

Can TAs Learn Better by Flipping a Classroom with SPOC?

Lisa Law

Hong Kong Baptist University
AAB 803, 8/F,
Academic & Administration Building,
15 Baptist University Road,
Baptist University Road Campus,
Hong Kong Baptist University
lisalaw@hkbu.edu.hk

Muhammad-Hafiz Z.A

Hong Kong Baptist University
AAB 803, 8/F,
Academic & Administration Building,
15 Baptist University Road,
Baptist University Road Campus,
Hong Kong Baptist University
muhdhafiz@hkbu.edu.hk

ABSTRACT

This pilot study investigates whether the introduction of a new pedagogical approach, flipping a classroom with Small Private Online Course (SPOC) together with student-centred blended learning activities through mobile learning technologies, can enhance the learning performance of 51 (N=51) teaching assistants (TAs) in a course of training teaching assistants. Records of participants' participation in various pre-designed online activities like article and video reading, quiz, graded test, interactive discussion & feedback comment were analysed against their classroom participation performance and their final grades (i.e. learning performance). In-class activities were designed with the purpose to engage participants' in-class interaction by using various mobile applications, outside classroom augmented reality mobile learning trails together with worksheet, discussion, etc. for reinforcement and timely clarification of participants' online learning concepts.

Data collected in this study were validated by a mix-method approach involving both quantitative statistics and qualitative analysis. Quantitative findings demonstrated a strong correlation between online/classroom participation and the overall grade and suggested that flipping the classroom with SPOC together with innovative in-class mobile related activities did enhance the learning performance of participants. Qualitative findings (N=38) with the thematic focus through the written feedback, however, showed that a small number of participants did not enjoy this approach of teaching due to the extra time they spent on the online learning materials and thus preferred more face-to-face teaching for conceptual matters.

Further investigation can be carried out by comparing classes with different combination of participants to see the consistency of data collection and the impact of using mobile learning technologies to enhance participants' online learning performance.

Author Keywords

flipped classroom; small private online course (SPOC); blended learning; mobile learning technology

INTRODUCTION

One of the challenges of training elite teaching assistants (TAs) is that many of them pay so much attention to their current research studies but neglect the importance of developing their teaching skills to teach university students which is also 'bread and butter' to the University. Therefore, it is crucial for educators to develop innovative pedagogy to motivate and engage TAs to learn related learning theories, abstract concepts and practical skills in order to nurture their future students. Concerning that TAs and their target students in the future were raised as a techno-generation, the pedagogy should ideally be techno-related.

The course of training TAs is to equip TAs of the Hong Kong Baptist University (HKBU) with the required theoretical and practical skills to take up their teaching assignments. This course was originally designed as a 7-week face-to-face teaching since it first started few years ago. The course was then re-designed in AY2017/18 to a 6-week flipped classroom team teaching after taken the consideration of adopting SPOC via an e-learning development platform, as one of the University's new initiatives. Flipped classroom is a model where the traditional classroom and homework elements are reversed and viewed as a student-centered teaching approach (Jesurasa, Mackenzie, Jordan, & Goyder, 2017; Jing Ping, 2016). The use of personal mobile devices was integrated with the flipped classroom approach to enhance participants' in-class engagement level. The course was structured in such a way that core concepts of the syllabus were presented on a 3-week SPOC which participants were instructed to complete before the class. Classroom activities were designed to promote classroom interaction among participants and teachers (as facilitators) to reinforce their understanding and provide timely clarification of their online learning concepts. These activities required the utilization of mobile applications that has to be accessed from their personal mobile devices. This approach echoes what Wang (2017) suggested as creating a seamless and flexible environment satisfying students' autonomous motivation needs via a variety of learning modes. Wang has further evaluated that flipped classroom can facilitate student learning experiences

through pedagogies that engage students in in-class active learning activities with intense interaction among students and teachers. The facilitative role of teachers is to give students timely feedback and continuously assess their progress.

