ORIGINAL ARTICLE

Impact of multimedia as a teaching tool on the performance of the 1ˢᵗ year MBBS students for academic achievements in India

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Background: There are various methods of teaching adopted by teachers/professors in medical colleges to deliver the lectures to the students. The present study aimed to find out the impact of multimedia as a teaching tool on the performance of the 1ˢᵗ year Bachelor of Medicine and Bachelor of Surgery (MBBS) students for academic achievements.

Methods: This was a Quasi-experimental study, conducted for three months (April to June 2016) at Muzaffarnagar Medical College, Muzaffarnagar, India. Total of 150 students of the 1ˢᵗ year MBBS were recruited for this study and two groups were formed (i.e. Group I and Group II). Each group included 75 students. Group I were taught by a traditional way of teaching and Group II were taught by using multimedia. Two tools were used viz, pre and posttest based on MCQs to assess the impact of multimedia on students' academic achievement. After taking the post-academic test, both groups were rotated i.e. in group I, lectures were delivered by using multimedia and in group II, lectures were delivered by the traditional way of teaching in order to get feedback from all 150 students to know the better way of teaching method.

Results: There was no significant difference in the average marks obtained by students between Group I and II (18.73±3.39 % vs. 18.8±3.76 %) before delivering lectures to them. However, after delivering the lectures, the average mark obtained by the students of Group II was found to be significantly higher as compared to Group I (70.78±12.01 % vs. 49.33±9.75 %).

Conclusion: The use of interactive multimedia tool found to be more effective for presenting the information than the traditional way of teaching.

Keywords: Multimedia; Traditional way; Academic achievement; Pre-test; Post-test

فعالية الوسائط المتعددة كأداة تعليمية على أداء طلاب السنة الأولى في كلية الطب في دورة (MBBS) لقياس تطور التحصيل الدراسي في الهند

الخلفية والأهداف: هناك عدة طرق يمكن بها تدريس الطلاب من قبل أعضاء هيئة التدريس في كليات الطب. في هذه الدراسة ، هدفنا هو دراسة تأثير الوسائط المتعددة كأداة تعليمية على أداء طلاب الطب السنة الأولى من أجل تطور التحصيل الدراسي. **الطريقة:** هذه دراسة شبه تجريبية أجريت خلال ثلاثة أشهر (من إبريل إلى يونيو ٢٠١٦) في كلية مظفرنغر للطب في الهند. تم اختيار ما مجموعه ١٥٠ طالب MBBS لهذه الدراسة وتم تقسيمهم إلى مجموعتين (المجموعة ١ والمجموعة ٢). شملت كل مجموعة ٧٥ طالبا. تم تدريس المجموعة الأولى حسب الأساليب التقليدية للتدريس ، بينما تم تدريس المجموعة الثانية باستخدام الوسائط المتعددة . تم استخدام أداتي قبل الاختبار وبعد الاختبار على أساس MCQs لقياس تأثير الوسائط المتعددة على التحصيل الدراسي للطلاب. بعد إجراء الإختبار اللاحق ، تم تبديل المجموعتين ، أي في المجموعة الأولى ، تم تقديم التدريس باستخدام الوسائط المتعددة وفي المجموعة الثانية ، تم التدريس بطريقة تقليدية . بحيث تم تقديم التقييم من جميع الطلاب الـ ١٥٠ المشاركين في الخطة لتحديد أفضل طريقة للتدريس ولكي تؤخذ بعين الاعتبار. **النتائج:** كان متوسط درجات الطلاب في المجموعة الأولى (١٨٫٧٣ ± ٣٫٣٩ ٪) والمجموعة الثانية (١٨٫٨ ± ٣٫٧٦ ٪) حيث أنه لايوجد فرق كبير قبل تقديم التدريس. ولكن بعد تقديم طرق تدريس مختلفة ، كان متوسط الدرجات التي حصل عليها طلاب المجموعة الثانية أعلى بكثير من المجموعة الأولى (٧٠٫٧٨ ± ١٢٫٠١٪ مقابل ٤٩٫٣٣ ± ٩٫٧٥٪). **الخلاصة:** يعد استخدام أدوات الوسائط المتعددة أداة أكثر فعالية لتقديم المعلومات من أساليب التدريس التقليدية . **الكلمات المفتاحية:** الوسائط المتعددة ، طريقة التدريس التقليدية ، تقدم التحصيل الدراسي ، الاختبار المسبق ، الاختبار اللاحق

