

Flipped Class in an English Medium Instruction Single Variable Calculus Course

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Abstract

In this article, we share an experience in teaching a basic undergraduate mathematics course of Single Variable Calculus by flipping the class. A theoretical framework for this stands on two main pillars of the English-medium instruction and the inverted revised Bloom's taxonomy. Within these frameworks, we attempt to create an atmosphere to assist our students for flipped class activities and to prepare them towards flipped learning environment. There are pros and cons of adopting English-medium instruction because the majority of our students are non-native English speakers and they find following classes in English is relatively hard. Encouraging our students to be active learners by fostering participation in class activities is particularly challenging due to the strong influence of Confucianism in society's culture that pupils should keep quiet and listen to the instructor. As instructors, we attempt to reverse the learning process in the revised Bloom's taxonomy. In the traditional classroom setting, the relatively easy steps at the bottom levels of the Bloom's taxonomy pyramid are acquired in the classroom while more difficult processes at the higher levels of the pyramid are acquired outside the classroom. Thus, when the students are truly in need of assistance from their instructors, they are left on their own instead. This can cause frustration for many students who are unable to complete homework on their own, without receiving help from peers or instructors. By flipping the class, the relatively easier process of acquiring the basic knowledge of the material can be delegated to the students themselves outside the class where they do not really need assistance from us. The more difficult tasks, including doing homework and problem-solving activities can be done in the class where instructors and peers are present and thus the students can get an instant help when they need. There are a number of ways to flip the class, one effective way involved assigning recorded video lectures to the students that should be viewed at home before in-class sessions. The video recordings utilized include both self-made videos and readily accessible produced by the *Khan Academy*. We also embed an element of technology in our teaching by introducing of computer algebra system (CAS) *Maxima*. After the implementing this flipped class, a mixed reaction was received. We compare quantitatively four sections of Single Variable Calculus class. Two sections are fully flipped, where one section utilizes self-made videos and the other utilize videos from the *Khan Academy*. One section is partially flipped and another on is unflipped (traditional class). A result of one-way ANOVA ($F(3, 306) = 2.67$, $p\text{-value} = 0.0447 < 0.05$) suggests that there exists a statistically significant difference between the four sections of flipped class for the assessment means. By Tukey's HSD post-hoc test, it was shown that there was a significant difference between the section with fully-flipped, self-made videos and the section with partially flipped. On the other hand, for the letter grade means, no statistically significant difference occurred across the four sections, as determined by one-way ANOVA ($F(3, 306) = 2.19$, $p\text{-value} = 0.0892 > 0.05$).