

An Exploratory Study in Flipped Classroom

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Abstract

Flipped classroom is an active learning strategy that used online material to review, with the classroom becoming the place to work through problems and advance concepts. The aim of this study is to examine students' perceptions on learning chemistry in a flipped classroom and their willingness to participate in a flipped classroom again in a matriculation college. One hundred and sixty-three students of a lecture group from Labuan Matriculation College participated in this study. Data were collected by using survey and interview which were analysed both quantitatively and qualitatively. Results of the study indicate that majority of the students were generally positive towards the flipped classroom and 86% of the subjects were willing to participate in a flipped classroom again. From this study, students' responses revealed that the benefits of the flipped classroom are that it: (1) captures attention, (2) gains prior knowledge, (3) facilitates control over own learning, and (4) enhances deeper learning. The findings imply that lecturer should provide videos which are short, simple, animated with subtitles, reflective questions and summary.

Keywords flipped classroom, perception, active learning, video, capture attention

INTRODUCTION

It is getting more challenging for educators in the twenty-first century to capture students' attention and engage them in active learning during lecture. Situations worsen when the learners are millennials, born between 1982 and 2002, who have been exposed to technology, information, and digital media at a very young age (Wilson and Gerber, 2008). They do not read much but, instead utilise a lot of media (Carlson, 2005). Millennial students find traditional lectures to be boring, unattractive, and not effective (Monaco and Martin, 2007).

Hence, an active learning approach must be employed to maximise in-class learning outcomes. There are many ways that active learning can be incorporated into the classroom. Flipped classroom is one of the active learning approaches.

The concept of flipped classroom has been made popular by Bergmann and Sams in 2012, they used online material to review and flipped classroom to become the place to work through problems, advance concepts, and engage in collaborative learning (Tucker, 2012). It inverts the traditional mode of the classroom where students listen to a lecture in class and then work on problems outside class. Benefits of the flipped classroom include its empowering of students to take control of their learning (Read, 2013), that it enhances deeper understanding (Bergmann and Sams, 2012), captures students' attention (Roehl et al., 2013), enhances active learning (Philips and Trainor, 2014) and results in the better engagement of students (Schell, 2012).

Though the flipped classroom has been widely used in other countries, it is still quite new in Malaysia. As a relatively new teaching strategy, it is not well researched, especially in the matriculation college environment. Past research findings showed that there was a positive perception of students on flipped classroom. However, there were also other findings that indicated negative perceptions. There were marginable holes in the research world regarding the perception of Malaysian matriculation students on the flipped classroom.

Objectives of Study

The objectives of this study are to examine the perception of Malaysian matriculation students on learning chemistry in a flipped classroom and their willingness to involve in a flipped classroom in the future.

Significance of Study

The findings of this research will help educators to obtain the views of students on the use of flipped classroom and their readiness to participate in flipped lesson in matriculation college.

Scope of Study

The findings focus on matriculation students' learning experience related to the flipped classroom but not the quality of instruction or any measure of student academic outcomes. This study relies heavily on the participants' ability and willingness to share their own thoughts.

LITERATURE REVIEW

Many studies have been carried out to identify the benefits of the flipped classroom. The flipped classroom promotes personalised learning as students can pause, rewind, and replay the video at their own pace, in which they gain control on their own learning (Gerstein, 2011; Heng, 2014; Read, 2013). Bergmann and Sams (2012) and Roehl et al. (2013) claimed that the flipped classroom strategy could help to gain students' attention in the classroom. Other findings showed that flipped learning empowers students to better prepare for class (Dobson, 2008; Zoller, 1999). Flipped learning also encourages deep understanding (Bergmann and Sams, 2012; Blair, 2012; Tucker, 2012).

Many studies have shown that students accept the flipped classroom positively. For example, Stone (2012) reported that 91% of his respondents liked the flipped strategy because it has improved their learning. In Johnson's study on his Pre-Calculus students in University of British Columbia, he concluded that 37 of the 63 students surveyed (59%) provided positive feedback about their experience in the flipped classroom (Johnson, 2013). In a study to investigate Actuarial Studies and Statistics students' views on the use of flipped classroom in Australian National University after experiencing the entire course

with this teaching style, Butt (2014) found that students views became far more positive towards the flipped classroom approach.

