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FLIPPED: A Case Study in Fundamental of Accounting in Malaysian Polytechnic

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Abstract

The new pedagogical flipped classroom was designed, developed and implemented using Flexible environments, Learning culture, Intentional content, Professional educators, Progressive activities, Engaging experiences, and Diversified platforms, also known as the FLIPPED model. The objective of this study is to investigate the effect of student interaction and engagement in a flipped classroom on student's achievement, knowledge, skill and attitude (KSAs) towards the subject, and course satisfaction. This study used mixed method design; a 5 likert scale questionnaire with open ended questions had been distributed, and a pre-test and post-test design was carried out. The results were analysed using paired sample t-test and linear regression analysis. The findings of the study indicated no significant difference between the effect of student interaction and engagement on student satisfaction and KSAs except for student achievement. However, students had positive comments on the implementation, instruction and interaction outside the classroom. This study concludes that flipped classroom design and development could be implemented with improvements.

Keywords: Flipped classroom, Student interaction, Student engagement, Student satisfaction, Student KSAs and student achievement, Fundamental of accounting and Malaysian polytechnic institution.

Contents

1. Introduction

Flipped classroom, or specifically flipped learning, leads to change in teaching and learning for any courses that are still using a traditional approach. In Malaysian Polytechnic, this group includes accounting courses, where the majority of the examination marks come from calculating and preparing accounts, and institutions that do not have a high bandwidth for internet excess. Providing an Internet connection to all Polytechnic Institutions, would enable this group to use technology either in pedagogical approach, learning material or interaction between peers and lecturers at any time, any place. While this new pedagogical approach is trying to create an active learning environment, in the short term, it requires support from all parties involved, including the top management, either in giving full commitment to the development of video lectures or other material using instructional tools, using learning platforms or designing detailed lesson plans to implement the changes. The most important change is the traditional learning culture and environment that has been practiced since the beginning of teaching and learning.

Not to deny the application and indicate problems in traditional teaching pedagogy, the idea of using the flipped classroom as a platform to address issues and problems "if the technology and active learning will enhance learning" brings the need for the use of online video lectures and other learning materials outside the classroom, active learning and face to face inside the classroom. However, previous studies showed that technology can "slip" teaching and learning process if not properly planned and implemented. Based on the research studies and discussions made on flipped classroom instruction, the educators came to the conclusion that learning processes have to change because technology is added into the traditional instruction (Pierce and Fox, 2012; Wilson, 2013). A well designed and implemented flipped classroom instruction can help students prepare before class with basic knowledge of subject matter, interact with peers and lecturers before and after class, gives the opportunity to use technology tools for developing their own learning material, attract students to actively engage in class activities, and provide more in class time doing tutorials and assignments with the presence of peers and lecturers to understand the content.

The findings of previous studies indicate that integrating technology into instruction by flipping the classroom certainly improves student knowledge and understanding before class, engages with in-class activities and attracts students to explore more on the subject matter. However, it is not that student achievement relies on technology (Arnold, 2011; Siti *et al.*, 2014b). Likewise, based on Arnold (2011) book reviews on a synthesis of over 800 meta-analyses relating to achievement by John Hattie, Arnold (2011) argues that institutions not only know ''what works best'' in education, the benefit of educational interventions, the role of lecture as activator and adequate feedback improve learning. Siti *et al.* (2014b) study also found that changes to a student centered learning environment do not effect student achievement, although students were engaged in class. The discussion on the roles of technology in flipped classroom instruction, as a supporter in the learning and teaching process that enables better learning, resulted in the common view that just focusing on the use of technology and active learning activities would be wrong, learning should be the center of the interest and interaction (Clark *et al.*, 2014; Roach, 2014; Siti *et al.*, 2014a). For effective flipped classroom environments, exploring the effectiveness of new tools is necessary. It is important to understand how learning occurs in flipped classroom environments (Murray *et al.*, 2013). Therefore technology should be used in an appropriate way with the relevant methods but also structured accordingly, to support learning. Related with the use of technology in flipped classroom, Siegle (2013) states that "…one of the most popular trends in instructional technology does not involve new technology, rather it involves changing the way classroom instruction and homework are managed by reversing the traditional order of delivery."(p.51). By accessing the video lecture at home, students will be prepared with basic knowledge before class and classes are more learner-centered, rather than teacher-centered, where student are unprepared and gain new knowledge in class; active learning, rather than passive learning; shared, rather than owned; and explored rather that followed. This structure is given different names, such as blended learning, hybrid learning, reverse classroom, and inverted classroom. Therefore, these types of courses are referred to as flipped learning courses.

