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Design, Implementation, and Effectiveness of Flipped Classroom and Debate

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Abstract

We adopted two innovative teaching methods in a post-graduate module (Money and Banking): flipped classroom and debate. We find significant evidence that these innovative teaching methods are effective in improving student performance as reflected in exam marks. Our surveys investigated students' perception of these two new teaching methods. The results indicate that students have great consensus in terms of the benefits of these approaches suggested in literature. In addition, based on the experience we gained in teaching this module and the students' feedback, we provide some suggestions in terms of how to best apply the flipped classroom and debate methods in teaching.

Keywords: flipped classroom; debate; learning efficiency; active learning

Introduction: Issues in the module Money and Banking

Money and Banking is a module that is shared by two MSc programs (i.e., MSc in Finance and MSc in Economics and Finance) in Xi'an Jiaotong-Liverpool University. In this module, we try to provide students with a broad picture of the key elements in the modern financial systems, which include financial instruments, important financial intermediaries, the regulators of the system-central banks and their monetary policies, instruments and tools, etc. Students are required to establish an in-depth understanding of how these elements influence each other in the financial system and to apply what they have learned in class to analyze real problems in financial systems. Although evaluations of this module in past years have been adequate, we have noticed some issues that are worth addressing. The first is caused by the nature of the module (e.g., information-intense) and the fact that a typical cohort of MSc students tend to have various backgrounds. For example, some are from Economics and Finance related background while others had unrelated degrees such as Engineering, Chemistry, or Urban planning. One of the challenges in teaching a module like this is to find the appropriate pace to teach. Students with relevant background may feel bored if the module leader spends too much time to cover the basics; students without the relevant background would be overwhelmed when the module leader speeds up. This observation is evidenced by students comments from the module questionnaire during 2014-2015: one student commented "sometimes it is boring" while another student said "maybe too much information".

A second issue in this module is related to the aforementioned issue. In this module, we require students to develop skills in synthesizing knowledge of various topics in order to understand the mechanism of the modern financial system and analyze events in the financial system. However, these higher level cognitive abilities are built on the familiarity with the prerequisite knowledge and students need plenty of

ISSN: 2455-3220
Volume 04 Issue 3
March 2018

exercises/discussion (in class or self-learning) to establish the inner logics that connect the various elements in the system. This can be challenge for some students. Without sufficient opportunities to exercise, weaker students will absorb information passively and may end up having segmented knowledge in different topics without being able to apply the knowledge in a meaningful way. In the module questionnaires over 2013-2014 and 2014-2015, while some students commented that "the teacher provided a lot of articles related to the lecture. It is helpful for us to learn a lot by connecting the lecture to the real life" and the module "shows that how the whole economy works and it's helpful", there are also comment for improvement such as the module "need to provide more real life examples" or "need more discussion and examples about real world in class". However, given the amount of necessary lectures on relevant topics, the module leaves us limited space for discussion or exercises in class.

Lastly, the module leader also faces the difficulty of interacting with students in class. There may be several reasons for this situation: firstly, except for a few, most of the students in class are not from universities that teach in the medium of English and the language barrier makes them difficult to quickly respond to the request of interaction; secondly, culturally, Chinese students are shy to express their opinions in public. This problem is also observed by one student who commented that "more interaction in the class" could improve the module.

The consequences of the above issues are that not all students can fully benefit from the module. Students with no background felt overwhelmed by the amount of content that was covered in the module -- which is not surprising as they have to quickly grasp the fresh new knowledge and learn to apply this knowledge in short periods. In addition, it has been observed that some students are quite passive in their learning activities and some may even give up their efforts of pursuing a deeper understanding. At the same time, stronger students are eager for more practice and examples from the real world. This diverse in student performance is evidenced by the high standard deviation (e.g. over 18% in both 2013-2014 and 2014-2015) and the high failure rate (e.g. 30% in 2013-2014 and 35.7% in 2014-2015) in final exams.

Module Design

To address the issues mentioned above, the teaching team of this module decided to introduce a new pedagogical approach called the "flipped classroom" which is becoming popular in the higher education community. In order to further promote active learning, critical thinking and students' communication skills, we also replaced the usual group presentation assessment with a group debate assessment.

Flipped Classroom as a Teaching Pedagogy

A flipped classroom, often referred to as "inverted classroom", is one in which lectures are presented as homework outside of class in online videos so that class time is reserved for student-centered activities. There is a considerable amount of research in support of the flipped classroom, which indicates improved learning achievement (Mattis, 2015; Souza & Rodrigues, 2015; Flumerfelt & Green, 2013; Strayer, 2012; Mason et al., 2013) and increased interaction between teachers and students in a flipped classroom (Flumerfelt & Green, 2013).

