



Flipped Classroom: Effects on Education for the Case of Economics

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Abstract

The notion of the flipped classroom has been received much attention in the literature as it may increase learning outcomes and learning effectiveness elementary and secondary education as well as university learning. In the author's class on international finance (economics) features a blended flipped classroom and lecture; questionnaires were used to collect learner data. Using principle component analysis, the effects of the flipped classroom are divided into two components: (1) challenge and growth and (2) understanding and quality. Also, it should be noted that the two components were not attained at the same time. A flipped classroom promotes education; however, it is difficult to attaining both components at the same time. To achieve a flipped classroom and active learning at one time seems an important but difficult task.

Keywords: Active learning, Collaboration, Economics, Flipped classroom, Spontaneous study, University, Video.

Contents

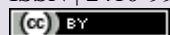
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1. Introduction

Recently, universities and postgraduate researchers have provided questions about the effectiveness of traditionally lecture-based teaching methods (Barr and Tagg, 1995). In spite of the fact that innovations in ICT enable new techniques for pedagogy, traditional lectures are still the main and central teaching method (Bligh, 2000).

On the other hand, Ritchhart *et al.* (2011) showed that many educators have started to worry about the complexities of teaching and learning for understanding as opposed to knowledge-based education. An increasing rate of university learners 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 (not just interest). Active learning is one technique.

According to Prince (2014) *active learning* is an umbrella term for pedagogies that focus on student activity and student engagement in the learning process. This approach seems to have been received much attention in Asian countries. It is a learning process that enables learners to learn more effectively in learning activities as reading, writing, discussion, or problem identification or solving that promotes analysis, synthesis, and evaluation skills. Cooperative studies, problem/project-based learning (PBL), and the use of case studies are thought to be appropriate ways to increase active learning. If the goal of teaching is to engender understanding, educators must move from rote memorization of knowledge and facts, known as *surface learning*, to deep learning in which understanding is developed from active and constructive processes (Ritchhart *et al.*, 2011).

To promote further studies, flipped classrooms recently have been introduced in many schools throughout the world. The flipped classroom is a reversed way of traditional teaching in which learners use new materials outside of class, such as at home, usually in the form of books or videos, and then perform their additional work, such as problem-solving, discussion or debates, in the classroom (see, for example, (Strayer, 2012; Schmidt *et al.*, 2016)).

In 2008, two chemistry teachers at Woodland Park High School in Colorado's Pike Peak found it difficult to spare time to reteach content for their absent students. The teachers recorded videos of their lessons, posted them online, and found that even students who had not missed class were watching the online video because it helped them review and strengthen classroom lessons. This technique helped absent students attain good results. The reason that the flipped classroom approach may be spreading is that it increases opportunities for educators to produce more high-quality online content so that classroom time can be used to engage student learning using PC software and increased Internet bandwidth. Learning management systems (LMS) and some related hardware and software improvements have been enhanced (Bates, 2005).

Recently, flipped classrooms have received much attention, so many studies have begun to be presented (Honeycutt and Warren, 2014). Nicholas (2008) found that 92.3% of students felt that problem-solving in flipped classrooms is useful. Bergmann and Sams (2012) and Prensky (2010) showed that learners can problem-solve, develop skills, and gain more understanding of the subjects taught. Fitzpatrick (2012) showed that flipped classrooms create a student-centered learning environment that increases technology usage and emphasizes collaboration. Milman (2012); Steed (2012) and others have indicated that learners can study at their own pace rather than listen to a video lecture on a subject that they already understand and can view lectures not only on a PC but also on mobile devices whenever it is convenient to do so. Milman (2012) showed that the flipped classroom has pros for teaching procedural knowledge about how to do something, such as solve a problem. Talbert (2012) showed evidence that the flipped classroom helps college learners learn more effectively. Goodwin and Miller (2013) showed that most teachers who challenged this method found it helpful, especially for learners with special needs and those in advanced classes. McLaughlin *et al.* (2013) showed that flipped classrooms promote student empowerment, development, and engagement. Michigan Radio (2013) reported lower failure rates as a result of the introduction of flipped classroom. NBC New York (2013) showed flipped classrooms provide learners flexibility and reduced stress. Also, flipped classrooms allow learners to compete assignments with others, which may help them keep deadlines, quickly and conveniently access help from their instructor, and promote improved grades. Schneider *et al.* (2013) showed that learners who engage in open-ended exploration first demonstrated better performance than those who used traditional textbook materials first, which implies that video lectures and textbooks should come after exploration and not before (Plotnikoff, 2013).