The flipped learning approach to instruction is basically in a form of video lectures and other material using learning platform components like online content, announcements, chat rooms, activities and other online materials before class, which also could be after class and face-to-face components like discussion, group work, completing assignments and tutorials and other active learning in-class activities. This type of instruction is meant to develop with new delivery of course content. The flipped course design is different from blended learning in that it combines the face to face and online modes of instruction in teaching and learning proses. Chen *et al.* (2014) and Crews and Butterfield (2014) provide some guidelines for flipped learning course design and development. This study used the models proposed for designing effective flipped classroom for higher education course design. These FLIPPED models are proposed by Chen *et al.* (2014) based on Flipped Learning Network (FLN) (2014) the four pillars of flipped learning in flipped classroom environment and provides additional guidelines for the designers of flipped classrooms as below:

i) Flexible Environment (F)

Allow educators to design a variety of learning modes and spaces according to student's needs. Students can choose when and where they learn before class and be flexible for in-class activities.

ii) Learning Culture (L)

Shift from traditional teacher-centered learning towards a student-centered learning approach, by fully utilizing in-class time for deep learning and creating rich learning opportunities to complete tutorials and assignments, with the presence of lecturers and peers.

iii) Intentional Content (I)

Design learning activities for students to develop their conceptual understanding, by determining the needs to teach and guide on what materials students should explore on their own, to maximize classroom time depending on grade level and subject matter with active learning strategies.

iv) Professional Educator (P)

Lecturers will play the role as activator continually observing students, providing adequate feedback, and assessing student work in the learning process. As well as co-operation with other lecturers and students to improve their instruction, accept constructive criticism, and tolerate controlled chaos in their classrooms or learning platform.

v) Progressive Networking Activities (P)

Lecturers need to apply different risk strategies for delivery activities at different levels; low-risk strategies in the early-adaption phase to high-risk strategies after adoption. This is due to the change of the learning forms because of familiarity of student's passive role.

vi) Engaging and Effective Learning (E)

Engaging an effective learning experience needs lecturer consideration on the best combination of structure, dialogue, transactional distance, and learner's autonomy by knowing what students need before class.

vii) Diversified and Seamless Learning Platforms (D)

New physical space of learning at home needs to be supported with digital platforms in order to provide a seamless learning experience both at home and in class. Therefore, to meet the criteria of student's knowledge domains for individualized, differentiated, personalized learning in a flexible, ubiquitous and seamless manner, these learning platforms need to be designed and operated in an active way.

Several studies show that the students prefer a flipped course structure (Pierce and Fox, 2012; Kim *et al.*, 2014). Similar studies (Davies *et al.*, 2013; Missildine *et al.*, 2013) investigated students' satisfactions of flipped classroom course mode. The findings of their studies indicated the knowledge gained by students before class had student's positive satisfactions (Missildine *et al.*, 2013) and lower satisfactions (Davies *et al.*, 2013) of the learning process. Studies on student achievement in flipped classroom courses for different educational levels shows that students were more successful in this type of course than traditional courses (Leicht *et al.*, 2012; Pierce and Fox, 2012; Murray *et al.*, 2013). This literature also shows that students have a positive satisfaction and attitude toward technology integrated flipped classroom courses. The main points of the literature lead to positive attributes of the flipped classroom design and development. However, there are limited number of studies that examine the effectiveness of the flipped classroom towards the achievement, Knowledge Skills and Attitude (KSAs), interactions outside classroom and satisfaction on overall fundamental of the accounting learning process. In this study, a FLIPPED model of instruction was designed and developed to deliver content of ''Adjustment Accounts'' topic in Fundamentals of Accounting course in terms of Principles of Accounting background in Malaysian Polytechnic Institution.

