

## Chapter 46

# The Effects of Problem-Based Learning with Flipped Classroom on Elementary Students' Computing Skills: A Case Study of the Production of Ebooks

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### **ABSTRACT**

*This study investigated, via quasi-experiments, the effects of problem-based learning with flipped classroom (FPBL) on the development of students' learning performance. In this study, 144 elementary school students were selected from six grade sections taking a course titled 'Production of Ebook', and were assigned into the following three groups: FPBL group (n = 50), PBL group (n = 48), Control group (n = 46). The authors collected both quantitative and qualitative data, including interviews with students and teacher's journal. Based on the analysis in this study, it is found that the effect of FPBL on improving students' learning performance was significantly higher than other teaching methods investigated. This research provides an innovative design and illustration of PBL for teachers, educators, and schools which pay attention to enhancing students' learning performance.*

## **INTRODUCTION**

In this age of digital technology, students have more opportunities for contact with digital electronic products, including personal computers, tablet computers, and smart phones. The functions of these products include rich video and audio effects, various software applications, and Internet connections. With the popularization of Internet access, increase in bandwidth, and applications of cloud technology, there are numerous opportunities for students to use various Internet applications. Recently, it was found that an average student who graduated from a university in the U.S. has spent less than 5000 hours on studying but over 10,000 hours on computer games, email, and social networking sites (Deshpande & Huang, 2011). Moreover, online learning is increasingly common in recent years (King, 2008). Other research indicates that 65% of higher educational institutions offer courses with Internet access for students to study, and as many as 63% offer university-level online learning courses (Allen & Seaman, 2013).

Accordingly, the researchers in this study discussed this topic with some teachers teaching computing courses in elementary schools and found that students are highly interested in the content of the computer courses at school. Yet, after observing how students use computers after school, it was found that most of them simply go online to play games or browse social networking sites. Unfortunately, that type of usage of computers and networks is not for learning or practicing what they have learned in computing courses.

On the positive side, with the development of the Internet technology, there are many applications and more feasible opportunities for online learning. Flipped classroom is one such innovative teaching model. Traditionally, a teacher teaches in a classroom and her/his students go home to do their homework. Teaching in a flipped classroom offers students a video of the course content so that they can study in advance. Then, students perform

and join learning activities such as practice and group discussions in the traditional classroom environment (Herreid & Schiller, 2013). The change in time and space of teaching helps to improve teacher-student interactions and discussion in the classroom (Miller, 2012). The idea of flipped classrooms is a popular topic in education reform and innovation. According to the report of a survey regarding flipped classroom by Classroom Window in June 2012, 67% of teachers believed that their students' learning effects were improved with the flipped classroom model, and 80% of teachers indicated that their students' learning attitudes were improved. Furthermore, 99% of the interviewed teachers would continue using the flipped classroom model next year (Francl, 2014). The advantages of flipped classroom include offering students a more diversified learning method, increasing in-class discussions and interactions, and achieving individual learning based on each student's competence (Herreid & Schiller, 2013). Therefore, this study aimed to apply the flipped classroom model in a computer course to explore the beneficial effects of this model on students' computing skills.

One of the authors in this study is a computing teacher in an elementary school. Based on the authors' reflections and teaching experience, it is found that students experience a disconnect with their learning in computing courses. In Taiwan, elementary school students are required to take computing courses; however, after students learn to use computer software, they still cannot apply it in their daily lives. They rarely have experience in solving a real problem with a computer (Lee, Shen, & Tsai, 2008). Problems in real life are much more complex than those in text books. Thus, students' learning must be connected to field experiences and their ability to solve problems should be improved via critical thinking (Chan & Ho, 2014). It is indicated that teachers' adoption of problem-based learning (PBL) and teaching design for students' learning activities is helpful for students' learning through problem-solving

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