Research shows four primary motivations for implementing the flipped classroom. First, it maximizes class time for student-centered activities, such as case study, class discussion, debate, exploration of real-word problems and solutions, etc., without sacrificing the content (Bergm & Sams, 2012; Roman & Papadopoulos, 2006; Bland,

ISSN: 2455-3220
Volume 04 Issue 3
March 2018

2006; Demetry, 2010). As such, incorporation of flipped classroom instruction into task design can enable class time to be maximized for engaging learners for skills development such as critical thinking, communication, team working, etc. Second, a flipped classroom allows for personalization of learning (Bergmann & Sams, 2008, 2012; Driscoll, 202; Lage et al., 2000). It can be designed to support students with varying needs, ability levels and learning styles; as well as to allow students to learn at their own pace, regardless of place or time. Third, flipped classroom allow for information to be "chunked", or broken into smaller sections for knowledge acquisition, which results in more effective and efficient task completion (An & Reigeluth, 2012). Last, flipped classroom can motivate students to become self-learners and life-long learners (Bland, 2006; Souza & Rodrigues, 2015).

Application of Flipped Classroom Approach in the Module

While there are numerous advantages to flipped classroom, there are also some challenges for teachers and students. One significant shortfall of the flipped classroom is high set-up costs for teachers, including an increase in time required to create online video lectures and design new in-class learning activities, as well as software required to create videos (Gannod et al., 2008; Lage et al., 2000). In our practice, we created videos by a screen recorder which has a free version and is easy to use. In addition, in this year, we only adopted the flipped classroom in the second half of the semester (6 lectures) and we divided each lecture into several parts, so that any particular part can be easily replaced in future without re-making the whole lecture. The lecture videos were then uploaded online one week before the actual class activities and students were required to watch these videos beforehand.

Another challenge for the flipped classroom is to design intellectually engaging flipped learning materials that support the learner in being active in the learning process. Watching video lectures in a perceived less formal learning environment, students are less attentive and self-disciplined compared to live instruction (Foertsch et al., 2002). In addition, students are discouraged from taking their own notes and missing the opportunity to ask questions during lectures when viewing materials outside of class (Bergmann & Sams, 2008). To deal with this problem, we adopted the following measures: firstly, in order to encourage students to watch videos on time, we notified the students that each week's videos will only be visible for two weeks and the class activities will be closely tied to the video contents (the videos were eventually available before the final exam, but students did not know this during the semester). Secondly, we encouraged students to print the PPT slides beforehand and make notes while watching the videos. At the beginning of each class, we usually quickly reviewed the video contents and then allocated some Q&A time so that the students can resolve their confusion before the class activities.

In the flipped classroom approach, designing the in-class learning activities is crucial. In this module, we adopted several forms of class activities including group discussion of lecture contents under pre-designed questions, case study, problem-solving exercise, group debate and documentary watching and discussion.

Debate as a teaching pedagogy

Debate is a teaching-learning strategy that presupposes an established position, pro or con, on a controversial issue. Students are required to work as a team to carry research on the debating topic, prepare and present arguments, ask cogent questions, listen to different perspectives and defend their own position based on logics and evidences.

ISSN: 2455-3220
Volume 04 Issue 3
March 2018

Debate as an old teaching strategy was popularly used in the 19th century and early 20th century (Darby, 2007). In recent decades, this teaching strategy has regained popularity and the literature documents many benefits of adopting debates in teaching. Firstly, debate promotes active learning (Alen et al., 2015; Joyce, 2012; Doody & Condon, 2012). The process of preparing, presenting, defending and interacting with the classmates increase the learners' engagement in the material. Secondly, the use of debate provides student with an opportunity to develop logical and critical thinking (Roy & Macchiette, 2005; Darby, 2007; Osborne, 2005). Debates require students to apply reason, anticipate and identify fallacies in opposing arguments, and justify their position using persuasive logic and evidence. In addition, in cases when the students' position is inconsistent with their own opinion, students have to defend positions that they oppose and attack perspectives with which they agree. In this sense, it forces students to adopt opposing perspectives and transcend their own prejudice toward an issue. Thirdly, in a good debate, the students must think about not only what will be said but also how it will be said. This requires students to orally communicate controversial ideas in a convincing manner. However, unlike a normal discussion, debate is a competition between two teams in which both teams try to persuade a third party (audience). The competitive element acts as a motivator (Schroeder & Ebert, 1983) which encourages even a usually silent student to talk. Research has found that debate is an effective method that provides students with opportunities to enhance communication skills (Combs & Borne, 1989; Garrett et al., 1996; Kennedy, 2007). Lastly, Moeller (1985) argues that, learning in debates does not appear to be limited only to students who directly participate because audience members also seem to learn a considerate amount.

