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A Virtual Reality and Stereoscopic Method to Teach and Learn Neuroanatomy.

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Introduction

This study aims to show the process of the construction, implementation and evaluation of a tool for teaching Neuroanatomy. The tool presented is accessible from personal computers, immersive, interactive, and allows photorealistic three-dimensional and stereoscopic vision.

Methods

Forty fresh brains were obtained from the São Paulo Department of Death Records (SP-DDR-Serviço de Verificação de Óbitos de São Paulo (SVO-SP)) and subjected to fixation, conservation, vascular injection, staining of gray matter, white fiber dissection, turpentine and bleaching bone techniques, as needed, at the Surgical Technique and Experimental Surgery Laboratory, University of São Paulo (Laboratório de Técnica Cirúrgica e Cirurgia Experimental da Universidade de São Paulo- USP). Images of areas of interest were captured using a manual turntable built for this purpose. The images were processed with commercially available software (Photoshop CS5; Stereo Photo Maker; VRWorx2.6 for Windows) non-linear format, interactive, three-dimensional stereoscopic and stored in a database of 5337 final images.

Results

The teaching resource was applied to 84 undergraduate medical students, divided into three groups: conventional (group 1), non-interactive stereoscopic (group 2) and interactive stereoscopic (group 3). Averages on the assessment of prior knowledge did not differ significantly ($P > 0.05$) among groups. The tool was evaluated through a written theory test and a lab practical. Groups 2 and 3 showed the highest averages and differed significantly from Group 1 ($P < 0.05$), Group 2 did not differ statistically from Group 3 ($p > 0.05$), revealing a result of similar training on the written theory test. Observing the Effect Sizes, it was found that these were of great magnitude, indicating student training effectiveness. ANOVA results showed significant difference ($P < 0.05$) between group means, and the Tukey test showed statistical difference between Group 1 and the others ($P < 0.05$). On the lab pratical, it may be noted that similarly to the written theory test, no statistical difference between Groups 2 and 3 were found.

Conclusions

The authors conclude that the tool presented provided a gain of knowledge for students and yielded significantly higher leaning when compared with traditional teaching resources.

Learning Objectives

It is possible to construction, implementation and evaluation of a tool for teaching Neuroanatomy

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