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

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 1-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 1-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 tests, 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 ± 3.93 % vs. 18.88 ± 3.76 %) before delivering lectures to them. However, after delivering the lectures, the average marks 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

ORIGINAL ARTICLE

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 1-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 1-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 tests, 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 ± 3.93 % vs. 18.88 ± 3.76 %) before delivering lectures to them. However, after delivering the lectures, the average marks 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
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 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 synergistic 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, NV, 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±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...
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
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

**DISCUSSION**

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

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean±SD</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>75</td>
<td>18.73±3.39</td>
<td>0.1142</td>
<td>0.9093 NS</td>
</tr>
<tr>
<td>Group II</td>
<td>75</td>
<td>18.8±3.76</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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)

<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Mean±SD</th>
<th>t-value</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>75</td>
<td>49.33±9.75</td>
<td>12.0120</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td>Group II</td>
<td>75</td>
<td>70.78±12.01</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.
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
Ethical issues (including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

ACKNOWLEDGEMENT
We wish to express our gratitude to all the first year MBBS students of batch 2016/17 who made this study possible. Special thanks to Principal of Muzaffarnagar Medical College, Muzaffarnagar for allowing us to conduct this research.

Ethical Approval: The study was approved by the Ethics Committee of Muzaffarnagar Medical College, Muzaffarnagar, India.

Conflicts of Interest: The authors declare that they have no conflict of interest.

REFERENCES