تأثیر چندرسانه ای به عنوان ابزار آموزشی بر عملکرد دانشجویان سال اول دوره پزشکی عمومی (MBBS) جهت سنجش پیشرفت تحصیلی در کشور هند

زمینه و هدف: روش های مختلفی برای تدریس وجود دارد که توسط اساتید در دانشکده های پزشکی به دانشجویان ارائه می شود. در مطالعه حاضر، هدف بررسی تأثیر چند رسانه ای به عنوان ابزار آموزشی بر عملکرد دانشجویان سال اول پزشکی عمومی (MBBS) جهت سنجش میزان پیشرفت تحصیلی بود. **روش:** این مطالعه یک مطالعه نیمه تجربی است که طی سه ماه (آوریل تا ژوئن ۲۰۱۶) در دانشکده پزشکی مظفرنگر کشور هند انجام شده است. در مجموع ۱۵۰ دانشجوی سال اول پزشکی عمومی MBBS برای این مطالعه انتخاب شدند و در دو گروه قرار گرفتند (گروه ۱ و گروه ۲). هر گروه شامل ۷۵ دانشجو بود. به گروه اول با روشهای سنتی آموزش، تدریس شد و به گروه دوم با استفاده از چند رسانه ای آموزش داده شد. دو ابزار پیش آزمون و پس آزمون براساس آزمون چند گزینه ای برای سنجش تأثیر چندرسانه ای بر موفقیت تحصیلی دانشجویان استفاده شد. پس از انجام تست پس آزمون، دو گروه جابه جا شدند، یعنی در گروه اول، تدریس با استفاده از چندرسانه ای ارائه شد و در گروه دوم، تدریس به روش سنتی انجام گرفت تا بازخورد همه ۱۵۰ دانشجوی شرکت کننده در طرح برای شناسایی بهتر روش مناسب تدریس مورد بررسی قرار گیرد. **یافته ها:** میانگین نمرات دانشجویان گروه اول (۳/۳۹٪ ± ۱۸/۷۳) و گروه دوم (۳/۷۶٪ ± ۱۸/۸) قبل از ارائه تدریس به آنها اختلاف معنی داری نداشت. اما پس از ارائه روشهای مختلف تدریس، میانگین نمره بدست آمده از دانشجویان گروه دوم به طور قابل توجهی بالاتر از گروه اول بود (۱۲/۰۱٪ ± ۷۰/۷۸ در برابر ۹/۷۵٪ ± ۴۹/۳۳). **نتیجه گیری:** استفاده از ابزار چند رسانه ای، تعاملی مؤثرتر برای ارائه اطلاعات نسبت به روش سنتی آموزش است. **واژه های کلیدی:** چند رسانه ای، روش سنتی آموزش، پیشرفت تحصیلی، پیش آزمون، پس آزمون

ہندوستان میں ایم بی بی ایس کے پہلے سال کے طلباء پر تعلیمی ملئی میڈیا کے اثرات، تعلیم میں پیشرفت کا جائزہ

بیک گراونڈ: دنیا میں تدریس کی مختلف روشیں ہیں جن سے میڈیکل کالجوں اور اداروں میں طلباء کو تعلیم دی جاتی ہے، اس تحقیق میں ہندوستان میں ایم ایم بی بی ایس یعنی جنرل فزیشین کے کورس میں پہلے سال کے طلباء پر ملئی میڈیا کےاثرات کا جائزہ لیاگیا ہے۔

