

Perception of Students and Faculty about Mounted Display of Dry Human Bones as Visual Educational Tool

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Abstract. This study aimed to assess the usefulness of mounted display boards of dry human bones as a self-directed learning tool for 1st year Bachelor of Medicine, Bachelor of Surgery (MBBS) students studying osteology. A prospective observational questionnaire-based study was conducted in a medical college attached to a tertiary care hospital in western Maharashtra. Feedback was obtained from 159 out of 200 participating students and was subjected for analysis. The results showed that the majority of students found the mounted display boards to be interesting (89%), beneficial for presentation skills (83%), improving thinking ability (82%), easing drawing tasks (62%), facilitating self-directed learning (79%), reducing mistakes during assessments (84%), enhancing subject understanding (91%), and promoting departmental involvement. The findings suggest that the development of department-specific display boards can enhance students' drawing skills, improve subject comprehension, thinking ability, and reduce errors made by students (75% students). Furthermore, the inclusion of charts with muscle attachments on the display boards was recommended by 94% students for additional utility. Overall, these findings highlight the significance of incorporating mounted display boards into anatomy departments as a valuable educational resource.

Keywords. Display board, Osteology, Self-directed learning, Visual educational tool, MBBS

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Introduction

Medical Anatomy constitutes a significant portion of the first-year Bachelor of Medicine, Bachelor of Surgery (MBBS) curriculum, with a total of 675 hours [1] of study, encompassing various subdivisions such as Gross Anatomy, Histology, Osteology, Embryology, Surface Anatomy, and Radiological Anatomy [2]. Among these, Osteology holds particular importance in the field of anatomy and forensic anthropology. In the ever-evolving medical field, doctors are required to continually update their knowledge and engage in lifelong learning [3]. Therefore, self-directed learning plays a vital role in enabling students to acquire and retain essential anatomical knowledge. To promote self-directed learning, it is crucial for educators to create a student-friendly classroom environment [3]. The Objective of the present study was to evaluate impact of display board as a self-directed learning tool for study of osteology. In response to this need, the authors of this study proposed an innovative approach to enhance self-directed learning by mounting and displaying bones along with relevant information. By making these displays readily available to students, they aimed to provide an accessible resource for independent learning.

Material and Methods

The study was carried out through Questionnaire based Feedback taken from 1st-year MBBS students and Postgraduate students in Anatomy. This is a prospective study carried out in a medical college attached to a tertiary care hospital in western Maharashtra. The participation of students and faculties was kept voluntary. The inclusion criteria was willingness to participate. The participants were briefed about the study and were given a questionnaire with consent form and participant information sheet. They were asked to use the display board for osteology study along with osteology charts [5] prepared by authors. The filled questionnaire forms were collected back and analyzed using Microsoft excel.

Materials used for making display board

Dry Human Bones- One Complete set for mounting, rectangular ply 6 mm thickness to make the display board with acrylic door, colored threads, wire, drill machine, velvet, screw, fevicol, color marker sketch pens, computer printouts, card papers.

Study design

This research study is a descriptive observational study using Questionnaire based feedback from 1st year MBBS anatomy students, postgraduate students and faculty members in anatomy in a medical college attached to a tertiary care hospital in western Maharashtra, India. The study was carried out after obtaining approval from the Ethics Committee of the Institution.

Study population

The study encompassed the entire 1st year MBBS student population, along with postgraduate students and faculty members specializing in anatomy. A total of 159 individuals actively participated in this research.

Measuring instrument

A questionnaire was prepared by the authors to inquire about the usefulness of mounted dry bones as a learning tool and to explore their preferences and suggestions for alternative resources to learn osteology. The questionnaire was based on five point Likert scale: 1) Strongly Agree, 2) Agree, 3) Uncertain, 4) Disagree, 5) Strongly Disagree [6].

Questionnaire

Q1: Mounted display of dry human bones makes learning more interesting. Q2: Mounted display of dry human bones develops the presentation skills in the students. Q3: Mounted display of dry human bones improves the thinking ability. Q4: Mounted display of dry human bones makes the drawing easier than drawing from book. Q5: Self-directed learning from the Mounted display of dry human bones is easy and time saving. Q6: Mounted display of dry

human bones helps in reducing mistakes during hard part viva. Q7: Mounted display of dry human bones improves the understanding of the subject. Q8: The department should provide the handbook of Mounted display of dry human bones to the students. Q9: There should be departmental competition for students to motivate them to come up with creative ideas of displaying dry human bones for enhancing learning of osteology. Q10: Keeping Charts of bones with muscle attachment on the corners of the display boards will be more useful.

Result

The questionnaire was given to 200 MBBS students in October 2021. Feedback was obtained from 159 students. The results of the study indicated the following perceptions among the participants.

