Research Article

Student assessment on learning based on powerpoint versus chalkboard

S M Chavan Swati[1*], S R Tankhiwale Suresh[2], S G Damke Sachin[3]

{[1]Assistant Professor, Department of Microbiology} {[2]Professor, Department of Medicine} {[3]Associate Professor, Department of Paediatrics} Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha – 442004, Maharashtra, INDIA.
Email: chavanswati@rediffmail.com, stankhiwale@hotmail.com, buntydamke@yahoo.com, chavanswati@rediffmail.com

Abstract

Aim and Objectives: To assess learning gain and learning preference of students based on PowerPoint versus chalkboard for department of Microbiology. **Material and Methods:** Students were divided into two groups of 80 each. Two didatic lectures were delivered. In lecture 1, Group A was taught on PowerPoint, while the group B on chalkboard on the same topic. In lecture 2, Groups were interchanged. Learning gain of the student was assessed from the pre test and post test. **Result:** In lecture 1, mean absolute learning gain score for group A was 42.1 and group B 45.7. Average normalized gain (g) for group A was 49.6% and group B 54.88%. Impact of students pass in group A was 73.77% versus 66.19% for group B. In lecture 2, mean absolute learning gain score for group A was 57.8 and group B 26.4. Average normalized gain (g) for group A was 64.10% and group B 27.56% .Impact of students pass in group A was significantly higher than group B, 79.63% versus 15.07 %. Students' preference for PowerPoint was 70% and 78% versus 23% and 14% for chalkboard, in lecture 1and2 respectively. **Conclusion:** Difference in learning gain of student for simple topic was of no significance for PowerPoint and chalkboard. Learning gain of student for complex topic was significantly more for chalkboard than PowerPoint. Student's preference for learning is by PowerPoint.

Keywords: Student assessment, Learning gain, didactic lecture.

[*]**Address for Correspondence:**
Dr. S M Chavan Swati, Assistant Professor, Department of Microbiology, Jawaharlal Nehru Medical College, Sawangi (Meghe), Wardha – 442004, Maharashtra, INDIA.
Email: chavanswati@rediffmail.com
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INTRODUCTION

Even in the era of multimedia we know the value of conventional methods of learning. Teachers from department of Microbiology at our college currently prefer more use of PowerPoint for didactic lectures while chalkboard is seldom used. Chalkboard teaching was widely used method for nearly a decade before the advent of PowerPoint. PowerPoint is a widely used method for medical teaching apart from the conventional chalkboard method as indicated by study of various research papers, also.[1,2,3,4] Edward Tufte has quoted that "PowerPoint is making us stupid, degrading the quality and credibility of our communication turning us into bores, wasting our colleagues' time". There are several articles agreeing with this opinion. Jean–Luc Doumount argues that reconsideration is required about when to use PowerPoint presentation as it is noteworthy that PowerPoint is used in over 30 million presentations.[5] Didactic lectures form a major part in students' curriculum of medical students. Appropriate teaching technology should be selected for optimum learning and motivation of students. The present study was carried out to assess the students learning gain for PowerPoint versus chalkboard and find out the student's preference for learning.

AIM AND OBJECTIVES

To assess the learning gain and learning preference of students based on PowerPoint versus chalkboard, for department of Microbiology.

Study design

Cross sectional, Interventional study

Sampling Method

Whole population was our sample. Students were selected consecutively.

