Chapter 86

A Method Based on Self–Study Log Information for Improving Effectiveness of Classroom Component in Flipped Classroom Approach

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ABSTRACT

The flipped classroom approach has recently begun to attract attention. In a flipped classroom, the conventional roles of classroom and homework are reversed: students study on their own using digital teaching materials or e-learning prior to class and then apply their learning in classroom activities. The authors have developed a method for improving the effectiveness of the classroom component: the students in a class are grouped on the basis of the time they spent studying (as recorded in their self-study logs) and their degree of understanding (as revealed by a self-study achievement test), and a different learning model is used for each group to improve their degree of understanding. Although they were unable to find a meaningful statistical difference in the test scores obtained in an experiment using one class of 34 students, there was a notable difference in the way questions were answered. The results of a free-description questionnaire indicate that the group learning encourages active learning.

INTRODUCTION

Conventionally, university students attend classroom lectures to gain knowledge and then as homework study textbooks and write and revise reports to deepen their understanding. A new paradigm that is attracting attention is the flipped classroom approach. As shown in Figure 1, in this approach, the roles of the classroom and homework are reversed: students study on their own by using digital teaching materials or e-learning (self-study) prior to class and then apply what they learned in classroom activities (Shigeta, 2014).

The importance of learning outside the classroom is widely recognized. The Japanese Ministry of Education, Culture, Sports, Science and Technology instructs universities to encourage students to study outside the classroom and to include in their syllabi the recommended material and time for self-study.

In addition, Umezawa et al. developed and produced prototype electronic teaching materials tentatively called "Introduction to Computers." We demonstrated them in classrooms and conducted trial evaluations (Umezawa et al., 2013b, 2013c, 2014).

We have now developed a method for improving the effectiveness of the classroom component in the flipped classroom approach: the students in a class are grouped on the basis of the time they spent studying before class (as recorded in their self-study logs) and their degree of understanding (as revealed by a self-study achievement test), and a different learning model is used for each group to improve their degree of understanding.

In Section 2, we describe the objectives and effects of the flipped classroom and related work. In Section 3, we describe how the self-study logs are collected, and in Section 4 we explain the details of the proposed method. In Section 5, we describe the details of our experiment. Specifically, we describe a learning method using Moodle (Learning Management System) for self-study, the contents of the self-study, and the self-study achievement test. We present the results of the experiment in Section 6 and discuss them in Section 7. Section 8 summarizes the key points and mentions future work.

Figure 1. Illustration of flipped classroom
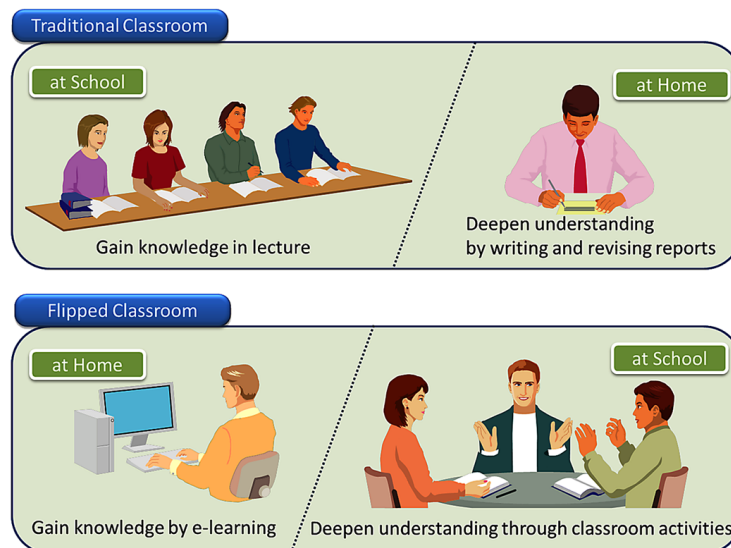
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