A virtual reality and stereoscopic method to teach and learn neuroanatomy.

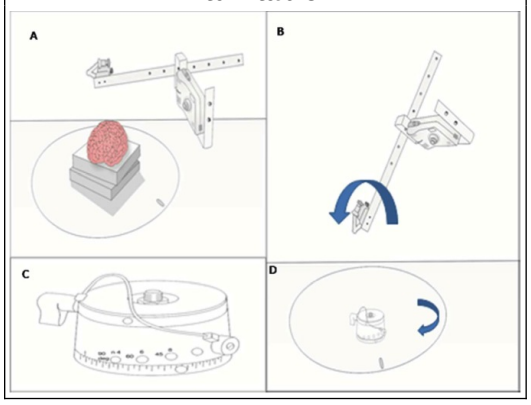
Jose W Faria MD, PhD; Eberval G. Figueiredo MD, PhD; Wellingson S. Paiva MD PhD; Jose P Otoch MD; Manoel Jacobsen Teixeira

UNIVERSITY OF SAO PAULO MEDICAL SCHOOL

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.

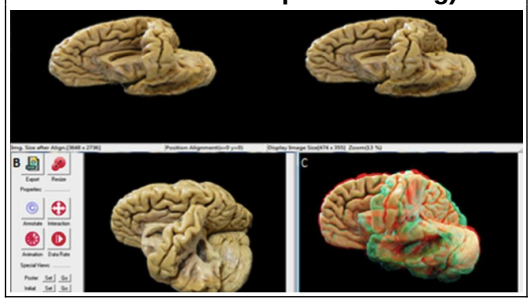
Figure 1 - Rotating platform built for image acquisition with platform Ilustrating arm with camera, dissected specimen and submitled to the neuroanatomical technique propped on bearing both on a manual circular turntable.



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.

Figure 2 - A- Right and left view for stereo pair formation B- Final 3D illustration3D glasses, for anaglyph, red and blue for adequate viewing).



Results

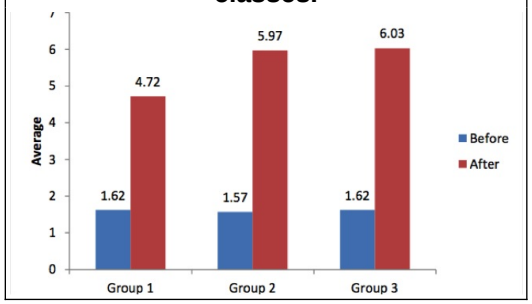
The teaching resource was applied to 84 undergraduate medical students, divided into three groups: conventional (group 1), non-interactive stereoscopic (group 2) and interactive stereoscopic (group 3). Averages on the assessment of prior knowledge did not differ significantly ($P > 0.05$) among groups. 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 ($P < 0.05$).

Table 2 – Distribution and comparison of grade averages before and after class and size effect intervention in each group.

GROUPS	BEFORE AVERAGE	BEFORE STANDARD DEVIATION	AFTER AVERAGE	AFTER STANDARD DEVIATION	Effect Size
GROUP 1	1.62a	0.65	*4.72b	1.20	4.77
GROUP 2	1.57a	0.65	*5.97a	1.28	6.77
GROUP 3	1.2a	0.65	*6.03a	1.20	6.78

* Represents the statistical difference between averages in the groups ($p<0.05$). Averages followed by the same letter do not differ statistically ,Tukey test ($p>0.05$).

Figure 3 - Group 1,2 and 3 grade averages on evaluation before and after classes.



Conclusions

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

Learning Objectives

improve medical education focused on human anatomy

Improving residents' training in microsurgical anatomy

References

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