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Theme I: Innovative Learning Applications and Practices.

Flipped Classroom at the Defence University: A Pilot Study

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Flipped Classroom at the Defence University: A Pilot Study

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Abstract: Flipped classroom is now a well-accepted concept due to the demands of education to utilise digital technology for teaching and learning. What it means is that the students are now expected to read/watch/listen to the lectures through the learning management system (LMS) or an e-learning portal before coming to the classes. What traditionally was practised is that students were given lectures during face-to-face sessions. Now, students do their 'homework' with the help of the instructors *during* face-to-face sessions. The concept is now being used successfully in some higher learning institutions in Malaysia, including Universiti Sains Malaysia, Penang and Universiti Kebangsaan Malaysia, Selangor. In fact, the emphasis is given by the Ministry of Education, Malaysia for all higher learning institutions to incorporate the use of technology in teaching and learning. Given this, the National Defence University of Malaysia (NDUM) must also be prepared to rise to this challenge. This paper becomes a pilot study on the use of flipped classroom at the NDUM. The aim of this paper is to examine the perceptions of selected students on flipped classroom. To achieve this aim, questionnaires were distributed to 40 students from two different courses, Maritime Technology and Medical courses. Preliminary findings suggest that students were unsure of how flipped classroom can help them in their learning. This brings the attention of the researcher to key issues that must be resolved before the NDUM incorporates flipped classroom university wide.

Keywords: flipped classroom, defence university, face-to-face sessions, teaching and learning

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Introduction

Flipped classroom is fast becoming a well-received concept due to the demands of education to utilise digital technology for teaching and learning. According to Tucker (2012), flipped classroom allows educators to put their teaching videos, lecture notes or reading materials online, and students will have to access these before coming to classes. This gives students more opportunities to talk about the materials that they have accessed, and as such more *active* and *interactive* dialogues will happen in the classroom.

What this means is that the students are now expected to read/watch/listen to the online lectures through the learning management system (LMS) or an e-learning portal before coming to the classes. What traditionally was practised is that students were given lectures during face-to-face sessions. Now, students do their 'homework' with the help of the instructors *during* face-to-face sessions. The concept is now being used successfully in some higher learning institutions in Malaysia, including Universiti Sains Malaysia, Penang and Universiti Kebangsaan Malaysia, Selangor.

The drivers for using flipped classroom, which is part of the tools for e-learning, are twofold. The most important one was the National Higher Education Strategic Plan which was launched in 2007. This plan has outlined e-learning as one of its Critical Agenda Projects (CAPs). This suggests that all tertiary education providers must equip their institutions with some forms of online teaching and learning. This was then further strengthened by the launch of the National e-Learning Policy in April 2011. Again, the emphasis is given by the Ministry of Education, Malaysia for all higher learning institutions to incorporate the use of technology in teaching and learning.

Given this, the National Defence University of Malaysia (NDUM) must also be prepared to rise to this challenge. This paper becomes a pilot study on the use of flipped classroom at the NDUM. The aim of this paper is to examine the perceptions of students on the new concept of classroom learning. To achieve this aim, questionnaires were distributed to 40 students from two different courses, Maritime Technology and Medical courses.

Objective and Significance of the Study

The study aims to examine the perceptions of students on flipped classroom. It is critical that this study comes out with some basis for making the concept amongst the key teaching and learning strategies at the NDUM. As Malaysia is adamant about making e-learning and its tools part of the eco system in education, the students' awareness and acceptance must be gauged. As the end users of flipped classroom, students' awareness about and acceptance of new approaches to learning will lead them to be *more* prepared to use the approaches.

Research Questions

This paper has two research questions that will help to achieve the aim of the study. These research questions include,

1. Did the flipped classroom concept help the students to learn?
2. Students' Perceptions

(a) Did the students perceive the concept to be suitable for all courses?

(b) What are the perceptions of students towards the concept?

To facilitate discussion, this paper has four main sections including this introduction. The second section discusses some relevant literature on flipped classroom and one learning model, Kolb's model. The third section presents the findings of this study and it is divided into three sub sections including research methods, descriptive and inferential analysis of the findings. The last section analyses the data in detail, followed by a conclusion to the study itself.

