Employing the Flipped Classroom Model in an Upper Division Civil Engineering Course

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This work evaluates the success of a Flipped Classroom Model in an upper division soil mechanics course in the Civil and Environmental Engineering Department at San Jose State University (SJSU). A 4.5-week segment of the 16-week course employed the Flipped Classroom Model, which consisted of brief videos to be watched prior to attending class that contained the key information to learn, followed by collaborative activities completed in the classroom during scheduled class times that covered application of the key information.

Student enthusiasm for the Flipped Classroom Model, based on a brief yes/no count of students on the first day of class was approximately 40% for and 60% against the model. Many shared preliminary concerns regarding applicability of the videos to the class, excessive time spent watching videos and working through homework outside of class, and the uncertainty of trying an approach that varied from the traditional classroom model.

This preliminary study will compare test scores collected in one semester that had a traditional lecture format to two of those taught with the Flipped Classroom Model. Student satisfaction with the Flipped Classroom Model was also evaluated through results from an online survey during both semesters with the Flipped Classroom Model.

Preliminary results are mixed, with some aspects of student success showing improvement and others showing slight decreases. The results also indicate that the learning gap between successful and unsuccessful students grew with the Flipped Classroom Model. Fewer students received C’s, with approximately one quarter of the ‘C’ students improving their grade to an A or B, approximately one quarter lowering their grade to a D or F, and 50% approximately half remaining in the ‘C’ range. Student satisfaction with the method was varied, with many appreciating the ability to replay the videos to review selected portions, the dedicated time to work with classmates on activities, and the ability to practice problems similar to exam problems in the collaborative learning sessions. Student dissatisfaction stemmed from the self-reported increase in time dedicated to the course, the number of problems assigned during the collaborative activities and lack of quality in the videos.

Based on the preliminary data collected, the Flipped Classroom Model has many advantages to the traditional lecture format and shows the potential for improving overall student success. The data also indicates that there is improvement that can be done to the course that will enhance student learning, including adding more videos that demonstrate examples, improving video quality and adjusting the collaborative activities.