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MATERIAL AND METHOD

The study was conducted in Department of Microbiology, Jawaharlal Nehru Medical College, Datta Meghe Institute of Medical Sciences, Sawangi, Wardha from a period of February 2014 to June 2014. The study was approved by the Medical ethics committee of the institute. Second MBBS students are routinely taught in two groups Aand B. The present study was carried out in the same groups without disturbing this routine thus, samples were selected consecutively. The teachers selected for the study had same teaching experience. Two lectures were delivered on randomly selected topics of parasitology section. Students were explained about the study. Consent for participation and Pre test was taken, prior to the lecture. Lecture 1, was scheduled on 12.03.2014, the topic was 'Enterobius *vermicularis'* . Group A was taught on PowerPoint, while group B had on chalkboard on the same topic. Lecture 2, was scheduled on 19.03.2014, the topic was 'Tissue filarial nematodes'. Teaching method were interchanged .Group A had didactic lecture on chalkboard, while the group B had on PowerPoint on the same topic. Post test and feedback was taken after the lecture. The pre and post test had same questions with total score of 10. Learning gain of the student in two groups, PowerPoint versus chalkboard was assessed by calculating the pre test mean score, post test mean score, absolute learning gain, class-average normalized gain and impact of pass students, from the pre test and post test. Statistical analysis was done by unpaired t test. Absolute learning gain = [% Post test score - % Pre test score] Absolute learning gain gives rough idea about the relative gain in the learning of students after the activity.[6] **Class:** average normalized gain (g = [% Post test score - % Pre test score]/[100 -% Pre test score], **Class:** average normalized gain , has been used by various researchers. Hake (2002) categorized Class-average normalized gain of 0.1-0.29 as low gain, 0.3-0.69 as medium gain and 0.7-1.0 as high gain.[6,7] Feedback form from learners was evaluated for preference. Statistical analysis was done by chi square test. The standard of lecture was kept optimum and confirmed through students ratings in feedback form on Likerts scale on various parameters like Learning objective identification, Preparation of topic, Clarity of diagram and text, time allotment (Adequacy), interaction, understanding, learning objective achievement.

RESULT

Out of total 165 students, In lecture1, 132(80%) students had given pre test and post test in the scheduled lecture. A total of 61 students in group A and 71 students in group B, had given their pre test and post test. Group A was given didactic lecture by PowerPoint on the topic 'Enterobius *vermicularis'* and group B had chalkboard teaching on the same topic Table 1, shows the pre test mean score, post test mean score, absolute learning gain, class-average normalized gain and impact of pass students.

Table 1: Lecture 1

	Pre test Mean ±SD	Post test Mean ±SD	Score change Mean ±SD	Absolute learning gain	Average normalized gain(g)	Impact of proportion
Group A (PP)	1.54±1.08	5.75±1.77	4.21 ±1.79	42.1±17.9	0.497±0.19	73.7
Group B (CB)	1.45±1.09	6.00±3.07	4.57 ±2.75	45.7±27.5	0.534±0.33	66.1
Unpaired t test	NS	NS	NS	NS	NS	NS

The difference in pre test mean score of group A and group B was not significant ($p>0.05$). Difference in pre test mean score and post test mean score of group A was significant ($p<0.05$). Difference in pre test mean score and post test mean score of group B, was significant ($p<0.05$). The difference in mean score change of group A and group B was not significant ($p>0.05$). The difference in absolute learning gain of group A (PowerPoint) and group B ($p>0.05$) (Chalkboard) was not significance ($p>0.05$).The difference in class-average normalized gain for group A was not significant than group B ($p>0.05$). Learning gain for both teaching method was medium Proportion of students pass (score 50% or more) in post test was significantly more than pre test in group A. Proportion of students pass (score 50% or more) in post test was significantly more than pre test in group B. Impact of students pass in group A was of no significance than group B, ($p>0.05$). In lecture2, 127(76.96%) students had given pre test and post test in the scheduled lecture. A total of 54 students in group A and, 73 students in group B had given their pre test and post test. The teaching method was interchanged. Group A was given didactic lecture by chalkboard on the topic 'Tissue filarial nematodes*'* and group B had PowerPoint teaching on the same topic. Table 2, shows the pre test mean score, post test mean score, absolute learning gain, class-average normalized gain and impact of pass students.

