To integrate or not to integrate?

A study of the educational efficacy of an integrated embryology and gross anatomy online resource for dental students

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Abstract

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Background & Rationale

Many health professional programs now offer integrated curriculum and increasingly rely on asynchronous online resources. Most online resources are subject specific. There are few studies reporting the educational efficacy of integrated content comparison presented to stand alone content in a digital resource

Research Question: Does integration of embryology in an anatomy of the cranial nerve digital tutorial lead to better learning outcome than a stand-alone anatomy tutorial in dental students?

Materials & Methods

Digital Resources
Two digital tutorials were created on cranial nerve anatomy. Both contained the identical anatomy content, but the experimental tutorial included the additional embryology content relevant to cranial nerve anatomy (Figure 1).

Study Design
Randomized single-blind study was conducted with the 1st and 2nd year dental students (Figure 2).

Data Analyses
- ANOVA and Tukey Honest Significant Difference (HSD) tests were used to analyze quantitative quiz and survey data.
- Thematic analyses was performed to identify common themes in the open comments.

Results

Learning Outcomes
- All study participant groups significantly improved the post test scores (Figure 3) (ANOVA (F (2, 161) = 3.20, p < 0.05, partial h2 = 0.03)).
- There was no significant difference in the post test improvement between the experimental and the control groups (Figure 3) (interaction: F(2, 157) = 2.79, p = 0.06)
- The post test improvement was significantly higher in the 1st year Dental students (D1) compared to the 2nd year Dental students (D2) (Figure 4) (main cohort effect: F(1,2) = 4.88, p < 0.05, partial h2 = 0.06, Tukey HSD, p < 0.05)

Survey Results
- Students perceived that they had learned from the tutorials. (Figure 4)
- D1’s perception of their learning was significantly higher than the D2 ratings (Tukey HSD, p < 0.05) (Figure 4)
- Self reported confidence level in cranial nerve anatomy after viewing the tutorial increased significantly in all cohorts. ANOVA, F(1, 139) = 159.53, partial h2 = 0.54. (Figure 5)
- No other significant differences in quantitative survey responses were noted. Main effect group: F(1, 2) = 0.22, p = 0.64

Conclusions and Discussion

• The integrated content had no effect on student learning contrary to expectations
• The 1st year dental students’ quiz scores improved more than the 2nd year students on quiz scores as well as perception of learning
• Studies such as this could contribute to more conclusive results with more time, study participants, and broader material
• This study demonstrates that integrated content does not harm student learning
• There are effective ways of teaching anatomy through online resources, and this can be utilized to study effects of integrated content.

References & Acknowledgements

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Figures:

- Figure 1: The tutorial sample title slide for the A) control resource containing only anatomy content and the B) experimental resource containing both anatomy and embryology content (Cranial Nerve image source: https://sketchfab.com/3d
- Figure 2: Study Design flow chart
- Figure 3: Average Pre and Post Quiz Scores
- Figure 4: Pre and post score improvement
- Figure 5: Average Perceived Learning
- Figure 6: Average Confidence in Cranial Nerve Anatomy
- Figure 7: Students’ comments on strength of the video and areas the video could be improved