LITERATURE REVIEW

Flipped classroom

Flipped classroom is defined as a set of pedagogical approaches that moves most of the information-transmission teaching out of the class and use the class time for learning activities that are active and engaging. It also requires students to complete the pre and post activities learning online or through other mediums that were non-class based (Abeysekera & Dawson, 2015).

It has been suggested that the flipped classroom approach creates an active learning environment which increases students' performance and learning (Gross, Pietri, Anderson, Moyano-Camihort, & Graham, 2015). Precisely, it enables students to gain exposure of the content prior to in-class participation, allows instructors to assess students understanding or learning in class through students' participation so as to customise suitable teaching and learning activities in time (Rutherford & Rutherford, 2013).

Despite these benefits, studies refuting the positive effects of flipped classroom over traditional classroom have surfaced lately. For example, Jensen, Kummer, and Godoy (2015) found no significant difference between the two pedagogical approaches when active learning was present. The author posits that flipped classroom was just another means of creating the opportunity for active learning to take place. In addition, Gross et al. (2015) found that students who completed the pre-class activities fared better than those who did not. In that sense, completing the pre-class activities is crucial for students to benefit from the flipped classroom. However, Jing Ping (2016) suggested that studies examining whether students actually spend time on the pre-class or online learning were limited.

Mobile Learning

Mobile learning is defined as the ability to learn about the subject content across different situations and through social interaction on personal mobile devices (Crompton, 2013). It allows information to be easily accessible by students and provides collaborative learning practices that support multitasking and group activities which enable students to interact with others (Roehl, Reddy, & Shannon, 2013). Lending credence to the need to adapt mobile learning is the increasing reliance on mobile devices as a source of information. Chiang, Yang, and Yin (2018) postulated that such trends change the way students seek information. Putting the aforementioned studies together, there is a need to integrate mobile technologies and learning into current teaching practices.

One advantage of using mobile learning and technologies in teaching is increasing students' engagement level (Hung, 2017). The author posits that students were better engaged in class when platform such as clickers were introduced and students were required to respond using their mobile phones. The use of clickers such as Kahoot! can be viewed as a gamification technique which makes students more willing to participate in the quizzes (Martyn, 2007). However, it seems that the adoption of mobile learning in the form of clickers-like platforms was limited to traditional classrooms. Since there has been a limited use of mobile technology in a flipped classroom environment (Lin, Hsia, Sung, & Hwang, 2018), it remains unclear if the perceived advantages associated with mobile technologies could be transferred to a teaching approach such as the flipped classroom.

Current Study

This study seeks to investigate if the flipped classroom together with the integration of mobile learning technologies enhanced participants' online learning. Using mix-method approach, we first conducted quantitative statistics analysis by examining the correlations between participants' online/in-class participation and their overall grades. To have a better grasp of the whole picture, we also examined the correlation between the in-class participation and online graded tests.

Secondly, qualitative analysis was conducted to identify factors that may facilitate or hinder the implementation of flipped classroom and mobile learning from participants' perspective. Abeysekera and Dawson (2015) recommended that a pilot run of the flipped classroom to gather participants learning and participants experience being in such a class is recommended prior to any large-scale implementation of a flipped classroom. These feedbacks could prove valuable in identifying facilitators or barriers towards executing flipped classroom pedagogy in the institution. Of greater importance would be the identification of factors that were contextualized to local context. We hope to unearth such factors through the pilot run of the flipped classroom.

METHODOLOGY

Participants

There was a total of 51 (N=51) TAs come from different disciplines across the University enrolled in this new training course held in AY2017/18.

Course design - Flipping the Classroom with SPOC via an e-learning Developing Platform

The course aims to prepare TAs to take up teaching assignments in the University by providing them with an introduction to the basic theoretical knowledge and practical skills required for teaching at university level.