Application of debate in the module

We divided the class (21 students) to 4 groups (i.e., 5-6 per group) to debate on two topics about monetary policies. When two of the groups are debating on their allocated topic, the other two groups act as the audience. Their positions swap in the next round of debate. The division of groups and defending position of each group were decided randomly which means that some students have to defend the position that they did not personally agree with in the first place. In order to increase students' interest, the selected topics are tightly connected to recent developments in the financial world and are themselves under hot debate by central banks at the time. Each debate lasts for around 60 minutes and includes five stages: opening statement, rebuttal, free debate, class discussion, and closing statement. The debate performance is evaluated based on students' arguments, evidence to justify their arguments, reasoning, logic thinking and effective communication. In order to ensure that each student fully participates in the debate and the preparation process, 20% of the debate marking is attributed to individual performance. In addition, at the rebuttal stage, the member who will respond to the opposing team's challenge is selected randomly by the computer.

To support preparation, we provided students with some relevant reading materials as a starting point and we also guided them to use digital resources in library. To familiarize students with the procedure of the debate, we organized a mock debate (not assessed) on a different topic one week before the assessment. The mock debate was performed by 10 volunteer students but we ensured that each group has one volunteer. At the end of the mock debate, the instructors provided comments on volunteers' performance and

ISSN: 2455-3220
Volume 04 Issue 3
March 2018

pointed out places to improve. Finally, we held a class discussion stage (not assessed) in which the audience was encouraged to express their own opinions on the debate topic. The purpose is to increase the audience's participation in the debate. In addition, although a debate has the limitation of creating an artificial black-and-white situation, we allow and guide students to recognize the complex of the issue in class discussion.

Evidence

The introduced innovations are effective in increasing students' performance and learning experience.

Student Performance

Students' performance has improved significantly compared to previous years. For example, for each assessment component, both the mean and median marks have increased by at least 5 marks in year 2015-2016 compared to previous years. Both the final exam marks and the overall marks in 2015-2016 have increased by more than 5 marks compared to the previous two years. In addition, the gap between strong and weak students has shrunk this year as indicated by the lower standard deviation (i.e., 15.4% compared to more than 18% in previous years) of student performance in the final exam. Last but not least, the module's high failure rate in the final exam has been improved as it has dropped by more than half over 2015-2016 (i.e., 14.3% relative to more than 30% in previous years). From the perspective of the learning outcomes, relative to year 2014-2015, students' performance in 2015-2016 has increased by 7.7%, 6.6%, 0.7% and 10% respectively for each outcome.

Module Questionnaire

The module questionnaire has showed that students have very positive comments on this module (see Table 1). Altogether 12 out of the 21 students responded to the module questionnaire. When they were asked about the things they enjoyed about the module, five students mentioned debate and discussions, two students mentioned the teaching style of the module, two students mentioned the team work experience and improved communication, and five students mentioned the contents/materials/cases of the module.

When students were asked about things to change in the module, seven (58.3%) students mentioned something akin to "the module is good and do not change" or "the class is perfect". Three students suggested even more "opportunities to practice" or "discussion". Students no longer indicate that the module is "boring" or "too much contents" or "need more interaction".

Table 1

Student performance in 2013-2014, 2014-2015, and 2015-2016

	Coursework	Presentation /Debate	Final Exam	Overall
2013-2014 (No. students 20)				
Mean	69.0%	65.2%	52.6%	56.9%
Standard deviation	9.8%	5.1%	18.0%	14.8%
Median	69.0%	65.0%	54.0%	57.9%
Min	50.0%	55.0%	11.0%	23.5%
Max	86.7%	72.0%	81.0%	80.5%
No. students failed	0	0	6	4
Failure rate	0%	0%	30.0%	20.0%
2014-2015 (No. students 14)				
Mean	64.5%	65.8%	54.3%	57.5%

ISSN: 2455-3220
Volume 04 Issue 3
March 2018

Standard deviation	2.9%	3.5%	18.2%	12.9%
Median	64.0%	68.0%	54.0%	57.6%
Min	58.5%	60.0%	25.0%	36.3%
Max	68.9%	68.5%	85.5%	80.2%
No. students failed	0	0	5	3
Failure rate	0%	0%	35.7%	21.4%
2015-2016 (No. students 21)				
Mean	76.1%	67.9%	59.7%	63.4%
Standard deviation	11.8%	3.1%	15.4%	12.1%
Median	79.0%	67.2%	64.0%	66.5%
Min	34.0%	64.0%	16.0%	26.1%
Max	89.0%	73.5%	80.0%	77.9%
No. students failed	1	0	3	2
Failure rate	4.8%	0%	14.3%	9.5%

