

Teaching Aids in Medical Education: An Integrated Approach over Conventional Methods

Archana Nimesh¹, Mohit Mehndiratta², Rajarshi Kar³, Seema Garg⁴, Dinesh Puri⁵

ABSTRACT

Aim and background: Didactic lecture is a predominant teaching method in medical colleges. Therefore, it should be made as effective as possible using appropriate and effective teaching aids. This paper assesses the preference of first-year medical undergraduate students for commonly used teaching aids during lectures and analyses the reasons mentioned by them for saying so.

Materials and methods: A self-designed feedback form was distributed to students of four groups (namely A, B, C, D) to indicate their preference for teaching aids [PowerPoint (PPT), overhead projector (OHP), blackboard/interactive whiteboard (IWB), direct interaction without teaching aid] and mention reasons for their respective choice.

Results: Batch A predominantly opted for PPT (50.6%) followed by blackboard/IWB (35.1%). Batch B predominantly opted for blackboard/IWB (52.0%) followed by PPT (42.2%). Batch C showed an equal preference for PPT (41.9%) and blackboard/IWB (41.9%). Batch D had a slightly higher preference for PPT (41.2%) over blackboard/IWB (38.8%). Preference for OHP was feeble in all batches (9.1, 1.9, 8.1, and 8.8% for Batch A, B, C, and D, respectively). Likewise, the preference for "direct interaction without teaching aid" was feeble in all batches (5.2, 3.9, 8.1, and 11.2% for Batch A, B, C, and D, respectively).

Conclusion: Students were not satisfied with PPT or blackboard teaching owing to their demerits. Students recommended their combination. Interactive whiteboard could be an efficient tool to integrate the two and make lectures more effective. Interactive whiteboard has great potential in facilitating the integration of pre-clinical and clinical subjects by allowing videos/animations/internet functions. This may be particularly useful for the competency-based medical education curriculum where there is an *emphasis* on integrated teaching.

Keywords: Blackboard, Didactic lecture, Interactive whiteboard, Medical education, Overhead projector, PowerPoint, Teaching aids.

Indian Journal of Medical Biochemistry (2021): 10.5005/jp-journals-10054-0188

INTRODUCTION

Didactic lecture has been the most commonly used method of teaching and learning in most colleges for a very long time. Though other methods of teaching-learning activities like group discussions,¹ role play,² problem-based learning,^{3,4} and case-based learning^{5,6} are more effective than the lecture method, yet the lecture remains the predominant mode of teaching in almost all the medical colleges. Lectures cannot be replaced by alternate methods of teaching especially in medical colleges due to reasons like a large number of students per MBBS batch (50–250), paucity of staff, and extensive syllabus. Hence, personalized attention by the teachers to the students is not practically possible. Despite these pitfalls, lectures have been indispensable in medical education. Thus, the teachers are faced with an onerous and erroneous task to cover the topic completely and perfectly in a lecture. The three most important aspects of a lecture are "Inspire", "Influence", and "Inform" the learners. However, it has been observed that the students expect the teachers to focus only on the "Inform" component implying that a teacher must complete the entire syllabus in a lecture. But the perspective of the competency-based medical education (CBME) curriculum is that even if the lectures are incomplete and imperfect, the teacher should make the lecture effective enough to make the students put an active effort into learning. The teacher should provoke the critical thinking process of students and make them understand the logic behind a concept rather than making the students passively imbibe the information. The teacher should inspire the students to read the topic themselves. The role of teachers in today's times (with CBME curriculum) is more of a facilitator of education. There should be an

¹Department of Clinical Biochemistry, College of Medicine, King Khalid University, Abha, Kingdom of Saudi Arabia

²⁻⁵Department of Biochemistry, University College of Medical Sciences, University of Delhi, New Delhi, India

Corresponding Author: Dinesh Puri, Department of Biochemistry, University College of Medical Sciences, University of Delhi, New Delhi, India, e-mail: dineshpuri21@yahoo.co.in

How to cite this article: Nimesh A, Mehndiratta M, Kar R, *et al.* Teaching Aids in Medical Education: An Integrated Approach over Conventional Methods. *Indian J Med Biochem* 2021;25(3):113–117.

Source of support: Nil

Conflict of interest: None

andragogical approach toward teaching rather than a pedagogical one. Thus, to achieve these goals and make a lecture more effective, the role of teaching aids is indispensable.