Nevertheless, there were studies that revealed negative perception on flipped classroom. Jaster (2013) reported that a majority of students actually voted to change from flipped classroom to traditional lecture approach in a first-year algebra course of Texas State University. It was due to the frustration with the over-demanding assignments and poor results in the first examination (Jaster, 2013).

Current literature focuses on the benefits of flipped learning and university students' perceptions towards it but lacks any study on Malaysian matriculation students' experience of flipped learning and their perceptions on it. Hence, this gap is filled through this study.

METHODOLOGY

Research Design

The study employed a mixed mode of qualitative and quantitative approach to explore students' perceptions of learning chemistry using flipped classroom and to get the insights of students' experiences of learning chemistry in a flipped classroom.

Sample

Students from one of the lecture groups of the researchers participated in this research. They were from Module 1, who took up Chemistry, Biology, Physics and Mathematics. The total sample of this study was 163 respondents. This comprised more than 30 % of the population of Module 1 students in the college.

The interview was conducted with two students from the group, which were purposively selected due to their willingness to participate in our interview.

Procedure

The research subjects were required to access a video produced by Khan Academy titled 'Real gas and van der Waals equation' through the official portal of the college a week before the flipped lesson. They then answered online quiz using the Kahoot.it website as an induction set to test students' prior knowledge on the topic. During the class, lecturer who were teaching the class concerned discussed higher order thinking questions with the subjects. After the lesson ended, the subjects individually answered questions in the questionnaire in 20 minutes. An interview was carried out two days after the lesson.

Data Collection Method

A survey was conducted by distributing questionnaires randomly to a total of 230 students at the end of the flipped class. A total of 163 response were collected. The questionnaire consists of a structured question and an open-ended question.

The interview was conducted two days after the lesson using open-ended questions. Only two students were willing to participate in the interview. The interview data was used

to supplement and extend students' perceptions on flipped classroom. The questions for the interview were as follows:

- i. Could you describe your experience of flipped classroom?
- ii. Do you think watching video is important for you? Why?

Data Analysis

To study the perception of students on flipped classroom, data was analyzed quantitatively by using descriptive statistics and data is tabulated in terms of frequency and percentage. Data collected from open-ended responses collected from the survey and interviews were examined, reduced and transcribed into a table manually. Repeated words in high frequency were then coded and emerged into four main categories supported by the findings of the literature reviews.

RESULTS AND ANALYSIS

The frequency and percentage of respondents who actually watched the video is shown in Table 1.

Table 1 Respondents who had watched and not watched the whole video assignment

Respondents	Frequency	Percentage
Yes	139	85.3%
No	24	14.7%

The reasons for respondents not watching the whole video are summarized in Table 2.

Table 2 Reasons for respondents not watching the whole video assignment

Reasons	Frequency
I have no access to video.	16
I don't have time to watch it.	7
I don't understand the content of the video.	5
I have a language problem.	2
I don't like watching videos.	1

The frequency and percentage of respondents who were willing to participate in a flipped classroom again is represented in Table 3.

Table 3 Respondents who were willing to participate in flipped learning in the future

	Frequency	Percentage
Yes	141	86.5%
No	22	13.5%

The responses of the open-ended question and interviews were grouped into four categories or themes, as shown in Table 4.

Table 4 Constructing of categories

Category/Theme	Sub-categories	Frequency
Capture attention	Don't feel sleepy	6
	Fun, interesting, enjoying	46
	Less boring	5
Gain prior knowledge	Know the basic ideas	6
	Prepare for a class	13
Control over own learning	Freedom to learn at their own pace	2
	Can pause, rewind and ask questions on the video	10
	Enables weak students to catch up with the better students	2
Enhance deeper learning	Improve understanding	32
	Save time for extra higher-level questions	2

Capture attention

Forty six respondents indicated that flipped classroom was fun and interesting and they paid more attention during the flipped lecture.