Relevant Literature

This section analyses two aspects of the study in brief, including flipped classroom and Kolb's model. Research on flipped classroom demonstrates that the concept *can* empower students to take charge of their own learning. There is nothing new about flipped classroom (Lancaster & Read, 2013). In the past, students were expected to read a paragraph or a chapter before coming to class, and further discussion on the reading material will be facilitated by instructors in the classroom. The difference is just the delivery method or medium of 'flipping' and the time spent on delivering lectures during face-to-face sessions. With the need to use e-learning in Malaysian higher learning environment, flipped classroom through the LMS may encourage instructors and students alike to adopt technology in teaching and learning. Since flipped classroom could also foster learner autonomy, the technology can assist in this effort (Cullen, Harris & Hill, 2012).

Hamdan et al. (2013) argued that there are four pillars of flipped learning. Firstly, the flipping concept requires a flexible learning environment. This suggests that the instructors will engage the students using various methods of learning; all of which involve active participation from all students. Secondly, flipped classroom involves a shift in the learning culture. This is where the students are empowered to take control of their learning; how and what to explore depend on students' desires to learn and directions of learning.

Thirdly, flipped learning requires intentional content. According to Hamdan et al., instructors use intentional content to ensure that students master "conceptual understanding together with procedural fluency." Lastly, the concept expects that the instructors become Professional Educators, who are reflective educators and constantly finding ways to improve the learning environment in flipped classroom.

Further, students who are in flipped classes progress faster because they understand the lessons better (Papadopoulos & Roman, 2010). Perez and Dong (2012) also found that flipped classroom allows students to master design skills effectively. Other researchers suggest that flipped classroom also assists students' understanding of lessons in law, physics and thus, improves their retention of knowledge (see Bates & Galloway, 2012; Lemmer, 2013).

Notwithstanding this increase popularity of flipped classroom, there are also concerns about this concept. Amongst the critical ones is the fact that flipped classroom, as an approach, can be poorly executed. Sam and Bergmann (2012) argued that some instructors would totally replace *themselves* with videos uploaded online. Further, the skills of presenting through videos can vary between one instructor to the other, and the different styles of

presenting will have to serve various needs of the students. In addition to this, concerns are also heard on the access of the Internet (see Acedo, 2012; Schmidt & Ralph, 2014); this suggests that whether students are having the same amount of access at home or wherever they choose to view the online materials before coming to class.

It is argued that students become more autonomous when flipped classroom is adopted in the teaching and learning environment. Students will then use their experiences to learn and understand new ones. Many scholars (see Walsh, 2013; McCue, 2014) suggested that the learning theory to be adopted when using flipped classroom is constructivism. Constructivism is about allowing students to construct new knowledge based on their prior experiences. This study uses Kolb's model to explain how prior experiences assist students to be more constructive in their learning. Kolb's (1984) four stages of cognitive constructive learning model are based on his interest in the nature of individual and social change, experiential learning and professional education. Kolb, using his four stages of cognitive constructive learning model, demonstrated how learning is based on series of re-shaping and re-interpretation of experiences (Harkin, Turner & Dawn, 2001). The essential characteristics of his model are shown in Figure 1.

Concrete experience allows students to experience or immerse themselves in the "doing" of a task. At this stage, students simply carry out the task assigned without reflecting on it. The aim is to accomplish the task. Reflection on experience gives students the opportunity to review what has been done and experienced. The skills of attending, noticing differences and applying terms help identify subtle events and communicate them clearly to others. Communication, thus, requires students to be fluent in any language in order to verbalise and discuss their perceptions.

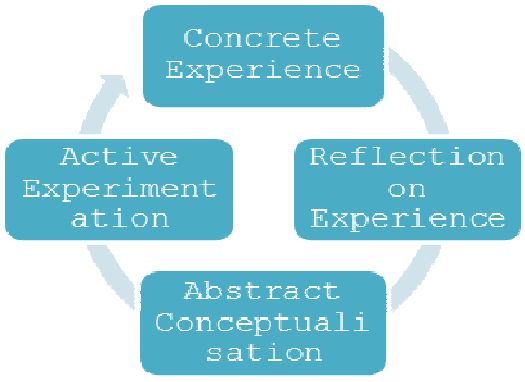

Figure 1. Kolb's Four Stages of Cognitive Constructive Learning
Source: Kolb (1984)

The next stage is abstract conceptualisations that require students to interpret and understand the relationships that exist. At this stage, theory might be particularly helpful as a template for framing and explaining events. Active experimentation or planning allows students to absorb the new understanding and translate it into predictions about what is likely to happen next or what actions should be taken to refine the way the task is handled.

