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FLIPPED CLASSROOM TEACHING METHODS: A SURVEY

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ABSTRACT

The traditional teaching methods have been utilizing for years. The strategies need to be improved to be able to adapt with current knowledge and also the students. Flipped classroom is fairly new in the teaching field as a strategy for teaching. As with most strategies, the flipped classroom has a variety of ways to implement not only for students but also the instructors. In this paper, we introduce and analyze the methods being used as new teaching methods in schools. We review and provide research on the implementation of the flipped classroom. We also provide some results of applying the flipped classroom methods and explain them to clarify advantages and disadvantages of the strategies.

INTRODUCTION

In recent years, the educational paradigm has shifted from teacher instruction mode to student-centered learning. Based on this kind of innovation, more technologies have been integrated into the educational scene, and multiple learning modes have provided students with various ways of learning. Among the various learning modes, the “flipped classroom” is regarded as a potential and extraordinary learning method that engages students in applying their learning knowledge and conducting higher order thinking, rather than receiving direct teaching instruction (Davies, Dean, & Ball, 2013; Flumerfelt & Green, 2013).

The term “flipped classroom” represents the learning approach that exchanges the time used to deliver basic knowledge in class and the out-of-class time for applying the knowledge or doing homework (Bergmann & Sams, 2012); that is, teachers are able to engage students in more learning activities for applying the knowledge they have learned through practicing, doing projects, discussion, and solving problems in class (Missildine, Fountain, Summers, & Gosselin, 2013), as shown in Fig. 1. The materials for out-of-class learning, which could be instructional videos, web-based tutorials or other forms of courseware, are mainly related to the knowledge levels of remembering and understanding (Baker, 2000; Mason et al., 2013; Rahman et al., 2014). In the flipped classroom, students are able to take control of their own learning pace, and be responsible for their own learning process. On the other hand, class time is freed up so that teachers can develop meaningful activities to stimulate the students to engage in higher order thinking (Kim, Kim, Khera, & Getman, 2014). To sum up, there are four advantages that the flipped classroom can provide: active learning, cultivating students’ learning attitudes, favorable use of class time, and putting emphasis on students’ learning status and solving students’ personal problems (Bergmann & Sams, 2012; Gaughan, 2014). Scholars have further indicated that, to successfully adopt flipped learning, teachers must have strong teaching beliefs and put a great deal of effort into guiding students to understand the real meaning of the learning content (Bergmann & Sams, 2012; Hwang, Lai, & Wang, 2015).

Another important element of the flipped classroom is learner presence, which represents students’ performance of their self-efficacy and self-regulation (Bloom, Kurian, Chua, Goh, & Lien, 2013). Several researchers have indicated that students’ learner presence intention is associated with their learning performance and the strategies they use (Kim et al., 2014; Shea & Bidjerano, 2012). For example, in the out-of-class learning mode, there is plenty of information on the Internet, some of which can encourage students to learn, while some might influence students’ concentration. In this situation, how students utilize the resources and what strategies they apply in learning are important (Rahimi, van den Berg, & Veen, 2015; Rosario et al., 2015). If students exhibit better self-regulation, they might effectively explore and learn the learning materials without being affected by other unrelated content (Liu, Lan, & Ho, 2014). Conversely, students with lower self-regulation might learn little before class, which could affect their performance in the in-class learning. Worst of all, they may be unable to engage at all in the class activities (Margolis & McCabe, 2003; Rahman et al., 2015). That is to say, students’ out-of-class learning performance plays an important role when students and teachers conduct their in-class activities (Mason et al., 2013). Hence, how students perform their self-regulation is regarded as a critical issue in students’ flipped learning performance (McLaughlin et al., 2013), and a mechanism for encouraging students to be self-regulated in learning is essential when conducting flipped learning activities (Sun et al., 2016).

In this research, we provide basic concepts relating to teaching methods, especially flipped classroom. We further review technology tools in the flipped classroom and discuss about some results as impacts on students. Finally, conclusions and future work are mentioned.

