International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 14, No. 5, May 2025 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_14.5.2025.24

ORIGINAL RESEARCH

Assessment of perception of virtual learning tools in learning human anatomy in 1st year medical students

Dr. Aprajita Awasthi[1], Dr. Arpan Dubey[2], Dr. Ameet Julka[3]

[1,2]Assistant Professor, [3]Professor & Head, Department of Anatomy, MGMMC Indore, India

Corresponding Author
Dr. Arpan Dubey
Assistant Professor, Department of Anatomy, MGMMC Indore, India
Email: arpandubey83@gmail.com

Received: 29 March, 2025 Accepted: 25 April, 2025 Published: 03 May, 2025

ABSTRACT

Background: Human Anatomy is a challenging subject in the MBBS curriculum due to its complex 3D structures and its foundational role in understanding other medical subjects. Conventional teaching methods, including lectures, dissections, and demonstrations, often fail to provide the required 3D visualization. With the advent of technology, virtual learning tools have emerged as potential aids, offering interactive and accessible learning experiences. However, their effectiveness compared to traditional methods and their impact on students' perception and learning outcomes need to be evaluated. **Method:** This study was conducted in the Department of Anatomy, MGM Medical College, Indore, to assess the perception of virtual learning tools among 1st-year medical students. A total of 240 students aged 17-23 years, who participated in both traditional classroom-based anatomy education and utilized various e-learning tools, were included. Data was collected using a Google Form questionnaire covering demographic details, resources used (e.g., educational videos, eBooks, interactive apps), and devices used for learning. The study aimed to understand the effectiveness of these tools and whether they can supplement or replace conventional teaching methods. **Results:** The study revealed that **57.1%** of the participants were males and **42.9%** were females. **81.25%** of students had an urban schooling background, while **18.75%** were from rural areas. Educational videos were the most popular learning resource (**95.8%**), followed by eBooks and eJournals (**53.0%**) and interactive anatomy apps (**42.1%**). Mobile phones were the most commonly used device (**92.1%**), followed by iPads/Tablets (**34.4%**). The study highlighted that virtual tools enhance interactive and independent learning but also have negative aspects, such as increased screen time leading to neck pain, eye strain, and headaches. **Conclusion:** The study provided valuable insights into students' perception of virtual learning tools for anatomy education. While these tools promote interactive and supported learning, they cannot completely replace the traditional role of teachers in mentoring, guiding, and evaluating students. Instead, they can be incorporated as part of a blended learning approach. As virtual learning tools become increasingly popular, there is a need to optimize educational design and technology to maximize learning opportunities. Understanding students' perceptions is crucial to effectively integrating these tools and enhancing learning outcomes.

Keywords: Human Anatomy, Virtual Learning Tools, Medical Education, Student Perception, Blended Learning, E-Learning, Technology in Education, Interactive Learning, Anatomy Education, Medical Students.

INTRODUCTION

Human anatomy is a branch of medical science that deals with the study of human structures. It is an essential discipline for students in health-related fields [1, 2].

Human Anatomy is one of the most difficult subjects to understand, learn and retain in the entire MBBS curriculum. The conventional modes of teaching and learning human anatomy include lectures , demonstrations , dissections , tutorials etc. But the nature of this subject is such that it is really difficult to visualise things in a 3D form and hence retaining things. Human Anatomy finds a base for understanding other subjects like pathology, medicine , surgery , obstetrics and gynaecology, Ent , surgery , ophthalmology. Without an in-depth knowledge one cannot proceed to understand various pathologies related to various systems,s of human bodies . Also, as students started their MBBS curriculum, Human Anatomy is the first subject requires a longer time for students to get acclimatised to as compared to other subjects.. Due to these factors, a search for better and student friendly means of learning human anatomy are being tried . Feedback are then taken from

DOI: 10.69605/ijlbpr_14.5.2025.24

students to analyse how they perceive these tools. Their feedback might guide us educators to include and incorporate better means of learning along with conventional means of teaching and learning . With the advent of technology various virtual learning tools have surfaced which might aid in learning human Anatomy. The use of virtual tools has been a revolutionary help for not only medical students but also medical teachers . Virtual learning environment (VLE) has been a term given to describe a digital space for teaching and learning using web-based software systems without limitations of time and place [3,4].

Some studies have assessed the impact of using virtual tools for learning human anatomy and suggested that learning with multimedia technology and video clips from various apps and youtube resulted in better grades [5,6,7]. From the point of view of students following positive aspects came into consideration: an increase in their motivation and engagement, constructive learning , affordability , accessibility, increasesed commitment to learning and better cognition (8,9) . The negative aspects as perceived by the students were increased time consumption, expensive and less interactve.(10,11). This study wants to explore whether these tools are better or worse than conventional means and can they be used as supplementary or front line means in teaching human anatomy. Understanding of the effectiveness of these tools can be done by knowing the perception of students as well as the impact it has on learning and understanding the subject.

