

Effectiveness of Teaching with Visualisation Table in Comparison to Traditional Lecture in Anatomy Department, Jinnah Sindh Medical University

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ABSTRACT

Objectives: To determine the effectiveness of Sectra visualisation table (SVT) in a public sector setup and to compare the traditional (TRAD) lecture with SVT-aided teaching in terms of learning outcomes and students' perception regarding SVT.

Study Design: Cross-sectional study.

Place and duration of study: Jinnah Sindh Medical University, from October to November 2018.

Methodology: Entire batch of BDS (Bachelors of Dental Surgery) i.e. 50 students were randomly distributed in TRAD and SVT groups, both were exposed to 3 sessions of 1-hour duration. TRAD group attended lecture sessions; whereas SVT group were exposed to SVT-aided teaching. Test was conducted at the end of each session. To compare the scores, independent sample t test was done. Percentages of feedback of SVT group was obtained on Microsoft excel. VAK questionnaire was used to identify learning styles of SVT group, and its association with their performance was obtained by chi square test.

Results: Scores of MCQs test between the groups showed non-significant difference ($p = 0.24$). Positive feedback was obtained in favour of SVT. Students of SVT group exposed to visual style of learning performed better.

Conclusion: SVT cannot totally replace traditional lecture, although it is a promising tool which can be introduced in the curriculum to enrich the learning experience of students.

Key Words: Traditional method, Sectra visualisation table, MCQs test, Feedback, Learning style.

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INTRODUCTION

Anatomy is one of the foundation's basic stones in medical and dental education.¹ Understanding of normal human structure strengthens the students' abilities to recognise the alterations as the result of a developmental defect, disease, or trauma. Knowledge of these alterations may help them in making clinical decisions.² The study of anatomy started by dissecting the human body,³ or while treating injuries.⁴ In the current era, the details of human body are studied by the help of dissection of cadavers, plastic models and virtual visualisation softwares.⁵

Conventionally, anatomy has been studied *via* dissection and lectures. Lecturing is the main pedagogic utilised for delivering knowledge, but it does not help in dealing with the clinical problems or modification of perspective.⁶

Anatomy is a subject where spatial visualisation has great significance and books and atlases provide two-dimensional images. Those learners having strong visual spatial ability get the maximum benefit from these sources,⁷ which is important for clinical practice.⁸

Dissection is acknowledged as the ideal method for learning anatomy. With the introduction of integrated modular curriculum, dissection is obsolete.¹ To compensate these changes and to achieve academic goals, an array of technologies has been adopted including Sectra visualisation table (SVT).² SVT enables students to visualise structures along different anatomical planes.⁹ It can be used for virtual dissection of the human body. It provides the capacity to load patient's data for clinical correlation.¹⁰ It enables students to practice quizzes, facilitates faculty in making the sessions interactive and researchers to work on tissue morphology.¹¹

Different individuals have different styles of learning¹² and if facilitators provide appropriate stimulus to provoke their specific perceptive mode then it enables the students to enhance their learning capabilities.¹³ The rationale of this study was to find out whether teaching with SVT can replace traditional lecture or can be used along with it to enhance knowledge and make it a pleasant learning experience.

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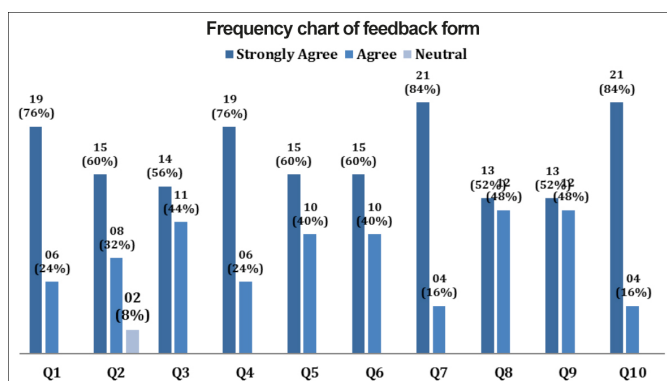
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Table I: Feedback form.

