

Teaching and learning human Anatomy in the University of Pavia: from models and clinical specimens to prosection on 3D models from our museum collection

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Due to decline of resources and support for teaching human anatomy, in our Institute the use of cadaver dissection is not economically feasible. After a few years in which I was able to perform prosection on fixed organs belonging to the Institute collection, over the last years students learned topographical anatomy on commercial plastic models (bones, muscles, joints, trunks and brains). New perspectives recently occurred thanks to a collaboration with Prof. Auricchio's group, which is involved in the strategic plan "3DPRINTING" (<http://www.unipv.eu/site/home/area-stampa/articolo12952.html>). First, we have segmented DICOM images of Computed Tomography (CT) to reconstruct 3D models of all the feet's bones from a patient. Then, these 3D models have been post-processed to obtain suitable file for 3D printing. A 3DSYSTEMS Projet 460 Plus, professional, full-color binder jetting printer (property of General Surgery2), has been used to create 3D models of feet's bone by chalk powder binding. Medical students will use these models to test their own ability to recognize feet's bones shape and to recompose them. Second, a plastic 3D anatomical model has been scanned by Artec Eva 3D Object Scanner to obtain a 3D virtual model of the physical one; this model has been modified to create a new modular model, printed with a process similar to one described above. Our Anatomy Institute is enriched by a Museum, established in the late eighteenth century by universally known anatomists (Rezia, Scarpa, Panizza, Zoja). This historical collection contains several sections (osteology, angiology, splanchnology, neurology and topographic anatomy). It is impossible to use these anatomical specimens of historical interest for prosection, but their life-size copies will constitute a cheap and effective method of learning. This strategy could not replace cadaver dissection experience but we hope that it could assist students in the comprehension of anatomical systems in a cost effective way within a systemic anatomy course. Besides, this method should optimize specimen's choice and focalize student's attention on peculiar, selected samples, preparing more appropriately medical students to their clinical practice.

References

- [1] <http://spmsf.unipv.eu/site/home/dipartimento/unita/sezione-di-anatomia-umana-normale.html>
- [2] Pietrabissa, A., Marconi, S., Peri, A., Pugliese, L., Cavazzi, E., Vinci, A., & Auricchio, F. (2016). From CT scanning to 3-D printing technology for the preoperative planning in laparoscopic splenectomy. *Surgical endoscopy*; 30(1), 366-371.
- [3] Auricchio, F., & Marconi, S. (2016). 3D printing: clinical applications in orthopaedics and traumatology. *EFORT Open Reviews*; 1(5), 121-127.

Keywords

Anatomical teaching; medical education; 3D printe; 3D scan.