The peer effect is also expected. Positive learner participation in classroom activities amid interactions with other learners and the instructor result in better work. Mok (2014) showed that the pros of flipped classrooms are that learners may develop their opinions by seeing classroom videos as many times as required to prepare for class. Gilboy *et al.* (2015) showed that the most of the learners who completed the evaluation preferred flipped classroom compared with traditional pedagogical strategies.

Flipped classrooms relate to active learning. Zayapragassarazan and Kumar (2012) showed that active learning classrooms include individual activities, paired activities, informal small groups, and cooperative student projects; however, these classrooms encompass many activities such as conceptual mapping, brainstorming, collaborative writing, case-based instruction, cooperative learning, role-playing, simulation, project-based learning, and peer teaching. Prince (2014) indicated that active learning refers to instructional methods that make learners participate in meaningful learning activities in such a way that they think about what they are doing. Steed (2012) showed that starting small and moving away from lectures to more active learning methods one lesson at a time may be beneficial to student outcomes. Bosch *et al.* (2008) showed that the introduction of active learning methods, including collaboration and cooperation within the flipped classroom paradigm, are hallmarks of existing learner-centered teaching methods. However, it seems difficult to use the flipped classroom for active learning.

Findlay-Thompson and Mombourquette (2013) indicated that learners in flipped classrooms and those taught using traditional lecture classes have the same outcomes. Talbert (2012) showed some pitfalls of the flipped classroom include instructors' preparation time; student resistance to taking on increased responsibilities for learning (i.e., increased responsibility on learners for their own learning can leave some learners feeling uncomfortable or abandoned); and culture shock for learners who are accustomed to rote, lecture-style learning. Atteberry (2013)

showed that flipped classrooms may not result in any differences in student outcomes; the study found no grade differences in a comparison of the flipped classroom with the two other traditional-lecture style classes.

Many problems seem to exist in flipped classrooms. First, classes delivered online have many merits; on the other hand, they have some serious problems: technical difficulties, a feeling of isolation, a relative lack of structure, and a general lack of support (Youngberg, 2012). Strayer (2007; 2012) showed some shocking data. Learners who participated in flipped classrooms were less satisfied with the teaching method than were 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. Flipped classrooms rely heavily on learner preparation. Not all learners learn positively. Goodwin and Miller (2013) stated that little rigorous research has been performed to evaluate the effects of this style of pedagogy. Hamdam *et al.* (2013) showed losses associated with reduced engagement in face-to-face Socratic teaching. Finally, of course instructors should use these new measures effectively; however, as noted Lage *et al.* (2000) and Blair (2012) the use of a flipped classroom could result in teachers devoting less effort to the creation of lecture presentations. Ash (2012) indicated that this method emphasizes an antiquated approach of teaching the lecture.

In my class, I use a half-flipped classroom. One of the benefits of this alternative approach to flipped learning with respect to the traditional classroom is that it not only relies on a great deal of collaboration, but it still allows for the use of significant class time for lectures and Socratic discussion, which is a critical element in the classic humanities canon of instruction. Also, in flipped classrooms, mandated study is emphasized over spontaneous study so it seems dangerous to rely heavily on a flipped classroom. In some case, it seems that mature learners are sometimes opposed to the flipped classroom. Spontaneous study is very important, so it is important to avoid interruption in spontaneous study. In some cases, the instructor's giving a quiz or checking notes at the start of the class immediately after the due date the lecture had to be viewed is important.

In my class, the use of the primary sources includes a bimodal collaborative teaching method, as learners collaborate by sharing their thoughts prior to class and the start of the class incorporates a student-centered collaboration based on the primary sources. One possibility is a blended or hybrid course that combines face-to-face interaction work with educational content delivery online (Garrison and Kanuka, 2004). This collaborative discussion on the primary sources may serve as the gateway into the broader topic discussion (Westermann, 2014). Crews and Butterfield (2014) indicated that the most positive impact of face-to-face learning is interaction in class discussions, group problems, and other types of active learning. Bligh (2000) argued that in spite of its criticisms, lecturing is as effective as most other teaching methods as a tool to transmit information.

Lectures are the most important and effective way of teaching in some cases. Taking into this account, my class is performed as described in the next section.

2. Theoretical Analysis

Taking into the above section account, my class is conducted as follows with the following syllabus:

Subject: International Financial Markets

Theme: International Financial Markets: Theory and Reality

General explanation: International finance includes exchange rates, international balances of payment, 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 of 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 every time.

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 text books. 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 clicker (or your smart device); however, your private information is not necessary to enroll.

3. Empirical Analysis

3.1. Method

The use of ICT is a key determinant in providing lectures to be recorded and made available to all learners outside of the classroom (Bates, 2005). Pappano (2012) showed that the Internet has enabled online education more effectively, and more recently Massive Open Online Courses (MOOCs) have been ongoing all over the world. Online education offers much merit (see (Babson Survey Research Group, 2013; Bolkan, 2013)). Obstacles of time and place have been decreasing in education.