At the start of the course, participants were instructed to use the SPOC platform which was delivered via an e-learning development platform. The SPOC-flipped classroom can be broken down into three stages namely 'before class', 'in class' and 'after class'. Details of each stage are stated as follow:

Stage 1

This stage involves participants' self-paced study on the pre-designed SPOC learning materials before each class. Participants were expected to spend 2 hours per week for the 3-week online learning materials. The type of activities that were delivered through SPOC include the dissemination of new learning concepts through online articles or videos, online discussions and feedback, online quizzes to assess participants' formative understanding and online graded tests to reinforce their learning as a summative measure. A participant would have deemed completing the online SPOC lesson upon completing all of the lesson-associated activities online. Marks were given for the participants' online participation.

Stage 2

It requires participants to attend in-class lessons. The average duration of each class is 2 hours 30 minutes. Each lesson is facilitated by a course team of six persons. Participants were expected to participate in various in-class activities. Marks were given for their participation. In-class activities include the use of various mobile learning applications as Personal Response System (PRS) to assess participants' understanding of online learning materials in a formative manner, the use of augmented reality (AR) mobile technology to reinforce abstract concepts on academic integrity through an outdoor learning trail together with face-to-face lectures to recap and supplement any online learning materials, group discussion based on the given tasks or assignments, face-to-face group presentation and video presentation as part of the assessment tasks, etc. The use of student-centred PRS such as Kahoot! and Ureply etc. on their mobile devices to motivate participants' in-class participation and a breakdown of the learning activities utilising different mobile learning etools in each week are listed in Table 1 for reference. The course teachers were on hand to assist and facilitate participants' preparation for the group presentation and video production.

Table 1. A summary of the adoption of different mobile learning etools to reinforce participants' online learning concepts in each week.

Mobile eTools Used	Purpose	Participants' Involvement
<p>Week 1</p> <p>Kahoot! https://kahoot.it/</p> 	<p>Use it as a Personal Response System (PRS) for in-class quiz to assess participants' understanding of week 1 online learning materials in a gamification environment.</p>	<p>Every participant makes appropriate responses to the quiz setup with Kahoot! via their mobile devices. Teachers to make immediate correction(s) on wrong answer(s) if required.</p>
<p>Week 2</p> <p>uReply http://ed2.edvant.net/</p>  <p>padlet https://padlet.com/</p> 	<p>Use it as a PRS for in-class quiz to assess participants' understanding of week 2 online learning materials in a gamification environment.</p> <p>Use it as an etool for participants to post any of their concerned question(s) on certain topic(s) via their mobile devices inside the classroom for teachers' attention.</p>	<p>Every participant makes appropriate responses to the quiz setup with uReply via their mobile devices. Teachers to make immediate correction(s) on wrong answer(s) if required.</p> <p>An etool available for participants to post question(s) inside classroom if required.</p>

<p><u>Week 3</u></p> <p>uReply http://ed2.edvant.net/</p> 	<p>Use it as a PRS for in-class quiz to assess participants' understanding of week 3 online learning materials in a gamification environment.</p>	<p>Every participant makes appropriate responses to the quiz setup with uReply via their mobile devices. Teachers to make immediate correction(s) on wrong answer(s) if required.</p>
<p><u>Week 4</u></p> <p>Kahoot! https://kahoot.it/</p> 	<p>Use it as a PRS for in-class quiz to assess participants' understanding of assessment related matters in a gamification environment.</p>	<p>Every participant makes appropriate responses to the quiz setup with Kahoot! via their mobile devices. Teachers to make immediate correction(s) on wrong answer(s) if required.</p>
<p><u>Week 5</u></p> <p>Conduct an outdoor exercise on “Trails of Integrity & Ethics” by using augmented reality together with the mobile learning technology via a mobile App called “AR Learn”</p> <p>Details can be found via: http://ar-learn.com</p> 	<p>Use the augmented reality together with the mobile learning technology for participants to experience outdoor mobile learning trails. During the mobile learning trails, participants should be able to examine conceptual issues of academic integrity and ethics in the given scenarios. Participants can activate the four different scenarios (or 4 checkpoints) by using the 3 triggers as shown below.</p>  <p>QR Code scanner</p>  <p>IR (Image Recognition)</p>  <p>BLE (Bluetooth)</p>	<p>Participants use their mobile devices to download a mobile App called “AR Learn” and conduct the outdoor learning trails with 4 checkpoints and provide their own inputs in each of the scenario described in the mentioned App.</p> <p>Details can be found via: http://ar-learn.com</p> <p>Please click the video link below to showcase participants' involvement in conducting the augmented reality mobile learning trails.</p> <p>https://youtu.be/Dctuk2OkMYg</p>

