

Learning Anatomy by Illustrations: Traditional versus Digital

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HOW TO CITE THIS ARTICLE:

Saami Zahid, Reeha Mahajan. Learning Anatomy by Illustrations: Traditional versus Digital. *Jr of Glob Med Edu and Res.* 2025; 8(2): 43-44.

Anatomical illustration is a fundamental tool in medical education as it represents 3-D structures into simple, understandable visuals. It helps students visualize spatial relationships between different anatomical structures of the body, which is essential for the accurate interpretation and creating a visual memory for applied anatomy in various clinical settings. Illustrations allow rapid comprehension, reinforce memory through visual encoding, and serve as valuable tools during revision and practical examinations.¹ One such pedagogy is the cognitive theory of multimedia learning, which explains its role in learning by reduction in cognitive load.

Anatomy education employs various forms of visual art which include the hand-drawn sketches, digital illustrations, 3D models, animations, and virtual reality tools. The most commonly used ones are traditional illustrations and digital illustrations.

Traditional art involves hand-drawn images made with physical materials such as pencil, ink, or watercolours whereas, digital art refers to anatomical illustrations created using digital tools like tablets and software.

Traditional diagrams in printed books offer a consistent, expert-drawn style that's easy to read without screens, highlights key structures with simplified visuals, are always accessible

without technical issues, and can be directly annotated by students for better learning, such as on-the-spot sketching during cadaver dissections or fieldwork. They are trusted and time-tested (e.g., Diagrams from Netter's Atlas and Gray's Anatomy are still widely preferred). However, in traditional drawing method, mistakes are hard to correct, besides creating neat, accurate drawings is time-consuming. They lack interactivity and cannot show dynamic or layered anatomical views as can be superimposed in many slides in digital art. A qualitative study using a haptic-visual observation and drawing (HVOD) method found that participants developed richer mental 3D models of anatomical objects, with enhanced cognitive understanding and memorization.²

Digital art allows quick, non-destructive editing through features like reusable templates, undo, redo, and layering tools, which saves time and helps separate anatomical structures clearly. The high zoom and precision tools enhance the accuracy of micro-anatomical illustrations, while consistent colours and lines ensure clean and professional visuals. It also enables dynamic content creation through animation and interactivity. Different brush types can be used to elicit different textures and surfaces of various organs. It offers easy accessibility, sharing, storage, and is

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environmentally sustainable by eliminating the need for physical materials. As the students create their own diagrams, it encourages active learning through repeated interaction with editable content.

Digital and traditional anatomical drawing methods offer distinct advantages. High-quality presentations and tablet-based tools can match or exceed traditional drawing for knowledge acquisition and engagement. However, printed atlases remain valuable in specific contexts.

A blended approach using hand-drawing for foundational learning and digital tools for refinement and three-dimensional exploration is the best likely option. It begins with traditional hand drawing to develop a deep, intuitive understanding of form, structure, and proportion, and then gradually incorporates digital tools for enhanced precision, refinement, and a comprehensive and versatile

learning experience. This method not only strengthens core artistic and anatomical skills but also allows for flexibility, experimentation, and adaptability, making it the most effective and forward-looking strategy for mastering both conventional and modern techniques.

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