

Implementing Digital Game Mechanics and Various Video Lecture Formats in a Flipped Research Method Course: What Postgraduate Learners Say?

Murphy Hin On Wong, Xintong Xie and Khe Foon Hew

Abstract The purpose of this study is to examine postgraduate learners' perceptions of a gamified flipped learning approach incorporated with video-recorded lectures in a postgraduate Research Method course. Both methods of quantitative and qualitative data collection methods such as questionnaire and interview were conducted to obtain students' feedback. The findings showed that most of the students had a positive attitude toward the flipped classroom. They were willing to recommend the flipped classroom to their friends and they liked watching the lessons on video. A majority of the students agreed that flipped learning is more engaging than the traditional classroom. Most participants reported they enjoyed taking the tests and quizzes online, and agreed that the flipped learning approach had improved their learning. Almost all participants agreed that digital game mechanics such as badges and leaderboard helped promote the success of flipped learning. Five different video-recorded lecture formats were also examined. Results revealed that participants most preferred the digital tablet writing + instructor talking head, as well as the PowerPoint slides + instructor talking head lecture formats. Suggestions to improve the flipped learning course were provided.

Keywords Online lecture · Video format · Flipped classroom · Gamification

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1 Introduction

With the technological advances made over the last two decades, students are no longer limited to learning in traditional classrooms. Blended learning, an active learning approach which combines web-based learning with face-to-face classroom, is believed by many researchers to have the potential to radically change higher education (Garrison & Vaughan, 2008). Today, many educators are paying more attention to the blended learning approach and a variety of blended learning formats are being implemented around the world. Of the many different models of blended learning in practice, the use of flipped classroom has become increasingly widespread (O'Flaherty & Phillips, 2015). The flipped learning approach basically replaces the traditional instruction with online videos in order to give students more opportunities to interact with their teachers and with their peers in the face-to-face class activities. Teachers thus become a facilitator who is able to pay more attention to the teacher–student interaction in the class. Online video lectures enable instructors to assign more in-class time for learner-centered activities, such as integrating the curriculum concepts with authentic examples, applying the knowledge into practice or inviting guest speakers to share their experience.

The flipped learning model has been applied in various subjects. See and Conry (2014), for example, designed a distinctive flipped classroom model for a faculty of clinical pharmacy and it worked out successfully. Roach (2014) implemented the flipped learning model to study students' perceptions of this approach and has found that students had a positive attitude toward the flipped classroom. Butt (2014) employed the flipped learning model in an actuarial course by reversing the provision of in-class course materials with after-class course materials. The study found out that students' perceptions of the flipped classroom were positive. Love, Hodge, Grandgenett, and Swift (2014) adopted a flipped learning model in an applied linear algebra course and for another section of the course utilized the traditional teaching method. Students who had taken part in the flipped class achieved better results in examinations than those students who had participated in traditional classrooms. Gilboy, Heinerichs, and Pazzaglia (2015) experimented with the flipped learning model in two undergraduate nutrition courses. The researchers found out that of all the 142 students, most of them claimed to like the flipped learning approaches rather than the traditional ones. Simpson and Richards (2015) redesigned a population health curriculum of a nursing program by applying a flipped classroom method and found that students gained a better understanding of the course content.

Although the previous studies have helped us understand flipped learning better, several research gaps still exist. First, a majority of studies have hitherto focused on undergraduate students in the Western world such as the USA (Bishop & Verleger, 2013). Relatively few studies have been conducted on postgraduate learners in an Asian country. Second, despite the increasing popularity of video-recorded lectures in flipped learning, we still understand little about how different video formats may affect students' preference of the lectures. Studying student preference of various

video formats is important because it can help us use the right format to develop video lectures that can engage students.

2 The Present Study

The present study aims to extend our collective understanding of flipped learning in two ways. First, we extended our study to a Hong Kong university context, more specifically to the teaching and learning of a postgraduate Research Method course. Second, we examined five different video-recorded lecture formats; these include the (a) traditional lecture format, (b) interview + PowerPoint slides, (c) instructor talking head + digital tablet writing, (d) instructor talking head + PowerPoint slides, and (e) instructor image + audio + PowerPoint slides. We have two research questions as follows:

1. How do postgraduate students perceive the use of flipped learning?
2. Which video lecture format is most preferred by postgraduate students?

