatomy teaching, Lecture delivery, Chalkboard, Power Point, Medical education.

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INTRODUCTION

Anatomy has been considered the foundation of medicine for hundreds of years and this view is supported by clinicians, teachers and students [1]. Anatomical knowledge is essential not only for surgeons, but also for anyone who performs an invasive procedure on a

patient, carries out emergency procedures or examines radiological imaging [2]. As a result of the restructuring of the undergraduate (UG) MBBS curriculum and teacher-student ratio, medical educators have felt the need for effective teaching and learning methods [3]. Teaching aids like chalk- board and power

point (PPT) have been used in Anatomy teaching for several years. Chalkboard is inexpensive, easy to clean and reuse, allows students to keep pace with the teacher and is not dependent on electricity. With an increasing number of medical seats, reduced teaching faculty and an extensive syllabus, there has been a constant effort to use modern teaching aids in medical colleges. PPT has the advantages of using colours, fonts, diagrams and animation [4]. Knowledge of the strengths and weaknesses of the teaching aids is vital for their appropriate and effective use in the educational process.

Learners are the most qualified sources to report effectiveness of the learning experience. Various studies have taken the feedback from the learners for assessment of the complex topic of Anatomy teaching [5, 6]. Following introduction of new competency-based curriculum by Medical Council of India (MCI) in UG teaching from August 2019, anatomy will be taught in all the professionals of MBBS. For that purpose, teaching aids will be helpful in delivering lectures to the students, keeping in view the reduced faculty in anatomy and time constraints. The present study aimed at obtaining an insight into the views of medical students on the two common teaching aids – chalkboard and PPT. Our study will also be a platform for future study on comparison of teaching aids after implementation of new UG curriculum in India.

MATERIALS AND METHODS

The present study was well planned, prospective and cross-sectional questionnaire-based study conducted on medical students of First, second and final professional examinations in India. After obtaining approval from institutional ethics committee, the study was conducted on 420 students, out of which 120 belonged to first professional, 200 from second professional and 100 students from final professional. MBBS students who were willing to give written informed consent were included. For first professional students, each participant was provided with questionnaire after routine anatomy lecture and was asked to return it after filling, within one day. The

students in second and final professional filled the questionnaire based on their previous experience of Anatomy lectures delivered during their first professional wherein both the teaching aids are regularly being used by Anatomy faculty. The questionnaire had two parts - demographic details of participant and rating of two teaching methods on five-point Likert scale (1- poor, 2 - fair, 3 - average, 4 - good, 5 - excellent). The data thus collected was compiled and analysed statistically. McNemar's Chi-Square test was used to calculate p values.

Questionnaire included following questions: Lectures were well organized and structured; Clarity of the contents/diagram; Clarity of relations of structures; Visibility of lecture; Reproducibility of text and diagram; stimulates interest in subject; Integration of text with figures; Ability to take notes and copy diagrams; Better understanding of topic; Overall satisfaction and effectiveness; Demonstration of applied aspects; Student-teacher interaction.

