

Is Flipped Classroom Effective on Higher Education for the Case of Economics?

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ABSTRACT

Flipped classroom has received much attention as it might increase learning effectiveness and improve learning outcomes in higher education as well as in elementary, secondary education, and business education. In the author's classes on economics, a blended class constitutes of flipped classroom and lecture, questionnaires and studying data, and outcome data were collected to evaluate the learners' studies and to make a learning analytics system. This paper shows that a flipped classroom promotes the effectiveness of education, but it is difficult to promote active learning such as spontaneous incentives for study in some cases. Class planning and much more investigation are necessary and important.

Introduction

Recently, universities and postgraduate researchers have provided questions about the effectiveness of traditional lecture-based teaching styles (Barr & Tagg, 1995; Moreno & Mayer, 2002). Despite innovations in ICT (information, communication, and technology) enabling new techniques valuable for pedagogy, traditional lectures are still the main and central teaching style. The reason may not be that some educators are not familiar with the ICT. Also, the word active learning has received much attention to promote studying.

On the other hand, many educators have seemed to worry about the complexities of teaching and learning for understanding as opposed to knowledge-based education. An increasing rate of university learners in newly industrializing economies and Japan may be one reason. Educators in universities are struggling to discover new strategies that enable learners to increase the effectiveness and incentives of the learning process. Active learning may be one solution, but introducing active learning may not lead to active study for students.

According to Prince (2014), active learning is an umbrella for pedagogies that focus on student activity and student engagement in the learning process. It enables learners to learn more effectively in learning activities as reading, writing, discussion, or problem solving that promotes analysis, synthesis, and evaluation skills. If the goal of teaching is to engender understanding, educators must move from memorization of knowledge and facts, known as surface learning, to deep learning in which understanding is promoted from active and constructive processes (Kurihara, 2016).

Flipped classrooms have recently been introduced in education. The flipped classroom is a reversed way of traditional teaching in which learners use materials outside of class, such as at home, usually in the form of videos or books, then perform their additional work, such as problem-solving, discussion, or debates, in the classroom (see, for example, Schmidt, Stancy, & Ralph, 2016; Strayer, 2012). Usually, video is used for preparing the class.

Flipped classroom expansion increases opportunities for educators to produce more high-quality online content, so classroom time can be used to engage learners or group learning. Learning management systems (LMS) and some related hardware and software improvements have been enhanced to assist educators to establish these classrooms (Bates, 2005).

As flipped classrooms have received much attention, many studies have begun to be published. Nicholas (2008) estimated that 92.3% of students felt that problem-solving in flipped classrooms is useful. Prensky (2001) and Bergmann and Sams (2012) indicated that learners can develop skills and gain more understanding of the subjects being taught. Fitzpatrick (2012) discovered that flipped classrooms make a student-centered learning environment that increases technology usage and emphasizes collaboration among students. Milman (2012); Steed (2012); and Louhab, Ayoub, and Talea (2018) showed that learners can study at their own pace rather than listen to a video lecture on a subject that they already understand. Learners can view lectures on a PC but also on mobile devices whenever it is convenient to do so. Goodwin and Miller (2013) indicated that most educators who challenged this method found it useful, especially for educators with special needs and for learners in advanced levels. McLaughlin, Griffin, and Davidson (2013) showed that flipped classrooms encourage student empowerment, development, and engagement. Schneider, Wallace, Blikstein, and Pea (2013) indicated that learners who engage in open-ended exploration first demonstrated better performance than those who used traditional textbook materials first. Steen-Utheim and Foldnes (2018) found that students show a more positive learning experience and higher engagement in the flipped classroom than with only traditional lectures.

The peer effect among learners is also expected. Positive learners can participate in classroom activities amid interactions with other learners. Mok (2014) reported the pros of flipped classrooms as learners may develop their opinions by seeing classroom videos as many times as required to prepare for class. Gilboy, Heinerichs, and Pazzaglia (2015) showed that most of the learners who completed the evaluation preferred flipped classrooms compared with traditional pedagogical strategies.

Flipped classrooms should relate to active learning. Active learning classrooms include individual activities, paired activities, informal small groups, and cooperative student projects; however, the classrooms include many group activities such as conceptual mapping, brainstorming, collaborative writing, case-based instruction, cooperative learning, peer work, role-playing, simulation, project-based learning, and peer teaching. Teaching others is sometimes an effective way to learn. Steed (2012) found that moving away from lectures to more active learning methods may be beneficial to student outcomes. Bosch et al. (2008) showed that active learning methods, including collaboration and cooperation on the flipped classroom paradigm, are hallmarks of existing learner-centered teaching methods.

