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Editorial

Anatomy Educational "Tools"

The first thought at the mere mention of anatomy education is usually cadavers. And while learning human anatomy is greatly facilitated by this unique laboratory experience, what most medical, dental, and allied health students remember is the smell. Additionally, in many parts of the world, cadavers are not readily available and learning from the "real thing" is not always an option.

Thus, the evolution of many other types of educational "tools" occurred to enhance and stimulate learning. Included in this group would be illustrations in books, first prepared as drawings which for printing purposes were converted to wood engravings. These evolved into hand painted artwork and have now progressed to computer generated multicolored illustrations[1]. There was also the introduction of models made out of a variety of materials. These began as very simple learning aides and have now advanced to extremely complex devices which include every structure in the body. Also included in educational "tools" would be body painting exercises[2]. These activities are very useful in helping students gain a better understanding of surface anatomy. And finally imaging which, as it has advanced from basic radiographs through CTs, MRIs, and recently ultrasound images too highly sophisticated, volume-rendered reconstructions, provide the learner with unique, real-time views of anatomy[3,4]. And while these "tools" are not meant to replace learning from the cadaver they have become wonderful adjunctual materials.

An evolution has also occurred related to the cadaver. This standard of anatomy education is not only available in the traditional formalin-fixed version but also in a variety of lightly embalmed preparations that not only decrease the user's exposure to harmful chemicals, but are, in some cases, suitable for surgical training. Additionally, with the development of plastination techniques, exceptional dissections, demonstrating the wonders of the human body, can be preserved forever. However, all of these preparations still require a body and in some parts of the world this is still the limiting factor.

Three-dimensional (3D) reconstructive technologies have been used in industry for a number of years. Additionally, rapid prototyping used extensively in engineering to generate models recently entered the medical field to aid in the production of 3D life-size replicas of human anatomical structures using a variety of medical image data[5] (i.e., CTs, MRIs, and 3D echocardiography). This technology is being used in the preparation of models for preoperative assessment and presurgical planning. What 3D printing had not done until recently was reproduce a detailed dissection. In an article in this issue of ASE, Dr. McMenamin describes how their group from Australia's Monash University has successfully printed, from surface laser scanning and/or CT imaging, various cadaver dissection models similar to specimens found in any cadaver dissecting room[6]. The printed reproductions are highly accurate, when compared to the original specimens, reproducible, and able to be handled in a classroom environment. In a quote from the article, Dr. McMenamin indicates "we advocate 3D printed anatomical replicas not as a replacement but an adjunct to actual dissection. If access to cadaver material is not an option or unavailable to students we maintain that 3D prints may offer a novel, accurate, and effective substitute"[6].

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