The objective of this study is to investigate the effectiveness of the flipped classroom in terms of student engagement inside and interactions outside classroom on students' achievement, KSAs and satisfaction in flipped learning instruction. The research questions that guided this study are: (1) Is there a significant difference between pre-test and post-test achievement in the flipped classroom environment? (2) Is there a significant difference between the effect of student interaction on student satisfaction, student KSAs and student achievement in a flipped classroom environment? (3) Is there a significant difference between student engagement on student satisfaction, student KSAs and student achievement in a flipped classroom environment?

2. Method

2.1. Design of the Study

This study conducted a mixed methods analysis to gain advantages of both quantitative and qualitative methods (Creswell, 2012). This study used quantitative student pre- and post-test achievement data, a questionnaire on student interaction, student engagement, satisfaction and KSAs and structured questions of overall student perception on flipped classrooms. A flipped classroom course covering adjustment accounts topic was designed and developed. The independent variable of the study was the flipped classroom course, student interaction and student engagement; the dependent variables were the satisfaction, KSAs and post-test achievement toward the topic. Details of the samples, instruments, procedures, and the flipped classroom instruction are below.

2.2. The Sample

The sample of the study was 85 students taking the DPA1013-Fundamentals of Accounting, core course for semester one students in Polytechnic Institution. A total of 150 students from different programs at the commerce department in Politeknik Tuanku Sultanah Bahiyah, registered to the course at the beginning of the semester. However, three classes out of seven that had been implementing the flipped classroom approach participated in this study. The sample was selected based on different programs offered in commerce department; Diploma in Accountancy (DAT), Diploma in Business Studies (DPM) and Diploma in Marketing (DPR) which have homogenous characteristic on the qualification of entrance for each program.

2.3. The Flipped Classroom Course

The adjustment accounts topic was designed and developed as a flipped classroom course for the purpose of this study. The flipped classroom course required two phases: the first phase was outside classroom using student learning time (SLT) that had been provided in the course syllabus at 2 hours per week, and the second phase was a full 4 hours of class time per week (Curriculum Development Division, 2010). In designing the flipped classroom, data on student needs on the ICT facilities were gathered. Then, based on the objectives and content of the topic from the standardized semester lesson plan, video lectures and other learning material was created and adopted using sharing platforms such as YouTube, other learning material and posted on the Blendspace learning platform. The lesson-learning platform was cerate from Blenspace.com (Figure 1). The learning platform included objectivist and constructivist elements. Objectivist structure in terms of content presentation structure of the learning material supported with constructivist elements like active learning activities as planned Jonassen (1998). The procedure of flipped classroom were using FLIPPED model by Chen *et al.* (2014) It aimed to help lecturers and students to flip