'I don't feel sleepy.'

'...a fun and interesting way of attracting the students' attention in learning chemistry.'

'...traditional lecture makes me sleepy because it consists of a lot of words.'

Gain prior knowledge

Nineteen respondents claimed that the flipped classroom was able to give them early exposure and allow them to gain prior knowledge before class:

I can learn in a more fun and interesting way aside from to being able to prepare before attending the lecture, which helps me to understand better.'

'The flipped classroom simulation has ensured that I obtain prior knowledge of the topic that is to be discussed. It was easier for me to digest the concept so, in a lecture, all that's left is checking whether I understand or not.'

'...give surface understanding regarding the topic before [it is] explained [in] detail during the lecture.'

'It encourages students to be more focus during lesson. Besides, during lecture, students will be more able to understand the objectives of learning.'

'Flipped classroom provide pre-lecture knowledge that help us to understand more in class.'

Control over own learning

Fourteen respondents admitted that using the video provided in the flipped classroom enabled them to have control over their own learning because they can pause, replay, or rewind the video:

'...through the video I can pause it if I think it is too fast. I can digest it slowly.'

'...students can even refer back to the lesson if they are unable to catch up.'

'...video allows students who need more time to understand certain concepts to take their time reviewing the material without getting left behind...'

Enhance deeper learning

Thirty four respondents indicated that if they watched the video before the lesson, it could free up some class time for discussion, problem solving, and other activities:

'It saves more time as we can further discuss more questions or theories with the lecturer...'

'...saves more time as we can discuss more questions or theories with lecturer.'

In addition, one respondent stated that the video on YouTube could link them to others videos available such as crash course on real gas which enhance self directed learning.

'...I was able to choose the video that can explain the topic using analogies that I can understand. An example of this is the Crash Course video link.'

DISCUSSION

A majority of the respondents which is 139 out of 163 respondents watched the whole video assignment and 24 respondents did not watch it. Sixteen of the 24 respondents claimed that they did not watch the whole video because they had no access to internet. Even though a free wireless networking (Wi-Fi) service was available, they claimed that they hardly used it since the streaming speed was too slow for viewing video. Moreover, free Wi-Fi was only available in limited locations in the college such as the library and reading room at the hostel. Not every student can afford a personal data connection, since high-speed data plan is still costly.

'I have no Internet access.'

'The Internet connection is too slow.'

Seven of the 24 respondents reported that they did not have time to watch the video. They were busy with other assignments and commitments at that time. Some even forgot that they had to watch a video assignment.

'I do not have extra time to watch it.'

'I forgot about watching the video.'

Five of the 24 respondents claimed that they could not understand the content of the video. The content may be too abstract for them. Only two of the 24 respondents stated that they had language problem. Poor command of the English language may discourage them from watching the video since the native speaker spoke with a certain accent and at a rate that is quite fast for these students, especially where subtitle was not available.

'I like watching chemistry lessons on video but I think the speed rate of the presenter is too fast. I can understand some of the content of the video but not all.'

'I have to repeat it five times in order to get what he wants to say because the person in the video only speaks but doesn't write anything, so we have to imagine what he is trying to say.'

Majority of the respondents (141 out of 163 respondents) stated that they would like to participate in a flipped classroom again. This shows that there were positive perceptions from matriculation students on the use of the flipped classroom. This was evident from the categories or themes that emerged from their responses to the open-ended question. The four categories are all benefits of flipped classroom, namely: (1) capture students' attention; (2) gain prior knowledge, (3) have higher control over own learning, and (4) enhance deeper learning.

Capture attention

Roehl et al. (2013) stated that the flipped classroom strategy could help to gain students' attention in the classroom. Unlike the traditional classroom, students no longer sit and listen to an instructor disseminating knowledge in an hour, but they will instead be involved in a more interactive discussion and problem-solving activities. This makes the class less boring and sleepy. Students' feedback in this study showed a marked consistency with the statement. Most of the students indicated that they were less sleepy in class compared to the traditional method, which is more teacher-centred. From the interview, one of the respondents claimed that the video captured respondents' attention with fascinating intonation and animation, which was not as boring as the black and white visual presentation in the traditional classroom.

