Hands-on training

Hands-on refers to an approach to learning or working that involves actively engaging with physical materials or objects, rather than simply observing or reading about them. This can involve anything from conducting experiments in a laboratory, to building models or prototypes, to practicing skills through simulation or role-playing.

The hands-on approach is widely recognized as an effective way to learn and retain new information, as it provides learners with opportunities to actively engage with the subject matter and apply concepts in a practical way. This approach is often used in fields such as science, technology, engineering, and mathematics (STEM), where hands-on experience is essential for developing skills and understanding complex concepts.

In addition to its educational benefits, the hands-on approach can also be a valuable tool for problem-solving and innovation. By working with physical materials and objects, individuals can experiment and test ideas in a way that is not possible through observation or theoretical study alone.

Overall, the hands-on approach is a powerful tool for learning, problem-solving, and innovation, and is widely used in a variety of settings, including classrooms, laboratories, and workplaces.

Hands-on training in neurosurgery

- Reshaping neurosurgical training: a novel simulation-based concept for structured skill acquisition and curriculum integration
- Cerebral aneurysm surgical training in the neuroendovascular era and its impact on the production of comfortable aneurysm surgeons
- The Modified Coffee Cup Model: A Novel Approach to Teaching Cavernous Sinus Anatomy
- Training in Endoscopic Endonasal Neurosurgical Procedures: A Systematic Review of Available Models
- Challenges in studying neuroanatomy in sub-Saharan Africa: The case of Cameroon
- Realistic 3D-Printed Lumbar Spine Model for Non-cadaveric Surgical Training: A Proof of Concept Study
- Improving Quality and Compliance of Surgical Hand Scrubbing Practices: A Clinical Audit
- The first EANS vascular and skull base hands-on course in East Africa: Review from the global and humanitarian neurosurgical committee initiative

A prospective study assessed the acceptance and usefulness of augmented 360° virtual reality (VR) videos for early student education and preparation in the field of neurosurgery.

Thirty-five third-year medical students participated. Augmented 360° VR videos depicting three neurosurgical procedures (lumbar discectomy, brain metastasis resection, clipping of an aneurysm) were presented during elective seminars. Multiple questionnaires were employed to evaluate conceptual and technical aspects of the videos. The analysis utilized ordinal logistic regression to identify crucial factors contributing to the learning experience of the videos.

The videos were consistently rated as good to very good in quality, providing detailed demonstrations of intraoperative anatomy and surgical workflow. Students found the videos highly useful for their learning and preparation for surgical placements, and they strongly supported the establishment of a

VR lounge for additional self-directed learning. Notably, 81% reported an increased interest in neurosurgery, and 47% acknowledged the potential influence of the videos on their future choice of specialization. Factors associated with a positive impact on students' interest and learning experience included high technical quality and comprehensive explanations of the surgical steps.

This study demonstrated the high acceptance of augmented 360° VR videos as a valuable tool for early student education in neurosurgery. While hands-on training remains indispensable, these videos promote conceptual knowledge, ignite interest in neurosurgery, and provide a much-needed orientation within the operating room. The incorporation of detailed explanations throughout the surgies with augmentation using superimposed elements, offers distinct advantages over simply observing live surgeries [1].

Hands-on neuroendovascular practice for nonselective undergraduate medical students effectively increased their interest in neurosurgery specialization and their desire to become neurosurgeons. Therefore, this practice can help recruit medical students for neurosurgery specialization [2]

Combining mixed reality visualization with the corresponding 3D printed physical hands-on model allowed advanced training of sequential brain tumor resection skills. Three-dimensional printing technology facilitates the production of a precise, reproducible, and worldwide accessible brain tumor surgery model. The described model for brain tumor resection advanced regarding important aspects of skills training for neurosurgical residents (e.g., locating the lesion, head position planning, skull trepanation, dura opening, tissue ablation techniques, fluorescence-guided resection, and closure). Mixed reality enriches the model with important structures that are difficult to model (e.g., vessels and fiber tracts) and advanced interaction concepts (e.g., craniotomy simulations). Finally, this concept demonstrates a bridging technology toward intraoperative application of mixed reality [3]

Long-term partnerships between academic departments in low- and middle-income countries (LMICs) and high-income countries (HICs) focused on education and training are playing an increasingly important role in scaling up global surgical capacity. Haji et al. believed that there multi-faceted approach consisting of in-country targeted hands-on training, out-of-country fellowship training at the mentor institution, and ongoing mentorship using telecollaboration and Internet-based tools is a viable and generalizable model for enhancing surgical capacity globally [4].

1)
Truckenmueller P, Krantchev K, Rubarth K, Früh A, Mertens R, Bruening D, Stein C, Vajkoczy P, Picht T, Acker G. Augmented 360° 3D virtual reality for enhanced student training and education in neurosurgery. World Neurosurg. 2024 Jan 23:S1878-8750(24)00103-7. doi: 10.1016/j.wneu.2024.01.092. Epub ahead of print. PMID: 38272307.
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3)
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4)

Haji FA, Lepard JR, Davis MC, Lien ND, Can DDT, Hung CV, Thang LN, Rocque BG, Johnston JM. A model for global surgical training and capacity development: the Children's of Alabama-Viet Nam pediatric neurosurgery partnership. Childs Nerv Syst. 2020 Jul 27. doi: 10.1007/s00381-020-04802-4. Epub ahead of print. PMID: 32720077.