Original Article

Medical Education

Teaching Anatomy at Undergraduate Level -- A Survey amongst Students Comparing use of Powerpoint and Blackboard

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ABSTRACT

Objectives: To find out a more effective method for teaching anatomy at undergraduate level by comparing PowerPoint and Blackboard-Chalk modes.

Study design: Comparative study

Place and duration of study: This study was conducted at the departments of anatomy at Army Medical College, Islamic International Dental College, Islamabad Medical and Dental College in Rawalpindi/Islamabad from March to May 2010.

Subjects and methods: 130 students who were exposed to both the PowerPoint and Blackboard-Chalk based lectures in three medical and dental colleges, were selected at random from class nominal roll. A specially designed questionnaire was sent to them. 82% (106) of the students returned the survey form with the response.

Results: Various advantages and disadvantages of both the PowerPoint and Blackboard-Chalk method were highlighted in the students' response. 65%, 62% and 60% of the students recommended that a combination based upon Blackboard as main format, and supplemented by PowerPoint should be used in lectures (embryology, histology and gross anatomy), gross anatomy demonstrations and histology practical respectively. The PowerPoint was recommended to be used in the beginning to outline the lecture and summarize the things at the end with picture showing wherever needed.

Conclusion: A strategy based upon mixing PowerPoint with Blackboard as main format is preferred by undergraduate students in anatomy.

Key Words: PowerPoint, Blackboard-Chalk, Teaching methodology, Teaching tools.

INTRODUCTION

A lecture has been the commonest teaching tool since centuries, dating back even to as past as Greeks of 5th century[1]. The research comparing lectures with other teaching methods does not provide sufficient evidence of favouring one method over the other, although small group discussion method appears to be superior for higher level learning process[2].

In anatomy, whole class lecturing is still a major teaching medium because of huge number of students and meagre faculty resources[3]. A lecture is generally considered as a better tool through which one can present the general plan for understanding the basics of a subject like Anatomy in one's own personal way[4]. So it is relevant that consistent efforts ought to be made to make the lecturing more effective[5].

Although Blackboard-Chalk method has been the main feature in our lecture methodology for a long time, the use of electronic media like Multimedia PowerPoint and Transparency-Overhead projector is becoming more and more common with advancing time. It has been under discussion, which way is superior: whether the PowerPoint or the "Old is Gold" Blackboard-Chalk method. The result of the studies done previously in this regards are available in the literature. It was noted in a study that the students preferred PowerPoint over TOHP[6]. A marked improvement was seen in the examination results when TOHP was replaced by PowerPoint in another study[7] but the efficacy of the PowerPoint was not found to be universal, rather it was observed as case-specific[8]. The use of Multimedia PowerPoint was taken by the students to improve their learning[9], however the genuine evidence supporting this perception is inconsistent. Moreover it is observed by the students that the teacher meaningfully integrates text with the visual images in a PowerPoint presentation, proponents of contiguity effect would predict increased students learning[10]. However the Multimedia presentations exhibit a lack of creativity[11], cause a strangling of interaction, promote style with less substance, excessive cluttering leading to less learning, and there is lack of innovation too[12]. It was also revealed in another study that PowerPoint did not enhance overall student grades compared to Blackboard-Chalk format[13]. The efficacy of a scientific instruction method, PowerPoint or Blackboard, is dependent significantly on an applied specific discipline.

Keeping in view of these observations and diverse spectrum of anatomy; gross anatomy, histology, embryology and neuroanatomy, a study was planned and conducted in different medical and dental colleges of Rawalpindi and Islamabad to find out an effective teaching method by comparing PowerPoint and Blackboard-Chalk, through a feedback-survey amongst the students.

MATERIALS AND METHODS

The study was planned and conducted in March-May 2010. The population comprised the undergraduate students of three medical and dental colleges of Rawalpindi/Islamabad: Army medical college (AMC) and its dental section, Islamic International medical college (IIMC), Islamic international dental college (IIDC) and Islamabad medical and dental college (IMDC). All surveyed students had experienced both the PowerPoint and Blackboard-Chalk based lectures. The names of the students were obtained from the nominal roll of 1st year MBBS and BDS classes of these colleges. Every 4th person of nominal roll at random was chosen and sent the survey form/questionnaire. Out of 130 forms/questionnaires despatched, 50, 50, 30 were sent to AMC, IIMC-IIDC and IMDC respectively. 106 were returned giving a response rate of 82%. The %age of returned survey forms was 76, 86 and 83 from AMC, IIMC-IDC and IMDC respectively.