Table 2: Lecture 2

	Pre test Mean ±SD	Post test Mean ±SD	Score change Mean ±SD	Absolute learning gain	Average normalized gain(g)	Impact of proportion
Group A (PP)	0.97±0.72	6.75±2.05	5.78 ±2.92	57.8±29.29	0.640±0.22	76.6
Group B (CB)	0.37±0.63	3.02±2.20	2.65 ±1.45	26.5±14.54	0.275±0.15	15.1
Unpaired t test	NS	NS	S	S	S	HS

The difference in pre test mean score of group A and group B was not significant ($p<0.05$). Difference in pre test mean score and post test mean score of group A, was significant ($p<0.05$). Difference in pre test mean score and post test mean score of group B was significant ($p<0.05$). The difference in mean score change of group A and group B was significant ($p < 0.05$). The difference in absolute learning gain of group A (Chalkboard) was more significant than group B (PowerPoint) ($p<0.05$). The difference in class-average normalized gain for group A was of more significance than group B ($p<0.05$). Learning gain for chalkboard teaching was medium and that, for PowerPoint was low. Proportion of students pass (score 50% or more) in post test was significantly more than pre test in group A. Proportion of students pass (score 50% or more) in post test was of no significance than pre test in group B. Impact of students pass in group A was more significant than group B (PowerPoint) ($p<0.0001$).

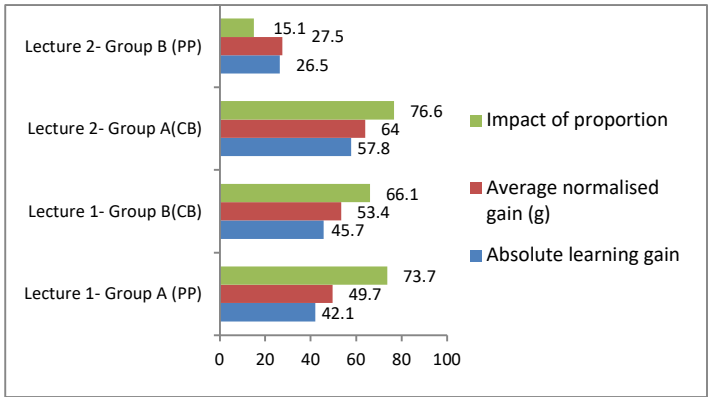

Figure 1: Overall performance of chalkboard (CB) and PowerPoint (PP) teaching

In lecture1and2 The overall performance was rated good and very good; by more than 75% students for both chalkboard and PowerPoint. Thus, confirming that optimum standard of lecture was maintained by both the teaching methods.

Table 3: Students rating (in percentage) for, overall performance of chalkboard (CB) and PowerPoint (PP) teaching

	Lecture1-CB (%)	Lecture1-PP (%)	Lecture2-CB (%)	Lecture2 -PP (%)
Very bad	1.58	zero	0.27	Zero
Bad	2.77	0.49	2.47	2.69
Average	18.08	13.06	19.52	17.20
Good	35.91	43.84	47.80	51.75
Very good	41.66	42.61	29.94	28.36

Student's preference for teaching method was as follows

In 1st lecture students preference for PowerPoint was 70%, 23% for chalkboard, for both 4%and 3% had no preference. In 2nd lecture, student's preference for PowerPoint was 78.51%, 14.04% for chalkboard, for both 5.78%and 1.65% had no preference. The difference in number of students preferring PowerPoint was of more significance than number of students preferring chalkboard.

