Section: Anatomy

Original Research Article

LEARNING STYLES AND PREFERENCES IN GROSS ANATOMY: A CROSS-SECTIONAL STUDY OF INDIAN MEDICAL STUDENTS

Maitreyee Mutalik[1], Shilpa Gosavi[2]

[1]*Professor & HOD, Department of Anatomy, Ramkrishna Medical College, Bhopal, Madhya Pradesh, India*
[2]*Professor & HOD, Department of Anatomy, Bharati Vidyapeeth Medical College, Pune, Maharashtra, India*

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Corresponding Author:
Dr. Maitreyee Mutalik,
Professor & HOD, Department of Anatomy, Ramkrishna Medical College, Bhopal, Madhya Pradesh, India.
Email: maitreyeemadhav@gmail.com

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ABSTRACT

Background: To progress towards learner-centered approach, one has to think about the learning styles or preferences of the students. The study tries to explore it for learning of human gross anatomy by medical students.

Materials and Methods: This was a cross-sectional study of 1351 medical students in India by giving a structured, anonymous questionnaire to capture a data regarding their learning modalities.

Results: To study anatomy, 66.7% of the students preferred to study by drawing diagrams; and 47.7% preferred rote memorization. Small group teaching was preferred by 70.8%. For practical sessions, 54.9% preferred dissection while 45.1% preferred prosected specimens. Many participants (40.4%) used digital tools for 50% of anatomy study. Females used digital resources more than males ($p < 0.05$) and also preferred small group teaching; and active dissection ($p < 0.05$), while males showed preference for more traditional methods ($p<0.1$). Regarding journals, many students said that almost 75% of students copy from another journal. About 46.1% responded that gross anatomy should be taught first, before teaching its allied subjects.

Conclusion: There is inclination towards use of digital resources; and not all the students appreciate learning anatomy by dissection. Females showed significant preference for digital resources, dissection and small group teaching. Many students don't appreciate workbook/journal and it was same for learning gross anatomy together with its allied subjects. A flexibility in curriculum may help.

Keywords: Anatomy, learning, dissection, curriculum.

INTRODUCTION

For the past few decades the education system has been trying to shift towards learner-centered or outcome-centered approach, though many challenges still persist regarding its implementation.[1-3] As the students come at the centre of it, it is imperative to know how an individual student approaches and processes any subject to hold the information or concept in her/his brain. It depends upon her/his individual learning style. And the individual learning process mostly depends upon the intrinsic capacities or abilities and intelligences of a person.

In the past human intelligence was perceived as a single entity, though many researchers challenged it and redefined the intelligence as an array of many different human brain capacities.[4-6] Thurstone brought forward the concept of primary mental abilities like verbal comprehension, verbal fluency, numerical ability, spatial ability, memory capacity, perceptual speed and inductive reasoning.[6] Howard Gardner introduced multiple intelligences (logical-mathematical, verbal-linguistic, bodily-kinesthetic, musical-rhythmic, interpersonal, visual-spatial, intrapersonal, naturalist, and existential).[5]

Concurrently different theories regarding learning styles also came forward.[7-9] The term 'learning style' was first described by Thelen in 1954. Gregorc (1979) defined learning style as "personally preferred way of dealing with information and experience for learning".[10]

Present study tries to see different methods the medical students prefer to learn human gross anatomy in phase I of their medical course in India.

MATERIALS AND METHODS

This was a cross-sectional observational study. We developed a structured, anonymous questionnaire to capture data on learning modalities such as different types of traditional methods, preferences for traditional versus modern methods, use of digital resources, gender-based differences in using the methods, and preferences while learning gross anatomy with its allied subjects. An approval from institutional ethical committee was obtained. The study population included 1351 students pursuing a Bachelor of Medicine, Bachelor of Surgery (MBBS) degree at any stage of their program, across 24 medical colleges in India.

RESULTS

The data-set consisted of 1351 valid responses, with 687 females (50.9%) and 663 males (49.1%), reflecting a near-even gender distribution; and 64.2% were in their first year of study, 29.7% in their second year, and 6.1% in their third or final year. When asked about their favorite basic science subjects, 60.2% preferred anatomy, 27.8% preferred physiology, and 12.1% preferred biochemistry.

Regarding rote memorization, 52.3% of students said that it is not helpful for examinations, while 47.7% felt it was useful. To study anatomy, 66.7% of the students preferred to draw diagrams contrary to 33.3% who only observed the diagrams to understand the details. When it comes to preferences for initial exposure to new topics, 64.0% of respondents felt that lectures or practical demonstrations were the best way to be introduced to new material, whereas 36.0% preferred to do it themselves. For better understanding of anatomy, 70.8% of respondents preferred small group teaching, while 29.2% preferred didactic lectures. When asked about preferences for practical anatomy sessions, 54.9% of students preferred hands-on dissection to understand minor details, while 45.1% preferred prosected specimens, stating that it provides essential knowledge of anatomy with advantage of saving time of the dissection.

The prevalence of technology use for anatomy studies is demonstrated by the fact that the majority of participants (40.4%) used digital tools for 50% of their anatomy studies, 34.6% used for 25% of anatomy studies, and 4.4% students did not use them at all.