and not to slip the learning process of flipped classroom, on the content delivery of material in a structured manner as summarize in the Table 1.
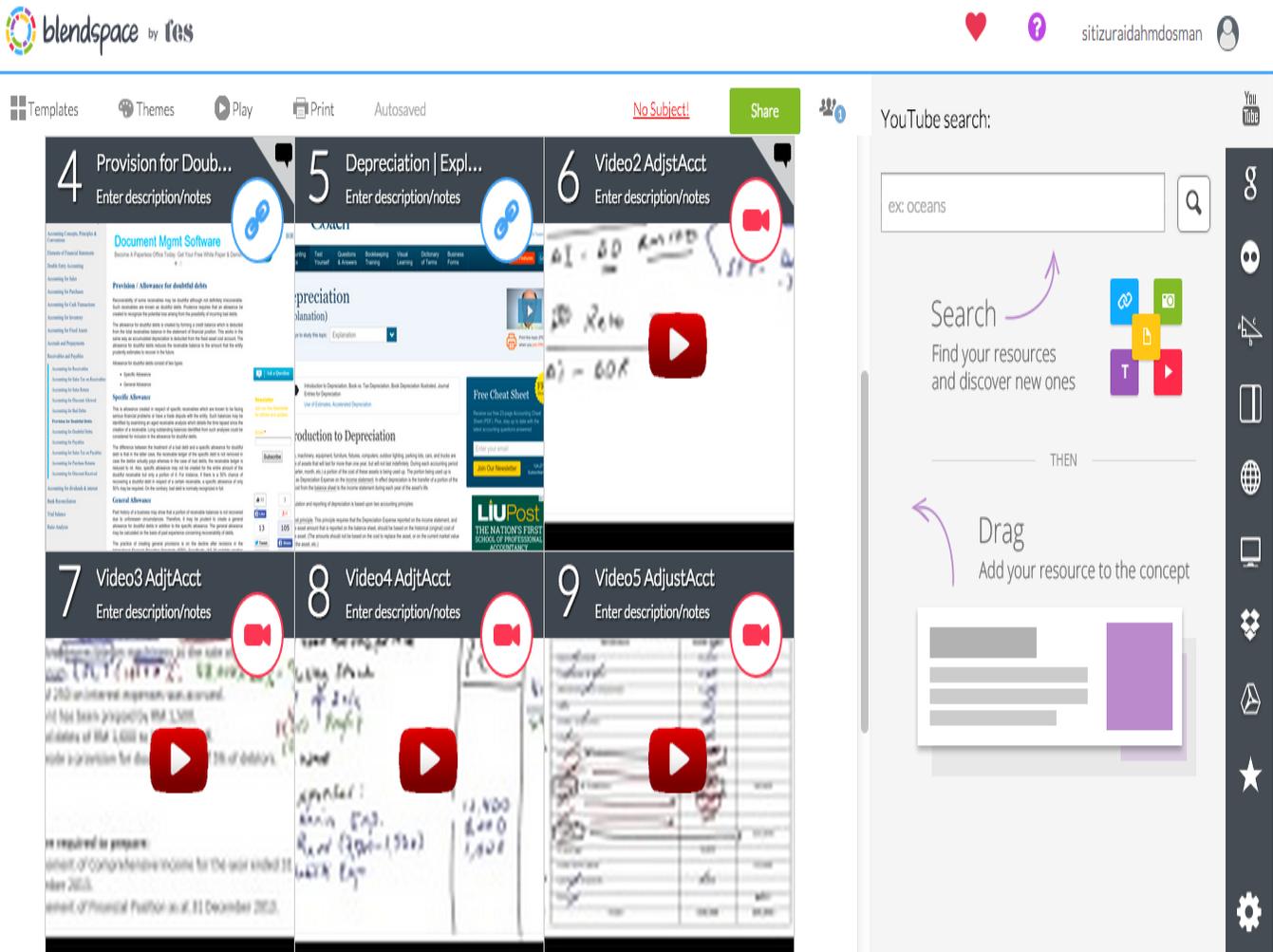

Figure-1. Screen Capture Blendspace learning platform

Source: http://bit.ly/1ksPvmF

Table-1. FLIPPED model learning process

Model	Learning Process	Instruction/material
F	Student will be ask to fill in the survey question on their needs throughout the learning process	Blendspace/survey form
L	Student will be watching the video lecture outside classroom and full in class time with lecturer and peers on completing assignment and tutorial. Both learning environment will include active learning activities	Blendspace/Pre-class assignment/tutorial exercise and workbook
I	Interaction outside classroom between student-material, student-student and student-lecturer will provide guidance for student to explore and use the knowledge to engage in class activities	Blendspace discussion board/ tutorial exercise and workbook
P	Lecturer play the role as activist in the discussion board and in class time	Blendspace discussion board/ tutorial exercise and workbook
P	Lecturer use Blendspace which was free, easy and user friendly for student to sign-up and log in and still have face to face time as traditional classroom.	Blendspace/ tutorial exercise and workbook
E	Based on student interaction on discussion board and pre-class assignment, lecturer will take consideration which part need to be emphasize to engage student with in-class activities	Blendspace discussion board/ tutorial exercise and workbook
D	Lecturer create video lecture that student need to watch and practice with workbook provided and play an active role in the learning platform to create student interaction and pre-class assignment for active learning activities outside classroom	Blendspace/ tutorial exercise and workbook

Source: Adapted from Chen *et al.* (2014).