3 Method

A case study methodology was employed to investigate a contemporary phenomenon in-depth and within its real-life context (Yin, 2013). A postgraduate course entitled “Research Methods” was flipped. The face-to-face class was scheduled once a week. The course ran for 10 weeks. The Moodle learning management system was used to host all the online activities such as the pre-class videos, discussion forums, online group work collaboration, and interaction among students and the instructor. In the face-to-face class, the instructor conducted activities such as problem-based learning in group, tutorials for questions and answers, hands-on experience of statistics software (i.e., SPSS), student presentation, and feedback sharing. A student-center learning environment was established. Optional post-class activities were also developed to extend students’ learning. The weekly activities are summarized in Table 1.

Digital game mechanics were also used in the flipped Research Methods course to motivate the student participation in the course. Students were rewarded with early bird and well-done badges when they completed a given task early or produced good quality work. Each badge was worth a certain number of points (e.g., one point for an early bird badge). These points did not count toward the final course grades. A leaderboard was also created to rank students based on the number of points students had accumulated. It could improve the student engagement in their learning process.

The videos were created in five main different formats (see Fig. 1a–e). The duration of videos varied between 5 and 18 min. Each video required 3–5 h for

Table 1 Weekly activities of the flipped research method course

Week	Topic	Pre-class	In-class	Post-class
1	Overview of the research process	Video, quiz	Q&A of the research process, group activity to identify the research topic, and problem statement of sample articles	Brainstorm own research topic, formulate own problem statement, upload onto Moodle, comment on peer's work
2	Literature review	Video, quiz	Review of Week 1 and literature review, analyzed previous published literature reviews, hands-on workshop on online database search	Summarize relevant papers in a table, identify limitations of previous studies, comment peer's work
3	Experimental design	Video, quiz	Review of Week 1, 2 and experimental design, analyzed previous articles	Give brief introduction to own research method, research questions, and procedure
4	Correlation and qualitative case study	Video, quiz	Brief review of Week 1, 2, and 3. Discussion of correlation and case study articles	Provide more information about own research method, including desired data collection methods
5	Survey	Search for existing survey	Discussion on characteristics of a good survey	Design an actual survey (group work), comment and vote peer's survey
6	SPSS	Video, SPSS practice	Review of video lecture, instructor demonstration of inferential statistics (e.g., <i>t</i> test) on SPSS, group activity on SPSS	Enter additional data, analyze additional data using SPSS, report results using APA, extend own learning to other tests (e.g., non-parametric tests)
7	Interview	Video, forum discussion	Review of video lecture content, critique an interview by analyzing mistakes and giving suggestions for improvement	Develop own interview protocol; make comments on peers' interview protocol
8	Observation	Observe use of mobile device in daily life	Discussion on key features of observational research, ethical issues, observer bias, observer effect	Make comments on peers' observational data
9	Content analysis	Video	Hands-on practice of content analysis	Evaluate peers' work
10	Wrap-up		Problem-solving activity to design a research study (group work)	