However, Ash (2012) indicated that this method emphasizes an antiquated aspect of lecture. Goodwin and Miller (2013) showed that little rigorous research has been performed when evaluating the effects of this style of pedagogy. Findlay-Thompson and Mombourquette (2013) indicated that learners in flipped classrooms and those participating in traditional lecture classes have the same outcomes. Talbert (2012) showed that pitfalls of the flipped classroom include educators' preparation time, learner resistance to taking on increased responsibilities for learning, and culture shock for learners who are accustomed to lecture-style learning. Atteberry (2013) found that flipped classrooms may not result in any differences in learning outcomes; the study found no grade (outcome) differences in a comparison of the flipped classroom with the two other traditional-lecture style classes. Missildine, Fountain, Summers, and Gosselin (2013) discovered that flipped classrooms can result in improved learning but not necessarily improved learner satisfaction. Strayer (2007, 2012) indicated that learners who participated in flipped classrooms were less satisfied with the learning method than learners in the traditional classroom. Some learners were uncomfortable with group learning activities, and others were accustomed to the traditional

method of doing assignments on their own. Some Japanese students feel the same way. Despite interest in the flipped classroom approach, no robust framework has been provided for the design (Chung, 2018).

A blended class, which is half-flipped and half-lecture classroom, is used in my class. The use of the primary sources includes a bimodal collaborative teaching method as learners collaborate by sharing their thoughts prior to the class, and the beginning of the class incorporates a student-centered collaboration based on the primary sources. One possibility is a blended course that combines face-to-face interaction work with educational content delivery online (Garrison & Kanuka, 2004). This collaborative discussion on the primary sources may serve as the gateway to the meaningful topics discussion (Westermann, 2014). Crews and Butterfield (2014) indicated that the most positive impacts of learning are interaction in class discussions, group problems, and other types of active learning. Van Wyk (2018) revealed that flipped classroom digital pedagogy improved economics students' academic performance and perceptions in an online open distance learning environment. One of the benefits of this alternative approach to flipped learning compared with the traditional classroom is that it relies on a deal of collaboration, but it still allows the use of significant class time for lectures and Socratic discussion, which is a critical element in the classic humanities canon of instruction. Davenport (2018) indicated that flipped classrooms improved students' critical thinking skills. Also, in flipped classrooms, mandated study is emphasized over spontaneous study, so it seems dangerous to rely heavily on a flipped classroom.

In some cases, it seems that mature learners are opposed to the flipped classroom as the other students' attitude are not possible ones. Some students are quite passive. The instructor giving a quiz or checking notes at the start of the class is sometimes efficient and important.

Theoretical Analysis

Considering the above section, one of my classes is conducted with the following syllabus:

Subject: International Financial Markets (2 units)

Theme: International Financial Markets: Theory and Reality

General explanation: International finance includes financial markets, exchange rates, international balance of payments, monetary and fiscal policies under the global economy, and so on. This class focuses on markets in the field of international finance. Theories of international financial markets are the main topic of this class; however, realistic aspects related to these theories are also examined. In every class, real phenomena are checked and discussed.

Goal: Understanding basic theories of international finance and the real conditions of international financial markets

Method of class: Blended class that uses a flipped classroom and lectures. Lectures include peer review, group work, practice by doing group discussion and demonstration, and teaching others. Class will become the place to solve problems, advance concepts, and engage in collaborative learning. Of course, you have to ask and answer many questions in this class for participation. Traditional lectures are provided using Socratic discussion.

Content and schedule:

1. Introduction, guidance
2. Foreign exchange markets: Nominal exchange rate, real exchange rate, foreign exchange markets all over the world, trade volume, globalization of the yen
3. Financial markets: Japanese financial markets, international financial markets, capital flows, commodity markets, theory of intertemporal money allocation
4. Financial institutions 1: Japanese financial institutions, US financial institutions, central bonds and stocks, credit creation
5. Financial institutions 2: Bonds and stocks, price and yield, portfolio theory

6. Exchange rate determination 1: Purchasing power parity theorem, monetary approach
7. Exchange rate determination 2: Uncovered interest parity, covered interest parity, portfolio approach, quiz
8. Monetary system and intervention: History, monetary systems around the world, intervention
9. Financial crisis: Theory of financial crisis, Asian financial crisis, Lehman shock, role of the IMF
10. International balance of payments 1: What is international balance of payments, elasticity approach, J-curve effect?
11. International balance of payments 2: Absorption approach, saving-investment approach, quiz
12. Open macroeconomics 1: Financial and fiscal policy, financial and fiscal policy under open macro economy
13. Open macroeconomics 2: IS-LM analysis
14. Financial derivatives 1: forward/future, option
15. Financial derivatives 2: swap, quiz.