Moreover, in contrast to the lecture method, other methods of teaching are not easy to execute in the limited time span of four and half years (tenure of undergraduate medical curriculum). Thus, it becomes even more important than the lecture delivered to students to be as effective as possible. The use of teaching aids or tools for delivering a lecture is thus immensely important for making a lecture effective. The traditional way of taking a lecture in most of the schools and colleges used to be the chalk and talk method (blackboard) and is still being used at times. However, with advancements in technology and the need to adapt to better teaching aids in the interest of the students, newer modalities

to facilitate teachings like the overhead projector (OHP) and PowerPoint (PPT) have come into being. Recently, another teaching tool called the interactive whiteboard (IWB) has been introduced in some schools and colleges as well.

In this study, we have assessed the personal preference of the first-year medical students for the type of teaching aids that they prefer while taking lectures (for Biochemistry) to make them more effective. The students were also asked to give their comments for choosing their respective preferences to enable us in modifying our teaching strategies accordingly to enhance learning among medical students. We have specifically enrolled the first-year undergraduate medical students in our study because the first professional year of the medical curriculum consists of pre-clinical subjects (anatomy, physiology, and biochemistry) who lack direct exposure of students to the hospital set up and interaction with the patients. These subjects are believed to be dissociated from the clinical realities. Thus, the students probably find the subjects very boring and difficult to correlate their knowledge in context with patients and hence may not retain their knowledge for long to apply to patients later on. Thus, there is a definite need to reassess our teaching tools which are being used for taking lectures to promote learning among students.

AIM AND OBJECTIVE

To obtain and assess the feedback responses of first-year medical students pertaining to the type of teaching aid they would prefer to be used during their lectures and analyze the reasons cited by them for their respective choice.

MATERIALS AND METHODS

The medical course in our country consists of four professional years and each year is further divided into two semesters except the second professional year which has three semesters, before the introduction of the CBME curriculum. In total, there are nine semesters of 6 months each thereby making the course duration of four and half years with an additional 1 year of mandatory internship. This cross-sectional study was carried out on the students of first-year MBBS (which consists of two semesters) after seeking approval from Institute's Ethics Committee for human research (IEC 2013/11/18/01). The duration of the study was 2 years. Feedback was obtained at the end of the first semester and then at the end of the second semester for two consecutive first MBBS batches (admission year 2014 and 2015). There were four groups in this study (namely Batch A, B, C, D). Batch A comprised of first MBBS students of the 2014 admission batch at the end of the first semester (December 2014), Batch B comprised of first MBBS students of the 2014 admission batch at the end of the second semester (May 2015), Batch C comprised of first MBBS students of the 2015 admission batch at the end of the first semester (December 2015), Batch D comprised of first MBBS students of the 2015 admission batch at the end of the second semester (May 2016). After obtaining written consent for participation in the study from the students, a self-designed feedback form (Table 1) was distributed to them. The question asked in the feedback form was regarding the type of teaching aid that they would prefer for lectures. In the feedback form, the students were given four choices to indicate their preference for the teaching aid (PPT, OHP, blackboard/IWB, direct interaction with no teaching aid; Table 1). The students also had the option of choosing the "can't say" option against the question

(if they wanted to avoid answering the question). They also had the option of writing their own comments/reasons for choosing the respective choice. After obtaining the student's feedback, the data were compiled and analyzed. The comments written by students were also analyzed to enable us to propose better teaching methods/strategies. The responses obtained from the students of the four batches were analyzed and the results so obtained were tabulated in the form of percentages (Tables 2 to 5).

RESULTS

The students of Batch A ($n = 77$) mainly opted for PPT (50.6%) followed by blackboard/IWB (35.1%) as their preference (Table 2). However, in Batch B ($n = 102$) (Table 3), majority of students opted for blackboard/IWB (52.0%) followed by PPT (42.2%). In Batch C ($n = 62$), equal preference for PPT (41.9%) and blackboard/IWB (41.9%) was observed (Table 4). In Batch D ($n = 80$), slightly higher preference for PPT (41.2%) over blackboard/IWB (38.8%) was observed (Table 5). The preference for OHP was found to be very less in all four batches (9.1, 1.9, 8.1, and 8.8% for Batch A, B, C, and D, respectively; Tables 2–5). Likewise, very few students opted for "direct interaction without any teaching aid" in all the four batches (5.2, 3.9, 8.1, and 11.2% for Batch A, B, C, and D, respectively; Tables 2 to 5).

DISCUSSION

From the results of our study, it is quite evident that majority of students felt the need for teaching aids during the lectures that too predominantly in the form of PPT or blackboard/IWB. The use of OHP has received a very bleak response from students. After evaluating the students' comments, the reasons cited by the students for choosing a particular teaching aid are being discussed in greater detail.