Stage 3

The final stage was crafted to consolidate after-class (SPOC) learning. This was achieved through sharing of quality resources and knowledge among course-mates, self-revision of learning materials on SPOC after in-class activities, group discussion carried out outside classroom and individual reflective journal. Participants were also invited to give their written feedback on the course delivery at the last lesson.

Materials

The related assessment methods involved in this study are described below.

Online participation marks (15%)

The online participation marks consisted of quiz participation at the end of each key step for participants to self-examine their own learning and 2 online graded tests which covered the week's SPOC learning contents to consolidate participants' understanding. Each participation score contributes 7.5% of the overall grade of the course. Participants were able to earn a maximum of 4 points for online participation.

In-class participation marks (15%)

Participants were given marks for their in-class participation and contribution in various activities. A maximum of 4 marks could be earned by each participant. The marks accounted for 15 % of the overall marks.

Participant learning performance

Participant learning performance was measured through their final overall grade. The overall grade consists of (i) online and in class participation (30%), (ii) in-class group presentation and video production (50%) and (iii) individual reflective journal (20%). The overall marks were recomputed to a maximum score of 4.

Participants' were asked to give their written feedback of the course delivery in the last lesson by answering two questions (i) Describe some good points about the course? (ii) Describe some areas of the course that could be improved?

Data analyses

The purpose of using the statistical analyses was to investigate whether the SPOC-Flipped classroom enhanced students learning. Descriptive statistics were examined and reported. Pearson product-moment correlation analyses were conducted to examine if there were any relationship between the variables of interest. A positive and significant value suggests that the two variables are positively related i.e. an increase in A will lead to an increase in B. A negative value means the variables are negatively related. Non-significant relationship suggests that these variables are not significantly related. The software, 'Statistical Package for Social Sciences (SPSS)' version 24, was used to conduct the quantitative data analyses.

The focus of the qualitative data was to gather participants' feedback on the perceived advantages and disadvantages of the SPOC-Flipped based classroom. The texts were analyzed and key themes pertaining to the course delivery were outlined.

RESULTS

Quantitative analysis

The scores taken out from the related assessment methods in this study as explained above, namely, participant learning performance (i.e. overall grade), online quiz participation, online graded test and in-class participation for N=47 were analyzed.

A breakdown of the mean score (M) and standard deviation (SD), of the mentioned assessment methods is presented in Table 1. The highest mean score was recorded for Online Quiz Participation. This seemed to suggest that participants were using the SPOC as part of their learning.

Related Assessment Methods	Means (M)	Standard Deviation (SD)
Participant learning performance (overall grade)	3.39	.28
Online quiz participation	3.60	1.15
Online graded test	3.09	1.19
In-class participation	3.60	.56

Table 1. Means score and standard deviation (SD) of each assessment type (N =47).

A Pearson product-moment correlation coefficient was computed to assess the relationship of the following pair of variables:

1) Online Quiz Participation and Participant Learning Performance

There was a positive correlation between the two variables, $r = 0.70$, $p = 0.000$. Overall, there was a strong, positive correlation between Online Quiz Participation and Participant Learning Performance. Increases in Online Quiz Participation were correlated with increases in Participant Learning Performance as shown in Figure 1.