Pre-study and after study: Pre-study is to listen the video and read textbooks. After study is to study materials presented during the class.

Evaluation: Examination: 65%; Quiz: 15%; Report: 10%; class activity: 10%.

Message: (1) If you are not competent in communication skills, never mind. Such skill is not related directly to evaluation. (2) There is some possibility for using a clicker (or your smart device); however, your private information is not necessary to enroll. (3) In every class, at least four newspaper articles are used.

Next, this paper mainly analyzes the effectiveness of the flipped classroom and the effect on the students' ability.

Empirical Analysis

1. Method

The philosophy behind the flipped classroom method may be that it allows all instructors to teach both content and process in the class. My class includes flipped classroom and lecture settings. In both of them, active learning is performed. Learning includes some important step processes including transfer of information, making sense of that information by connecting it to learners' own experiences and organizing the information in the mind, and inspiring continuous (lifelong) learning. Via active learning and lecture, learners may not only increase their studying time but also improve problem-solving and skill development and may gain more understanding of the issues. Online videos and ICT resources help understand the theory ahead of class meetings, and collaborative study fosters deep learning of the theories and enables students to apply the theories to case studies and solve problems.

The following questions were asked of class participants:

- (1) How many times did you use video pre-class per each class?
- (2) Which was more effective: pre- or post-study?
- (3) How long did you listen to the video (minutes)?
- (4) Did it help your understanding?
- (5) Did it change your method and quality of your learning?
- (6) Did it make you challenge spontaneous study?
- (7) Did you feel growth as a learner?

The number of the answers is 112 (three different kinds of classes, 2 universities).

2. Results

The results of Question (4), (5), (6), and (7) are shown in Table 1.

Table 1: Descriptive Statistics

	Question(4)	Question(5)	Question(6)	Question(7)
Average	4.692	4.635	4.281	4.198
Standard error	0.130	0.125	0.234	0.154
Standard deviation	0.789	0.785	0.998	0.705
Variance	0.632	0.619	1.001	0.468
Kurtosis	2.340	0.788	1.829	1.505
Skewness	-1.348	-0.756	-1.009	-0.716

The results are clear, and almost all of them are as expected. However, at least one important thing is left to improve the classes. All of the video material were undated before the classes (several days before), but they were deleted one day later after class. In general, flipped classroom using video continues to upload the videos, and students use them after the class. Also, students who cannot attend the classes would like to use them in the future, and, in general, students would like to use them repeatedly. The reason why my class adopts such a method (deleting each material (video) one day's later) is to increase the pre-study and improve problem-solving skill. Thinking time and opportunities should also be increased.

If the videos are uploaded for a long time and are made for after-study, some students would feel better, and there would some possibility of the improving the scores of questions (4) and (5). Surely, it would be better for some subjects or some materials to take such elements into accounts, but there would cause large sacrifices as mentioned before. Kurihara (2016) showed that the effects of my flipped classroom are clearly divided into: (a) challenge and growth and (b) understanding and quality. Also, (a) and (b) are not attained at the same time. Flipped classrooms can promote the effects of education. Also, it may be difficult to combine a flipped classroom and active learning. If the mandated study is emphasized instead of spontaneous study in flipped classroom, it seems dangerous to rely heavily on a flipped classroom. Spontaneous study is very important, so it is important to avoid interruptions to spontaneous study. There are some cautions about the need for both educators and learners to be properly trained in how to use and teach in a flipped class. In my class, active learning of lectures is introduced to promote the quality of the class; however, active learning sometimes can dampen the quality as spontaneous study may be damaged. Flipped classroom is very effective for mastery studying, so sometimes spontaneous or active studying can be a sacrifice.