روش : یہ ایک نیم تجربی تحقیق ہے جو دو ہزار سولہ میں ہندوستان کے شہر مظفر نگر کے میڈیکل کالج میں انجام پائی ہے۔ مجموعی طور پر ایم ایم بی بی ایس کے پہلے سال کے ڈیڑھ سو طلباء کو چنا گیا۔ ان کودوگروہوں میں تقسیم کیا گیا ، ہرگروہ میں پچھتر طلباء تھے ، پہلے گروہ کو روایتی طور پر تعلیم دی گئی جبکہ دوسرے گروہ کو ملئی میڈیا کے ذریعے تعلیم دی گئی اس کے بعد ملئی میڈیا کے اثرات کا اندازہ لگانے کے لئے پری ٹسٹ اور پوسٹ ٹسٹ کی روش بھی اپنائی گئی ، اس کے علاوہ دوسرے گروہ کو ملئی میڈیا سے تعلیم دی گئی اور پہلے گروہ کو روایتی طرز پر تعلیم دی گئی تا کہ تدریس کی بہتر روشوں کا جائزہ لیا جاسکے ۔

نتیجی : تدریس سے پہلے گروہ اول اور گروہ دوم میں کوئی خاص فاصلہ نہیں تھا لیکن جب دونوں گروہوں کو ملئی میڈیا اور روایتی طرح سے تعلیم دی گئی تو گروہ دوم کے طلباء نے ا چھے نمبر لئے۔

سفارش : میڈیکل تعلیم میں ملئی میڈیا سے استفادہ کرنے سے روایتی روش تدریس کو موثر بنانے میں مدد ملتی ہے

کلیدی الفاظ : ملئی میڈیا ، روایتی طرز تعلیم ، پوسٹ ٹسٹ ، پری ٹسٹ

INTRODUCTION

Teachers/Professors in higher education are under the pressure of providing more effective and efficient learning environments and educational experiences for their students. In colleges and universities, teaching is considered as an important vehicle for achieving institutional goals of enhancing students' knowledge and learning, as well as engaging them in the learning community to be prepared for their future citizenship. Therefore, teachers/professors are always looking for ways to make their educational initiatives more effective (1). There are various methods of teaching that have been adopted by teachers/professors in order to present information to the students. Lecture method is one of the common methods of teaching in which teachers deliver lectures orally and is presented on the chalkboards with written materials on hand or by transparencies on an overhead projector. Nowadays another method of delivering lectures in which visual information can be directly projected onto the screen from computers has been extensively used in the recent years. For teachers to present information in this manner, most of the colleges and universities have classrooms equipped with the sufficient technology (2,3).

Multiple senses of the audience can be stimulated by multimedia at a time since multimedia is multisensory. Moreover, it enables teachers to control the content and the flow of information (4). Students' interest level, their understanding and their memorizing ability can also be increased by teaching with multimedia (5).

The term multimedia appeared in the 1990s and was defined by Reddi and Mishra (2003) as: *"an integration of multiple media elements (audio, video, graphics, text, animation etc.) into one synergetic and symbiotic whole that results in more benefits for the end user than any one of the media element can provide individually"* (6). Later in 2005, Mayer extended the definition as: *"a multimedia instructional message is a presentation consisting of words and pictures that are designed to foster meaningful learning"* (7).

Multimedia has the ability to create high-quality learning environments. Interactive multimedia can provide an efficient learning atmosphere for distinct learners with the ability to create a more realistic learning context through its different media and allow a learner to take control of it (8). Multimedia's pedagogical strength is its natural ability to process information that we already have as human beings. Together with our brain, our eyes and ears form a formidable system for transforming meaningless sense data into information. The old saying that "a picture is worth a thousand words" often underlines the case, particularly when it comes to moving images, because our eyes are extremely adapted by evolution to identify and interpret our motion (9).

The present research, regarding the impact of multimedia as a teaching tool on the performance of students for academic achievements, was found to be controversial as some researchers have found that it enhances students' academic performance whereas others have found the traditional way of teaching (chalk and talk method) more effective (4, 10-11).

Hence, the present study was designed to find out the impact of multimedia as a teaching tool on the performance of the 1ˢᵗ-year MBBS students for academic achievements.

METHODS

This was Quasi-experimental study conducted on 150 students of the 1ˢᵗ year MBBS enrolled at Muzaffarnagar Medical College (a private Medical College), Muzaffarnagar, Uttar Pradesh, India for three months (April to June 2016) after getting approval from the ethical committee of Muzaffarnagar Medical College, Muzaffarnagar, India.

