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A Practical Study of Using Mathematic History in Flipped Classroom

Abstract

Flipping classroom is a new teaching mode coming from America and changing the traditional teaching mode. Students watch the teaching video produced by their teacher and do some exercises before going to the class. In class, the teacher uses some exercises to test whether students understood the knowledge in the video they have watched, and if they still have some problems, the teacher helps them to master and understand this knowledge. On the other hand, in traditional classes, students learn the knowledge in class and internalize it after class with the help of some exercises. Flipping classroom interchanges the two stages: Students acquire knowledge before classes by themselves using the teaching video, and internalize this knowledge in the class.

In China, the practice of using a flipping classroom mode began in 2011 and many primary and secondary schools are currently using it. It has become a much discussed issue in China, since there are many problems in applying the flipping classroom mode. For instance, teachers just let students doing much more difficulty exercises in classes; some teachers are confused and think that students have learned the knowledge before coming to the class, and therefore, they think that the only thing they can do in the classroom is to do more exercises.

We believe that the integration of the history of mathematics is a good way to solve these problems. In this context, we started a study in a junior middle school in Shanghai. It is a private junior high school, in which all students have a good level of self-study ability. The school has used flipping classrooms for three years. All teachers in the school are able to make micro-video.

The lesson “the Midsegment of a Triangle” is our example to study the use of the history of mathematics in a flipping classroom. Before the class, the teacher produces a micro-video to introduce the definition of the midsegment of a triangle and its basic property, and she gives a way to prove this property that comes from the textbook. Then she gives as homework to students: are there other ways to prove the property? In the class students first give feedback based on the micro-video and share the other methods they have thought. Subsequently, the teacher guides students to use the median of the triangle in order to make different small triangles in the big triangle to prove the property (Fig.1). After a five minute discussion in groups, students share their way to prove (Fig. 2). The way they used is the same with the method of Euclid. Then, the teacher uses another video to show that in order to prove the property we can use the method of calculating the area of a triangle in the “Nine Chapters”, which was given by Liu Hui in China (Fig. 3). Finally, they do some exercises to remember the property.

After class, the questionnaire indicates that students are very interested in this lesson, can understand the historical material used, and get to know the mathematical idea of transformation. They are impressed by the figure-rearrangement method of Liu Hui, and admire the wisdom of the ancients.