Survey Form/Questionnaire: The survey form consisted of thirty six statements in five sections. Its draft was identified after extensive literature reading and sent to panel of anatomy experts with post graduate qualifications, and research experience. The section 1 was about the population: medical/dental students. The section 2 had six statements of general nature; the statement No 1 was about the level of likeliness for the teaching tools being currently used, asking the response on the pattern (I strongly like= SL, I like= L, I am neutral= N, I do not like= DL, and I strongly dislike= SDL, while statement No 2-6 were required to be responded on Yes/No pattern. The section 3 carried statement No 7-24 which were designed to elicit the response showing the advantages and disadvantages of PowerPoint usage. Similarly section 4 had the statement No 25-36 framed to elicit the response for Blackboard-Chalk usage. The section 5 consisted of final recommendation of the respondents. In section 3 and 4 the respondents were asked to show their response on 5-point Likert scale (SA= I strongly agree, A= I agree, N= I am neutral, DA= I do not agree and SDA= I strongly disagree), "SA" and "A" response collectively taken as "Agreed".

RESULTS

The section 1 showed that out of 106 respondents 70 were MBBS students while 36 belonged to BDS class. The section 2 dealt with the general statements regarding the teaching tools without being specific about them.

Table No.1: Advantages of use of PowerPoint

Statement		SA	A	N	DA	SDA
Excellent tool to understand the figures, graphs and pictures of clinical conditions.	AMC	24(23%)	12(11%)	2(2%)	0	0
	IIMC	22(21%)	14(13%)	4(4%)	2(2%)	1(1%)
	IMC	13(12%)	11(10%)	1(1%)	0	0
	Total	59(56%)	37(34%)	7(7%)	2(2%)	1(1%)
Good for outlining the lecture at the beginning and summarizing at the end.	AMC	13(12%)	19(18%)	5(5%)	0	0
	IIMC	16(15%)	18(17%)	6(5%)	2(2%)	0
	IMC	8(7%)	9(8%)	5(5%)	3(3%)	0
	Total	37(34%)	46(43%)	16(15%)	6(5%)	0
Effective tool in understanding embryology, histology and neuroanatomy.	AMC	10(9%)	17(16%)	8(7%)	3(3%)	0
	IIMC	6(5%)	15(14%)	5(5%)	10(9%)	8(7%)
	IMC	11(10%)	12(11%)	2(2%)	0	0
	Total	27(25%)	44(41%)	15(14%)	13(12%)	8(7%)
Soft copy available easily, no need to take notes.	AMC	5(5%)	12(11%)	7(7%)	11(10%)	3(3%)
	IIMC	9(8%)	19(18%)	6(6%)	5(5%)	4(4%)
	IMC	11(10%)	7(7%)	3(3%)	1(1%)	2(2%)
	Total	25(23%)	38(36%)	16(15%)	17(16%)	9(9%)

Table No.2: Disadvantages of use of PowerPoint

Excessive slides are shown and sometimes the teacher reads out the slides in hurry, less discussion.	AMC	14(13%)	12(11%)	7(7%)	3(3%)	1(1%)
	IIMC	13(12%)	20(19%)	4(4%)	4(4%)	2(2%)
	IMC	10(9%)	4(4%)	5(5%)	4(4%)	0
	Total	37(35%)	36(34%)	16(15%)	11(11%)	3(3%)
Less eye contact between the teacher and student. Less discussion when lights are dim during the lecture.	AMC	11(10%)	10(9%)	10(9%)	5(5%)	2(2%)
	IIMC	12(11%)	16(15%)	5(5%)	11(10%)	0
	IMC	11(10%)	2(2%)	5(5%)	6(6%)	0
	Total	34(32%)	28(26%)	20(19%)	22(21%)	2(2%)