All the regular 1ˢᵗ-year MBBS students of 2016 batch were included in the study and all the supplementary 1ˢᵗ-year MBBS student of the previous batch were excluded because of the purpose of the study. Two tools were used namely; pre and post-test based on MCQs and student's feedbacks which were taken from every student. Informed consent was obtained from all the participants included in the study.

A faculty workshop for module development of multimedia as a teaching-learning tool was conducted followed by the validation of the module by experts. For the awareness of multimedia as a new teaching-learning method, students' sensitization program was carried out. 150 students were divided into two groups i.e. Group I and Group II. Each group included 75 students. Both groups i.e. group I and II were equivalent in terms of specialty and academic level. Both groups i.e. group I and II were tested before delivering the lectures to them (i.e. pretest). In group I, lectures were delivered by the traditional way (chalk and talk method) and in group II, lectures were delivered by using multimedia (using a computer presentation programme). The same teacher was appointed to deliver the lecture by both methods of teaching (multimedia and chalk & talk methods) in order to maintain homogeneity in teaching acquisition and skills. Now, after treatment, both groups were tested (i.e. post-academic achievement test). After taking the post-academic test, both groups were rotated i.e. in group I, lectures were delivered by using multimedia and in group II, lectures were delivered by traditional way of teaching in order to get feedback from students to know the better way of teaching method. For the purpose of the study, extra classes were conducted twice a week.

Statistical analysis:

Statistical Package for Social Science version 20 (IBM, SPSS Statistics 20, Armonk, NY, USA) was used for data analysis and graphs were generated with the help of GraphPad Prism version 5 and Microsoft Excel. The data was presented as mean$\pm$SD. The statistical differences of marks obtained by students between two groups i.e. Group I and Group II were determined by student independent sample t test. The results were considered significant at $p < 0.05$.

RESULTS

The demographic characteristics of participants are presented in Table 1. The total number of students included in the present study was 150, out of which 75 students belonged to Group I to whom lectures were delivered by the traditional way, and the other 75 students belonged to
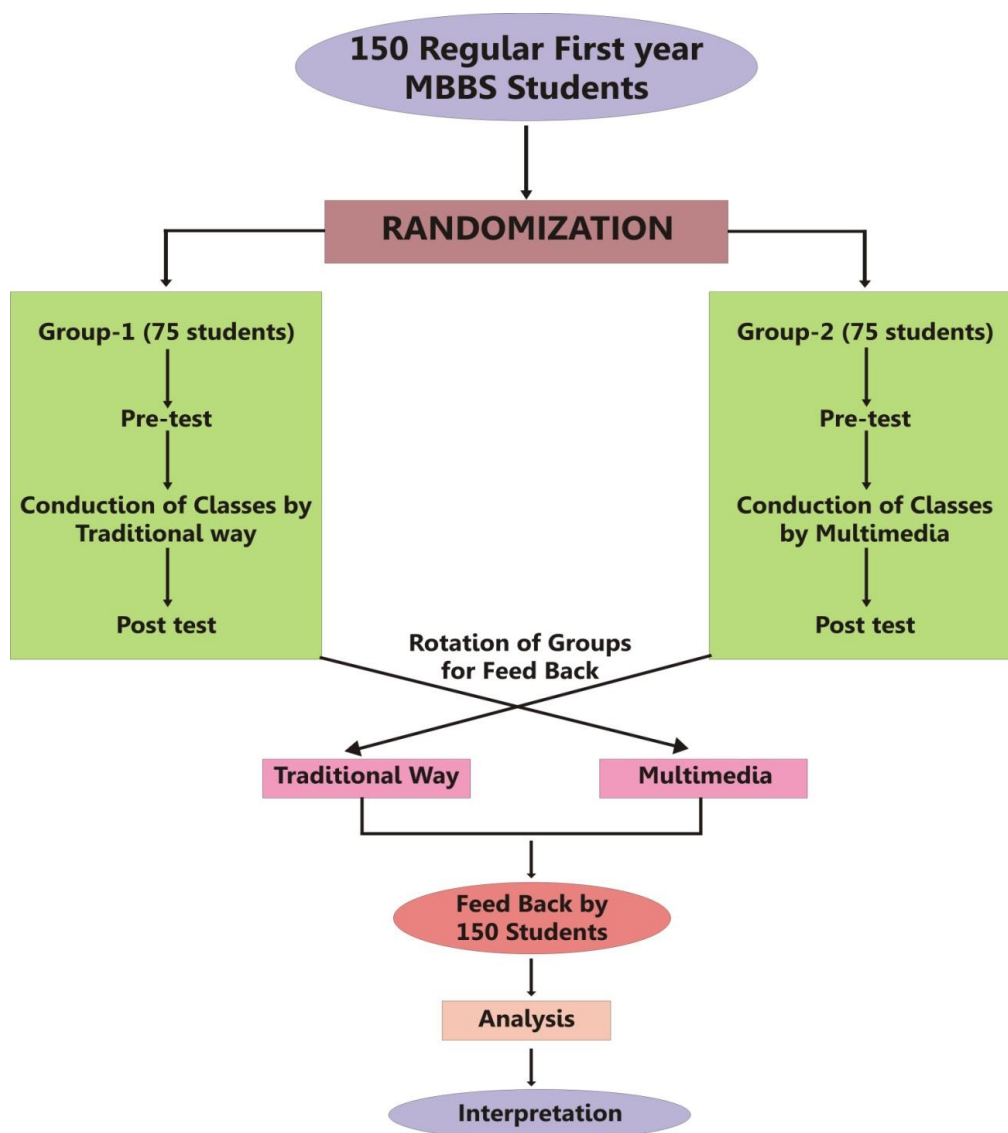
Figure 1. Flowchart elaborating the study protocol