Generally, students are able to enter the cycle at any stage and follow its logical sequence. The important point is that students are never conceived of as merely passive recipients of knowledge, as they are constantly engaged in learning through adjusting their experiences and constructing new information.

Kolb's model too has to face some challenges despite its wide usage in educational research. There is one critical issue that arises from Kolb's Cognitive Constructive Learning. The model takes very little account of different cultural experiences and conditions of learning (Anderson, 1988; Kayes, 2002). As most cognitive and communication styles are culturally-based, failure to consider this in the learning process might hinder students' progress in learning. As mentioned earlier, students' experiences play a vital role in their learning process. Thus, Kolb's model might not be suitable for students from different cultural backgrounds. Attention needs to be paid to the different models of *selfhood* and the extent to which these might differ from the 'western' assumptions that underpinned Kolb's model.

Despite this, this study adopts Kolb's model because it is able to demonstrate the importance of experiences in aiding students' learning. This is because students learnt best by doing things rather than just thinking about how they have done them. In actual fact, students' previous experience aids them in deciding how best to 'do' things. To reiterate, effective learning is seen to have occurred when a person progresses through Kolb's four stages (Harkin, Turner & Dawn, 2001).

Findings

Research Methods

The study adopts a quantitative approach to research by means of a survey. The respondents were chosen because they were the researcher's students in Semester 2, Academic Session 2013/2014 at the NDUM. There were 40 questionnaires distributed but only 37 were returned. This becomes the basis of discussion for this paper.

The items in the questionnaires were adopted from MHS Flipped classroom – Student Survey from surveymonkeys.com available online. There were three sections in the questionnaire. The first one is the demographic part of the respondents. The second section is on understanding flipped classroom, and the last section seeks students' views on flipped classroom and any other related issues pertaining e-learning. 5-point likert scale was used for items in Section B with 1 (Strongly Disagree), 2 (Disagree), 3 (Not Sure), 4 (Agree) and 5 (Strongly Agree).

Data collected were analysed using the Statistical Package for Social Sciences (SPSS) Version 18. Descriptive analysis includes using the frequency, mean and standard deviation. Further, inferential analysis uses correlation (Pearson) and chi square tests.

Descriptive Analysis

This sub section will be presented based on the research questions of the study. Nonetheless, it is important to present the data for the demographic information first because

they provide some basis of justification on the students' perceptions of flipped classroom. This demographic aspect of the respondents is further illustrated in Table 1. Further, it needs to be emphasised that in this study, the researcher refers to the LMS and flipped classroom (in the questionnaires) interchangeably. This is because part of the practice of flipping requires the use of the LMS. Thus, the questionnaire items that sought students' perceptions on flipped classroom used both terms, the LMS and flipped classroom to refer to this new concept of learning.

TABLE 1 DEMOGRAPHIC INFORMATION OF THE RESPONDENTS (IN PERCENTAGES)

Items/Variables	MT	MC	M	F	Y	N
Majoring in	38	62				
Gender			70	30		
Have Used the LMS					95	5

Eight items from Section B were able to provide answer for the first research question. Table 2 further illustrates the responses of the respondents on whether flipped classroom is able to assist their learning. The majority of the respondents agreed that flipped classroom has helped them in their own learning. Based on Table 2, the mean score of whether the LMS, that is flipped classroom has helped students in learning, is 3.78, which suggests that most respondents had chosen between Not Sure, Agree and Strongly Agree from the 5-point likert scale.

TABLE 2 RESPONSES FOR RESEARCH QUESTION 1

	N	Mean	SD
The LMS helped in learning	36	3.78	.866
Class activities are helpful to support learning	37	4.27	.838
Class activities relate to materials on the LMS	37	4.35	.588
Using the LMS and take notes	36	3.08	1.079
Using the LMS and stopped when needed	37	3.32	.884
Using the LMS and re-watched if did not understand	36	3.72	1.137
Using the LMS and paid 100% attention	36	3.92	.770
Using the LMS and marked when you have questions	36	3.25	1.131
Valid N (listwise)	35		

N = 37

It is argued that the class activities provided for the students have also helped the students and are extending students' understanding of the material in the LMS. The mean scores for both items are 4.27 and 4.35 respectively, which demonstrate that students perceived flipped classroom positively.