MATERIALS AND METHODS

This study was conducted in the **Department of Anatomy, MGM Medical College, Indore**, to assess the perception of virtual learning tools in learning human anatomy among **1st-year medical students**. A total of **240 students** who participated in classroom-based anatomy education as well as utilized various e-learning tools were included in the study.

Study Design and Population

The study involved **1st-year medical students** who were exposed to both traditional classroom teaching and virtual learning resources for human anatomy. The **study population** consisted of **240 students** aged between **17 to 23 years**.

Data Collection Tool

Data was collected using a **Google Form questionnaire**, which was distributed electronically among the participants. The questionnaire was designed to obtain **basic demographic details** (including age, gender, and schooling background) and included **multiple-choice questions** aimed at assessing the students' perception of various virtual learning tools. The tools assessed included **educational videos, eBooks and eJournals, interactive anatomy apps, anatomy websites, online PowerPoint presentations,** and **E-conferences and webinars**. Additionally, the questionnaire explored the **devices** used by students for accessing these resources, including **mobile phones, iPads/Tablets, laptops,** and **desktops**.

Ethical Considerations

Prior to participation, **informed consent** was obtained from all students, and the **purpose of the study** was clearly explained to them. Participation was **voluntary**, and the responses were **anonymous** to maintain confidentiality.

This methodological approach enabled a comprehensive assessment of the usage patterns and perceptions of virtual learning tools among the medical students, providing valuable insights into their effectiveness in learning human anatomy.

RESULTS

A total of **240 students** who participated in classroom-based anatomy education as well as utilized various e-learning tools were included in the study.

Table 1 Gender Distribution of study participants

Gender	Count	Percentage (%)
Males	137	57.1
Females	103	42.9

The table shows the gender distribution of students, with **57.1%** being males (**137** students) and **42.9%** being females (**103** students). This indicates a higher proportion of male participants compared to females.

Table 2 Schooling Background of study participants

Schooling Background	Count	Percentage (%)
Urban	195	81.25
Rural	45	18.75

The table shows the schooling background of students, with **81.25%** (**195** students) having completed their education in an urban setting, while **18.75%** (**45** students) came from a rural background. This indicates a predominantly urban-educated participant group.

Table3. Resources Used for Anatomy Learning by study participants

Resources Used	Count	Percentage (%)
Educational Videos	230	95.8

DOI: 10.69605/ijlbpr_14.5.2025.24

eBooks and eJournals	127	53.0
Interactive Anatomy Apps	101	42.1
Anatomy Websites	61	25.4
Online PowerPoint Presentations	37	15.4
E-Conferences and Webinars	4	1.7
e-Gurukul, cbsicentral, Notion, Biohuman, Telegram, 3D Apps		

The table illustrates the various resources used by students for learning anatomy. **Educational videos** were the most popular, used by **95.8%** (**230** students). This was followed by **eBooks and eJournals** at **53.0%**, and **Interactive Anatomy Apps** at **42.1%**. **Anatomy Websites** were used by **25.4%**, while **Online PowerPoint Presentations** were preferred by **15.4%**. Only **1.7%** participated in **E-Conferences and Webinars**. Additionally, some students mentioned using other resources like **e-Gurukul, cbsicentral, Notion, Biohuman, Telegram,** and **3D Anatomy Apps**, although specific percentages were not provided for these tools.

Table 4 Devices Used by study participants

Devices Used	Count	Percentage (%)
Mobile Phones	221	92.1
iPad/Tablet	83	34.4
Laptop	63	26.4
Desktop	14	5.9

The table shows the devices used by students for learning, with **Mobile Phones** being the most commonly used at **92.1%** (**221** students). This is followed by **iPad/Tablet** usage at **34.4%**, and **Laptops** at **26.4%**. **Desktops** were the least used, with only **5.9%** of students utilizing them. This indicates a strong preference for mobile and portable devices for educational purposes.