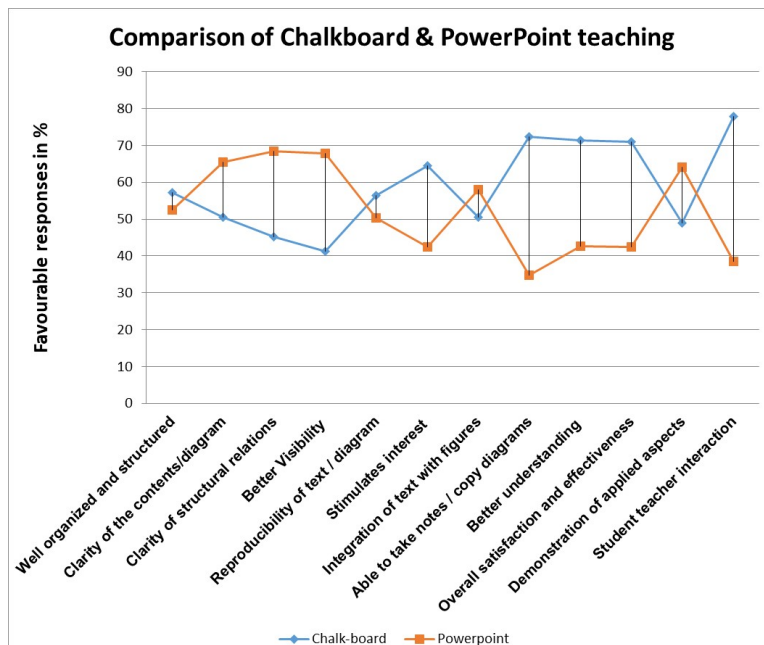
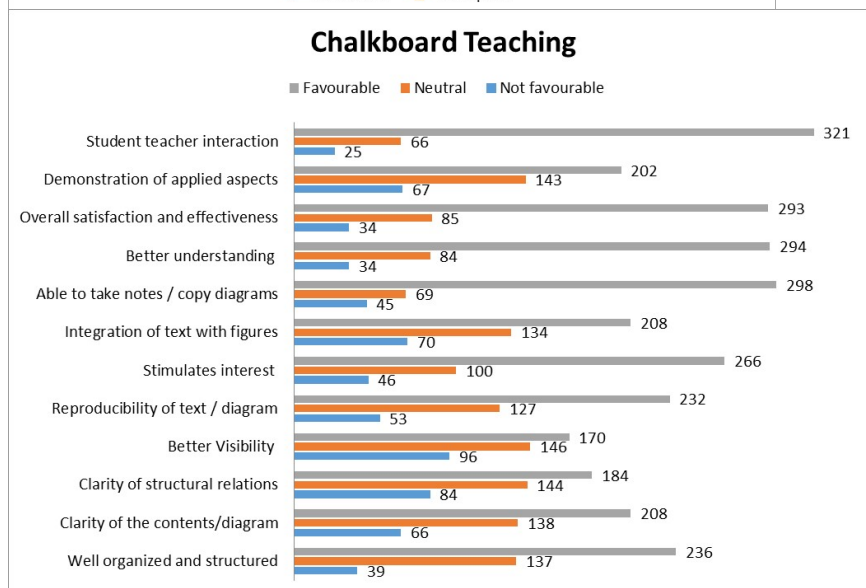
RESULTS

In present study, questionnaire was completely filled by four hundred and twelve students - 164 males (40%) and 248 females (60%). Likert scale 4 and 5 was rated as favorable, 3 as neutral and score 1, 2 as not favorable. Favorable responses of both the teaching aids are compared in table 1 and figure 1. Students' responses on Likert scale for chalkboard are shown in figure-2 and for PPT are depicted in figure-3.

Significantly higher number of students (p value <0.001) preferred PPT over chalkboard for clarity of the contents/diagram; clarity of relations of structures; visibility of lecture contents and demonstration of applied aspects (Table-1, Figure-3). On the other hand, chalkboard was significantly preferred over PPT for stimulating interest in subject; ability to take notes and copy diagrams; better understanding of topic; student-teacher interaction and overall satisfaction and effectiveness of lecture delivery. (Table-1, Figure-2). Also, chalkboard was rated higher for reproducibility of text and diagrams and making the lectures

Table 1: Comparison of students' responses to chalkboard and PowerPoint.

Questions	Chalkboard (favourable) (number and percentage of students)	PowerPoint (favourable) (number and percentage of students)	McNemar's test (P value) Significant P value < 0.001 *
Lectures were well organized and structured?	236 (57.28%)	216 (52.42%)	0.183
Clarity of the contents/diagram?	208 (50.48%)	270 (65.53%)	<0.001*
Clarity of relations of structures?	186 (45.14%)	282 (68.44%)	<0.001*
Visibility of lecture contents?	170 (41.26%)	279 (67.71%)	<0.001*
Reproducibility of text and diagram?	232 (56.31%)	207 (50.24%)	0.091
Stimulates interest in subject?	266 (64.56%)	175 (42.47%)	<0.001*
Integration of text with figures?	208 (50.48%)	239 (58%)	0.027
Able to take notes and copy diagrams?	298 (72.33)	143 (34.70%)	<0.001*
Better understanding of topic?	294 (71.35)	176 (42.71%)	<0.001*
Overall satisfaction and effectiveness?	292 (70.87%)	175 (42.47%)	<0.001*
Demonstration of applied aspects	202 (49.02%)	264 (64.07%)	<0.001*
Student - teacher interaction	321 (77.91%)	159 (38.59%)	<0.001*


Fig. 1: Line chart showing comparison of favourable responses of chalkboard & PowerPoint teaching.