2.4. Data Collection Instruments

An achievement test and questionnaire were used to collect relevant data in this study. The achievement test on adjustment accounts topic was used as a pre-test to measure students' prior knowledge and as post-test to measure knowledge acquisition on the course content. The achievement test was adopted from "Test 2" that had been prepared early in the semester by the course lecturer and will be kept in the continuous assessment file and will be used on the last week of the lesson after covering all the sub-topics. The achievement test consisted of one problem solving type question. The item of measuring students' satisfaction was adopted from Roach (2014). While student interaction, student engagement and KSAs were adapted from Kuo *et al.* (2014); Reeve (2013) and Adler and Milne (2010) had 57 five point-likert type. The items were all coded from 5 (strongly agree) to 1 (strongly disagree), expect for KSAs item which were coded from 1 (to no extent) to 5 (to great extent) for each statement. The answers on the student's perception on the overall learning process help to explain any quantitative differences about the subject. The alpha reliability coefficient of the questionnaire scale was .85 indicating that the instrument was highly reliable.

According to Nunnally (1978) (cited in Ogunkola and Archer-Bradshaw (2013) that stated the cut off value of 0.7 is acceptable. Thus, it can be concluded that the instrument used in this research is reliable.

2.5. Procedures of the Study

The activities of flipped classroom are shown in Fig. 2. At the beginning of the study, students will sign up and log in for a Facebook account which almost all the students have this social learning network account. Students will choose Adjustment Accounts lesson and start the first lesson of 2 weeks before class meeting. In the lesson platform, students need to answer the survey question on their need, then proceed to view the course outline with suggested activities by the lecturer. Next, students need to give feedback on the suggested activities and recommend others activities, as needed. Then, lecturers will take the consideration on the activities to be implemented in class. Every student has to be active and interact with peers and lecturers in the discussion board of the platform for each lesson. In order to be sure that all students view the video lecture and other learning material, they need to comment on the section that they view. Pre-class assignments will be given, for example, they need to create their own learning material based on the topic that will be discussed in-class. Marks will be given on the interaction, comments and completing the pre-class assignment.
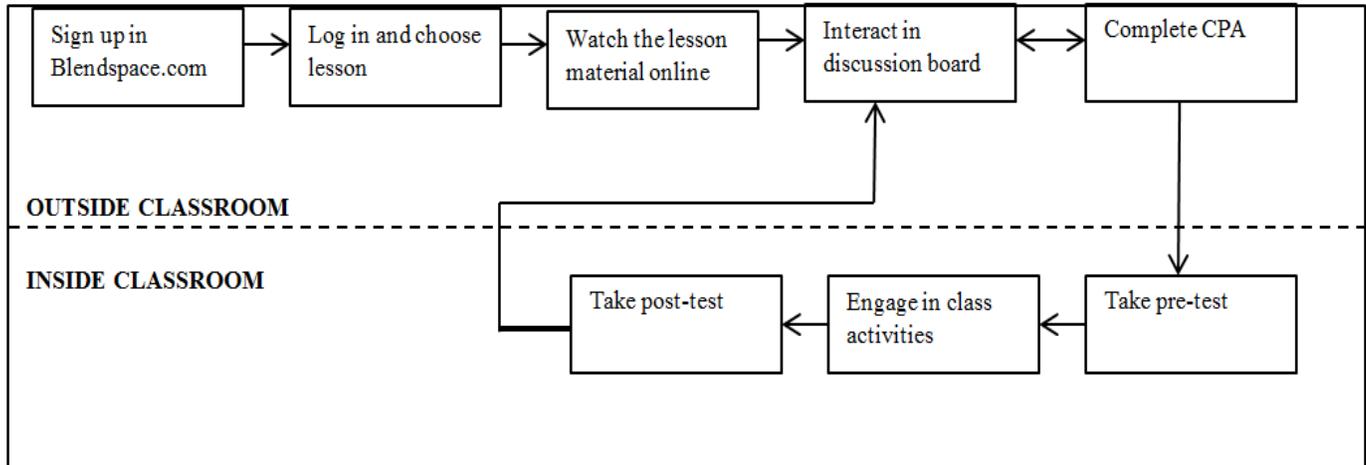

Figure-2. Activities in the adjustment account flipped classroom

After 2 weeks outside learning activities, the first process of in-class activities will start; "Test 2" will be taken as a pre-test before starting the lesson. T flipped classroom on adjustment accounts topic lesson will consist of a 2-hour class meeting twice a week. The same content will be covered for all classes and the lessons will last for four weeks. During a half an hour classroom meeting, discussion will occur on student problems on outside classroom activities and pre-class assignment they have to complete.