Table No.3: Advantages of use of blackboard and chalk

Statement		SA	A	N	DA	SDA
Students learn the subject better as they are continuously tuned in the learning process.	AMC	10(9%)	20(19%)	5(5%)	3(3%)	1(1%)
	IIMC	20(19%)	11(10%)	11(10%)	0	0
	IMC	8(8%)	8(8%)	7(7%)	1(1%)	1(1%)
	Total	38(36%)	39(37%)	23(22%)	4(4%)	2(2%)
Student-teacher interaction is more intense and intimate in blackboard teaching.	AMC	11(10%)	17(16%)	8(8%)	1(1%)	1(1%)
	IIMC	17(16%)	14(13%)	9(8%)	3(3%)	0
	IMC	10(9%)	7(7%)	2(2%)	6(6%)	0
	Total	38(36%)	38(36%)	19(18%)	10(9%)	1(1%)
Students can understand the subject better by taking the notes when the teacher is writing on the board.	AMC	7(7%)	16(15%)	6(6%)	8(7%)	0
	IIMC	25(24%)	11(10%)	5(5%)	3(3%)	0
	IMC	10(9%)	5(5%)	5(5%)	3(3%)	1(1%)
	Total	42(40%)	32(30%)	16(15%)	14(13%)	1(1%)
It creates an environment of more participation and discussion	AMC	10(9%)	17(16%)	10(9%)	1(1%)	0
	IIMC	15(14%)	12(11%)	11(10%)	1(1%)	0
	IMC	6(6%)	10(9%)	5(5%)	3(3%)	0
	Total	31(29%)	39(37%)	26(24%)	5(5%)	0
A lot of flexibility in the blackboard teaching.	AMC	3(3%)	24(23%)	8(8%)	3(3%)	0
	IIMC	18(17%)	10(9%)	11(10%)	3(3%)	0
	IMC	5(5%)	8(8%)	7(7%)	4(4%)	0
	Total	26(25%)	42(40%)	26(25%)	10(9%)	0

Table No.4: Disadvantages of use of blackboard and chalk

In case of large class, the black board is difficult to read	AMC	13(12%)	15(14%)	6(5%)	4(4%)	0
	IIMC	15(14%)	20(19%)	4(4%)	0	3(3%)
	IMC	11(10%)	12(11%)	1(1%)	1(1%)	0
	Total	39(37%)	47(44%)	11(10)	5(5%)	3(3%)
In case of poor handwriting of the teacher, the things become difficult and there is a problem in taking notes.	AMC	8(8%)	12(11%)	12(11%)	3(3%)	3(3%)
	IIMC	17(16%)	11(10%)	7(7%)	7(7%)	1(1%)
	IMC	13(12%)	6(6%)	4(4%)	2(2%)	0
	Total	38(36%)	29(27%)	23(22%)	12(11%)	4(4%)
The students lose the contact with the contents of the subject as the board is erased in case of less space.	AMC	9(8%)	13(12%)	10(9%)	4(4%)	2(2%)
	IIMC	11(10%)	12(11%)	9(8%)	10(9%)	1(1%)
	IMC	8(8%)	8(8%)	8(8%)	1(1%)	0
	Total	28(26%)	33(31%)	27(25%)	15(14%)	3(3%)

In section 3, various statements were presented about PowerPoint as a teaching tool. The advantages of the PowerPoint agreed by the respondents [Table 1]: PowerPoint being excellent tool for showing figures/graphs during lectures (90%), good for outlining the lecture in the beginning and summarizing at the end

(77%), effective tool for embryology and histology lectures (66%) and easy availability of soft copy (59%). The disadvantages of PowerPoint agreed were [Table-2]: tendency to show excessive slides and that too in hurry (69%), less eye contact between the teacher and students, and less discussion due to dim light during the lecture (58%).

In section 4 the response to the various statements showed the advantages and disadvantages of Blackboard-Chalk usage. The advantages brought forward were [Table 3]: Learner feels continuously tuned in the learning process (73%), students teacher interaction being more intense and intimate (72%), better understanding by taking the notes whilst the teacher writes on the board (70%), atmosphere of more participation and hence more discussion (66%) and more flexibility in teaching (65%). The disadvantages noted were [Table 4]: Difficulty to read the Blackboard in case of a large class (81%), poor handwriting of the teacher becomes problematic (63%), and feeling disconnected with the subject if the board is erased due to less space (57%).