Questions	1	2	3	4	5
The use of SVT helped me to better understand the topic					
The content demonstrated by SVT was according to the objectives					
The visual information was relevant to the verbal description					
Learning by SVT is captivating and increasing attention span					
We were able to view the cross sectional and reconstructive images					
SVT helped me to conceptualize the relationship between different structures					
SVT had a positive impact on both basic and advanced anatomical learning skills					
Learning with SVT took less time than conventional learning method					
Clinical relevance provided by SVT enhanced my interest in medical profession					
SVT should be included in teaching methods					

Table II: Numbers of high and low scorers in each category of learning preference and their association.

Mean of MCQ test scores of SVT group	Learning styles			Total No. of students (High + low scorers)	Pearson chi-square
	Audio	Kinesthetic	Visual		
<7.00	7 (28 %)	0	1 (4%)	8 (32%)	p-value .004
>7.00	3 (12 %)	6 (24 %)	8 (32 %)	17 (68%)	
Total	10 (40%)	6 (24 %)	9 (36 %)	25 (100%)	

**Figure 1: Feedback results of SVT group.**

The objective was to determine the effectiveness of SVT in a public sector setup and to compare the TRAD lecture with SVT aided teaching in terms of learning outcomes and students' perception regarding SVT.

METHODOLOGY

A cross-sectional study was conducted on BDS (Bachelors of Dental Surgery) batch 2017-18, in Anatomy Department of Jinnah Sindh Medical University after IRB approval. A total of 50 students from first year BDS participated in the study for a duration of three weeks from 29th October to 17th November 2018.

All the participants were informed about the purpose of research and written consent was taken. Students were randomly distributed from the whole batch into two equal groups, of SVT and TRAD. The year-back students not included. Both the groups were exposed to three sessions of 1-hour duration on pre-decided topics according to the curriculum, TRAD group being taught by traditional lecture

method and SVT group was taught with the help of visualisation table. Sectra visualisation table, was exported from Sweden (article no: 91-00037, dimension 185×103×10 cm).

At the end of each session, performance of both groups was assessed by conducting one best multiple choice question test to compare the teaching methods in terms of outcome. Each MCQ test comprised of 10 questions. All the questions were reviewed by two senior faculty members of anatomy department for validation.

Feedback form was given to the participants of SVT group at the end of third session. The form composed of 10 questions to observe the perspective of students toward SVT (Table I). It was in the form of 5 point Likert's scale: 1. strongly agree, 2. agree, 3. neutral, 4. disagree, 5. strongly disagree.³

The VAK questionnaire used in the survey was designed by Fleming.¹⁴ The questionnaire was given to the SVT group students at the end of the third session to recognise the learning style preferences of these students to find out if there is any association between the learning style and performance of students who were exposed to this new teaching tool.

The collected data was tabulated and statistical analysis was done by using SPSS version 20. Results of MCQS test scores of TRAD were compared with that of SVT by applying independent-sample t-test. Results of feedback form were analyzed by calculating the percentages on Microsoft excel. The percentages obtained were represented by bar chart.

Results of VAK questionnaire were analysed by calculating the frequencies on Microsoft Excel, which indicated the learning preference of SVT group students. Impact of learning style on their performance was obtained by grading the students as high scorers (>7 marks) and low scorers (<7),

cross-tabulation indicated number of high and low scorers in each category of learning preference. Association of the learning style of SVT group with the scores of MCQ test was obtained by Chi-square test.

RESULTS

Out of 50 students who participated in MCQs test, 60% were girls and 40% were boys. The average age was 18-20 years. The test scores compared were the mean scores of tests conducted after each session. The mean score of TRAD group was 7.21 ± 1.01 and that of SVT group was 7.54 ± 0.95 . The comparison of scores between TRAD and SVT groups who were exposed to different teaching methods showed statistically non-significant difference with p-value of 0.24.

To determine the association between learning preference and learning outcome of SVT group students, they were graded according to their marks into high and low scorers, cut down value being 7.

Among all, 68% of the students scored $\geq 70\%$. Observing the learning preference, the predominant learning style was 'audio' (40%); but among the high scorers 47% students belonged to 'visual' style group (Table II).