Table 1. Demographic characteristics of the study subjects (n=150)		
Variables	**Value**	
Gender	Male	80 (53.33 %)
	Female	70 (46.67 %)
Age	18.61 years	
Board	UP Board	18 (12 %)
	CBSE Board	70 (46.67 %)
	ICSE Board	39 (26 %)
	Other Boards	23 (15.33 %)

Group II to whom lectures were delivered by using multimedia along with the teacher. Table 2 shows the average marks obtained by the students of Group I and Group II before delivering lectures to them (i.e. Pre-test

Table 2. Average marks obtained by the students of Group I and Group II before delivering lectures to them (i.e. Pre-test Score)

Group	N	Mean±SD	t-value	p-value
Group I	75	18.73±3.39	0.1142	0.9093[NS]
Group II	75	18.8±3.76		

Results are shown as mean±SD; [NS] Not significant; N: Number of students

Table 3. Average marks obtained by the students of Group I and Group II after delivering lectures to them (i.e. Post-test Score)

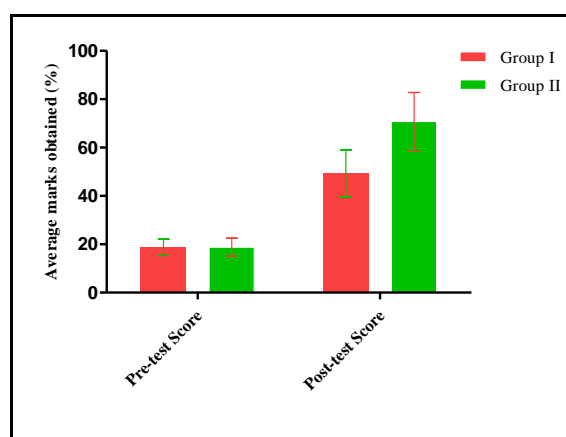| Group	N	Mean±SD	t-value	p-value
Group I	75	49.33±9.75	12.0120	<0.001*
Group II	75	70.78±12.01		

