Chapter 11
Advances in Anatomical and Medical Visualisation

Paul Michael Rea
University Of Glasgow, UK

ABSTRACT

Advances in digital technologies are rapidly progressing, and as such, those involved in education at all levels have to adapt our educational methodologies to ensure effective and validated pedagogical methods in our teaching practice. One such area rapidly progressing is that of anatomical and medical visualisation. With such a rich and prestigious history, the subject of anatomy is at the forefront of these advances. This chapter highlights the history of anatomy in medical education, and clearly illustrates the key changes that are paramount to our digital natives learning today. With the advent of a new MSc in Medical Visualisation and Human Anatomy which bridges the gap between traditional and modern techniques in anatomical education, this chapter clearly illustrates how to amalgamate traditional teaching methodologies with those of the digital age. It will also highlight key areas to enhance employability of students entering employment in an ever-changing market.

INTRODUCTION

Anatomy can be thought of as one of the core subjects within a medical curriculum. Indeed, the study of the human body through cadaveric dissection is a key feature of this degree. However, not all universities have adopted cadaveric dissection due to a number of reasons like cost, risk of infections (e.g. prions) and risks of fixation of the cadaver from staff handling fluids (Miller, 1988; de Craemer, 1994).

The teaching of anatomy has had a rich and florid past throughout the centuries. From the first ever written surgical text dating back to Egyptian times 1600BCE, to anatomical teaching within medical, dental, nursing and allied healthcare professional curricula today, the core feature of training was the patient and the cadaver.

Since that time, the cadaver has been at the heart of anatomical teaching. However, for a variety of reasons many places throughout the world do not have access to this resource which can be expensive to manage, and involve a great deal of administrative regulations and procedures.

Nowadays, the digital age is rapidly progressing and the way our student's access information

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has evolved considerably over the years since the introduction of the Internet. With the surge in technology, a lot of anatomical products and apps have arisen on the market. However, prices range considerably, and the quality of these products vary considerably. Indeed, with our digital natives, our next generation of students, new, exciting ways of engaging the student population have to be examined. In addition to this, faculty are requiring modern technologies to be used alongside our traditional techniques, like cadaveric dissection, for example. Faculty have to be able to integrate a variety of teaching methodologies (blended learning techniques) to ensure continual engagement with our student population, who are now accessing information very differently from how they used to.

BACKGROUND

Anatomical knowledge and understanding has dated back to the Egyptian times circa 1600 BCE. The first writing that documented anatomical, and indeed medical and surgical history was the Edwin Smith Papyrus, named after the American Egyptologist who purchased it ("An ancient medical treasure," 2010.). It details 48 surgical cases, but also lays out a foundation for describing the type of injury, how to undertake a diagnosis, the longer term prognosis, as well as the treatment and any further explanations.

Since that time, many famous names in anatomical and medical circles contributed to knowledge and understanding including Hippocrates of Kos (4th-5th century), Aristotle, Herpohilos and Erasistratus (4th century BC) and Galen (2nd century BC). More significant works, which influenced development in the progression of anatomy, included the Canon of Medicine (completed in 1025, and influenced well into the 16th century) and then De Humani Corporis Fabrica by Andreas Vesalius, based on actual cadaveric dissection.

Indeed, even from the Renaissance, anatomical teaching has been undertaken using cadavers (Persaud, 1984). This also extended into the 16th and 17th centuries, especially with the influence of William and John Hunter in advancing anatomical knowledge and understanding (Moore, 2005). Since these times cadaveric based anatomical teaching became the mainstay of medical education. As such, there was a surge in private anatomical schools along with hospital based training courses. Into 1822, the Royal College of Surgeons came to the agreement that short courses would no longer be acceptable to enter the college diploma. Shortly after this in 1832, the Anatomy Act echoed this opinion too about medical training, and specifically the use of the cadaver. This resulted in a shift in the way anatomy and medical training occurred. Previously, it was more of an apprenticeship model that was used where the student and the instructor would work closely with each other. The move towards more of a professional development course using the deceased from a hospital based environment, and where larger numbers of students were taught together was more favoured (McLachlan & Patten, 2006).

The medical world then entered uncertainty into the 18th and 19th centuries when there was a shift from no organised thinking and methodology, to one of creation of anatomical knowledge which was standardized scientifically. Into the 19th century, the world of anatomy and medicine became more male dominated. Alongside this, the creation of the knowledge base from sound scientific experiment and reproduction ensured that the anatomical structures were then understood further in terms of their function.

It has been disputed that perhaps in gross anatomy, there will be no identification of new structures in research (McLachlan & Patten, 2006), although this was recently challenged with the definition of the "new" anterolateral ligament. Here Claes et al. (2013) provided a