Strong association ($p=.004$) was found between the scores of SVT group students and their learning styles as obtained by Chi-square test (Table II). Feedback form results revealed the perception of students regarding the use of Sectra. All the students showed strong positive response towards its use and not a single student responded negatively. In response to most of the questions, more than 60% expressed strong agreement but reply to question 3, 8 and 9 was around 50% in strong agreement and agreement (Figure 1).

DISCUSSION

Teaching anatomy with the objectives of forming a base for clinical teaching and making this experience enjoyable for the students is at times very difficult. Each day a new teaching tool is introduced to facilitate and stimulate the students to seek the desired knowledge on the subject. Use of virtual atlas and dissection is already a part of curriculum in the developed countries. The challenge was to introduce this tool effectively in the local setup, where there are 350 students in each batch of MBBS and 50 students in BDS. The outcome of this study will give an idea about how SVT can be introduced in the curriculum which needs proper scheduling of timetable, venue and adjustment of faculty involvement, to get the maximum benefit out of it.

The impact of this tool on the performance of students was observed by comparing the scores of two groups, which indicated statistically insignificant difference. Codd and Choudhury compared traditional method with 3D virtual reality computer model, they observed no significant difference.¹⁵ In

2010, a study was conducted on medical undergraduates by introducing dissect software, they found minor difference in the scores of diverse learning groups which indicated that none of the teaching methods is superior to other and they proposed that multimodal methods can enhance the performance of students.¹⁶ Tam and colleagues concluded in their review article that computer assisted learning displayed better learning outcome in terms of scores, but they believed that long term studies are needed in this respect.¹⁷

Association of the learning style of SVT group students with their test performance showed that those students who had visual style of learning scored higher, probably because SVT provides more visual clues but this needs more research-based evidences to reach a conclusion. Farkas *et al.* observed the learning outcome of students in different settings like lecture & laboratory and compared it with their learning styles, but no association was found.¹⁸ Baykan and Nacar did not found any relationship between GPA of medical students and their learning styles.¹⁹ El Tantawi found that dental students who attended maximum number of lectures and had aural style of learning performed best.²⁰ In 2013, study was conducted to see the relationship between VAK learning styles and problem solving styles. They found positive association between aural and kinesthetic style of learning with the confidence, innovativeness & struggling nature of the student.²¹ Al-Qahtani *et al.* concluded that if the teachers were aware of the learning style preferences of students, they could modify their teaching methods accordingly, which will help them to catch up with the course content effectively and improve their academic performance.²²

Students seemed to be excited with the new experience, very enthusiastic feedback was received from the students who attended the sessions of SVT as shown in Figure 1. Students strongly agreed with the idea of introducing SVT in the curriculum. The idea of learning basic anatomy with this tool as well as more advanced clinical skills was also highly acknowledged by majority of students. In contrast to traditional lecture, with SVT use they remained engaged and their attention span increased. Codd and Choudhury also used feedback as a research tool to compare the effectiveness of 3D model with traditional method & got a positive feedback for 3D model.¹⁵ Vertemati and his co-workers observed the impact of different teaching tools to study anatomy and focused on preference of these tools by students. Anatomical physical model and 3D virtual model received positive acceptance while videos/multimedia received negative feedback.²³

Although the study sample comprised of whole batch of BDS, future study on a substantially varied and large sample to be more conclusive is needed.

CONCLUSION

If traditional method or SVT-aided teaching is conducted exclusively then none of them is markedly superior to

others. SVT used as an adjunct to existing tools of learning will surely improve academic performance and improve the attendance and attention of the students.

ETHICAL APPROVAL:

Approval was obtained from the Institutional Review Board of Jinnah Sindh Medical University, Karachi, Pakistan.

PATIENTS' CONSENT:

Consents from BDS students were taken to publish this work.

CONFLICT OF INTEREST:

Authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:

GSQ: Study conception and design.

SC, AP: Acquisition of data.

TK, IQ: Analysis and interpretation of data, drafting of manuscript.

GSQ, ZB: Critical revision.

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