DISCUSSION

All these resources for teaching and learning human anatomy are also called Virtual learning environment [12,13] In other words, Virtual learning environment could be explained as a digital space for teaching and learning using web software systems without restriction of time and space [14,15]

Various websites , lectures (captured with PowerPoint slides) , audio recordings , software applications , video conferences, social network, online documents and online databases have been recognised essential resources in acquiring knowledge virtually [15, 16]

Use of e-learning tools has hence become a subject of interest among education institutions, , students and teachers (13)[17]. In fact various studies found out that better grades were achieved when learning with multimedia technology and video clips including those from YouTube [18, 19, 20] . These modes of learning have not only increased students motivation and engagement allowing constructive approach to learning , but also given accessibility especially to disabled students [13] These tools have indeed found to make the students feel more commmited to studying , increasing their learning processes and cognition skills [21]

Various questions were asked so as to know the perception of students regarding their usage of various e-learning tools . 23.3% students said they strongly agree while 90(37.5%) agreed that they understand the topics better when they use virtual means to learn Anatomy as compared to theory lectures, there were only 14 (5.83 %) students who disagreed while the rest were of a neutral opinion. Furthermore 118(49.17%) students like the communication flow while 32(22.86 %) do not like it , which itself could be an explanation as to why students understand the subject better while using virtual means . Peer pressure is increasing day by day leading to growing depression and insomnia among students leading to poor retention and performance in various summative and formative assessments . 94(39.17%) students were of the opinion that the peer pressure is less in learning anatomy by using elearning tools while 42(17.5%) disagree to it, while 104(43.3%) students were of the neutral opinion . The mode of learning hence, does not seem to have an effect in releasing peer pressure among students which is in accordance with a sense of learner isolation . The best part of using virtual tools for learning anatomy is that it's accessible and portable information, this was confirmed by the students' response where 191(79.56 %) students use e-leaning tools because it has made it possible to learn Anatomy anytime, anywhere. 117(48.75%) said its more time consuming , 47(19.58%) said its less time consuming where as for 76 (31.6%) students time was not much of a differential factor. This could be due to the fact that using e learning tools also opens up portals to get engaged and distracted in other activities like gaming , social media and entertainment, which somehow deviates the student from the learning task at hand . 133(55.4%) students agreed to the fact that they get more time for self study , while 40(16.7%) students said they don't. This could point to the fact that students found working without teacher encroachment more rewarding in relation to time management . 106(44.2%) students were of the opinion that they don't find it very expensive while 62(25.8%) students found it more expensive, affecting its sustained effectiveness at all times it ought to be. This requires a joint effort between network providers and institutions of higher learning where large amount of data is

DOI: 10.69605/ijlbpr_14.5.2025.24

needed for research and learning . 119(59.5%) students agreed to the fact that it has made a positive impact on their remembrance and recall of text while 95(39.6%) students said it did not make much of a difference. 132 (55%) students were able to assimilate knowledge better while for 92(38.2) students if was the same as learning usung conventional means. E-learning tools made 92(38.2%)students more alert, 57(23.8%) students less alert while for 91 (45.5%) students it was same . While 98 (40%) students were motivated for research when using e leanrnig tools , 95(39.5%) students were neutral about it. . Students who are motivated to learn will choose tasks that enhance their learning, will work hard at those tasks and will persist in the the face of difficulty in order to attain their goals . 40.4% students said that using e-learning tools has no effect on improving their communication skills, while 33% students said it did. On asking if integrating various e-learning tools has reduced their rate of cramming of the subject, 36 (36. %) students agreed while 42.9 % students found it to be contrary . 55.4 (16.6%) students reponded that they have have neck pains , eye strains and headaches using various e-learning tools, while 133 (55.42%)students did not had any such problems .

In a study conducted by Vidona et al [22] about 39.3 % of students used android phones , 17.3 % used iPhones , 18,7 % used laptops , 1.9 % used tablets , 5.1 % used Anatomy videos , 4.2 % used power points . They also used various other medias like 3D atlases , and other anatomy applications . Their percentage of usage of mobiles laptops and tablets in much less as compared to our study. This could be due to non availability or less availability of these devices or internet facilities in the area in which study was conducted or simply because of more usage of conventional modes of learning . 40.6 % students disagreed when asked if they understand better using virtual tools where as about 47.2 % agreed to it , this was again different from our study where 60% of the students agreed that these virtual means were effective in helping them understand anatomy better where as a mere 5.83% who disagreed . Could be due to easily availability and usage of e-learning tools .

CONCLUSION

The study and it's findings have no doubt provided an important insight about students' perception of learning anatomy through various e learning tools. Various e learning tools taken up in the study do enhance interactive and and independent way of supoported learning, it should also be taken into cognisance some of the perceptions of students that seem to have a negative implication on various aspects like having to negative health effects like neck pain, eye strains and headaches .

Virtual learning tools, hence cannot be a total substitute to teachers role in physical mentoring , guiding , monitoring and evaluation that students constantly need for all round appraisals but rather can be incorporated where necessary as blended learning . As the use of various e learning tools grows increasingly among students of higher learning and understanding especially in a structured course like Anatomy , the need to optimize educational designs and technology to maximise learning opportunities is the need of the hour . The ultimate goal of learning is understudying , retention and application of the subject and the perception of students is the best means to know and understand what modalities of learning and teaching can be incorporated to maximise benefits to the students optimising our resources of time , energy and money .