In the last section the recommendations from the students were sought for the use of teaching tools for different areas of Anatomy: the response sheet revealed [Table 5] that the PowerPoint mixed with Blackboard-Chalk was the most recommended tool; 65%, 62% and 60% students voted for it for lectures (embryology, histology and neuroanatomy), gross anatomy demonstrations, and histology practical respectively. The difference between recommendations of best teaching tool for different areas of anatomy by the students is statistically significant (p value)

Table No.5: Recommendation for use of teaching modalities for different areas of anatomy

Areas	PowerPoint		Blackboard chalk	PowerPoint with Blackboard-chalk
Lectures (embryology, histology and neuroanatomy	AMC	11(10%)	1(1%)	26(25%)
	IIMC	7(7%)	11(10%)	26(25%)
	IMDC	6(6%)	0	17(16%)
	Total	**24(23%**	**12(11%)**	**69(65%)**
Gross anatomy demonstrations	AMC	2(2%)	12(11%)	24(23%)
	IIMC	7(7%)	14(13%)	23(22%)
	IMDC	3(3%)	3(3%)	19(18%)
	Total	**12(11%**	**29(27%)**	**66(62%)**
Histology practical	AMC	17(16%)	1(1%)	20(19%)
	IIMC	6(6%)	14(13%)	24(23%)
	IMDC	3(3%)	3(3%)	19(18%)
	Total	**26(24%**	**18(16%)**	**63(60%)**

DISCUSSION

The characteristics apparently related to effective lecturing have been set out as; preparation, presentation and evaluation[2]. In our study "the presentation" part has been analysed through a survey comparing PowerPoint with Blackboard-Chalk conducted in different medical and dental colleges of Rawalpindi-Islamabad. The probable advantages and disadvantages of PowerPoint and Blackboard-Chalk were presented to the students in the shape of statements for their response.

The biggest advantage of the Blackboard usage brought forward is that the students learn the subject better as they are continuously tuned in the learning process by taking notes and making diagrams while the teacher is writing over the board. This activity of taking notes keeps them attentive and hence there is more elaboration and transformation of ideas. This observation has been supported by the finding of an earlier study[14]. On the other hand some students reported that act of taking notes steals a lot of time that would have been used in understanding the subject. 81% of the respondents talked about the difficulties faced in Blackboard-Chalk lectures in case the class is large or the teacher's handwriting is poor. It is consistent with the result of another earlier study[15].

Advantages of PowerPoint highlighted through this survey: 90% of the respondents identified it as an excellent tool for use of showing pictures during Anatomy lectures. The use of PowerPoint to outline the lecture in the beginning and summarizing at the end was favoured by 77% of the respondents. It is consistent with the suggestions already made in the literature that Multimedia presentation allows for graphical simulations that leads to mental imagery and associated knowledge, and hence to increased learning[16]. There is another study supporting this observation[17]. The disadvantages of PowerPoint brought forward through this study are: tendency of the teachers to show excessive slides and that too in hurry, less eye contact between the teacher and student. The result is supported by the theory of cognitive load that states that element of hypermedia may reduce learning through increasing cognitive load and disorientation[18].

Moreover split attention defect mentions that the learning is reduced when the students are exposed to multiple modalities of information that require integration[19]. Another point highlighted in this study is that during PowerPoint lectures, the students feel that more emphasis is being given by the presenter on his style and less on the substance. It is consistent with the result of previous studies.[11 and 20]

The final response of the students revolved around a recommendation that they should be taught using either Blackboard-Chalk or a combination of Blackboard and PowerPoint rather than PowerPoint usage only. In lectures covering different areas of Anatomy, 65% of the respondents recommended their teaching to be built on the combination; Blackboard-Chalk as main lecture format with PowerPoint being used to supplement it by showing figures/pictures, and also to outline the things in the beginning and summarizing at the end. In gross Anatomy demonstrations, 62% of the population favoured this combination method followed by 63% in Practical Histology. This observation is supported by result of an earlier study[21]. Moreover Pence (1997) has found in his study that addition of PowerPoint to a traditional lecture creates a very effective educational environment[22].

As we discuss the learning objectives in medicine, it is noted that a low level learning activity like outlining/ summarizing, drawing/ illustrating and giving examples, contrasts to a high level activity that involves analysing the data, correlating, deriving and reaching at some conclusion in a diagnostic process[23 and 24] and hence more emphasis should revolve around that brain activity in all sorts of teaching tools. It has been argued that PowerPoint presentation was good for discussing general information and not good for presenting complex problems involving analysis and derivations[14]. Another study in this regard revealed that to date, the empirical evaluation of PowerPoint-assisted lecturing in higher education is limited[8].