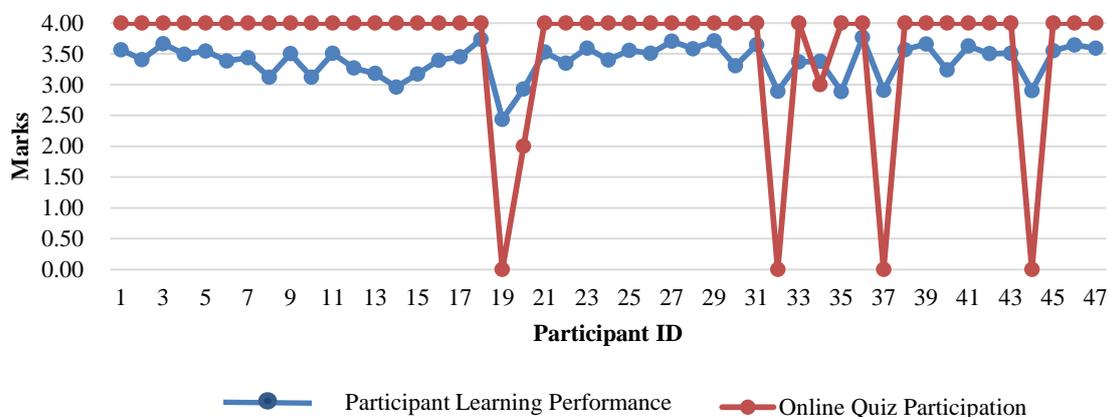


Figure 1. Relationship between online quiz participation and participant learning performance.

2) *Online Graded Test and Participant Learning Performance*

There was a positive correlation between the two variables, $r = 0.74$, $p = 0.000$. Overall, there was a strong, positive correlation between Online Graded Test and Student Learning Performance. Increases in Online Graded Test were correlated with increases in Participant Learning Performance as shown in Figure 2.

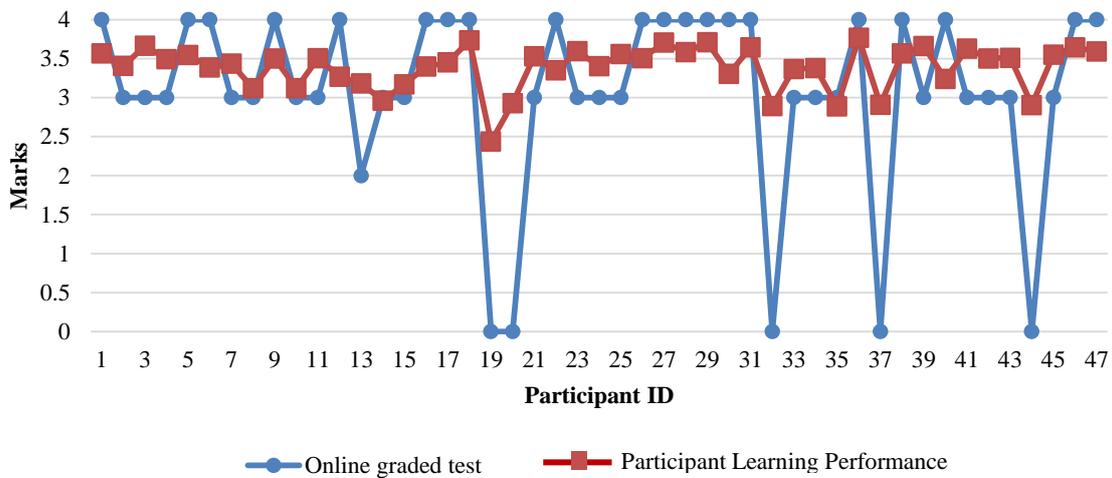


Figure 2. Relationship between online graded test and participant learning performance.

3) *In-class Participation and Participant Learning Performance*

A positive and significant correlation between the In-class Participation and Participant Learning Performance was observed, 0.55 , $p = 0.000$. This seems to suggest that there is a strong correlation. Increases in In-class Participation (with the use of mentioned mobile learning technologies and activities) were correlated with increases in Participant Learning Performance as shown in Figure 3.