Fig. 2: Students' responses on Likert scale for chalkboard. Favorable- 4 and 5, Neutral - 3, Not favorable 1 and 2.

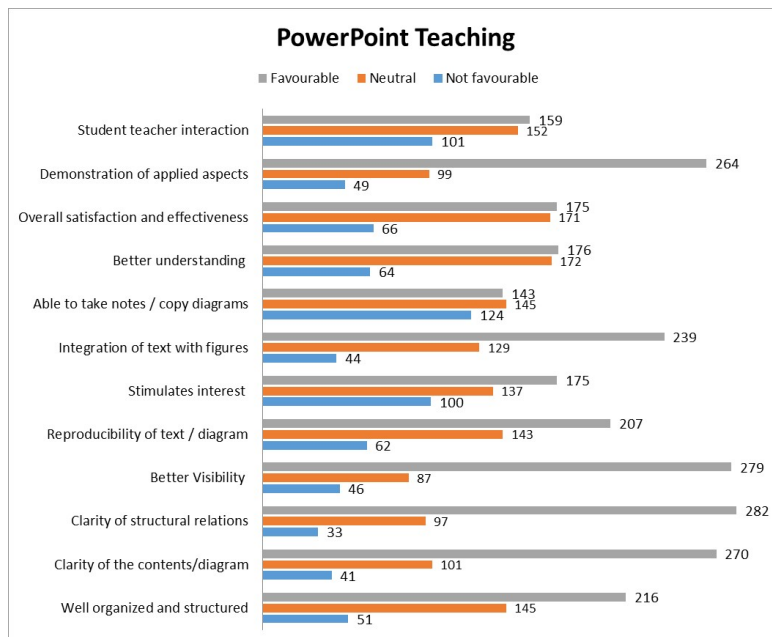


Fig. 3: Students' responses on Likert scale for PowerPoint. Favorable- 4 and 5, Neutral - 3, Not favorable 1 and 2.

more organized and structured whereas PPT was rated higher for integration of text with figures (Table-1, Figure-1). Chalkboard received maximum favourable responses and was most preferred by the students as it enhances student-teacher interaction (77.91% vs. 38.59%, p value < 0.001) whereas PPT was most favoured for clarity of structural relations (68.44% vs. 45.14%, p value < 0.001). As far as overall satisfaction and effectiveness of lecture delivery method is concerned chalkboard was considered much higher than PPT (70.87% vs. 42.47%, p value < 0.001). (Figure-2, 3)

DISCUSSION

Anatomy has been the backbone of medical education for hundreds of years. Various methods of teaching Anatomy include lectures through chalk- board, the cadaveric dissection, power point presentation and imaging methods. The traditional and the most frequent method has been the chalkboard for teaching Anatomy. The 35-mm slide projector was once popular but it is now heading towards extinction. The use of transparency and overhead projector (OHP) is also gradually decreasing. Instead, the use of PowerPoint presentation is gradually increasing. Some studies show that the learners prefer chalk and board over PPT presentation [7,8,9]. On the other hand, some studies show that the students prefer PPT presentation over chalkboard [10,11]. Preference to combined methods was highest in some studies [12,13].

If referred to three essential domains for assessing teaching methods- understanding the concept, retention of lecture information in memory and reproducibility of diagrams, chalkboard was observed to be the better method of teaching. In present study, for overall satisfaction and effectiveness of lecture delivery method, chalk and board was considered better than PowerPoint (70.87% vs. 42.47%). Our result is supported by Dhaliwal et al. who reported that Chalk and blackboard was best in allowing interaction and helping recall while slides were best in imparting clinical details, but were sleep inducing. The teacher's style of instruction was suggested to be most important in making the lecture engaging [14]. In our own earlier study while rating the teaching aids, excellent /good rating was given by 80.3% students to classroom teaching on the blackboard, followed by dissection (68.3%), models (45.2%), multimedia (42.8%) and PowerPoint teaching (32.7%) [15].