Some students mentioned that PPT is a must for taking lectures so that students sitting at the back can comfortably see the slides and understand what the teacher is speaking. It is a common problem faced by the students seated at the back complaining that the points written on the blackboard by the teacher are not visible to them. Another advantage of PPT presentations cited by the students was that PPT slides are good for projecting complex structures/diagrams/equations and hence should be used frequently. This saves time for the teacher to focus on other important aspects of the topic. However, quite a lot of students have criticized the PPT presentations saying that some of the teachers tend to just read out the slides without making the students understand the concept. Some students highlighted in their comments, that teachers scroll through the slides too fast which limits their capacity to take down important notes or understand the concepts. Students also mentioned that the matter contained in the slides is too crowded and the content is picked up from their textbook, copied, and pasted on the slides. Hence, the students feel bored and baffled to recognize the important points. Students have mentioned that if teachers have to recite the text contained in the slides, then there is no need for a teacher and that they would prefer reading the topic from the internet or self-study from textbooks and save their time to cover up their syllabus. Similar pros and cons of PPT slides have also been described in an article by Schmaltz and Enstrom.⁷ Some students have pointed out the fact that the subjects taught to them during the first year fail to highlight their clinical relevance and hence they find it difficult to understand the concepts. Hence, they would like to have PPT presentations

Table 1: Format of the feedback form used for obtaining the response of medical students with regards to the teaching aid that shall be used for delivering lectures

Question	Response 1	Response 2	Response 3	Response 4	Can't say	Any other relevant suggestion
Which teaching method would you prefer	PowerPoint	OHP (overhead projector)	Blackboard/interactive whiteboard	Direct interaction without any teaching aid		

Instructions: Please don't write your name or roll no on this sheet of paper. Your feedback will be kept confidential. You have to choose (tick) the response that you think is most appropriate. You may choose more than one response. If you don't agree with any response or do not want to answer the question, you may mark the choice as can't say. You may also give any other relevant suggestion at the space provided for the same

Table 2: Preference for teaching aid among students of Batch A

Teaching methods	No. of students (n = 77)	% of students
PowerPoint	39	50.6
OHP (overhead projector)	7	9.1
Blackboard/interactive whiteboard	27	35.1
Direct interaction without teaching aid	4	5.2

Table 3: Preference for teaching aid among students of Batch B

Teaching methods	No. of students (n = 102)	% of students
PowerPoint	43	42.2
OHP	2	1.9
Blackboard/interactive whiteboard	53	52.0
Direct interaction without teaching aid	4	3.9

Table 4: Preference for teaching aid among students of Batch C

Teaching methods	No. of students (n = 62)	% of students
PowerPoint	26	41.9
OHP (overhead projector)	5	8.1
Blackboard/interactive whiteboard	26	41.9
Direct interaction without teaching aid	5	8.1

Table 5: Preference for teaching aid among students of Batch D

Teaching methods	No. of students (n = 80)	% of students
PowerPoint	33	41.2
OHP (overhead projector)	7	8.8
Blackboard/interactive whiteboard	31	38.8
Direct interaction without teaching aid	9	11.2

to include visually appealing videos of clinical cases as well. Few students have also recommended that PPT slides are a good teaching aid provided that a printout of the slides is distributed to the students beforehand so that they can focus on understanding a concept rather than taking down notes. Thus, we have received a mixed response from the students with regards to PPT as an option to deliver lectures by the teachers.

Students in favor of blackboard as a teaching aid have mentioned that the teachers who teach through chalk and board method explain the concepts well with natural pauses and eye contact with students ensuring that students can understand the topics clearly. The chalk and board method also enables the students to take down notes as the teacher writes down the important points on the board. A study in literature also showed that students preferred the chalk and board method.⁸ However, a few students feel that the visibility of text on the blackboard is not always good making the students seated at the back struggle to read the writings on the board. Moreover, students complained that all topics of a chapter are not covered by the teachers who use the chalk and board method. Another important point highlighted by students was that videos cannot be played on a blackboard. Thus, some students recommended that blackboard teaching be the predominant mode of teaching and must be supplemented with PPT slides to project important structures/diagrams or to play important animated videos related to difficult concepts or for describing patients/diseases. Similar results with a preference for the combination were obtained in a study by Nagothu et al.⁹ However, some students wanted it *vice versa*. These students mentioned in their comments that the predominant mode of teaching should be through PPT and that shall be supplemented with blackboard teaching specifically for those topics which need simplification of a complicated concept. Thus, from analysis of the results of our study, we have observed a mixed response of the students with regards to the blackboard teaching with students in favor as well against the blackboard teaching.

