Flipped Learning in the middle school math class

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Abstract. Flipped Learning which provides lectures through video(in advance) and promotes preparation at home is an innovative method that reverses the traditional teaching method such as after school homework. This study has applied flipped learning method to 7th grade math class for a period of a month. Students were provided with public education videos as prior learning material, and mini-lectures, quizzes, group discussions, individual activities such as work sheets were given during class. Results show the number of videos watched has positive relationship with academic achievement.

Keywords: Flipped Learning, math class, pre-class video, achievement

1 Introduction

When talking of recent issues of education, students’ ‘lack of self-initiative’, ‘lack of responsibility’, ‘addiction to smart phones, computers and etc.’ are often mentioned. By Understanding the characteristics of the learners living in todays ‘smart environment’ and using such environment to solve problems, flipped learning emerged as an innovative teaching method. Flipped learning was first used by chemistry teacher Bergman and Aaron Sam; as a way to supplement the deficiency of class which Athletic students suffered. As the effectiveness of it got known it spread to other subjects. In Korea it became known as few universities started applying it [1]. In particular, the UNIST of Ulsan based around the CTL is trying to enhance quality of education (student), productivity of professor (professor), and reduce cost through e-Education (school). As a way of achieving such goal, the university is promoting flipped learning based redesigning of current curriculums. The background of such business propulsion is due to rising demands on DIY method and importance of application rather than knowledge transfer [2]. On elementary and middle school level, through 2014/3 KBS Panorama (Flipped classroom) such method was widely shown, and before such broadcast in few school at Busan Yong-Su elementary school, Inchon Simgok elementary school flipped learning based lectures were given but its effects negligible [3]. How to build the content of the flip-de-learning is largely divided into three types [2]. First, it is using a commercially produced material. Second, public
education materials: that leverage (OER Open Educational Resources), OCW, MOOC, YouTube, and iTunes U. round use. Third, the data(video) that are directly produced by instructors. This study was designed as a flipped learning class with public education materials. The purpose of the study is to see the relationship between students' academic achievement and voluntary participation with watching movies at home, and in class participation with academic achievement.

2 Flipped learning class practices in schools

2.1 Cases of primary and secondary schools

The most representative example of the flipped Learning is a US state of Colorado Woodland Park High School. This flipped learning began as an attempt by School chemistry teacher Jonathan Bergman and Aaron Sam to change typical classroom lecture. After the flipped learning class students’ academic achievement had improved. In addition, the interaction between teachers and students were promoted, more intimate relationship was formed, and the positive effect on students' individual learning ability was verified [4]. Aaron Sam’s flipped learning based AP chemistry course take steps as follows: First, students view video lectures on the next lesson (pre-class, videos are directly made or also even made by other teachers.) watched from the house the day before. The next day when class begins time for questions and answers (10 minutes) are given. Students are then given similar exercise questions. While the teacher solves few exemplary problems, students are given chance to remind the lecture video they’ve seen. Then are given chance to ask question. The rest of the time will be used as individual studying time. If the class is an experiment there will be no video will be provided and preparation assignment will be given. Flipped Mastery Learning to extend the concept to the introduction of the claimed individual study focused on the level and speed of the individual [4]. Dale Clinton, Michigan, USA (Clintondale) High School has flipped learning applied in all subjects. As a result of overall improvement in academic achievement, the graduation ratio has reason from 80 to 90 percent. [6]. In Busan Yong-Su elementary school flipped learning was done through teacher produced screencast, Cyber Home Learning, EBS, e-books etc. (For students who haven’t the chance to watch the video were given one during lunch time.) For supplementary classes, screencasts of explanations and solutions on the topic were made and given through class SNS. Flipped learning showed effectiveness for managing poor achieving students and resulted in students participating in class with enthusiasm and teaching each other [3]. Jung Min (2014) as a result of applying flipped learning in 6th grade math class (ratio concept), attitudes toward mathematics were higher than in the traditional classroom. However, the achievement was not significantly different between the two groups. Thus, even though the class which is applied with flipped learning has found a lot of positive effects, it does not necessarily mean it’s effective.
2.2. Features of the flipped Learning

Flipped learning class represents a big difference in some respects when compared to the traditional class ([5], [7]). First, academic activities done in school and home are reversed. The learning of new information, which got done in classrooms traditionally, now gets done at home. Also which used to be homework is now done in classrooms. Second, students who used to be passive listeners turn into active learners responsible for their own learning. The role of the teacher changes from a mere knowledge transferer to a coach; therefore is highlighting the role of facilitating and guiding the learning of students. Third, a change in the content of the lesson exists.

3 Method

The study was conducted for Gangwon Province K-woman middle school 7th grade class of 30 people. These students were only into two weeks of study at middle school. Students were familiar with the traditional lecture class, and no prior experience with the flipped learning classes. Students had the experience of EBS lectures and YouTube use. 7th grade math lesson on integers and rational numbers was carried out for one month with flipped learning. The classes were divided into 6 groups and students (of varying grades) were equally distributed based on the results of assessment grade. Classes were mainly achieved by six groups each consisting of 4 to 5 students. In addition to work sheet (group), quizzes, and personal work sheet which enabled self-directed learning were given. Six pre-lecture videos which were provided were lesson material published in Gangwon Edu World (http://ngcc.gweduone.net/).

For student management, LMS system of Gangwon Edu World was used. This system shows the number of video learning, learning time, and the progress rate.

4 Results & Discussion

4.1. Relationship between pre-class study and achievement

Students are supposed to watch the videos at home, but if not were made to watch them before class. However, the researcher felt the need to emphasize the importance of voluntary viewing of the videos at home. As a result, correlation between the frequency of video watching (pre- class) and the grades of midterm test are studied. Correlation coefficients of the between two is $r = 0.68$ (excluding missing data: Midterm / viewing times: 95.4 / 1 time, 74 points / US viewing, 53.6 points / 6). It
shows that home learning to voluntarily (video learning) is positive effect on the students achievement.

4.2. Achievement of the midterm exam and in class

Various tests were conducted during group activities and of those tests, comparison between in class tests and mid-term tests have been done. The purpose of such comparison is to determine whether one can predict student’s performance. The mid-term test was made by other teachers (not the lecturer) for such specific reason. For In-class test result 2nd and 5th test’s average was used. And the correlation rate showed 0.83($r=0.83$). Such achievement analysis shows not only the importance of ‘just’ watching videos in flipped learning but also voluntary enthusiastic participation of the student itself. Making sure students voluntary participate in video based learning at home and providing tools and questionnaires to self-check their progress is needed, Also in-class activity has a close relationship with student achievement

References