REFERENCES

1. Pangaro LN (2006) A shared professional framework for anatomy and clinical clerkships. Clin Anat 19: 419-428.
2. Yvette B (2020) Anatomy: A brief introduction. Medical News Today, Healthline Media. https://www.medicalnewstoday. com/articles/248743
3. Cassidy S (2016) Virtual learn environments as mediating factors in student satisfaction with teaching and learning in Higher Education. J Curr and Teach 5: 113-123.
4. Hamutoglu NB, Gemikonak, Duman I, Kirksekiz A, Kiyici M (2020) Evaluating students experiences using a virtual learni environment: satisfaction and preferences. Educ Tech Research Dev 68: 437-462.
5. Swetha S, Thenmozhi MS (2019) A survey on evaluation of students' perception in anatomy teaching methodologies. Drug Invention Today 13: 63-69.
6. Choi-Lundberg DL, Cuellar WA, Williams AM (2016) Online dissection audio-visual resources for human anatomy: Undergraduate medical students' usage and learning outcomes. Anat. Sci. Educ 9: 545-554.
7. Barry DS, Marzouk F, Chulak-Oglu K, Bennett D, Tierney P, et al. (2016) Anatomy education for the YouTube generation. Anat Sci Educ 9: 90-96.
8. Martin-Gutiérrez J, Mora CE, Añorbe-Díaz B, González- Marrero A (2017) Virtual technologies Trends in Education. EURASIA J Math Sci and Tech Educ 13: 469-486.
9. Kotranza A, Lind DS, Pugh CM, Lok B (2009) Real-time in-situ visual feedback of task performance in mixed environments for learning joint psycho-motor-cognitive tasks. Paper presented at the 8th IEEE International Symposium on Mixed and Augmented Reality (ISMAR), Orlando, FL.
10. Jingjie Z, Xinliang X, Hualin J, Yi D (2020) The effectiveness of virtual reality-based technology on anatomy teaching: a meta-analysis of randomized controlled studies. BMC Med Educ 20: 127.
11. Heidi LL, Stephen ED (2006) First-year Medical students prefer multiple learning styles. Adv Physio Educ 30: 13-16
12. Ravi H, Krishnamoorthy K (2016) Anatomical dissection as a teaching method in dental school. Indian J Appl Res 6: 84-85
13. Martin-Gutiérrez J, Mora CE, Añorbe-Díaz B, González- Marrero A (2017) Virtual technologies Trends in Education.EURASIA J Math Sci and Tech Educ 13: 469-486.

DOI: 10.69605/ijlbpr_14.5.2025.24

14. Cassidy S (2016) Virtual learning environments as mediating factors in student satisfaction with teaching and learning in Higher Education. J Curr and Teach 5: 113-123.
15. Hamutoglu NB, Gemikonakli O, Duman I, Kirksekiz A, Kiyici M (2020) Evaluating students experiences using a virtual learning environment: satisfaction and preferences.Educ Tech Research Dev 68: 437-462.
16. Wang G, Engelina PK, Ahmad NF, Sfenrianto (2018) E-Learning through social media in the virtual learning environment. IOP Conference Series: Materials Sci and Engr 420: 012110.
17. Paulo A, Luísa M, Carlos M (2017) The Influence of Virtual Learning Environments in Students' Performance. Universal J Educ Res 5: 517-527.
18. Swetha S, Thenmozhi MS (2019) A survey on evaluation of students' perception in anatomy teaching methodologies. Drug Invention Today 13: 63-69.
19. Choi-Lundberg DL, Cuellar WA, Williams AM (2016) Online dissection audio-visual resources for human anatomy: Undergraduate medical students' usage and learning outcomes. Anat. Sci. Educ 9: 545-554.
20. Barry DS, Marzouk F, Chulak-Oglu K, Bennett D, Tierney P, et al. (2016) Anatomy education for the YouTube generation. Anat Sci Educ 9: 90-96.
21. Kotranza A, Lind DS, Pugh CM, Lok B (2009) Real-time in-situ visual feedback of task performance in mixed environments for learning joint psycho-motor-cognitive tasks. Paper presented at the 8th IEEE International Symposium on Mixed and Augmented Reality (ISMAR), Orlando, FL.
22. Willy B Vidona, Jemima A Chukwu, Ehitare I Ekhoye (2022) Assessment of the Perception and Impact of Anatomy Education via Virtual Learning Environment: A Study Using Edo State University Uzairue. Journal of Clinical & Biomedical Research. SRC/JCBR-149. DOI: doi.org/10.47363/JCBR/2022(4)144