However, with regards to IWB teaching, students have mentioned in their comments that they had a good experience of learning in classes delivered to them through the usage of IWBs. However, they feel that they came across such kind of teaching aid (IWB) at very few teaching centers due to its non-availability in most of the setups. These students have requested us to incorporate this teaching aid as much as possible in their lectures.

Thus, from the results of this study and analysis of students' comments, it is clear that students have a mixed opinion about the usage of PPT and blackboard as a teaching aid during the lectures. Neither the students were completely satisfied with the PPT aid nor with the blackboard teaching. The majority of students in Batch A

preferred PPT while the majority of students of Batch B preferred blackboard/IWB teaching. Batch C and D had the more or less same preference for either of these teaching aids. However, considering the merits and demerits of PPT and blackboard as a teaching aid with respect to each other it will be rational to use a combination of the two as per the topic and need of the students. A study in literature also showed that students preferred a combination of these teaching aids.¹⁰ Interactive whiteboard can definitely serve as a teaching modality that can integrate PPT teaching with the traditional chalk and board method.

Interactive whiteboard is a smartboard that has been recently introduced for teaching purposes and corporate presentations to make them more effective.¹¹ It is an electronic assembly comprised of a few components that are wirelessly connected. It has a touch-sensitive whiteboard to be mounted on a wall and is used to write upon using a digital pen.¹¹ Teaching through IWB mimics the classical blackboard (chalk and talk) method wherein the teacher can write on the board and explain a difficult topic to the students simultaneously. The teacher can save the contents written on the board¹¹ to be revised by the students later on as well. Interactive whiteboard also has the option to immediately switch over to PPT mode wherein the whiteboard can serve as a display screen to project PPT slides on, via an electronic projector linked to the computer system.¹² This mode enables the teachers to play animations or videos¹¹ for making the topic simplified and interesting. This teaching aid is quite convenient for the teachers to deliver a topic in a more comprehensive, effective, and time-bound way.¹² Moreover, it saves effort to arrange the chalks/markers and duster for erasing the board¹² or distributing the printouts of the PPT slides to the students. The IWB can also be connected to the internet¹¹ to circulate the slides to the students or to show information live from the internet.¹¹ This is extremely important when students are being taught about a rare disorder in a patient which they would hardly come across ever in their real life. This device, however, has a few disadvantages like being costly and dependent upon power supply for electric charging of the equipment. Moreover, it might take some time for all the teachers to get comfortable with this new teaching aid and its functions in preparing their lectures.

Though studies have shown that PPT is a good teaching aid but it is not being used properly by most of the teachers.⁷ The salient features of a good PPT presentation includes selecting appropriate font size, the color of text and background, number of lines per slide or number of words per line, use of functions like bullets, and a moderate amount of animations to make PPT more effective but unfortunately such guidelines^{7,13} are rarely being followed for preparing PPT slides and hence have decreased its effectiveness. Students have mentioned that they find PPT slides to be monotonous and do not evoke interest in the topics. Blackboard too has been proven to be an effective teaching aid in literature but the medical syllabus is too vast to be exclusively taught through this teaching aid. Hence, our recommendation based upon students' feedback is that PPT slides should be prepared appropriately and be used *via* the IWB equipment with an intermittent switch over to the writing mode on the whiteboard. This method will help teachers cover a large number of topics in the given time span and yet make the lecture more interactive with the students by utilizing the whiteboard writing option or video playing mode or net access function.

There are ample numbers of studies in the literature which have criticized the traditional didactic lecture method of teaching due to its several demerits. With the CBME-based curriculum, other methods of teaching like role play, problem-based learning, case-based learning, etc., are being promoted more and more in the field of medical education especially during the first professional year (pre-clinical year) to integrate the pre-clinical subjects with clinical ones to enhance our quality of medical education as these methods of teaching are based on direct interaction between the teacher and students unlike seen in a didactic lecture which is more of a monolog.¹⁴ However, it is not easy to arrange these kinds of teaching sessions frequently for students. Hence, the use of an IWB can serve as a means to facilitate interaction between teacher and students in contrast to the didactic lectures which are usually found monotonous by the students.¹⁵ A study in literature too has shown that an interactive lecture is more effective than a didactic lecture to teach a topic¹⁶ and at times while teaching aids are combined, it results in a better understanding of the topic in first MBBS students.¹⁷ We are using IWB teaching in our medical college for teaching theory as well as for practical briefing sessions. This has been appreciated by students greatly.