Results are shown as mean±SD; *Significant at $p<0.001$; N: Number of students

Score). There was no significant difference in the average marks obtained by students between group I and II (18.73±3.39 % vs. 18.8±3.76 %) before delivering lectures to them, indicating that at the initial level, the previous subject knowledge prior to delivering lectures of both groups were the same. Table 3 shows the average marks obtained by the students of Group I and Group II after delivering lectures to them (i.e. Post-test Score). The average marks obtained by the students was significantly higher in Group II as compared to Group I (70.78±12.01 % vs. 49.33±9.75 %), indicating the positive impact of multimedia teaching on the 1st-year MBBS students for their academic achievements. Figure 2 shows a comparison of two methods of teaching (i.e. traditional and multimedia way of teaching) on students' average performance by pre and post-tests. Figure 3 shows feedback from students regarding the best way of the teaching tool.

Figure 2. Comparison of two methods of teaching (i.e. traditional and multimedia way of teaching) on students' average performance by pre and post-tests

DISCUSSION

There are distinct learning styles for distinct learners and at the same moment, multimedia offers a range of learning styles to meet distinct student's needs and address their individual differences. In addition to some potential disadvantages of teaching assisted by multimedia, the benefits of teaching and learning method were documented. Multimedia can best create a meaningful learning environment recommended by cognitivism and constructivism (4).

In the present study, the teaching of biochemistry among undergraduates (MBBS students) using the interactive multimedia tool found to be more effective than the traditional way of teaching. Similar to the present findings, Shah et al., reported that multimedia aided teaching (MAT) was more effective than the traditional one. Student's achievement towards science improves more if the multimedia aided teaching method is used as compared to the traditional method of teaching (4). Similarly, Nwaocha et al. carried out a study in Nigeria to enhance students' interest in mathematics via multimedia presentation and reported multimedia presentation can improve students understanding,

enthusiasm, class attendance and satisfaction (10). Sarmento e Souza et al., evaluated the impact of multimedia in the information transfer of subjects specific to tropical disease-Tetanus and Snake Envenoming and concluded that multimedia was a more efficient and quick means for knowledge building process in medical education than traditional teaching materials (12). Kapri et al., stated that multimedia approach was an effective method in the teaching of science, since multimedia allowed teaching as a simplified strategy leading to an easy understanding of the things and producing long-term memories about different concepts in students (13). Afyouni et al., investigated the impact of multimedia teaching methods and lectures on the competencies of second-year students in General Electronics Course at technical and vocational school of Isfahan city and found that the multimedia based electronic functional training score was considerably greater than that of the lecture-based group. In addition, they found that multimedia was capable of transforming the learning atmosphere into a functional skills training course in electronics and made it
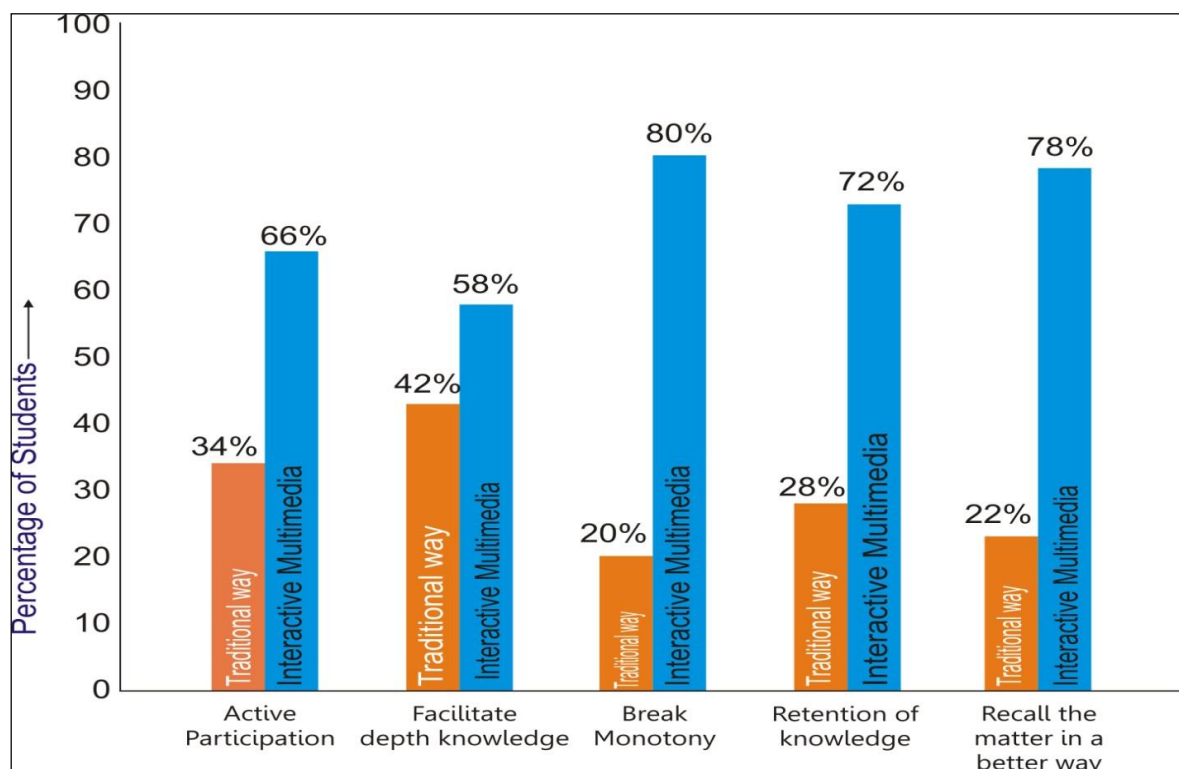
Figure 3. Feedback from students regarding the best way of teaching tool (Traditional way vs Multimedia)