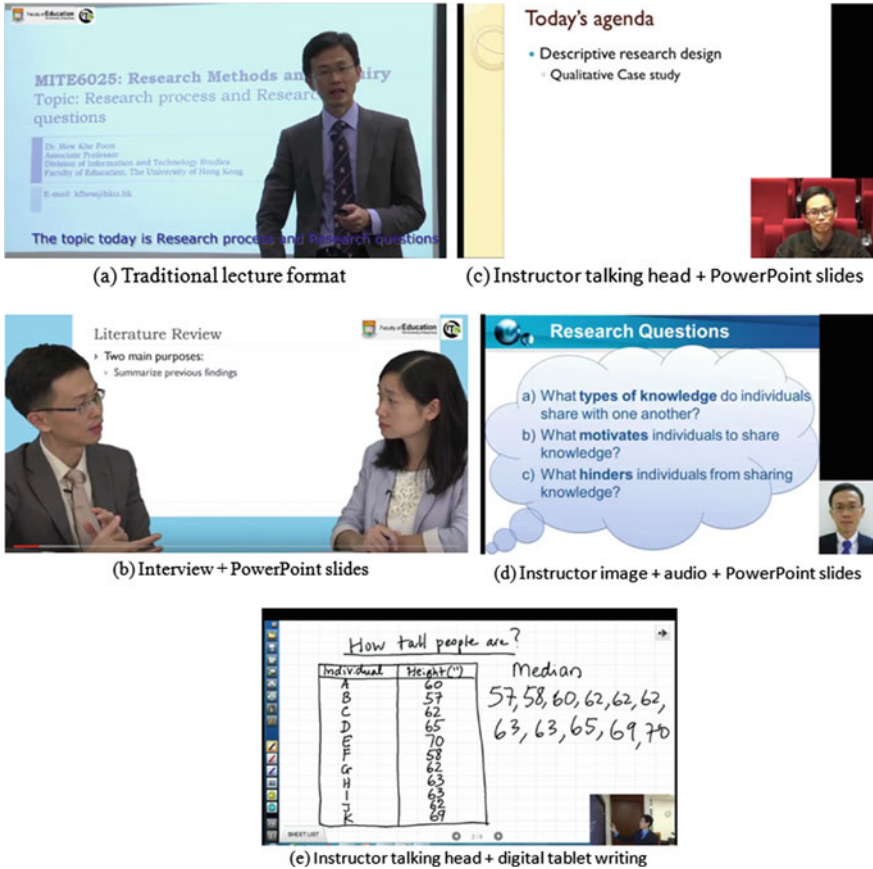


Fig. 1 Types of video lecture formats

shooting and editing. The videos were uploaded to YouTube platform for easy student accessible with digital or mobile devices. The quality of the video was in high definition 1080p format. It was designed for full screen clear viewing. Online quizzes were prepared for students to complete after watching the videos. It assisted the student in understanding the content and reinforcing their memory for the upcoming face-to-face class each week.

3.1 Participants

A total of 36 students (11 males and 25 females) gave their consent to participate in the research study. The students came from countries such as Hong Kong, Mainland China, Mexico, and India with different backgrounds, such as teacher, publisher, school support staff, online educator, and fresh university graduates.

3.2 *Data Collection and Analysis*

Students' perceptions of the flipped learning course were collected using a questionnaire survey. The questionnaire was a 5-point Likert scale with eight items (see the Results section). The students' opinions were further gathered by six open-ended questions: "what are the advantages of flipped learning?"; "what are the disadvantages of flipped learning?"; "would flipped learning be useful for other subjects?"; "what improvements would you recommend to improve the flipped learning course?"; "what improvements would you suggest to improve the video lecture format?"; and "please state any other comments you wish to make about flipped learning." Students were also asked to rate the five different video lecture formats on a five-point scale, ranging from "not at all interested" to "very interested." Individual interviews (about 30 min each) were also conducted with 10 students. The interviews provided a more in-depth understanding of the participants' opinions toward flipped learning.

4 Results

4.1 *Quantitative Results*

From Table 2, it can be seen that most of the questions regarding learner' learning experience of the flipped learning approach implemented in the class received affirmative answers. About 80% of the participants indicated (agreed and strongly agreed) that a flipped learning course was more engaging than a traditional classroom. Close to 89% of participants indicated that they would recommend flipped learning to their friends. About 78% of participants reported that they liked to watch the lessons on video. Three-quarters of the participants agreed or strongly agreed that they liked taking tests and quizzes online. About 83% of participants indicated they liked to self-pace themselves through the flipped course. Seventy-two percent of the participants said they were more motivated to learn in a flipped learning course. Three-quarters of the participants reported that flipped learning had improved their learning. Finally, about 86% of the participants indicated that the use of digital game mechanics was helpful in promoting the success of flipped learning.