Survey

The survey results on debate also show that students had excellent experience in debate. We conducted two surveys: one for debaters and one for non-debaters (i.e., the audience). Among the debaters, 85.7% of the students indicated (Q1) that they have learned a lot in preparing for the debate. In addition, 71.4% of the students agree that debate is better than class discussion for controversial topics (Q2). At last, more than 95% of the students agree that debate improved their critical thinking skills (Q3), communication skills (Q4), and the debate preparation is a good teamwork experience (Q5). When we asked students what did they like most about their debate experience, several students commented that they liked the process of coming up with arguments to defend their position, sharing the ideas with team members and searching for information and data to support their arguments. This suggests that students were not only active but also enjoyed the debate preparation, and that debate is an effective method to promote active-learning.

To investigate how much benefit students would receive by acting as the audience, we also asked 4 questions to the non-debaters. From Q1 and Q2, we found that exactly half of the audience changed their opinions regarding the topic after the debate, suggesting that listening to the debate is useful. This is also evidenced by Q3 in which 90% of the students suggest that they have learned and improved their understanding of the topic from the debate. 60% of the audience also believes that debate is better than class discussion for controversial topics (Q4).

Before the debate, we had some concern that students might be silent during the free debate phase when no specific student will be designated to participate. However, we found that our concern was unwarranted as students were not shy to challenge the opposing team and defend their own opinions. This suggests that, the competitive element in debate indeed could motive students to participate.

Table 2

Summary statistics on survey of flipped classroom

Panel A: Survey on the effectiveness of the flipped classroom (No. of collected response: 16)				
Strongly agree	Agree	No opinion	Disagree	Strongly disagree

ISSN: 2455-3220
Volume 04 Issue 3
March 2018

Q1: Online lecture videos support students with varying needs, background knowledge, ability levels and learning styles.

Number	5	8	1	2	0
Percentage	31.25%	50.00%	6.25%	12.50%	0.00%

Q2: Online lecture videos allow me to learn at my own pace, regardless of place or time.

Number	6	10	0	0	0
Percentage	37.50%	62.50%	0.00%	0.00%	0.00%

Q3: Flipped classroom approach allows more time for class activities such as class discussion, case study and debate.

Number	4	8	3	1	0
Percentage	25.00%	50.00%	18.75%	6.25%	0.00%

Q4: Class activities, such as class discussion, case study and debate, are effective for me to develop skills, e.g. communication skills, team work skills, analytic skills.

Number	6	8	2	0	0
Percentage	37.50%	50.00%	12.50%	0.00%	0.00%

Q5: Class activities, such as class discussion, case study and debate, are effective for me to build a bridge between theories and practice.

Number	7	6	3	0	0
Percentage	43.75%	37.50%	18.75%	0.00%	0.00%

Q9: Comparing a long video and several short videos with the SAME total length, I prefer the later one.

Number	1	8	0	1	0
Percentage	10.0%	80.0%	0%	10.0%	0%

Q11: Flipped classroom can motivate me to become self-learner and life-long learner.

Number	3	10	2	1	0
Percentage	18.75%	62.50%	12.50%	6.25%	0.00%

Panel B: Survey on student preferences

Q6: Comparing traditional lectures with flipped lectures, which approach do you prefer?

	Traditional lectures	Flipped lectures	Combination	Indifference
Number	2	0	14	0
Percentage	12.50%	0.00%	87.50%	0.00%

Q8: Which of the following classroom activities enhanced your learning experience?

	Case Study	Class discussion	Debate	I suggest:
Number	13	7	10	0
Percentage	81.25%	43.75%	62.50%	0.00%

Q10: What is the ideal length of online lecture videos.