In present study medical students preferred PowerPoint over chalkboard for clarity of the contents/diagram, clarity of relations of structures, visibility of lecture contents, integration of text with figures and demonstration of applied aspects. Multiple diagrams can be shown on PPT to clarify relations of structures while the same is not practically possible with chalk and board. There are multiple options on PPT software to zoom and display small structures, which is why students can see it

more clearly from a distance. A study by Nuhu *et al.* revealed that majority of the preclinical medical students preferred PowerPoint presentation over the traditional chalk and talk method in teaching gross anatomy [16]. For demonstration of applied aspects PPT was rated better than chalkboard in our study. Studies show that most of the students felt that chalkboard was ineffective in demonstration of clinical conditions and in covering more subject per lecture [9,17].

Ability to take notes and draw diagrams in a class is important for the learner to have better spatial understanding of structures and organ systems. It helps in revision of the topic and long-term retention of the knowledge. In present study it was seen that chalkboard was a preferred method from the learner's viewpoint (72.33% vs 34.70%) for taking notes, copying diagrams, reproducing text and developing a better understanding of the topic. Similar observations were also reported by other studies [8,9]. In a study by Meyur *et al.* the students preferred blackboard teaching over OHP and result was statistically significant (p value < 0.0001). Blackboard teaching was also preferred over PPT presentations ($p < 0.02$). But in comparison to OHP, students preferred PPT though the difference is not statistically significant ($p < 0.10$) [17]. Shaikh showed that 81.65% of the students preferred chalkboard for copying diagrams but 81.3% of students felt that for demonstration of three-dimensional figures, PPT was better [9].

For a student if the lecture is interesting, learning becomes easier. Praveen *et al.* reported preference of chalkboard over PPT because of better student-teacher interaction, maintenance of good eye contact and it helped taking down the notes. In their study, students from Dhaka Medical College preferred chalkboard over PowerPoint (50% vs 25%) [18]. Students prefer chalkboard for advancing the understanding of the subject as it contains natural pause and break during writing and rubbing the board which allows the students to follow the material and take down the notes [19]. In present study, students preferred chalkboard over PPT for better student-teacher

interaction (77.91% vs 38.59% p value < 0.001). Saha *et al.* showed that students felt that stress on important points could be given by the teacher more in chalkboard method of teaching (46.9%) as compared to PowerPoint (10.2%), overhead projector (10.2%) or mixed aid presentation (32.7%) [12]. Studies have shown that students preferred chalkboard because it facilitated the interaction between teacher and students [9,17]. The PowerPoint reduces the interactive discussion between teacher and students. Some studies have shown that the interactive features of blackboard have the potential to enhance the learning experience [20]. In present study, the students felt that a chalkboard presentation is slightly more organized than PPT (57.28% vs. 52.42%, p value-0.183). However, Power Point was reported to be slightly better organized in another study (83.33% vs. 79.63%) [21]. The difference could be due to smaller sample size in the latter study.

With the onset of COVID -19 pandemic, the anatomy teaching scenario has changed dramatically and online distance learning is the only option available to us. Students have lost access to cadaveric dissection in addition to other optimal learning modalities like prosection, models, specimens, skeletons and practical face to face interaction. Studies have shown that although online teaching programs are useful, they provide lower rates of self-perceived learning and satisfaction than dissection [22]. This again brings into focus the importance of student-teacher interaction and stimulating the student's interest in the subject for the overall satisfaction and effectiveness of the learning experience.

The results of the present study suggest that both the tools of teaching have some strengths and limitations. Therefore, as Anatomy teachers, we suggest that combination of both teaching methods would be more effective for learners. Combination of both the methods was also suggested in previous studies [12, 23]. The strength of the present study is that, based on student responses, it clearly defines strengths of chalk-board and PPT and provides a guide for the teachers on 'which teaching aid to be used and when' while planning a

lecture. This will further facilitate an integrated and appropriate use of both teaching aids for effective lecture delivery. Other strengths of our study are its planned and prospective design and inclusion of large number of subjects including the senior batches of students who are better informed and experienced in giving their feedback.

CONCLUSION

In present study, for overall satisfaction and effectiveness of lecture delivery method chalkboard was rated much higher than PPT. This study highlights the areas of strength of both teaching aids and suggests using traditional chalkboard as the preferred lecture delivery method in the classroom supplemented with PPT to illustrate applied aspects and diagrams.

ABBREVIATIONS

PPT – PowerPoint

OHP – Overhead projector

MBBS – 'Bachelor of Medicine Bachelor of Surgery

MCI – Medical council of India, **UG** - Undergraduate

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Conflicts of Interests: None

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