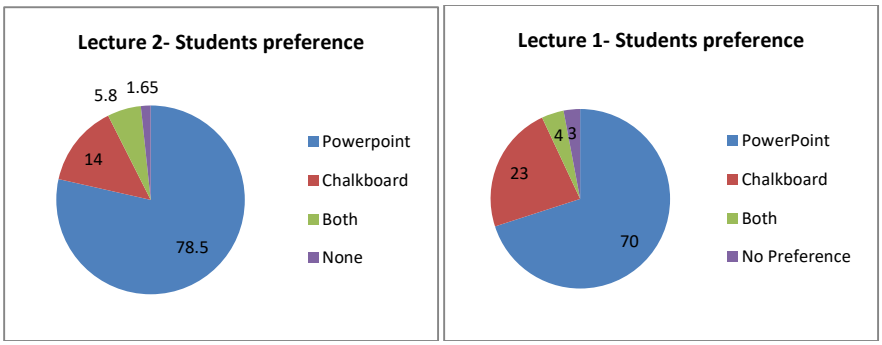

Table 4: Student's comments for liking PowerPoint and chalkboard teaching

Sr. No.	PowerPoint	Chalkboard
1	Diagrams are easily understandable	Easy to understand
2	Clear text with elaborative diagrams	Concentration of student increases
3	Can see colorful diagrams, flow charts and video clips	Sufficient time to write down notes
4	Efficiently get to note down points prepared by professor	Notes made and written in front of me gives me time to understand
5	Easily imaginable	Remember more
6	Fascinating	Each point is clear
7	Two way exchange of knowledge	Interactivity is more
8	Visual clarity	We get to make notes simultaneously with teacher
9	Images saves time	Focused teaching
10	Schematic representation	Provides well oriented and deep knowledge
11	More interesting	Teacher is well prepare, students also concentrate on things made by teacher
12	Involves whole class	Learning objectives are always in front of eyes

Table 5: Student's comments for disliking PowerPoint and chalkboard teaching

Sr. No.	PowerPoint	Chalkboard
1	It should not be just read but should be taught clearly	Never understand about topic going on
2	Excess slides, too many lengthy slides like pages of books	Takes time for teacher to draw diagram
3	In PP we used to just write down notes. Just copying notes does not help	Every point is not covered
4	Stressful for eyes	Board shines
5	Unable to remember things taught in it	No picture/ Lack of graphical picture
6	When slides are changed quickly	No clarity of diagram and text
7	Power cut. Electricity problem.	Bad infrastructure
8	Difficult to understand. Not properly understood	Every point is not covered
9	Speedy lecture. When it is too fast.	Not able to see when sitting back
10	Can get distracted quicker	Very distracting
11	When slides are changed quickly	Difficulty in collecting notes, understanding small letters and diagrams
12	Teachers are boring in PowerPoint.	We feel sleepy
13	Sometimes no interaction teacher just reads out slide monotonously	Handwriting is not legible
14	Less knowledge gained	I hate chalkboard we have covered in school

DISCUSSION

The difference in learning gain of students after teaching with PowerPoint was not significant than chalkboard, for simple topic i.e. 'Enterobius *vermicularis'*. The learning gain of students after teaching with PowerPoint was more significant than chalkboard, for complex topic covering numerous organisms i.e. 'Tissue filarial nematodes'. Hence, chalkboard is better method of teaching than PowerPoint as per the scoring and pass result for complex topic with multiple sub topics. In lecture1 when the topic involves single organism; the result is similar to Meo *et al* (2013)[2] reporting no significant difference in chalkboard and PowerPoint teaching. According to Meo *et al* integrated teaching using both is an effective method. In contrast to this study, Dr Thaker *et al* (2013)[3,] Dr Kusumlata Gaur *et al* (2013)[4], also reported use of multimedia with PowerPoint presentation as an ideal teaching tool. While, in lecture2, when the topic involves

multiple organisms (Loa loa, Onchocerca volvulus, mansonella streptocerca, mansonella perstans, mansonella ozzardi); the result in present study are similar to, study done by Rokade SA and Bahetee (2013)[9]. The students performed better in test, for chalkboard than for PowerPoint. In present study, Chalkboard is found to be more focused and well oriented than PowerPoint for complex topic. In chalkboard the key points, diagram and life cycle are made on the limited space available with minimum erasing hence, the content of multiple organisms can be naturally compiled at the time of teaching. While in PowerPoint, such data can be presented but such compilation of content does not take place at the time of teaching. Hence, for such topic chalkboard teaching is found to be more effective than PowerPoint. IInd year, Medical students' preference is highest for PowerPoint. This is similar to observation made by Vikas Seth *et al* (2010)[1] for undergraduate and Fluoresce, Laveran *et al* (2013)[8] for post graduate students. In contrast, study by Ethel L. B. *et al* has reported preferred blackboard teaching.[10]

CONCLUSION

The learning gain of students by PowerPoint was of no significance as compared to chalkboard for simple topic involving single organism or single sub topics. The learning gain of students by PowerPoint was of more significance as compared to chalkboard for complex topic involving multiple organism or multiple sub topics. Medical students' preference for learning is by PowerPoint as compared to chalkboard.

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