AREA OF STUDIES IN THE FLIPPED CLASSROOM

There were many areas of study where the flipped classroom had been implemented during the three years. The analysis of this explored the research question “What areas of flipped classroom studies have been researched?” This study reported that the flipped classroom had been implemented in various areas of study. Morgan (2014) mentioned that many instructors from different fields of study in the United States of America (USA) tried to conduct experiments study in using the flipped classroom approach. Sams and Bergmann (2012) also showed that flipped classroom instruction is not only applied in chemistry and math classes, but also in all areas of study.

Various studies in flipped classroom in 2013, 2014 and 2015 showed different fields of studies, including science and social courses, such as information systems (Davies et al., 2013), chemistry (Baepler et al., 2014), algebra (Love et al., 2014), economics (Roach, 2014), engineering, sociology and humanities (Kim et al., 2014), integrated humanities (Kong, 2014), physiology (Talley & Scherer, 2013), statistics (Touchton, 2015), public health (Simpson & Richards, 2015), calculus (McGivneyBurelle & Xue, 2013), science, technology, engineering, or mathematics (STEM; McLaughlin et al., 2014), business (Warner et al., 2014), and English language (Hung, 2015).

TECHNOLOGY TOOLS IN FLIPPED CLASSROOM

Many different technology tools or online platforms have also been used in flipped classroom research. Hence, this section will answer the research question three “What technology tools or online platforms have been used for implementing the flipped classroom?” In applying the flipped classroom approach, there are various technology tools such as Wikis and Blogs can be employed to interact virtually outside the class and used to work collaboratively to solve problems or exchange ideas. These tools allow the users to share text, pictures, and videos with other users during distance learning (Pempek, Yermolayeva, & Calvert, 2009). This study shows that various technology tools or online platforms have been used by students to access online video or contents before coming to class. The students also used these platform tools to study through online collaboration outside the class.

Staker and Horn (2012) mentioned that the activity of teaching and learning is not only limited to behind the classroom wall, but can also take place outside the class. Therefore, by using various technology media or online platforms, students can study virtually, watch learning subjects for free all the time and interact with students and instructors outside of the class. Here, we share some examples of different online platforms used in the flipped classroom practice. Love et al. (2014) reported that the screencasts were developed specifically in a flipped linear algebra course and the instructor created the presentations using the LaTeX beamer package. Roach (2014) used a Blog as online platform to share the video lectures; students had to access and watch one video per week that was available on a Blog. Hung (2015) used a WebQuest to establish students’ active learning in and English language class. Missildine et al. (2013) reported that 16 master’s-prepared faculty members taught two courses via interactive television on three campuses. While Kim et al. (2014) reported that students in a flipped classroom watched video lectures on YouTube and collaborated on Google Docs and Google Hangout. Table 1 summarizes various technological tools or online platforms have been employed in flipped classroom research.

Table 1: Technological Tools in Flipped Classroom research.

Number	Contents
1	MyITLab videos and software simulation
2	Echo360 Classroom Capture (Echo360 Inc., Dulles, VA), the Sakai Website, Integrated Learning Accelerator Modules (ILAM)
3	Recorded tools, webcam, laptop, tablet device, or mobile phone. Blackboard® Journal page.
4	Online screencasts and LaTeX beamer package
5	Blog, online software (http:// ed.ted.com), video sources adopted

	from: Khan Academy, Freakonomics; NPR: Planet Money; PBS: Idea Channel; Wall Street Journal: Opinion Journal
6	YouTube video, Blackboard LMS , Google Docs, and, Dropbox, Google Hangout
7	A video message board, microphones, large-screen monitors, whiteboards, and wireless.
8	A tablet PC, Online pre-lesson learning and a Web-based word processor (Google Docs)
9	Interactive television
10	Course Website (http://www.jacobenfield.com/allThingsWeb)
11	Course Website (http://www.NextGenU.org)
12	The TI-89 graphing calculator and WeBWork (an online homework system), Maple Worksheets, mathlets, videos, clickers, and e-textbooks.

IMPACTS ON STUDENT'S LEARNING

In this study, the researchers found a number of positive impacts in flipped learning practice: students' achievement, students' motivation, students' engagement, and students' interaction.