	< 5 minutes	5m to 10m	10m to 20m	20m to 40m	> 40 minutes
Number	0	3	11	2	0

ISSN: 2455-3220
Volume 04 Issue 3
March 2018

Percentage	0.00%	18.75%	68.75%	12.50%	0.00%

Table 3
Summary statistics on survey of debate teaching

Panel A: Survey of debater (No. of collected response: 21)					
	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Q1: I have learned a lot in preparing for the debate.					
Number	11	7	0	0	3
Percentage	52.4%	33.3%	0.0%	0.0%	14.3%
Q2: For controversial topics, debate is better than class discussion.					
Number	7	8	3	1	2
Percentage	33.3%	38.1%	14.3%	4.8%	9.5%
Q3: The debate experience improved my critical thinking skills.					
Number	8	12	1	0	0
Percentage	38.1%	57.1%	4.8%	0.0%	0.0%
Q4: The debate experience improved my communication skills.					
Number	7	13	1	0	0
Percentage	33.3%	61.9%	4.8%	0.0%	0.0%
Q5: Debate preparation is a good teamwork experience.					
Number	11	9	1	0	0
Percentage	52.4%	42.9%	4.8%	0.0%	0.0%

Panel B: Survey of non-debater (No. of collected response:10)					
	Strongly agreed with the affirmative	Agreed with the affirmative	No opinion	Agreed with the negative	Strongly agreed with the negative
Q1: How did you feel about this topic before the debate?					
Number	0	4	6	0	0
Percentage	0.0%	40.0%	60.0%	0.0%	0.0%
Q2: How do you feel about this topic after hearing the debate?					
Number	0	6	1	3	0
Percentage	0.0%	60.0%	10.0%	30.0%	0.0%

	Students that changed their opinion after the debate	Students that did not change their opinion after the debate
Number	5	5
Percentage	50.0%	50.0%

	Strongly agree	Agree	No opinion	Disagree	Strongly disagree
Q3: This debate improved my understanding of this topic.					
Number	1	8	0	1	0
Percentage	10.0%	80.0%	0%	10.0%	0%

Q4: For controversial topics, debate is better than class discussion.

Number	2	4	3	1	0
Percentage	20.0%	40.0%	30.0%	10.0%	0%

Future improvement

Based on our experience of using the flipped classroom approach and the debate teaching method, we summarize a few issues related to these innovations and also discuss some suggestions and our future plans for improvements.

Flipped classroom approach

1) Compared to the traditional lectures, the flipped classroom approach requires the students to watch videos in their free time which demands students to be much more self-disciplined. A potential issue for putting the lectures online is that students either skip the actual class or do not watch the online videos on time (i.e. before the class activities). To address this issue, we suggest combining the class activities with assessment. For example, we plan to give out small coursework tasks (randomly or regularly) at the beginning of each class. The coursework will be based on the video contents and students will be required to finish and submit the coursework before other class activities. No late submission will be accepted. This will increase students' incentive to study the videos beforehand and it will also prevent the situation that the students do not bother to come to class because lectures are online. In addition, students' performance in the coursework will also allow us to evaluate the effectiveness of on-line learning activities.

2) Bergmann & Sams (2008) point out that students miss the opportunity to ask questions when viewing materials (online lectures) outside of class. This issue was also noted in our survey of the students. Two students commented in the survey that they prefer the traditional lectures because they can ask questions immediately during the lecture. Therefore, if the online teaching method is to be adopted, the teaching staff have to figure out ways to increase the timely communication between students and teaching staff. Although we have allocated Q&A times in class this year, we plan to introduce the discussion forum online next year which will allow teaching staff to answer students' questions on time.

3) In our survey of the flipped classroom, 81.25% of the students indicate that they prefer several short videos compared to a long video with the same total length. 68.75% of them indicate between 10 and 20 minutes is the ideal length of online lecture videos. Therefore, in the next year, we could consider to break some of the lengthy videos into shorter pieces.

4) In our survey of the flipped classroom, we investigated students' preference between traditional lectures and flipped classroom. 87.50% of the students suggest that they prefer a combination of traditional lectures and flipped classrooms. Two students commented that they prefer the basic concepts and important theories be taught in traditional lectures. From the perspectives of both preparing costs and the effectiveness of teaching, we also believe that converting an entire module through the flipped classroom approach is not appropriate. The teaching staff should be selective in terms of which of the topics should be flipped and which should be taught through traditional lectures.

Debate teaching method

1) To further increase the audience' participation in the debating activities, we plan to introduce another phase (i.e., audience interaction) in which the audience has the opportunity to challenge the debaters.

ISSN: 2455-3220
Volume 04 Issue 3
March 2018

In addition, although the audiences' participation (i.e., class discussion in which the audience express their opinions) is not assessed this year, we plan to embed audiences' performance in the debate assessment in future.

2) Lastly, in order to further increase the effectiveness of the debating preparation, we plan to give more guidance to students. We plan to set up regular meetings with the debating teams to evaluate their arguments, reasoning, collected evidence and so on to ensure their understanding of relevant materials, and to guide students in the right direction and inspire students to analyze the issue from wider perspectives.

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ISSN: 2455-3220
Volume 04 Issue 3
March 2018

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