There were significant gender differences in these areas: Females used anatomy videos and mobile applications more than males which showed a statistically significant difference ($p < 0.05$).

Females also showed a statistically significant preference for small group teaching and active dissection over prosected parts ($p < 0.05$), while males showed a statistically marginal preference for didactic lectures and other more traditional methods such as textbook reading ($p<0.1$).

Regarding journals/workbooks of anatomy, 49.5% students said that more than 75% of students just blindly copy diagrams or texts from journal/workbook of a fellow student for the sake of completing it, while 24.1% felt that almost 50-75% students do that, for 15.7 % students this number was 25-50% and 10.7% felt it to be less than 25%.

About 53.9% said that the traditional way of teaching gross anatomy simultaneously with its allied subjects is better while 46.1% responded that gross anatomy should be taught first, before teaching its allied subjects.

DISCUSSION

This cross-sectional research of 1351 MBBS students in 24 Indian medical colleges attempts to see which different learning styles do they prefer and does the gender play any role for their learning styles.

The finding showing anatomy as more favorite subject among students is consistent with previous research that shows that anatomy, being three-dimensional, is more engaging for preclinical learners.[11]

In the present study almost half of the students preferred rote memorization. In subjects like anatomy, where the students encounter numerous difficult terms per day, memorization is frequently used as a foundation for knowledge. Actually, reasoning is always preferred over memorization for long-term retention.[12] Creative or analytical ways are great ways to learn, though memorization definitely has its important role in learning.[13] In practice there should be a balance between memorization and other strategies.[14]

Majority of participants (66.7%) reported engaging in active visual learning versus passive observation (33.3%) as a strategy for understanding the material. This finding is consistent with research that suggests that visual-spatial strategies are more effective than passive learning for anatomy mastery.[14] As anatomy is a study of structures and relations, visual-spatial ability and bodily-kinesthetic intelligence are beneficial to the medical students.[15,16]

It was interesting to note that just a little less than half of the students (45.1%) said that study of prosected parts provides good knowledge of anatomy and it is less time consuming than the dissection. There is no doubt that dissection gives more knowledge and spatial orientation and it is great to have hands on experience to understand anatomy.[17-19] However it is always a possibility that not all phase I students can do the dissection meticulously (if it is not their learning style) and there is a chance that they destroy the important anatomical structures during the process. For such learners can we think of giving anatomy knowledge by providing prosected specimens or some modern methods like dissection videos or simulations?.[17,20,21]

Preference towards small group teaching of 70.8% of students highlights the value of interactive environments in creating additional layers of

knowledge, which is supported by "layered learning" models.[11]

New generation of medical students especially after the pandemic started relying more on digital contents which was reflected in this study. Female students, in the present study, preferred digital resources more than male students. This statistically significant finding is in contrast to the stereotypical view that males are more tech-savvy than females.[22,23] They also preferred dissection and small group teaching more than the male students, which has been a similar finding from some previous studies.[24-26] Male students in the study showed more verbal-linguistic intelligence as they preferred didactic lectures and textbook reading more than female students. It was in contrast to the previous findings where males outperform females in visuospatial and females outperform males in verbal abilities.[27]

In feedback regarding journal writing, almost 75% students said that majority of students try to copy material from somebody's journal blindly. Journal or workbook writing is used everywhere as a supporting learning tool.[28] Over the years, we and our colleagues have experienced a reluctance from many students to use the journal as a learning tool. The feedback we received in the study also goes parallel to it. If the learning tool is ideal, we need to explore different methods to motivate the students to do it.

In India, under the subject Human Anatomy, students learn gross anatomy simultaneously with its allied subjects (histology and embryology) and genetics together and the human anatomy question paper contains questions from all these subjects. In the study, almost 46.1% of students preferred to have learned gross anatomy before introducing the allied subjects. For a student with global approach, learning all these subjects together will help understand the concept better, but for a student with sequential approach it may be a confusing process because he/she needs to learn it step by step – one subject at a time.[8,29]

Plovnic (1975) and Wunderlich and Gjerde (1978) did some work on learning styles of medical students. It was related with the discussion about effect of environment on preferred learning style, which states that there should always be appeals to natural learning styles, but the environment can also be structured to influence the use and development of alternate styles.[10,30] More research regarding this can lead to effective outcome-centered learning.

In the present study we need to see that these are the perceptions of students who deal with the challenges of information overload during less than 10 months study period they get in phase I, increase in student/cadaver ratio, and increase in student/teacher ratio. Such environmental factors may have affected the feedback of the students and this can be a limitation of the study.

CONCLUSION

Each student has different past learning experience and different motivation to learn the given course as well as personal preconceptions or different cultural backgrounds. It may indicate that instead of imposing the 'ideal' or 'traditional' methods, we can consider the different learning styles of the students to develop teaching methods. Though it becomes practically impossible to go with individual approach when the number of students is large, instead of giving a rigid frame for a particular teaching course, it can be kept flexible. It may give the students a chance to explore their own styles.

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