Unpacking the Effectiveness of Flipped Classroom: Positive Learning Outcomes but Evaluation Fallouts from Flipping the Embryology Curriculum in an Integrated Medical Gross Anatomy Course

Introduction

Flipped classroom (FC) is a pedagogical innovation with increasingly broad adoption among medical schools. However, the effectiveness of this pedagogy is poorly understood beyond student satisfaction and exam scores, which limit understanding of *what designs* work *for whom* in educational innovations.

Methods

This mixed-methods, retrospective study engaged the theoretical lens of layered analysis for a Fall 2019 (n=184) FC implementation. This IRB-approved study sought to understand the learning experience and outcomes for FC that entailed pre-work videos and quizzes, where quiz results guided in-class, custom interactive sessions. Results were compared to 2018 cohort (n=184), which received identical content in a didactic format, using item-response theory and instructor ratings using t-tests. Results were triangulated with qualitative deductive analysis of open-ended responses on an optional end-of-course survey and required lecturer evaluations to assess student learning experience.

Results

The 2019, flipped-classroom cohort demonstrated higher average embryology ability levels on all four exams, compared to the 2018 cohort. The 2019 cohort significantly outperformed the 2018 cohort on the 2nd ($P < .01$) of three interim exams and the comprehensive final ($P < .05$).

Layered analysis allowed identification of specific educational design elements impacting learning. Students perceived the pre-work videos positively and the instructor to be experienced and expert. Video content was too deep and in-class events needed more sequential ordering of content to foster learning.

Conclusions

As more schools continue to move toward implementation of novel teaching methodologies, emphasis should be placed on providing effective introduction to and rational for change to the new curricula.