CONCLUSION

The use of teaching aids remains the mainstay of delivering an effective lecture to medical students. Out of the currently available teaching aids, an IWB seems to be the most promising and efficient tool to make lectures more interactive and effective in comparison to the traditional didactic lectures for first-year medical undergraduate students. Adapting to teaching using IWBs has the potential to fill in the lacunae in our medical curriculum to a good extent.

ACKNOWLEDGMENTS

We thank medical students for participating in the study and Medical Education Unit of our college.

REFERENCES

1. Zhao B, Potter DD. Comparison of lecture-based learning vs discussion-based learning in undergraduate medical students. *J Surg Educ* 2016;73(2):250–257. DOI: 10.1016/j.jsurg.2015.09.016.
2. Hassanzadeh A, Vasili A, Zare Z. Effects of two educational method of lecturing and role playing on knowledge and performance of high school students in first aid at emergency scene. *Iran J Nurs Midwifery Res* 2010;15(1):8–13.
3. Zhang Y, Zhou L, Liu X, et al. The effectiveness of the problem-based learning teaching model for use in introductory Chinese undergraduate medical courses: a systematic review and meta-analysis. *PLoS ONE* 2015;10(3):e0120884. DOI: 10.1371/journal.pone.0120884.
4. Ding X, Zhao L, Chu H, et al. Assessing the effectiveness of problem-based learning of preventive medicine education in China. *Sci Rep* 2014;4(1):5126. DOI: 10.1038/srep05126.
5. Nair SP, Shah T, Seth S, et al. Case based learning: a method for better understanding of biochemistry in medical students. *J Clin Diagn Res* 2013;7(8):1576–1578. DOI: 10.7860/JCDR/2013/5795.3212.
6. Tayem YI. The impact of small group case-based learning on traditional pharmacology teaching. *Sultan Qaboos Univ Med J* 2013;13(1):115–120. DOI: 10.12816/0003204.
7. Schmaltz RM, Enstrom R. Death to weak PowerPoint: strategies to create effective visual presentations. *Front Psychol* 2014;5:1138. DOI: 10.3389/fpsyg.2014.01138.

8. Kumar M, Saxena I, Kumar J, et al. Assessment of lecture strategy with different teaching AIDS. *J Clin Diagn Res* 2015;9(1):CC01–CC05. DOI: 10.7860/JCDR/2015/10805.5413.
9. Nagothu RS, Reddy IY, Paluru R. Effective physiology teaching methods: from the perspective of first year MBBS students. *Indian J Clin Anat Physiol* 2016;3(3):336–338. DOI: 10.5958/2394-2126.2016.00076.1.
10. Naqvi SH, Mobasher F, Afzal MA, et al. Effectiveness of teaching methods in a medical institute: perceptions of medical students to teaching aids. *J Pak Med Assoc* 2013;63(7):859–864.
11. Brigham TJ. Smart boards: a reemerging technology. *Med Ref Serv Q* 2013;32(2):194–202. DOI: 10.1080/02763869.2013.776903.
12. Muttappallymyalil J, Mendis S, John LJ, et al. Evolution of technology in teaching: blackboard and beyond in medical education. *Nepal J Epidemiol* 2016;6(3):588–592. DOI: 10.3126/nje.v6i3.15870.
13. Kosslyn SM, Kievit RA, Russell AG, et al. PowerPoint((R)) presentation flaws and failures: a psychological analysis. *Front Psychol* 2012;3:230. DOI: 10.3389/fpsyg.2012.00230.
14. Palocaren J, Pillai LS, Celine TM. Medical biochemistry: Is it time to change the teaching style? *Natl Med J India* 2016;29(4):222–224.
15. Mehta B, Bhandari B. Engaging medical undergraduates in question making: a novel way to reinforcing learning in physiology. *Adv Physiol Educ* 2016;40(3):398–401. DOI: 10.1152/advan.00068.2016.
16. Roopa S, Geetha MB, Rani A, et al. What type of lectures students want? - areaction evaluation of dental students. *J Clin Diagn Res* 2013;7(10):2244–2246.
17. Nair DS, Bedekar MY, Agrawal MJ, et al. Effectiveness of teaching aids in medical education. *Ann Appl Bio-Sci* 2017;4(1):A58–A61.