Abstract #1010 : Self-directed use of neuroanatomy apps does not influence learning outcomes in a tertiary second-year gross anatomy unit

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INTRODUCTION

Computerised 3D teaching tools in anatomy education are not new, but they are now contained in apps that are easily downloaded by students. A previous study using a computerised 3D neuroanatomy tool reported that 79% of experimental students strongly agreed that it helped visualise 3D structures and spatial relationships in the brain [1]. The majority (64%) of experimental students in this study would have preferred user control (i.e. self-directed use of the tool) [1].

Mobile technology devices (smartphones and tablets) are owned by the majority of chiropractic students at Murdoch University[2]. Two-thirds of the students owned one or more mobile anatomy software applications (apps) [2]. Anatomy apps were used on a weekly basis by 78% of students who owned apps; however the majority used apps for less than 30 minutes [2]. The effect of anatomy app use on students' grade outcome remains unknown.

OBJECTIVES:
1. To measure self-directed learning readiness (SDLR) in second year anatomy students.
2. To determine if anatomy app use improved student outcomes on a summative neuroanatomy assessment.
3. To examine if an association exists between SDLRS score, age, gender or previous anatomy unit score and students' neuroanatomy assessment score.

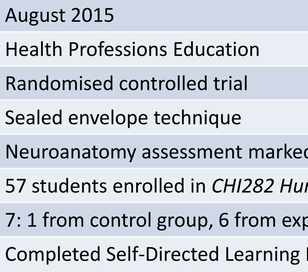
METHODS

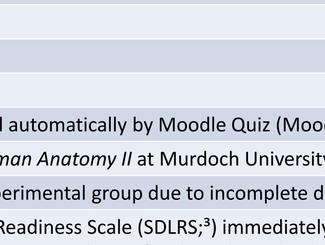
Table 1. Research design and methods.

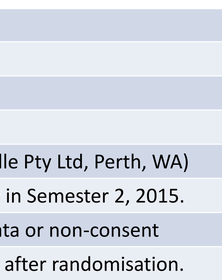
Timing of study	August 2015
Field of study	Health Professions Education
Research design	Randomised controlled trial
Randomisation process	Sealed envelope technique
Blinding of outcome	Neuroanatomy assessment marked automatically by Moodle Quiz (Moodle Pty Ltd, Perth, WA)
Number of participants	57 students enrolled in *CHI282 Human Anatomy II* at Murdoch University in Semester 2, 2015.
Exclusion of participants	7: 1 from control group, 6 from experimental group due to incomplete data or non-consent
Control group	Completed Self-Directed Learning Readiness Scale (SDLRS;[3]) immediately after randomisation. Attended three weekly anatomy laboratory classes (each 1.5 hours in duration) with cadavers, models and clinical images.
Experimental group	Completed SDLRS immediately after randomisation. Attended three weekly anatomy laboratory classes (each 1.5 hours in duration) with cadavers, models, clinical images and had access to iPads pre-loaded with four apps (Table 2).
Ethics Approval	Approval 2015/113 by Murdoch University Human Research Ethics Committee.
Quantitative Assessment	Summative 30 image-based multiple choice questions test using Moodle Quiz Function. Time limit of 30 minutes.
Statistical Analysis	Multivariate linear regression using SPSS software (Version 21; IBM Corp)

Table 2. Neuroanatomy apps used in the intervention.

Name of app	Developer	Version/Size
Brain and Nervous Anatomy Atlas: Essential Reference for Students and Healthcare Professionals	Visible Body	6.0.11/ 458 MB
Brain and Nervous System Pro	3D4Medical.com, LLC	3.8/ 758 MB
Essential Anatomy 5	3D4Medical.com, LLC	5.0/ 645 MB
iSurf BrainView	Netfilter	4.1.0/ 30.4 MB







RESULTS

Table 3. Demographic data

	Control (n=25)	Experimental (n=25)
Males (%)	10 (40%)	12 (50%)
Mean age (years ± SD)	22 ± 6	22 ± 4
Mean previous anatomy unit score (% ± SD)	65 ± 9%	66 ± 8%

RESULTS (cont.)

Table 4. SDLRS questionnaire results.

	Control (n=25)	Experimental (n=25)
Mean Total SDLRS score (± SD) *(Cronbach's alpha = 0.88)*	150 ± 13	151 ± 12

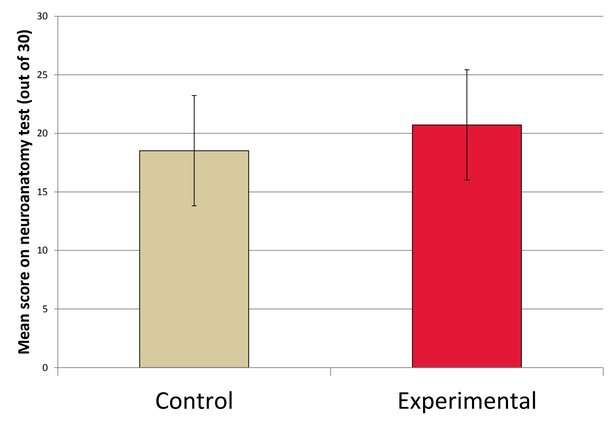


Figure 1. Mean neuroanatomy test scores.

Table 5. Results of the multivariate linear regression analysis.

Variable	β coefficient	95% confidence interval for β	p value
Previous anatomy unit score	**0.348**	**0.214 - 0.483**	**<0.001**
Group	1.75	-0.340 – 3.84	0.099
Gender	-0.754	-2.97 – 1.46	0.496
SDLRS score	-0.005	-0.099 – 0.090	0.920

DISCUSSION

The use of anatomy apps during a limited number of anatomy laboratory sessions did not significantly increase students' scores on a neuroanatomy summative assessment. A "technology learning curve"[4] whereby the students spent time learning how to use the apps may have taken time away from learning course material. Pedagogically, the apps are limited[5] to Level 1 (knowledge) and Level 2 (comprehension) of the Blooming Anatomy Tool (BAT)[6] whereas the neuroanatomy summative assessment contained many questions from Level 3 (application) and Level 4 (analysis).

Very recently it has been shown that with enough time to overcome the "technology learning curve", use of iPads can improve student outcome[4]. Particularly useful for learning neuroanatomy on apps, is the ability to rotate, zoom and section virtual brains. Despite not improving student outcome in the present study, anatomy apps may be a useful learning tool when used in conjunction with cadavers, models and clinical images.

CONCLUSIONS

Use of anatomy apps during a limited number of laboratory sessions, did not enhance learning outcomes on a neuroanatomy assessment in a second-year tertiary anatomy unit. Given the inconsistent findings between studies, and limited number of studies conducted in this area, further studies are warranted to establish whether the use of mobile technologies influences anatomy learning outcomes.

REFERENCES

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