SUPPLEMENTING A NEUROANATOMICAL MODULE WITH YOUTUBE VIDEOS DOES NOT IMPROVE STUDENT LEARNING OUTCOMES

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INTRODUCTION

Curriculum changes resulting in reduced contact time, and the implementation of the "Learning & Teaching Strategy"[1] at Murdoch University, have prompted the adoption of "Blended Learning" in many units. Blended learning has been reported to improve student outcomes in a gross anatomy course for second-year physiotherapy students at La Trobe University[2]. The effect of blended learning on the academic performance of second-year health profession students, who have been taught anatomy at an undergraduate medical level[3,4], has not been investigated.

YouTube is a popular streaming site for educational anatomy videos[5,6]. Many students use YouTube as their primary source of anatomy-related video clips and perceive that these videos help them learn anatomy[5,6]. Neuroanatomy is a subset of gross anatomy that many students need help with to learn effectively. Recognising this problem, Dr Scott Border and Dr Andrew Lowry from the University of Southampton, established the YouTube Channel "Soton Brain Hub"[7]. Soton Brain Hub hosts a collection of more than 75 neuroanatomy videos and boasts more than 2,800 subscribers.

The use of videos in anatomy education has yielded positive findings. Studies of first-year medical students have revealed that using anatomy videos at least once significantly improved anatomy examination performance[8,9]. The videos used in these studies covered anatomy of the thorax and abdomen. The effect of students using neuroanatomy videos on anatomy examination performance has not been reported.

Our research question: Does supplementing a neuroanatomy module with Soton Brain Hub YouTube videos improve student outcomes?

Our aim: To measure students' self-perceived learning and performance on a summative neuroanatomy test.

MATERIAL & METHODS

Timing of study	August 2015 & August 2016
Field of study	Tertiary anatomy education
Number of participants	2015: 49 of 58 (84%) of students enrolled in 2nd year anatomy. 2016: 54 of 82 (66%) of students enrolled in 2nd year anatomy.
Excluded participants	2015: n=9 did not complete consent form/survey 2016: n=28 did not complete consent form/survey
Historical control group	2015 cohort: 22 males, 27 females (mean age: 22± 5 years old) Mean ± SD pre-requisite unit score: 66 ± 9%
Experimental group	2016 cohort: 20 males, 34 females (mean age: 22± 4 years old) Mean ± SD pre-requisite unit score: 64 ± 8%
Ethics approval	Approved by Murdoch University Human Ethics and Research Committee. Project numbers: 2015/113 & 2016/143.
Intervention	Type: Students requested to watch 15 neuroanatomy videos produced by Soton Brain Hub on YouTube. Duration: 3 weeks.
Quantitative assessment	Type: 40-question summative neuroanatomy test with 15/40 questions same in 2015 & 2016 to allow comparison. Timing: Week 4 of Semester 2, 2016
Qualitative assessment	Type: 3 closed-ended survey questions Timing: 4 weeks post-test
Statistical analysis	tTest to compare mean grades between 2015 & 2016; linear regression to test for association between perceptions and use of YouTube neuroanatomy videos and neuroanatomy test scores.

RESULTS

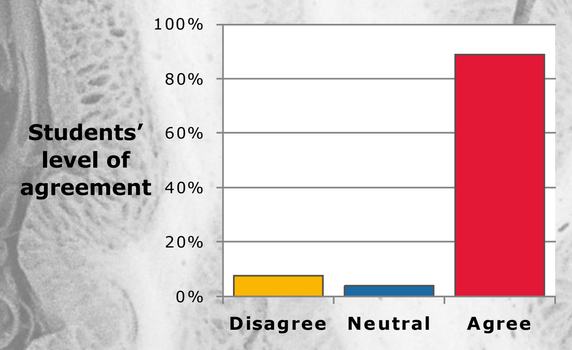


Figure 1. Students' (2016 cohort) level of agreement that watching YouTube videos improved their understanding of neuroanatomy.