Gain prior knowledge

When students watched the video, they were equipping themselves with some prior knowledge of the content. Gaining prior knowledge is crucial for students, especially facing

difficult topics that are hard to understand and solve. Students without prior knowledge do not have time to understand the facts and concepts being presented to them in the lecture because of an overloading of information (Zoller, 1999). When students could not understand or find meaning in the topic, they would choose to go towards surface learning, whereby they memorise facts and formulas just in order to reproduce them in examinations. This is consistent with a respondent's feedback in the interview in which the respondent claimed that gaining prior knowledge from the video gives them a good basic overview and better understanding.

Have higher control over own learning

Fourteen respondents indicated that the flipped classroom allows them to have higher control over their own learning. This is different from the traditional setting in which students may not clearly understand the contents once as replaying is impossible if they miss the important parts. By providing a video before class, students are given the freedom to learn at their own paces. They may pause or rewind the video, write down questions they may have and discuss these later with their teachers and peers in class. This is consistent with the statements of Read (2013) and Heng (2014) that flipped classrooms help students who need more time to understand certain concepts to take their time reviewing the material without getting left behind. As a result, this can improve students' achievement and also their behaviour in class.

The feedback from the respondents in the interview session further supports the importance of replaying video.

'I simply cannot absorb the content completely with only one take. It sometimes requires time to do so.' (Student A)

'It is helpful for students who slow in learning.' (Student B)

Enhance deeper learning

When students do flipped classroom, they could review the material; this enables them to ask better questions and work out more challenging questions in class. Moreover, they could understand the difficult content better. Some of the respondents stated that the flipped classroom can help lecturers free up some time in class to help them improve their understanding by working through problems, and advanced concepts that enhance deeper understanding. This is supported by Tucker (2012).

LIMITATIONS

This research only involves one lecture group in Module 1 of Labuan Matriculation College. Hence, this sample size is too small to generalise the finding to all the students in matriculation college.

One of the barriers to the success of the flipped classroom is the failure of students to watch the video because they have problem accessing the internet at the speed necessary. When students do not watch the video, they will feel lost and left out in the discussion

while the other students who have watched video are making progress towards problem solving.

In addition, the video adopted from the online source may not suit the needs of the instructor due to the length, content, or language of the video. This may urge the instructors to design or construct personal videos, which require additional time, effort and skills from the instructors.

SUGGESTIONS

To overcome the problem of internet access, instructors could just provide students with a hard copy, either in the form of a digital video disc (DVD) or universal serial bus (USB) memory stick, since most students nowadays could access to computers easily.

The video provided should be suitable to students' level of language, cognition, and listening skills. From the recommendations of students, a video is good if it is short, simple, animated, and more interactive with subtitles, quiz questions, and summary.

When instructors are new to the flipped model, it is suggested to start small, simple and not to get too ambitious. Instructors may start with a ready-made video from YouTube and work on topics that are difficult for students.

Good communication with students before the implementation is very important to ensure students understand why lecturers are conducting a flipped classroom and what happens if they do not watch the video. This may overcome the problem of students' resistance to the new model. This could also prevent students from skipping class thinking that they have already learned the topic through the video but missing the idea of the real benefits of the flipped classroom.

CONCLUSION

Generally, majority of the students gave positive feedback on the flipped classroom. A majority which is 85.3% (n = 139) of them watched the video and 86.5% (n = 141) of them would like to participate in a flipped classroom in the future. The findings showed that students enjoyed the learning of chemistry in the flipped classroom but needed more time to accept the new model. From this study, the benefits of the flipped classroom were: (1) captures attention, (2) gain prior knowledge, (3) control over own learning, and (4) enhances deeper learning. The findings imply that lecturer should provide videos which are short, simple, animated with subtitles, reflective questions and summary. Further research on the effectiveness of the flipped classroom on learning may be carried out in the future. However, the biggest drawbacks would be the difficulty in accessing the Internet on the campus. Better coverage and a more rapid internet may encourage more instructors to try out the new approach.

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