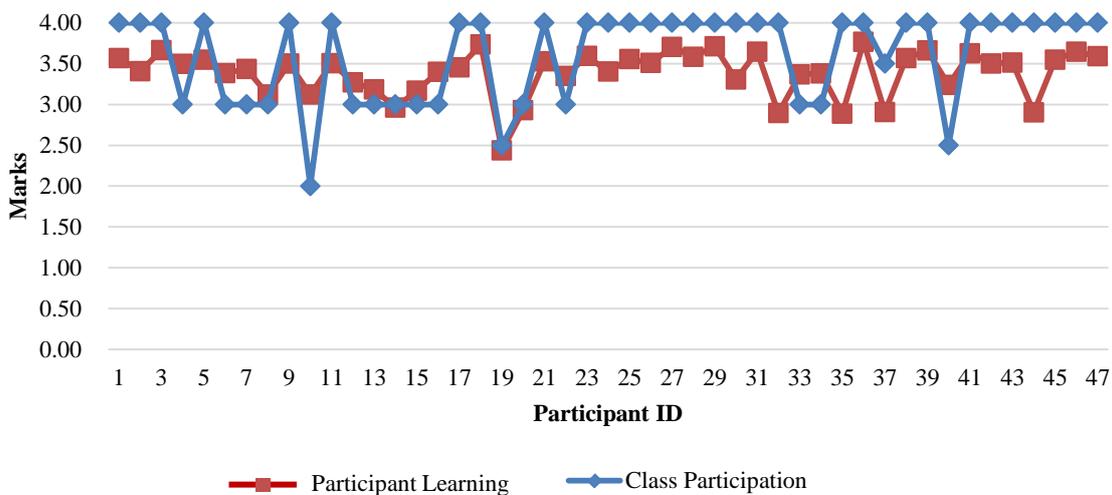


Figure 3. Relationship between in-class participation and participant learning performance.

A summary of the correlation between the variables in this study is shown in Table 2.

	Online quiz participation	Online graded test	Participant learning performance	In-class participation
Online quiz participation	1	.877**	.699**	.118
Online graded test	.877**	1	.740**	.197
Participant learning performance	.699**	.740**	1	.545**
In-class participation	.118	.197	.545**	1

Table 2. Correlation of variables ** Correlation is significant at the 0.01 level (2-tailed).

Qualitative analysis

Qualitative analysis was performed on the participants’ written feedback in the last lesson of the course regarding the course delivery. Participants were asked for their comments (if any) on the following two questions:

- Q1) “Describe some good points about the course?” and
- Q2) “Describe some areas of the course that could be improved?”

Their responses were analysed and key themes were identified based on the number of times these themes were mentioned. The top three themes and samples of their responses are provided in Tables 3 and 4.

Q1) “Describe some good points about the course?”

Three key themes were identified related to the advantages of the SPOC-Flipped classroom. The most frequent mentioned advantages associated with the SPOC-Flipped classroom were increased class participation and participant engagement. 40% of the respondents felt that the way the course was conducted provided them with opportunities to participate in the various class activities. 24% of the participants felt that the SPOC-Flipped classroom was a creative teaching pedagogy. The use of mobile technology (like PRSs and mobile learning trails) enabled the content to be delivered in an interesting manner. Finally, 11% provided feedback paid tribute to the role that teachers played. For example, one of them felt that the teachers aided their learning by reinforcing and making complicated concepts clearer in class. For the purpose of this reporting, although ‘others’ formed 25 % of the feedback gathered, the items under the category were not listed because they consisted of single responses such as ‘no comments’, etc. which are not significant enough to make any judgement or comment. Figure 4 below has presented the findings in the form of percentage breakdown graphically.

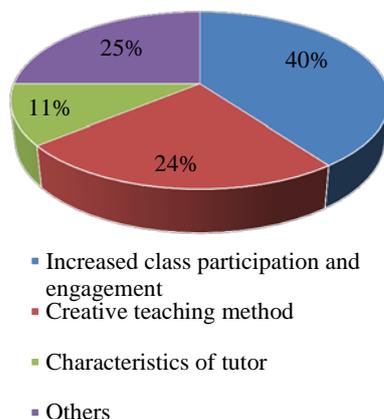


Figure 4. Advantages of adopting SPOC-Flipped classroom.