Table 3 answers the question raised in Research Question 2(a), which is whether students thought that flipped classroom is suitable for all courses. There are two items involved for this research question, and the second one is on the students' own experience and expectation whether the concept is suitable for them or not. Based on Table 3, it can be concluded that the respondents were having mixed perceptions on the suitability of flipped classroom for all courses (a mean score of 3.05). A better perception, though, can be seen for the suitability of flipped classroom for them individually (a slight increase of the mean score, 3.41). The researcher argues that this scenario is perhaps due to the respondents' lack of experience in and exposure of using flipped classroom before this, and the fact that this course was the only

course, which adopts flipped classroom.

TABLE 3 RESPONSES FOR RESEARCH QUESTION 2(A)

	N	Mean	SD
Flipped classroom suitable for all courses	37	3.05	1.079
Flipped classroom suitable for you	37	3.41	.956
Valid N (listwise)	37		

TABLE 4 RESPONSES FOR RESEARCH QUESTION 2(B)

	N	Mean	SD
Prefer flipping to traditional	37	3.35	1.033
Will you recommend flipped classroom	37	3.54	.989
Do you want to continue using flipped classroom	37	3.68	.944
Valid N (listwise)	37		

Table 3 is better supported by Table 4, which illustrates the responses for Research Question 2(b). It appears from Table 4 that the respondents were moderately in agreement on their preferences for traditional and flipped learning, recommendations for flipped classroom and preferences to further use the new concept. Again, what can be discerned from this table is that students were sceptical about flipped classroom. The researcher opines that their scepticism is not baseless. Being a new concept at the NDUM, students have yet to see the 'effectiveness' of flipped classroom in improving their learning.

Section C of the questionnaire probed into the respondents' opinions on flipped classroom. The summary of the respondents' comments is presented in Table 5. Out of 37 respondents, only 13 provided their commentaries on the new concept of learning (one student provided two different opinions). The respondents' comments were divided into five themes, and the frequency of the themes being chosen is recorded in the table.

TABLE 5 RESPONSES FOR SECTION C

Issues Raised	Frequency
Access to the Internet – Problems	6
Traditional way – Better	3
Flipped classroom – Interactive & Attractive	2
Flipped classroom – Convenient	2
Flipped classroom – Must be guided	1

The respondents' comments revolved around one of the concerns addressed in the literature on access to the Internet as well as on their preferences for traditional learning. Despite that, materials in the LMS are seen as interactive and attractive. Further, flipped classroom is perceived to be a convenient concept but the implementation of flipped classroom must be guided by the instructors.

Inferential Analysis

The researcher postulates that students will base their perceptions of flipped classroom with the learning experiences that they had undergone previously in terms of medium and method of learning. What can be established from Table 6 is that students' perceptions about flipped classroom were influenced by the strategies whilst engaging with the online materials. Although

moderately supported ($p<.01$ and $p<.05$, 2-tailed), respondents opined that the LMS helped them to learn. This suggests that flipped classroom has *moderately* helped students in learning.

TABLE 6 DID THE LMS HELP STUDENTS TO LEARN (PEARSON CORRELATION)

	1	2	3	4	5	6
LMS helped (1)	1	.088	-.058	.593**	.148	.006
Using the LMS and take notes (2)	.088	1	.062	.392*	.387*	.146
Using the LMS and stopped when needed (3)	-.058	.062	1	.086	.038	-.107
Using the LMS and re-watched if did not understand (4)	.593**	.392*	.086	1	.430**	.056
Using the LMS and paid 100% attention (5)	.148	.387*	.038	.430**	1	.090
Using the LMS and marked when you have questions (6)	.006	.146	-.107	.056	.090	1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

TABLE 7 HAVE USED AND FREQUENCY OF ACCESSING THE LMS (CHI-SQUARE)

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	3.830[a]	3	.280
Likelihood Ratio	3.221	3	.359
Linear-by-Linear Association	.397	1	.528
N of Valid Cases	33		

a. 6 cells (75.0%) have expected count less than 5. The minimum expected count is .09.