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, active learning, and lecture. 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 leaning and lecture, learners may improve problem-solving and skill development and may gain more understanding of the subjects.

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?

Principal components analysis is used for estimation. This statistical method is used to identify a smaller number of uncorrelated variables, namely, principal components, from a (large) amount of data. The goal of this analysis is to examine the maximum amount of variance with the fewest number of principal components. This strategy combines the techniques of principal component analysis to decompose the variables that measure general phenomena into common and specific components. Eisenhardt (1989) indicated that upper and lower class limits would be necessary; however, the amount of data is small, so all of the data were included for estimation.

3.2. Results

The results are shown in Tables 1 and 2 and in Figure 1 and 2. As an ordered Eigenvalues, 2 is selected.

Table-1. Descriptive Statistics

	Understanding	Quality	Challenge	Growth
Average	4.086	4.086	3.869	3.869
Standard error	0.165	0.165	0.211	0.144
Standard deviation	0.792	0.792	1.013	0.694
Variance	0.628	0.628	1.027	0.482
Kurtosis	2.912	0.781	1.753	1.528
Skewness	-1.361	-0.761	-1.151	-0.713

Table-2. Principal Components Analysis

Eigenvalues: (Sum = 4, Average = 1)					
				Cumulative	Cumulative
Number	Value	Difference	Proportion	Value	Proportion
1	2.875251	2.132979	0.7188	2.875251	0.7188
2	0.742272	0.476881	0.1856	3.617523	0.9044
3	0.265391	0.148305	0.0663	3.882914	0.9707
4	0.117086	---	0.0293	4.000000	1.0000
Eigenvectors (loadings):					
Variable	PC 1	PC 2	PC 3	PC 4	
CHALLENGE	0.548506	0.167772	-0.489252	-0.656983	
GROWTH	0.416177	0.784533	0.370819	0.271657	
QUALITY	0.536214	-0.323921	-0.404569	0.666239	
UNDERSTANDING	0.488275	-0.501434	0.677827	-0.225170	
Ordinary correlations:					
	CHALLENGE	GROWTH	QUALITY	UNDERSTANDING	
CHALLENGE	1.000000				
GROWTH	0.685004	1.000000			
QUALITY	0.806601	0.434387	1.000000		
UNDERSTANDING	0.636919	0.351818	0.783019	1.000000	