We can see from Table 3 that the participants most preferred the "instructor talking head + digital tablet writing" format, followed by the "instructor talking head + PowerPoint slides" format. Seventy-five percent of the participants reported they were very interested and somewhat interested in these two formats.

However, more participants ($n = 14$) reported they were very interested in the "instructor talking head + digital tablet writing" format, as compared to the "instructor talking head + PowerPoint slides" format ($n = 8$). The third most preferred video format was "Interview + PowerPoint slides" with 72% of participants

Table 2 Results of the survey on participants’ perceptions toward flipped learning (*n* = 36)

Question	SD	D	N	A	SA
The Flipped Classroom is more engaging than traditional classroom instruction	2	1	4	15	14
I will recommend the Flipped Classroom to my friends	1	2	1	18	14
I like watching the lessons on video	1	2	5	17	11
I like taking my tests and quizzes online using Moodle	2	3	4	19	8
I like to self-pace myself through the course	2	2	2	18	12
I am more motivated to learn in the Flipped Classroom	2	4	4	15	11
The Flipped Classroom has improved my learning	2	1	6	21	6
Gamification is helpful to the success of Flipped Classroom	1	1	3	17	14

Note SD strongly disagree; D disagree; N neutral; A agree; SA strongly agree

Table 3 Participants’ preference of the video lecture formats (*n* = 36)

Question	VI	SI	N	NVI	NAI
Traditional lecture format	6	15	11	3	1
Interview + PowerPoint slides	9	17	9	1	0
Instructor image + audio + PowerPoint slides	3	17	11	3	2
Instructor talking head + PowerPoint slides	8	19	5	3	1
Instructor talking head + digital tablet writing	14	13	7	2	0

Note NAI not at all interested; NVI not very interested; N neutral; SI somewhat interested; VI very interested

reporting somewhat interested and very interested. The “traditional lecture” format was the fourth preferred style (58%), while the least preferred format was “Instructor image + audio + PowerPoint slides” (56%).

4.2 Qualitative Results

The qualitative results collected via the six open-ended questions in the questionnaire, as well as from the individual interviews. Participants’ opinions will be presented under each heading below.

4.2.1 Advantages of the Flipped Learning Course

Many of the participants worked full-time in the day; or took several courses concurrently in the semester. Students found the pre-class video lessons provided them flexibility to learn at their own pace, such as viewing the video and answering the quizzes in their own spare time. Flipped learning eliminated the problem caused by different learning paces between strong and weak students in the classroom.

Self-pacing was therefore an advantage to the participants under the flipped learning setting. The use of Moodle also helped create a convenient online environment for the pre-class activities, discussion, sharing, and interactions among students. Students welcomed the use of YouTube in hosting the video lectures. Most students reported that YouTube is a convenient channel because it allows the videos to be played on all kinds of devices whether on a desktop or a mobile device (e.g., smartphone). Many students felt that the flipped learning course turned out to be more interesting than other classes they attended. Students stated that in the flipped learning course, they became more active participants instead of being a passive one in the class. Students also enjoyed the use of digital game mechanics (e.g., badges and leaderboard). Most students felt that these game mechanics motivated them to participate in the class activities.

4.2.2 Disadvantages of the Flipped Learning Course

Probably, the least favorite aspect of flipped learning was the increase in student workload in completing the pre-course activities, and some students needed time to adjust to this new approach. Not every student was willing to invest the time to watch the videos, answer the quiz, or complete other pre-class activities such as searching for a questionnaire survey and comment on it. Consequently, students who did not do the pre-class work would get less out of the in-class discussion.

4.2.3 Would Flipped Learning Be Useful for Other Subjects?

Most of the participants believed that flipped learning is applicable and practical for other subjects. Participants suggested that flipped learning might be particularly appropriate for science-related subjects because the complex molecule structure and mouth movement could be easily expressed via video. Students could replay the video for revision whenever they wished in a flipped learning setting. This is not possible in a traditional lecture setting because it would be unreasonable to ask the instructor to repeat the lecture many times. Students who had already understood the lesson would feel bored and irritated.