appealing while attracting teachers and learners to the learning system, strengthening the stimulus injected into the teaching and learning system, helping to consolidate learning and teaching materials and impelling them (2). Ilhan et al., aimed to outline the effect of multimedia on the academic success of social studies students and concluded that multimedia technique increased the academic success of students in social studies lesion compared to traditional classrooms (14).

Seth et al., evaluated students ' perceptions of the effect of PowerPoint (PPT) lecture presentations on traditional chalk and speak methods and lectures using transparencies and overhead projector (TOHP). They noted in their study that the medical learners considerably preferred the use of PPT lectures over the other techniques, while the dental learners did not substantially prefer any specific technique. Because of the same infrastructure and equipment, the preferences of learners for a teaching method can differ significantly within the same organization. In addition, it emerged that any teaching aid would be suitable and efficient in the hands of a qualified teacher (15).

Contradictory to our findings, Saini et al., reported that the traditional way of teaching (chalk and talk method) was superior to PowerPoint lectures in nursing education. In the old-fashioned way of teaching, teachers used their imaginations to make their classes more interactive and interesting, so it was more beneficial as it promoted interaction, open discussion, and critical thinking (11). According to the studies, MAT improves student's attitude towards science. When the lectures are presented through PPTs, the students are better able to learn and retain the materials (16-18). MAT motivates learners to take an active role in the teaching and learning processes (4).

Computer-assisted instruction contributes to the better quality of teaching process. From a pedagogical point of view, multimedia and computer-assisted teaching method is better than a traditional teaching method. Computer and multimedia as tools at the hands of teachers can be interactive and programmable. Also, according to certain teaching goals, they have the ability to be changed according to the needs and the styles of learners (19).

The strength of this study is that it was adequately powered since the significance of results was high. Despite its strength, the present study has got some limitations. First, we have selected only the first year MBBS students as study subjects (i.e. small number of participants). Secondly, due to time constraint, only one topic of Biochemistry subject was covered. It would have been better to include students from all the batches by adopting a suitable sampling technique.

The use of interactive multimedia tool found to be more effective for presenting information than the traditional way of teaching (chalk and board). Also, performances of students increased when the information was presented by using interactive multimedia. Hence, using multimedia as a teaching tool should be reinforced in all colleges and universities in order to deliver lectures.

Every tool has its own advantages and disadvantages depending on the requirements. However, the extensive use

of multimedia was found to be more useful and user-friendly was also for promoting teaching and learning in the field of medical education. However, further studies are needed in order to find out the impact of multimedia on academic achievement.

Ethical considerations

ACKNOWLEDGEMENT

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