Key themes (N= 38)	Excerpts of participants’ responses
Increased class participation and engagement (15)	“...we can be involved in this class.”
	“Engage student very well...”
	“Many interactive activities...”
Creative teaching method (9)	“Interesting, useful.”
	“...video part is interesting...”
	“The course is presented in a rather lively and interactive way.”
Characteristics of teachers (4)	“They are all enthusiastic.”
	“Good communication, patient...”
	“The lecturers [teachers] are well prepared for every lecture, including the learning materials.”
	They have a great passion to teach us, even the topics are quite conceptual, hard to explain.”

Table 3. Excerpts of participants’ responses to the question of “Describe some good points about the course?”.

Q2) “Describe some areas of the course that could be improved?”

The top 3 disadvantages identified were i) Content, ii) Duration and iii) Unfamiliar with Flipped Classroom model (refer to Figure 5 for illustration). 13% of the responses mentioned that the Content was too much and the duration of the class was long. These participants felt that there were too much before class preparation work for them such as too much reading. At the same time, the class duration was not reduced. Thus, they felt that with the greater online presence, the in-class duration should be reduced. Interestingly though, there were participants who felt that more face-to-face lessons were needed. One participant mentioned that he/she preferred to go to class and learn instead of having to learn online. He/She felt uncomfortable that too much learning responsibility is placed on them.

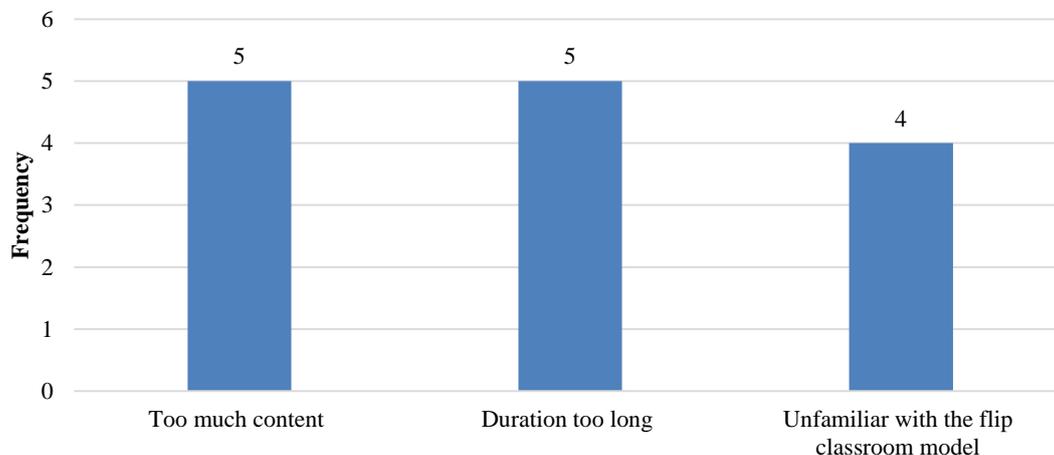


Figure 5. Disadvantages of adopting SPOC-Flipped classroom.

Key themes (N= 38)	Excerpt of participants’ responses
Too much content (5)	“It takes too much time for before-class activities”.
	“A lot of information has been given but sometimes I feel a little bit difficult to follow with professional terms.”
	“Too much activity may cause some loss of focus, tired students may treat it as “interesting but useless part” then allow themselves to be distracted for a while.”
Duration too long (5)	“Too long time”
	“...sitting through an hour to two hours of material before class and another 2 hours in class is a bit too much.”
	“...class flipping means we learn most of the content by ourselves, this may consume us much more time to learn the same thing when compare with the traditional teaching approach.”
Unfamiliar with the flip classroom model (4)	“The Flipped Classroom teaching approach is new to me.”
	“But the con is that there’s so much responsibility that has been put onto students.”
	“More living method (face to face)...”