Final remarks:

1. Although PowerPoint can be employed for a well structured and easy-to-follow lecture, it tends to lead to a tendency to overwhelm the learners with an overly-rapid presentation of information. The lecturer naturally possessing a deep understanding of the subject, often tends to progress at a pace that is too fast for the students to follow.
2. The Blackboard-Chalk method ensures that information stays available, providing context for further discussion. The learners see the ideas being developed; they are supported in following the conceptual process. Moreover the lecturer slows down to his/her handwriting speed, giving time to the students to follow the lecturer's train of thoughts.

Working on Blackboard involves not only creative thinking, illustration but sharing also. The board drawing may be utilized to draw attention to the details using arrows, underlines, circles, checks, groupings etc.

CONCLUSION

A strategy of Blackboard-Chalk as the main lecture format supplemented with PowerPoint use is preferred by undergraduate anatomy students.

REFERENCES

1. Brown G, Atkins M. Effective teaching in higher education. London: Routledge; 1988.
2. Cannon R. Lecturing. Kensington (NSW), Higher Education Research and Development Society of Australia. 1988.
3. Finucane PM, Johnson SM, Prideaux DJ. Problem based learning, its rationale and efficiency. Med J Aust 1998;168:445-8.
4. Donald A Baligh. What is the use of lectures? School of Art and Design. Great Britain 1998; 5:8.
5. Walton AJ. Lectures, Tutorials and the Like, Oxford and Lancaster, UK: MTP 1972.
6. Bartsch RA, Cobern KM. Effectiveness of PowerPoint presentation in lectures, Computers and Education 2003; 41:77-86.
7. Lowry RB. Electronic presentation of lectures-effect upon student performance, University Chemistry Education 1999; 8:18-21.
8. Szabo A, Hastings N. Using IT in the undergraduate classrooms: should we replace the blackboard with PowerPoint? Computers and Education 2000;35:175-187.
9. Hogarty, Kristine Y, Thomas RL, Kromrey JD. Another Look at Technology Use in Classrooms: The Development and Validation of an Instrument to Measure Teachers' perceptions. Educational and Psychological Measurement 2004; 63:139-162.
10. Michas I, Berry D. Learning a procedural task: effectiveness of multimedia presentations. Appl Cogn Psychol 2000; 14:555-75.
11. Wineburg Sam. PowerPointless. Am School Board J 2003.
12. Becker WE, Watts M. Chalk and Talk: A national survey on teaching undergraduate economics. Am Econ Review 1996; 86:448-53.
13. Mines RO. Do PowerPoint Presentations Really Work? Proceedings of 2000 ASEE Annual Conference, St. Louis, MO, 2000.
14. Creed D. PowerPoint No! Cyberspace Yes! In: The national teaching and learning forum, New York, NY: Greenwood Publishing Group; 1998.
15. Seth V, Upadhyaya P, Ahmed M, Moghe V. Adv Med Educ Prac 2010;1:11-6.
16. Jorge T, Fiolhas C, Almeida L. Science learning in virtual environments: a descriptive study. Br J Educ Tech 2002; 33(4).
17. Hu S, Kuh GD. Edu Policy annual arch 2001; 28: 292-6.

18. Eveland WP, Sharon Dunwoody. User control and structural isomorphism or disorientation and cognitive Load. Commun Res 2001; 28:48-78.
19. Goolkasian P. Pictures, words and sounds: From which format are we best able to reason? J Gen Psychol 2000; 127:439-59.
20. Casonova J, Casanova SL. Computers as electronic blackboard; Remodelling the organic chemistry lecture Educom Re. 1991: 31-4.
21. Lalit M, Ravi SP, Ashwin K. J Clin Diagn Res 2010; 4:3363-8.
22. Pence HE. PowerPoint and cooperative learning: an ideal instructional combination. The Technology Source, 1997.
23. Bloom BS. Taxonomy of Educational Objectives, handbook 1: cognitive domain. New York: Longman; 1984.
24. Wilbert JM, Svinicki M. McKeachie's teaching tips: Strategies, Research, and Theory for College and Universities Teachers. 12th ed. Boston: Houghton Mifflin; 2006.

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