The Impact of Virtual Dissection on Engineering Student Learning and Self-Efficacy

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Christine Toh, Connor Disco, & Dr. Scarlett Miller

**Background and Motivation**

Product dissection activities are widely practiced in engineering education and recent efforts have sought to develop and utilize virtual dissection tools, little data exists on how these tools impact the learning process. Therefore, this study investigates the impact of virtual dissection on student learning and self-efficacy to understand the effects of virtual dissection tools for enhancing engineering instruction.

**20 first year engineering students** were assessed for learning and self-efficacy before and after a dissection activity, consisting of 4 conditions.

**Experimental Design and Methodology**

Two independent raters judged the pre- and post-test student learning assessment results.

**Results and Conclusion**

**Student Learning**

A 2-way repeated measures MANOVA: $F(4, 13) = 2.35, p > 0.11$; Wilk's $\Lambda = 0.58$.

Students were learning through dissection, but **no significant difference was found between the physical and virtual dissection** conditions.

**Student Self-Efficacy Gains**

A 2-way repeated measures MANCOVA: $F(10,5) = 5.91, p > 0.03$; Wilk's $\Lambda = 0.08$.

There was a **significant difference in self-efficacy** between the physical and virtual dissection conditions. (gender and semester standing as covariates)

**Conclusion**

Virtual dissection results in the same student learning as physical dissection, but increases in self-efficacy are reduced in students who perform virtual dissection. Future research should focus on the development of more interactive virtual dissection interfaces in order to refine and enhance virtual dissection environments in engineering education.

- Physical dissection results in **greater self-efficacy gains** in engineering students compared to virtual dissection.
- **Gender and semester** standing play a role in self-efficacy gains from dissection activities.