Table 7 presents the respondents' frequencies of accessing the LMS. Prior filtering was done and it is found that the majority of respondents accessed the LMS once a week (23 respondents chose this). This was then analysed using Chi Square test to see the relations between using the LMS and the frequency of accessing it. The test is significant statistically (x^2 (2) = 3.83, $p < 0.5$) between the frequency of accessing and using the LMS.

Discussion and Conclusion

Discussion

The previous section has discussed in brief the data collected through questionnaires and analysed using the SPSS Version 18. In general, only Research Question 1 has been answered positively by the respondents. The materials provided in the LMS have assisted the students to adopt flipped classroom easily. In fact students who provided comments (see Table 5), suggested that flipped classroom offers interactive and attractive way of learning.

Nonetheless, the respondents were having doubts on the suitability of flipped classroom for all courses and for themselves. The respondents were also sceptical about flipped classroom as a whole. Lack of exposure to and experience of flipped classroom has contributed to the hesitation of flipped classroom as a concept of learning. This finding supports an argument made in a report that the most fundamental issues to be addressed when flipping a class is the students' reception of the new learning environment (see Hanover Research). It appears that these respondents were not receptive because they were not able to link their previous learning experiences with this new learning approach.

Questionably, the respondents might not be *meaningfully engaged* in their learning; analysing this scenario using Kolb's model, the respondents could have gone through abstract conceptualisation, active experimentation and concrete experience stages, but they *might have* '*missed*' the reflection on experience stage. They failed to reflect on the different experiences

whilst using the flipped concept of learning.

The researcher argues that, apart from a further investigation into flipped classroom, the students at the NDUM are perhaps sceptical of any learning and teaching process that requires the use of technology. For one, the crucial challenge that must be solved is the Internet access for students to use the LMS and ultimately for the NDUM to implement flipped classroom. Although generally the penetration of technology and the Internet is high in Malaysia, the Internet access to some part of the nation is hindered by various factors. Ironically, the NDUM is located in Kuala Lumpur, at the outskirt of the capital city. Various reasons for the instability of the Internet access and connection at the NDUM will not be explained here due to lack of evidence to support these reasons. Thus, this becomes an internal issue for the NDUM to solve. Should the aspiration of the Ministry of Education, Malaysia be realised, the Ministry must ensure that all institutes of higher learning, including the NDUM, are given financial assistance to improve the infrastructure especially the bandwidth and computing facilities.

Further, the lecturers at the NDUM planning to adopt flipped classroom will require pedagogical and technical supports. These include training on the pedagogy of online teaching and how to plan for suitable learning activities to be used in the classes. As argued in the previous section, flipped classroom can be poorly executed due to various reasons. Moreover, flipped classroom is not to replace the much needed face-to-face sessions at the NDUM. It is to allow students a lead in learning since they are able to do the 'homework' first and come to classes ready to ask questions. Arguably, the lecturers must provide class learning activities that are related to the lessons or materials online and supportive of students' prior reading before attending the face-to-face sessions.

Conclusion

This paper is not without its limitations. Due to its limited number of respondents, the data and findings could only be used as preliminary data. Further, the methodology can be improved to also include qualitative data that can further complement the quantitative data. These limitations can be overcome in future research. Apart from these, perhaps the differences of students' academic majors too should be used as a variable in investigating students' perceptions of flipped classroom.

Flipped classroom is just another way of learning that *can* be successfully implemented. Its strength is that it is able to assist students to understand and prepare for their next classes, and thus come equipped to classes with questions and arguments to be discussed and debated with friends and instructors. Students' previous experiences of learning can be used to gauge the suitability of flipped classroom for future implementation. Without technology, flipped classroom can still be implemented, but the requirements of the Ministry of Education, Malaysia that must be met become the driving factor to use flipped classroom through the existing LMS at the defence university. In conclusion, based on the preliminary data, the defence university is still not ready to adopt flipped classroom at this point of time. Given ample period to promote flipped classroom and to improve the Internet access, flipped classroom can be a useful concept to enhance teaching and learning at the NDUM.

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