Introduction

Didactic teaching is one of the prominent methods applied to large class teaching. However, the biggest problem is that it fails to allow close tutorial guidance, reducing opportunities for interactive learning. To address this problem, a new teaching method called “flipped classroom” can be used. The teaching method of “flipped classroom” inspires teachers to efficiently facilitate the interactive dynamics of students, rather than depend on the traditional teaching method of lecturing through video records and slide shows (Sams & Bergmann, 2013). Teachers would be able to give command to individual students who encounter learning difficulties in class, while other students could work independently on the contents that demand simple reasoning and memory. Students can carry out the aim of study only when they analyze, speculate, and explore problems independently to obtain options or alternative answers to questions. Through this new teaching method, teachers can guide students to progress steadily, because self-study and the attitude of independence are primary to the motivation for research and creativity. Owing to the rapid development of network techniques in recent years, many multimedia teaching platforms, such as Moodle, have been in use. Moodle, which was constructed on a Course Management System (CMS) to encourage e-learning, offers students’ opportunities for online group discussion and self-examination, while providing teachers with information on students’ learning processes and opinions. The application of Moodle as a learning platform improves educational interaction and aids teachers realize students’ personal aptitudes and academic achievements to improve teaching quality and efficiency. This study aims to explore the influence of experimental instruction on learning attitudes and mathematics performances. In addition, based on different genders and abilities may show variations in students’ learning attitudes and mathematics performances.

Literature Review

Flipped Learning

Flipped learning, which is more commonly referred to as “the flipped classroom”, is a growing teaching trend. In flipped learning, active and intentional transfer of some of the information delivery to outside of the classroom with the goal of freeing up

time to make better use of the face-to-face interaction in school (Bennett et al., 2012). This is often done with teacher created online videos (also referred to as screencasts or vodcasts). All students can rewatch the video as needed. This frees more class time for data collection, collaboration, and application. Learners have immediate and easy access to any topic when they need it, leaving the teacher with more opportunities to expand on higher order thinking skills and enrichment.

Time becomes available for students to collaborate with peers, engage more deeply with content, and receive immediate feedback from their instructor (Hamden, McKnight, McKnight, & Arfstrom, 2013). The most important feature of the flipped class model is to increase teacher to student and student to student interaction during class time.

Moodle Learning Platform

Moodle is a free educational web application designed for e-learning (Dougiamas, 1998; Wu, 2008). Moodle includes flexible features including the layout, course management, assessment strategy quizzes, and cooperative learning (Wu, 2008). Using the functional modules of the Moodle learning platform, teachers can guide interactive activities for online group discussion, examinations, and assessments. It provides a means to collect students' opinions and information on their learning process and helps teachers understand students' personal aptitudes and academic achievements to enhance teaching quality and efficiency.

Owing to greater flexibility with respect to location and timing, computer-assisted teaching methods have developed and changed the traditional in-class teaching style whereby students unilaterally gain knowledge from teachers. Combining scientific technology with education creates interactive discussions not only between the teachers and students but also between the students, thus making the learning process active, multi-faceted, and flexible; enriching learning quality; and motivating the students to engage in self-directed and responsible learning. Students become active learners, rather than knowledge receivers (Baillie & Percoco, 2000; Chen, Lou, & Luo, 2001). Moodle had pedagogical advantages since it was built in accordance with the teaching approach which emphasizes the construction of knowledge through active and interactive learning, and learning multi-sensory experience through multimedia. The design of Moodle was based on socio-constructivist pedagogy (Brandl, 2005; Palincsar, 1998; Shachar & Neumann,