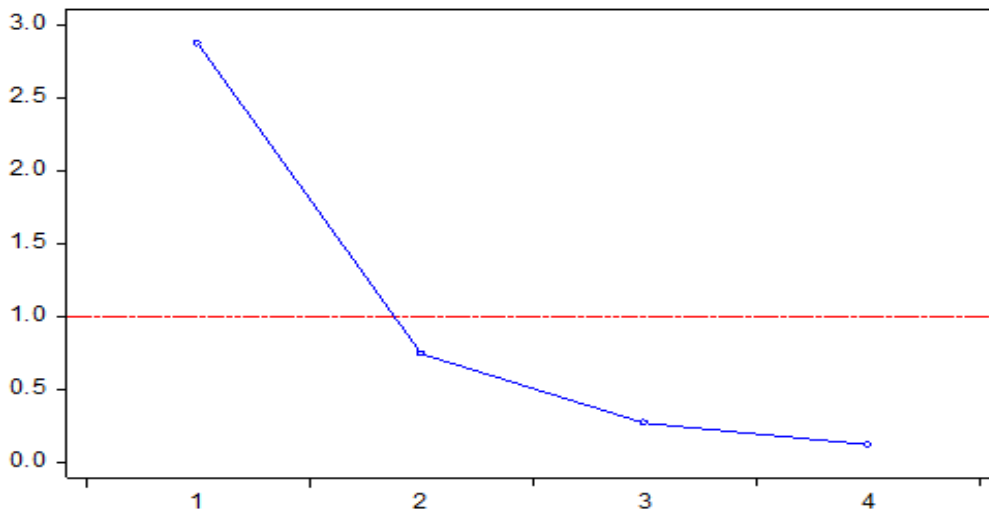


Figure-1. Scree plot1

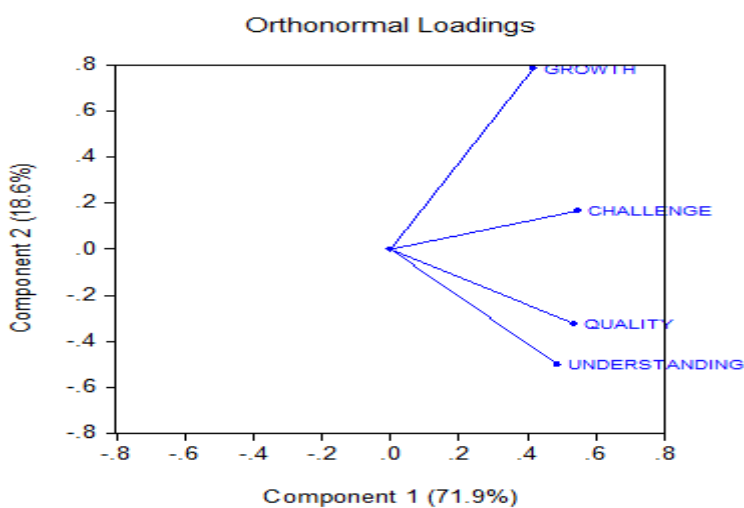


Figure-2. Scree plot2

The results are clear and interesting. The analyses are performed in the next session, 3-3.

3.3. Analysis

The results are clear. 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; however, to attain (a) and (b) at the same time is difficult. It may be difficult to combine a flipped classroom and active learning at one time.

Mandated study is emphasized instead of spontaneous study in flipped classroom, so 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 instructors 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.

Flyvbjerg (2006) indicated that learners should have an incentive to watch videos at home just as they are requested to be motivated to read their textbooks and do their homework. Also, Tucker (2012) showed that if learners do not have basic math skills, they cannot do an interesting physics project. Ferreri and O'Connor (2013) showed that a small-group, case-based course could promote class efficiency. These are basic points that cannot be denied. Instructors must be willing to let go of traditional teaching exercises and be fully trained in how to conduct a flipped classroom as it is not as simple as recording a video and letting learners do homework in the class. However, the experience of my class offers important points to consider.

Steinhert and Snell (1999) showed that in a flipped classroom, interactive work in the classroom is more effective than traditional monologue-style lectures. In my class, active learning occurs at the same time. Nagappan et al. (2003) and Williams et al. (2000) showed that a program of paired learners in flipped classroom is recommended as an effective way to teach coding to beginners. Lectures are used in my class; however, there is some possibility that another opportunity should be conducted. Tucker (2012) indicated that 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 and with lectures may be one key issue or solution. Again, 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.

4. Conclusion

This study was informative in that it confirms that flipped classrooms have yielded both positive and negative outcomes. Flipped classrooms have received much attention as they may increase the learning outcomes and

effectiveness not only in elementary, middle/junior high, and high school but also in university classes. On the other hand, this technique also includes some cons. My international finance (economics) class blends a flipped classroom and lecture; a questionnaire for learners provided the data used herein. Using a principle component analysis, two clear categories emerged (a) challenge and growth and (b) understanding and quality. Also these two teaching methods cannot be attained at the same time. A flipped classroom promotes the effect of education, however, it is difficult to attain both (a) and (b) at the same time. The use of a flipped classroom and active learning at one time is difficult.

It appears that for the flipped classroom to be an effective teaching methodology, a number of processes must be in place. Ani (2012) and Morgan (2014) stated that the most important variable in delivering materials will always be a instructor who has much knowledge about how learners learn. As indicated by Mok (2012) it may be a good idea to expand the flipped classroom with other proven pedagogies such as differentiated instruction for learners of different abilities. In my case, lecture would solve some or all such problems that occur. The most important thing is that active learning and flipped classrooms cannot coincide. It is a serious problem. Bonwell and Eison (1991) indicated 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. Spontaneous study should not be interpreted. Wilson (2013); Fink (2013) and Taylor (2010; 2011) introduced the notion of the *significant learning experience* to increase student interest, engagement, and retention.

Learners must come prepared for each session by watching the assigned video lectures. Learners also should 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 (Honeycutt and Warren, 2014). Also students should understand their responsibilities to this new style of learning. Enfield (2013) indicated that flipped classrooms are effective in helping students learn the content and may increase self-efficiency in their ability to learn independently. Flipped classrooms are said to fit well for low-level learners, however; my image fits well this idea. Regardless of this level, spontaneous incentives seem necessary to promote positive outcomes for my class. Stated another way, the flipped classroom and active learning promote spontaneous learners in my class.

Addition study seems necessary. Marshall and Rossman (1989); Yin (1994); Cooper and Schindler (1998); Crano and Brewer (2002); Zikmund (2003) and Flyvbjerg (2006) showed that interviews with learners are useful to achieve a better understanding of a phenomenon. In my case, only open-ended questions were used as they encourage respondents to answer freely. Unanticipated answers and rich data were useful to promote the quality of the class. Not only open-ended question but also closed-ended questions may be necessary to advance knowledge of this area to the next level.

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