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Editorial

Evolving trends in anatomy- A global perspective

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“I will turn human anatomy into roses and stars and sea. I will dissect the beloveds body in metaphor.” — Siri Hustvedt, *The Summer without Men*.

As change is the only constant thing, the poetic words of Siri Hustvedt seem achievable with the changing trends. The body preservation process popularized by the Egyptian reached to a stage where body can be kept in cryogenic chamber for centuries. Hoping one day technique will come where we can awake the deceased person. Procuring the body was tough task in the past as well as today. However, most of the countries are running body donation program to overcome this problem. In India, religious sects appeal to their followers to donate their bodies for medical teaching and research advancements. Body donation is slowly getting approval in the society and people are donating their bodies willingly.

Anatomy teaching which started with simple chalk and board kind of model evolved to where we are using 3D models, digital dissection tables, PowerPoint presentation and roles plays. In today's world a teacher need to keep updating himself/herself with advance courses in medical education. Webinar is new normal to all of us. They are good and safe ways to meet and exchange ideas on recent trends and new perspective in anatomy. Modern teachers not only teach they facilitate and mentor the students.

To learn anatomy, students have also evolved, they no longer rely on books for knowledge. They are using you

tube, various apps and hand on workshop to update their skills. Simulation labs, C-arm and ultrasound machine are new additions to learn anatomy. The endoscopic anatomy is the latest evolving trend which teaches the students beyond anatomical positions and gives whole new perspective to look at the body. Medical ethics which was never officially taught in anatomy is now gaining popularity as a part of new competency based medical education (CBME curriculum).

‘A Step Ahead’

Our thoughts on evolving trends in anatomy

As teachers, we tend to have a love-hate relationship with technology. We have been enjoying old-school pencil and paper, physical presence and communication, and less virtual interaction. Now, we have started enjoying technology. On critical analysis, we have certain things to consider for new virtual and online technologies; will these be good for teachers who like personal one-on-one interaction with their students? Will these add to the spark to teaching which is already being done? And will these technologies be good for students' grasping of the subject?

Keeping in mind, all these questions, here we are quoting some examples of innovative educational technologies which should be included into the anatomy teaching:

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Virtual reality

Rapidly developing Technology such as: virtual reality, augmented reality, and mixed reality are one of the primary used technologies in the classroom is to take students on virtual field trips of human body. **Pros:** Appeals to visual learners. **Cons:** Students lack the personal human touch.

Digital readers/tablets/ Mobile technology

Increasingly, bulkier hard-copy textbooks are being replaced with digital ones that are accessible via a tablet and mobile phones. Instead of banning mobile devices from use during class, some schools are incorporating this technology into the learning process through educational apps. **Pros:** The regular updates of digital content eliminate the cost of purchasing new textbook editions every few years. These educational apps can be personalized. **Cons:** To fully implement, schools would need to provide a tablet to every student and have a system in place for dealing with lost, damaged, or stolen assets.

3D Printing

3D printing is an impressive application of creating organs and models. One can create models that students can investigate to have interaction and learn in a group. **Pros:** 3D printing can be useful for both visual and kinesthetic learners. It can decrease the time spent on planning and designing models. **Cons:** 3D printing technology is an easy way out for a student in place of their own physical models creation.

Gamification

Quiz/crossword puzzles/snowball/fishbowl technique/ role plays for AETCOM modules

Students learn better when they are having fun. Gaming can be used in the classroom by joining the fun part of play with the conceptual learning. **Pros:** It increases the engagement and students get enthusiastic. Immediate feedback can be received. **Cons:** Fun game is not effective at teaching all concepts. One has to devise effectively use of games for learning programs.

Cloud Technology

Flipped classroom and self directed learning

Cloud is used to store and share digital textbooks, lessons, videos, and assignments. It gives students opportunity to live chat. This technology enables to take help of a new educational model known as ‘flipped classrooms’. In this technique students watch a lecture before class and discuss in the class. Group work and analytical activities can be taken up in the classroom setting. **Pros:** It enables students

to easily access information from any device connected to the internet and quick access to the teacher through live chat options. **Cons:** Every student need to have adequate access to the internet. Security issues like hacking can be a concern.

Magic Mirror

The Magic Mirror is a user interface technique that mimics a normal mirror and presents nonphysical visual feedback in addition to the normally optical effect. The user’ image is taken via a camera and is shown on the screen which looks like a mirror onto the user. **Pros:** It presents medical data augmented onto the user’s body and shows additional 2D and 3D information according to the user’s needs. This system extends the concept for medical education and rehabilitation. **Cons:** Costing and unnecessary usage may be a big concern.

Artificial Intelligence (AI)

AI is used in educational sphere for automating grading and feedback. It provides personalized learning opportunities. It provides greater insights into a student’s learning patterns. **Pros:** Less of human resources required. Saves teachers’ time by doing the grading and giving feedback on their behalf. **Cons:** Not a real world feel. Lacks personalized human touch.

Simulation

In this educational technology sophisticated manikins are used in simulated patient environments. It is also known as a human patient simulator or high-fidelity simulators. **Pros:** This technique help computerized systems to control full-body manikins. These are programmed for realistic responses to learners’ actions. The manikins can breathe and talk, sleep-and-wake up. These features are used for better presentation of structures, functions, symptoms and medical skills.¹ **Cons:** Costly and difficult to maintain.

Recent Advances

Science is based on innovation and anatomical science is also evolving every day. By using advanced radiological and microscopic techniques, researchers have overturned previous misconceptions. Lymphatic drainage of brain is hot topics among scientist and in 2017 researchers were able to establish the lymphatic vessels in human meninges.² Lymphatic system is reported in mouse brain which interconnect network of glial cells that facilitates the circulation of fluid throughout mouse brains. Mesentery has been established as a new organ of the human body.³ In 2019 researcher described web of capillaries that pass through the bone of mice.⁴ These capillaries provide faster route for blood cells in the bone marrow to enter the circulation. In future, these innovations may help us to

understand spreads of cancer better. Reptiles like muscles were reported in 8 to 14 week old fetuses which disappear before birth.⁵ These muscles may be remnants of our evolutionary ancestors that disappear during early stage of embryonic life. These new discoveries are the start rather than end of a developing view of human anatomy.

Our Recommendations

1. Adapting and investing in technology should be considered as the need of the day for the medical institution.
2. There are multiple learning methods available and each method has its own advantages and disadvantages. Adopting blended learning should be a way forward.
3. Use evidence-based methods to facilitate teaching and learning to achieve the targets of curriculum based medical education.
4. Training the faculty in advanced medical education courses will help them to adopt new methods of teaching.

Anatomy has been a cornerstone for studying medicine and surgery for hundreds of years. These evolving trends indicate that assimilation and application of anatomy will metamorphose it from being dull and passive subject to a more dynamic and collaborative subject. The impact of COVID-19 pandemic has profoundly affected education, with most universities changing face-to-face classes to online formats. The advent of innovative techniques are real road ahead maps in anatomy learning. I conclude by saying: “Any sufficiently advanced technology is indistinguishable from magic.”— Arthur C. Clarke.⁶

Conflict of Interest

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