4.2.4 What Improvements Should Be Made to the Flipped Learning Course?

Several students suggested that subtitles be provided for all the video lectures. This would help non-native English learners to follow the video content more easily. One student recommended that the pre-class video be made available at least 72 h before the next face-to-face class in order to give students sufficient time to watch the video and complete other pre-class activities. Students also suggested that the duration of each video be not more than 10 min long. Other suggestions include

(a) providing a summary of key points at the end of each video, (b) incorporating other media such as animations in addition to video, and (c) showing the questions before the start of the videos so that students would be more motivated to watch the videos to find the answers.

5 Conclusions

To the best of our knowledge, this study is the first in Hong Kong to examine the use of digital game mechanics and various video lecture formats in a postgraduate Research Methods class. From the participants' perspectives, the flipped classroom was stimulating and engaging, which enhanced students' learning motivation. It also had the "flexibility" of supporting self-paced learning outside class and saved time for both instructors and learners in the class. Students could preview and review the video lectures and learn materials at anytime and anywhere. This provided an opportunity for students to prepare for the face- to-face lessons and get a better understanding of the content. We found that students most preferred the digital tablet writing + instructor talking head video format. This lends support to the findings of Guo, Kim, and Rubin (2014) who reported that "Khan-style tablet writing" tutorials tend to be more engaging.

The findings of this study should, however, be viewed with some caution due to the small participant sample size. Future research examining a larger sample size would be useful to help us generalize the results. In this study, we did not measure the actual duration of each student's video views. In future studies, we plan to use YouTube statistics to provide us an indication of the total viewing time of each video. Finally, although it is useful to understand students' perception and preference of using flipped learning, it is more important to examine whether the postgraduate students can acquire and use the knowledge comparable to traditional classroom setting. Therefore, in subsequent studies, we plan to carry out experimental studies that will interrogate this very issue. We also plan to examine the two video formats most preferred by students, namely the "instructor talking head + digital tablet writing" and the "instructor talking head + PowerPoint slides" formats. Future studies can be conducted to examine which of these video formats can significantly affect student attention and learning.

References

- Bishop, J. L., & Verleger, M. A. (2013). The flipped classroom: A survey of the research. In *ASEE National Conference Proceedings*, Atlanta, GA.
- Butt, A. (2014). Student views on the use of a flipped classroom approach: Evidence From Australia. *Business Education & Accreditation*, 6(1), 33–43.
- Garrison, R., & Vaughan, H. (2008). *Blended learning in higher education: Framework, principles and guidelines*. San Francisco: Jossey-Bass.

- Gilboy, M., Heinerichs, S., & Pazzaglia, G. (2015). Enhancing student engagement using the flipped classroom. *Journal of Nutrition Education and Behavior*, 47(1), 109–114.
- Guo, P. J., Kim, J., & Rubin, R. (2014). How video production affects student engagement: An empirical study of MOOC videos. In *Proceedings of the first ACM conference on Learning@ scale conference* (pp. 41–50). ACM.
- Love, B., Hodge, A., Grandgenett, N., & Swift, A. (2014). Student learning and perceptions in a flipped linear algebra course. *International Journal of Mathematical Education in Science and Technology*, 45(3), 317–324.
- O’Flaherty, J., & Phillips, C. (2015). The use of flipped classrooms in higher education: A scoping review. *Internet and Higher Education*, 25, 85–95.
- Roach, T. (2014). Student perceptions toward flipped learning: New methods to increase interaction and active learning in economics. *International Review of Economics Education*, 17, 74–84.
- See, S., & Conry, J. (2014). Flip my class! A faculty development demonstration of a flipped-classroom. *Currents In Pharmacy Teaching And Learning*, 6(4), 585–588.
- Simpson, V., & Richards, E. (2015). Flipping the classroom to teach population health: Increasing the relevance. *Nurse Education in Practice*, 15(3), 162–167
- Yin, R. K. (2013). *Case study research: Design and methods*. Sage Publications.

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