Student's motivation. Besides students' achievement or effective learning, students' motivation also played a significant role in implementing the flipped classroom. Motivation is an inner power that pushes humans to take an action or move toward a goal (Harmon-Jones, Harmon-Jones, & Price, 2013). Students' motivation is defined as a spirit, initiative, and willingness of students to attend and learn material (Cole, Field, & Harris, 2004). In education, motivation is acknowledged as one of the most crucial elements which support students' performance and achievement.

The flipped classroom also increases self-perceived knowledge or self-efficacy in independent learning (Galway et al., 2014; Enfield, 2013). McLaughlin et al. (2014) mentioned that the strategy of the flipped learning approach will foster students' motivation in further learning. Their study indicated that the ILAM LMS (Integrated Learning Accelerator Modules) allowed students to learn at their own pace outside the class. In terms of independent learning, McGivney-Burelle and Xue (2013) also noted that students are able to work at their own pace in class.

Students' engagement. The next positive impact is enhancing students' engagement. All researchers probably agree that the aim of flipped learning is to establish students' engagement with active learning. Students' engagement refers to students' active learning or students' desire to actively participate in routine class activity such as submitting homework, listening to the topic, working on what the instructor asks them to do, and actively attending the class (Yang & Cheng, 2014). Likewise, Zepke, Leach and Butler (2009) mentioned that students' engagement resulted from students' motivation.

Students can enhance their engagement in classroom activity, participate in discussions, exchange ideas, and solve problems with their peers (McLaughlin et al., 2013). The use of the flipped classroom also promotes students' empowerment, development, engagement, and critical thinking. The study conducted by Chen et al. (2014) reported that students were satisfied with the class meeting, their attendance of the class was improved, and they had opportunities for active learning rather than listening to long lectures. It showed that the flipped classroom has been successfully practiced to better engage students in learning various subjects. In contrast, the class without flipping or traditional class tends to produce disengaged learning environment because this conventional learning model has some problems.

Students' achievement. Achievement tests can provide an accurate snapshot of how well students are performing on various subjects. The structure of innovative learning environment and pedagogical strategy is the most pivotal factor that will increase student achievement in learning activities (Huang & Chiu, 2015). Therefore, the main goal of the emergence of the flipped classroom in education is to enhance student learning and achievement by focusing class time activities on student understanding and hands-on activities rather than on lecture. Some researchers have implemented the flipped classroom model to examine students' achievement



International Journal OF Engineering Sciences & Management Research

in learning various subjects. The following reports showed that the flipped classroom model has effectively supported students' learning achievements with several motives.

Furthermore, applying flipped classroom model is more effective compared to traditional classroom in term of students' achievement. Beapler et al. (2014) released the results of their research showing that students' outcomes in a flipped classroom were significantly better than those in a conventional classroom or control class, and students' perceptions of the learning environment were also improved. Hung (2015) in her study reported that the structured and semi-structured flip lessons were more effective instructional designs than the non-flip lessons (flip > semi-flip, flip > non-flip, $p < .05$) in teaching the English language. In the same manner, McGivney-Burrelle and Xue (2013) also noticed that flipping pedagogy in calculus was effective and worth the significant investment of faculty time and effort compared to traditional class.

CONCLUSIONS AND FUTURE WORK

This research has clearly demonstrated that the application of flipped learning has altered the culture of students' learning from a lecturer-centered to student-centered, with more class activities belonging to students. We introduce new teaching paradigms as flipped classroom teaching methods. Different fields utilizing the methods are considered. We review technological tools of flipped classroom and also evaluate the impacts of the methods on a field of study. The impacts on students' learning are considered at different points of view. We also suggest that future flipped classroom studies may use a variety of research designs such as experimental research, case study, ethnography, and indeed design and developmental research (DDR) or design based research (DBR). The systematic study of DDR research will produce a variety of models, techniques, and modules of flipped classroom practices. Even more, future studies of flipped classrooms may apply for not only science studies, but also social studies such as foreign language classes, physical education, English, history, drama classes, and humanities.

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International Journal OF Engineering Sciences & Management Research

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International Journal OF Engineering Sciences & Management Research

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