Table 4. Excerpt of participants’ responses to the question of “Describe some areas of the course that could be improved?”.

DISCUSSION

The correlation analyses implied that the SPOC-Flipped Classroom enhances participant learning performance. The strong correlation observed in particular between Online Quiz Participation and the Overall Grade and the Online Graded Test is worth noting. This suggests that participants were likely to increase their Online Grade Test scores and Participant Learning Performance cores if they participated in the Online Quiz. The Online Quiz was meant to formatively assess participants’ understanding of online materials. Their understandings were also assessed through the Online Graded Tests as a summative one. Crucially, as the Online Graded Test was based purely on online learning materials, it added to the credibility that in our study, the SPOC-Flipped classroom enhanced participant learning performance.

The role of the teachers should not be neglected. The facilitative role that the teachers embraced to ensure that the teaching style suited the SPOC-Flipped classroom environment complimented the participant learning performance. Evidence of this was seen in Figure 3 that there is a strong correlation between in-class participation and the participant

learning performance. The purpose of the in-class activities with the use of mobile learning technologies and others was complimenting the online learning. Teachers provided guidance and assisted in clarifying participant's understanding of the course content as suggested by Wang (2017).

Participants' feedback on this pilot pedagogy served as valuable guidance for future SPOC-Flipped classroom endeavors. Participants identified increased classroom participation and engagement, creative teaching method and characteristics of teacher as the top three advantages of the flipped classroom. Having more classroom engagement and interaction enhances participants' understanding which in turn results in better overall grades (Gross et al., 2015). Characteristics of teachers have also been reported as key to the success of flipped classroom (Jesurasa et al., 2017). The authors also acknowledged that varying efficacy on the use of flipped classroom could be due to the personnel involved in the in-class teaching phase.

The current study highlights the effect of using mobile learning technologies on flipped classroom pedagogy. Increased engagement was made possible with the integration of mobile learning technologies with flipped classroom. The utilization of PRS through the various mobile applications that the participants could access via their mobile devices provided participants with the opportunities to participate in the classroom discussion as compared to the traditional class where only a few participants were given the chance to contribute to the discussion due to time constraints. Lin, Hsia, Sung, and Hwang (2018) found that effective integration of mobile learning technologies enhanced the benefits of flipped classroom. The collaborative learning experience that created by integrating the mobile learning technologies in the flipped classroom pedagogy allow participants to access learning materials more easily and more engaged in classroom discussions. Such integration can further enhance the benefits of adopting flipped classroom pedagogy in many subject teachings.

The top three grievances were related to the content, class duration and unfamiliarity with flipped classroom. There seemed to be a difference in expectation regarding the flipped classroom. Participants were unsatisfied that the duration of classes was too long or expected more face to face mode of lesson. Managing participants' expectation and satisfaction had been identified as a key factor determining the success of the flipped-classroom (Jesurasa et al., 2017). There is a need to ensure that participants truly understand what is expected of them and what flipped classroom entails since this will affect their satisfaction which in turn affect their learning (Gilboy, Heinerichs, & Pazzaglia, 2015). In our case, the unfamiliarity with the flipped classroom resulted in a small number of participants reporting that they felt overwhelm that the learning had to be done by themselves or preferred more face to face teaching for lecturers to explain complicated/abstract concepts. The addition of mobile learning technologies enhanced activities might also lead to an 'overloading' of participants' learning. They also seemed to use traditional classroom as a benchmark to what they perceived ought to be a 'normal' class, leading to some participants perceiving that the workload was much more as compared to traditional lessons.

CONCLUSIONS

To conclude, this pilot study highlighted the strong correlation between participant online learning via the SPOC-Flipped classroom with their overall participant learning performance. This study also described how the adoption of mobile learning technologies to enhance participants' learning performance of using flipped classroom pedagogy. It is therefore worthwhile to carry out further investigation by comparing few more classes of different combination of participants to see the consistency of data collection together with the use of different mobile learning technologies to enhance participants' online learning performance.

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