Viewing the recorded videos outside of class time is not enough to make the flipped classroom successful; the way teachers integrate instructional videos into an overall approach makes an important difference. It would be very difficult to achieve significant positive effects in my class by introducing a flipped classroom and active learning at the same time; however, it would not be impossible. It is possible that a blended class that combines the flipped classroom with lectures may be one key issue or solution. It should be noted that both flipped classrooms and active learning themselves are not objectives to be introduced but just methods to promote class quality and understanding of learners and to spur incentives to study. Flipped classrooms are not the goal.

Finally, equation (1) is regressed based on the learning analytics system.

$$\text{Final result} = \alpha + \beta \text{present} + \gamma \text{Times of seeing the video} + \zeta \text{Small test} + \varepsilon \quad (1)$$

This includes my learning management system (LMS) and can be used by learners. Learning analytics system is for educators and for learners. Learners also know the other students' study (sparring time, times of seeing the video, and so on) during the semester.

Table 2: Descriptive Statistics

	Final result (0-100)	Present (0-15)	Times of seeing the video (0-)	Report (0-10)	Small test (0-15)	Exam at the end of the semester (0-65)
Mean	80.75	13.93	38.18	8.81	9.12	53.75
Median	83.00	15.00	32.50	9.00	10.00	57.50
Maximum	100.00	15.00	97.00	14.00	15.00	64.00
Minimum	7.00	12.00	24.00	7.00	4.00	25.00
Std.Dev.	17.87	1.43	18.71	1.32	3.50	14.92
Skewness	-0.67	-0.58	2.28	0.53	-0.16	-0.69
Kurtosis	2.41	1.40	7.40	1.55	1.49	2.40
Jarque-Bera	1.45	2.61	26.83	2.14	1.59	1.50
Probability	0.48	0.27	0.00	0.34	0.45	0.47

Table 3: Regression Analysis

Method	OLS	Robust squared estimation	OLS	Robust squared estimation
C	-19.993 (-0.488)	-28.714 (-0.601)	-29.198 (-1.011)	-29.322 (-0.845)
Present	6.997** (2.24)	7.628 (2.095)	6.378*** (2.807)	6.430*** (2.555)
Times of seeing the video	0.107 (0.45)	0.094 (0.337)	0.060 (0.354)	0.043 (0.214)
Small test	-	-	1.751** (2.195)	1.800* (1.878)
Adj.2/adj.Rw2	0.260	0.445	0.590	0.704
F-statistic/Rn- squared statistic	3.462	5.826	8.214	17.285
Prob(F-statistic/ Rn-squared statistic)	0.064	0.054	0.003	0.0006
D.W.	1.220	-	1.467	-

*Note: Parentheses are t-value (LS) and z-value (robust squared estimation). ***, **, * denotes significant at 1%, 5%, 10% respectively.*

The results are almost as expected. Viewing video many times is not necessarily related with the high scores of the final result. It is, of course, reasonable to improve the scores of (4)-(7), but too much independence on mandatory study, for example, is sometimes meaningless for higher education.

Conclusions

This study was informative in that it confirmed that flipped classrooms have yielded both positive and negative outcomes. Flipped classrooms have received much attention as they may increase learning outcomes and effectiveness. On the other hand, this method also

includes some cons. My international finance (economics) class blends a flipped classroom and lecture; a questionnaire for learners provided the data used herein.

It appears that for the flipped classroom to be an effective teaching methodology, a number of processes must be in place. However, there are some cons at least for my classes. The most important thing is that active learning and flipped classrooms cannot always coincide. It is a serious problem. Bonwell and Eison (1991) showed that active learning methods require learners to utilize higher-order thinking skills such as analysis, synthesis, and evaluation. For example, additional video clips and optional study that cover advanced topics can be prepared to cater to top-tier learners who may want to explore beyond the syllabus. As these, spontaneous study should not be interpreted. Instead, it should be promoted if the good outcome does not appear soon. Educators, including me, should be instructors who have knowledge about how learners learn. Davenport (2018) found that the availability of resources, including the textbook, online videos, and classroom collaboration, is important as a key component of students being able to succeed. Also, learners must come prepared for each session by watching the assigned video lectures or studying. Learners should also understand the purpose of the flipped classroom and should communicate. Bergmann et al. (2011) showed that it is important to create a situation in which learners take responsibility for their own learning. Reflection is important for learners to think and work through an idea to make the necessary connections before they discuss it with others. Class planning and much more investigation are necessary and important.

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