Observation 1: 89% percent of students felt that mounted display of dry human bones makes learning more interesting. Observation 2: 83% students felt that Mounted display of dry human bones develops the presentation skills in the students. Observation 3: 82% students felt that Mounted display of dry human bones improves the thinking ability. Observation 4: 62% stu-

dents felt that Mounted display of dry human bones makes the drawing easier than drawing from book. Observation 5: 79% students felt that Self-directed learning from the Mounted display of dry human bones is easy and time saving. Observation 6: 84% students felt that Mounted display of dry human bones helps in reducing mistakes during hard part viva. Observation 7: 91% students felt that Mounted display of dry human bones improves the understanding of the subject. Observation 8: 75% students felt that the department should provide the handbook of Mounted display of dry human bones to the students. Observation 9: 75% students felt that there should be departmental competition for students to motivate them to come up with creative ideas of displaying dry human bones for enhancing learning of osteology. Observation 10: 94% students felt that Keeping Charts of bones with muscle attachment on the corners of the display boards will be more useful.

These findings demonstrate the positive perceptions and benefits associated with utilizing mounted display boards of dry human bones as an educational tool for enhancing student engagement, learning outcomes, and understanding in the field of osteology.

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
Strongly Agree	66	46	41	38	58	64	53	51	50	87
Agree	76	86	89	61	68	70	91	69	69	63
Uncertain	11	23	17	40	23	18	12	23	31	6
Disagree	4	2	8	14	6	4	2	13	5	0
Strongly Disagree	2	2	3	3	3	3	1	2	4	2

Table 1: Responses from students and staff to questionnaire regarding their perception towards Mounted Display of Dry Human Bones as Visual Educational Tool.

Discussion

The implementation of a new competency-based medical curriculum by the Medical Council of India highlights the significance of core competencies in Anatomy education [7]. Within the realm of gross anatomy, the study of bones assumes a paramount role, as it provides a foundation for comprehending the human skeletal

framework and its biomechanics. A research, such as the work conducted by Gordon S. Findlater et al., has demonstrated that the introduction of supported self-directed learning initiatives enhances student engagement, leading to deeper learning and a more profound understanding of anatomical knowledge [8]. By embracing these principles, medical education can

effectively equip students with the essential competencies required for their future medical practice.

The number of MBBS program admission seats has increased in recent years. There is shortage of available original human bone sets [9, 10]. To overcome this situation the authors have come up with idea of bone display boards.

In our study, we had used display of bones with labeling of parts and important areas of the bones on the boards to facilitate the three dimensional viewing and understanding. This increased student's interest in learning as felt by 89% of the students in our study. In the study, 79% students felt it helped in self-directed learning as they can visit the department during non-teaching hours i.e. free time to study and discuss among themselves on these display boards. As reported by Nyembet.al. Students prefer the three dimensional understanding of the structure [11]. In our study, 91% felt the display boards helped them in better understanding of bones. The display boards provide the students with direct observation of bones with labeling, it helps them in generating photographic memory and helps them to recall in examination as reported by 84% of the students. Also 83% of the students experienced that it helped them with their presentation skills as most bones are displayed according to their anatomical positions in the body. Also, 94% of students agreed that keeping charts of muscle attachments alongside of display boards further helped them in correlating and deep learning.

As experienced by 75% of students that departmental competition can help them with creative thinking for display of bones and labeling for better understanding thus increasing the students' participation in learning process. It is important to note that 75% students felt if a handbook of photographs of mounted bones with attachments and labels is provided by authors will be of help for revision during examination. They also found it easier, 62% of students, to draw the diagrams in gross anatomy journals from the display board. As has been suggested by Daleen Raubenheimer et al. in their extensive study, designing a student-directed strategy for teaching

and learning osteology is need of the hour [12].

Conclusion

The development of educational tools that support self-directed learning is crucial, particularly for complex subjects like Anatomy. Our study contributes to this aspect by providing a three-dimensional (3D) understanding of osteology, which has been previously emphasized by Pujol S. [13]. As discussed earlier, a majority of the participants in our study found the mounted display of dry human bones to be highly beneficial for self-learning and comprehension of this intricate yet significant subject in the medical field. Based on our findings, we suggest the implementation of a self-rating scale for self-directed learning, as proposed by Williamson S. [14]. This approach could further enhance the learning experience and outcomes for students. By promoting active self-assessment and reflection, such a scale would foster a deeper understanding of anatomical concepts and encourage continuous improvement in self-directed learning practices. Our study underscores the value of incorporating visual educational tools, such as the mounted display of dry human bones, in Anatomy education. These tools provide students with a 3D perspective, facilitating self-learning and comprehension of the complex anatomical structures. Furthermore, the introduction of a self-rating scale for self-directed learning could potentially optimize the learning process and outcomes in the field of Anatomy.

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Compliance with ethical standards: The study obtained approval from the Ethics Committee of the Institution.

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

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