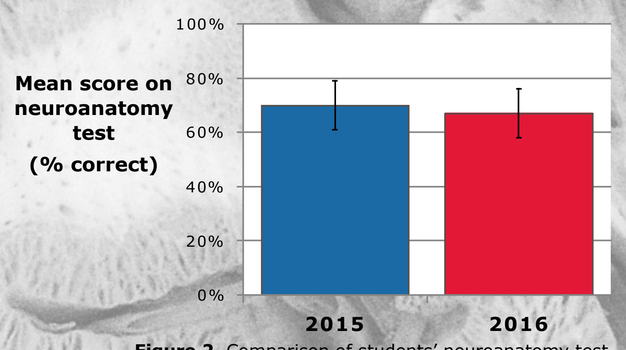
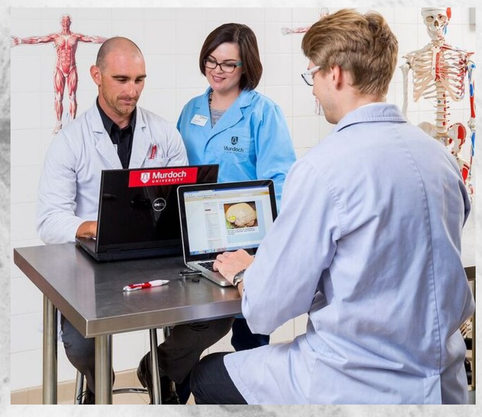


Figure 2. Comparison of students' neuroanatomy test scores in 2015 (not asked to watch YouTube) & 2016 (asked to watch 15 YouTube neuroanatomy videos by Soton Brain Hub).



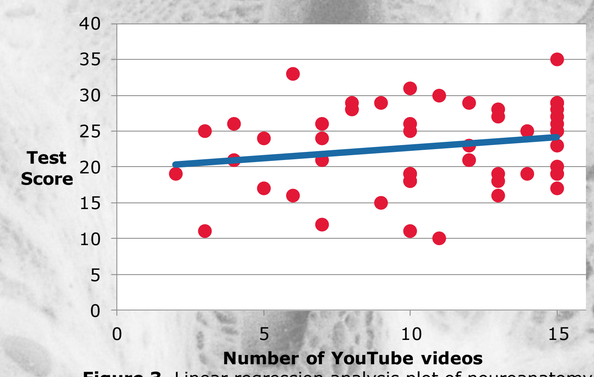


Figure 3. Linear regression analysis plot of neuroanatomy test score and number of Soton Brain Hub videos watched

Kirkpatrick's Hierarchy	Results
Level 1: Reaction *Did they like it?*	89% of 2016 cohort reported they felt that watching the Soton Brain Hub YouTube videos improved their learning (Figure 1).
Level 2: Learning *Did they learn it?*	Neuroanatomy test scores were not different between 2015 and 2016 cohorts (2015: 70 ± 20%; 2016: 67 ± 16%, p=0.42; Figure 2).
Level 3: Behaviour *Did they use it?*	Number of YouTube videos watched: 10 ± 4 out of 15. Number of times each video watched: 2.4 ± 1.6 times.
Level 4: Results *Did it affect results?*	Neuroanatomy test scores were not related to the number of videos watched (β=-0.003, 95% CI: -0.986 to 0.980, p=0.10; Figure 3) or students' perceptions that the videos improved their learning (β = 1.86, 95% CI: -1.23 to 4.95, p=0.234).

DISCUSSION

This is the first study to investigate whether supplementing a neuroanatomy module with YouTube videos affected students' grades on a neuroanatomy test, or their self-perceived learning. We found that although a majority of students believed that the Soton Brain Hub videos improved their learning of neuroanatomy, it did not improve the 2016 student performance above the levels of 2015 students.

Previous studies that demonstrated a significant improvement in students' anatomy examination performance after the addition of videos did not include neuroanatomy. These earlier studies included gross anatomy videos of the thorax and abdomen which are considered less cognitively overwhelming than neuroanatomy[8,9]. The Soton Brain Hub videos are high quality, accurate and at the right cognitive level for our neuroanatomy syllabus. Therefore we suspect that watching videos out of class may not be engaging students adequately in their studies.

We recommend that if educators are going to use videos in their blended learning, they should make the experience highly interactive to encourage deeper learning. Watching and discussing the videos in class, or interrupting videos with short quizzes to test learning may be useful strategies to accomplish this task.

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