"Traditional versus Computer Assisted Teaching of Human Osteology: A Randomized Control Trial Study."

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Abstract:

Introduction: Osteology teaching is effective when it is taught in small groups, but due to time constraint, shortage of trained faculty and increase in the number of intake of students, traditional teaching in small group has become challenging. Therefore, an innovative technique for teaching osteology was developed to overcome the above limitations.

Methods: Sony handycam with 500 optical zoom was connected directly to the LCD projector which gave a highly magnified image of bone on the screen. The teacher had freedom to move the bone as and when required and was able to emphasize the details as per need of students. First year BDS students (n=90) were randomly divided into two groups. One group was taught osteology by traditional method and other with the help of developed device by the same teacher. Total 4 tutorial classes were taken of each group. After completion of each class objective structured practical examination was conducted to assess the performance. Students' feedback was also taken.

Results: It was found that performance after teaching with the help of visual aid was better and the difference was statistically significant (p=0.0204). Student's feedback on the two methodologies of teaching revealed that students preferred traditional way of teaching.

Key words: computer assisted learning, human osteology, visual aid, performance

Key notes: Effect of visual aided teaching of human osteology on the performance of students

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Introduction:

There is growing interest, throughout the educational sector as a whole, for computer assisted learning. New and continuing advances in technology have contributed to the possibility of creating teaching material in more accessible, interactive and highly visual style. These methods have reduced some of the negative effects of increasing class size, expanding curricula, added time pressure on students and shortage of trained faculty.

Traditionally, human osteology is taught in small groups where bony features are shown by teacher to students, which is supposed to be the best way of learning as the learner gets firsthand experience. Demonstration of the minute details of bone to every student is a time consuming process.

In many medical colleges of India seats of undergraduate students has increased, but number of faculty has not increased proportionately, therefore, small group teaching has become very difficult.

The use of multimedia has been demonstrated to assist learning. It is also proposed that with such formats, student learning outcomes can be improved by maximizing the effectiveness of tutor teaching time.[1] Many commercial software packages are available in market which can be used for teaching osteology to large groups and they will support both teaching and learning, but they have their own drawbacks: they are frequently not in local language of students, they do not perfectly answer the needs of local academic program, and above all they are very costly.

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The literature clearly suggests that use of multimedia does not adversely effect learning outcomes but the particular benefits and difficulties experienced by the students using this format are lacking.

Considering all these shortcomings, we developed an economic and customizable visual aid for teaching osteology to the medical students. This study was planned to investigate the feasibility, utility and effectiveness of an innovative visual teaching aid in a first year dental course.

Material & Methods:

This randomized control trial study was conducted on 90 BDS first year medical students, who were admitted to King George's Medical University, Uttar Pradesh, Lucknow, India in year 2010. After approval from institutional ethical committee, informed consent was taken from each student participating in the study. Each student was given an identity number. Students were randomly divided into two groups, A & B.

Basis cranii externa and interna was taught to the students in four tutorial classes, one hour each. All the classes of both groups were taken by same teacher. Each topic was taught to both groups on the same day. First topic to group A was taught by traditional method and to group B by visual aided method. Second topic was taught to Group A by visual aided method and to group B by traditional method. Therefore, each group was taught two classes by traditional method and two with the help of developed device. In traditional method, teacher first explained various bony features by drawing diagrams on blackboard and then showed those features to the students individually in small groups. The developed device consisted of Sony handycam with 500 optical zoom to get magnified view of bone on the screen. Handycam was suspended from a stand and skull was kept below it. It was connected directly to the LCD

projector on view finder mode and the magnified view of various bony features was shown to whole of the batch simultaneously. Teacher was free to move the skull according to need.

After each class, objective structured practical examination was conducted for each group with similar set of questions, to assess the performance of students. Student's feedback was also taken regarding their experience of two methodologies. Scores were collected and analyzed statistically.

Results:

Marks obtained by each student in 4 objective structured practical exams were converted into percent score for each method. Mean % score of traditional teaching was compared with that of visual aided teaching (Table 1). Mann-Whitney test was applied to compare the data and it was observed that the performance after teaching with the help of visual aid was better and difference was statistically significant (p=0.0204). Student's feedback was taken on the two methodologies of teaching. 62.5% students opined that traditional way of teaching was better while clear visualization of bony features was better in visual aided method (60.42%). The teacher was able to create more interest in class (56.25%), and students were able to understand in a better way (60.42%) when the topic was taught traditionally. The most important comment was that traditional way of teaching helped them more in recalling the facts when they were giving test (72.92%).(Table-2)

Discussion:

This study was planned to investigate the feasibility, utility and effectiveness of an innovative visual teaching aid in a first year dental course. The prime driver for this mode of instruction has been the perceived need to teach osteology to large group of students in equally effective way.

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Mode of teaching(n=90)	Mean±SD (%)	Median (Min, Max) (%)
Traditional	51.35±19.3	52.50 (0.0, 90.0)
Visual aided	57.23±22.6	60.00 (10.0, 100.0)

Table-1 Comparison of means of "Percent score" between "Mode of Teaching"

Students' Views	Traditional	Visual aided
Better method of teaching	62.5%	37.5%
Clear visualization of bony features	39.58%	60.42%
More Interesting	56.25%	43.75%
More understanding	60.42%	39.58%
Helped in test more	72.92%	27.08%

Table-2 Students' feedback analysis

Several authors have identified the use of multimedia as an effective method of teaching cognitive skills to medical and allied health students.[2,3,4,5,6,7] These reports from the literature also suggest that students perform as well, if not better, in assessments following multimedia instruction. Barker compared the use of an instructional videodisc with a lecture and demonstration format for 45 pre professional students. Outcomes were measured quantitatively from written examination results and performance analyses. No difference between the two methods was observed.[8] But the results of present study clearly suggest that student's performance was significantly better when they were taught with the help of visual aid. These aids have been identified as positive adjuncts for medical students learning functional anatomy and osteology.[9,10]

Multimedia could be used for teaching osteology to large group of students in two ways: (1) by preparing Power point presentations or (2) by using commercially available CD Roms. If we prepare power points according to our need there is lack of spatial orientation and lack of adjustment according to student's need. Power point presentations lack spontaneity, flexibility and non-linearity.[11] Commercially available CDs are usually not in local language of the students, do not perfectly answer the needs of the local academic program and cost is a big limiting factor. The current innovative teaching technique was able to combat all the above disadvantages and moreover it was not compromising the student's performance in our setup as well. But students' feedback analysis revealed that majority of students preferred traditional way of teaching. Possible reason for this contradiction may be in traditional method teacher shows each and every detail of bone personally to the students.

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Less exposure of our students to multimedia devices in their premedical study could also be one of the limiting factors. The magnified view of bone is different from the actual picture, may be students were finding it difficult to correlate both.

From the educators' point of view, there was reduction in time spent in demonstrating the details so there was more time available for repetition and reinforcement of facts. The classes were less tiring and teacher was able to finish the subject in allotted time, where as in traditional method the classes usually overshoot the prescribed time. May be students have not realized this fact but due to repetition of facts they were able to perform better in the test, when taught by visual aided method.

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