The student will engage with classroom activities with problem solving exercises and tutorials with group and individual activities, questions-answers about the problem and preparing the balance financial statement, with the guidance of the instructor. At the same time, the lecturer will play their role as activator by creating questions and environments that lead students to engage in class. Later on, students will interact in the discussion board for the next lesson. At the last meeting of the lesson after 4-weeks, students will take the same "Test 2" as a post-test and answer the questionnaire.

The data collected through the pre-and post-test and questionnaire were analyzed through descriptive and inferential statistics such, paired sample t-test and linear regression analysis using SPSS version 20.

3. Results and Discussion

The data collected through the pre-and post-test and questionnaire were analyzed through descriptive and inferential statistics such as paired sample t-test and linear regression analysis using SPSS version 20. The results were examined accordingly with the study's research questions.

3.1. Difference between Pre- Test and Post-Test Achievement in Flipped Classroom Environment

Regarding the first question of the study, Table 1 shows the results of the paired sample t-test performed in order to find the significance of the difference between pre-test and post-test mean scores in flipped classroom environment.

Table-2. Paired sample t-test of pre-test and post-tests score

		N	$\bar{x}$	SD	df	t	p
Student achievement	Pre-test	85	59.77	27.74	84	-2.66	.009
	Post-test	85	67.76				

Note: N=num. sample; $\bar{x}$ = mean; SD= standard deviation; df=degree of freedom

It was found out that the flipped classroom approach on adjustment accounts topics led to a significant increase in student achievement scores ($t_{(57)}$) = -2.66, p<0.05). The mean score of student achievement increased from 59.77 to 67.76. These findings show student interaction outside classroom and student engagement inside classroom in flipped classroom environment on adjustment accounts topics have an important effect on the design and development using FLIPPED model related to student satisfaction and KSAs. As a results of SD=27.74, students had a significantly higher achievement when implementing the flipped classroom compared to before the lesson started.

3.2. Difference between the Effect of Student Interaction on Student Satisfaction, Students KSAs and Student Achievement in Flipped Classroom Environment

Table-3. Correlation between student interaction with student achievement, student satisfaction and student KSAs

Model	R	R²
Student Achievement	.180[a]	.032
Student Satisfaction	.733[a]	.537
Student KSAs	.542[a]	.293

a. Predictors: (Constant), Student Interaction
b. Dependent Variable: Student Achievement; Student Satisfaction; Student KSAs

Table 3 represents the correlation between student interaction with student achievement, student satisfaction and student KSAs. In this case, the correlation between student interaction and student achievement is very low with the R= 0.180, and the effect on student achievement only 3.2% explained by student interaction, which is very small variation. However, compared with student satisfaction and student KSAs, where the R= .733; .542 which indicate high correlation between student interaction and student satisfaction and average correlation with student KSAs. In addition, with student interaction there is a large variation of effect on student satisfaction with 53.7% and only 29.3% on student KSAs, which is small. This result is most likely caused by students who are used to traditional classrooms and do not understand the topics explained by just looking at the video lecture. The students also commented that they are not familiar with chatting on the discussion board academically. Therefore, they enter the class prepared but with unanswered questions.

Table-4. Significance of student interaction in student achievement, student satisfaction and student KSAs ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
Student Achievement	Regression	2549.649	1	2549.649	2.778	.099[b]
	Residual	76174.845	83	917.769		
	Total	78724.494	84			
Student Satisfaction	Regression	12.393	1	12.393	96.208	.000[b]
	Residual	10.691	83	.129		
	Total	23.084	84			
Student KSAs	Regression	9.581	1	9.581	34.440	.000[b]
	Residual	23.091	83	.278		
	Total	32.672	84			

a. Dependent Variable: Student achievement; Student Satisfaction; Student KSAs
b. Predictors: (Constant), Student Interaction

The ANOVA was run at the 0.05 probability level as shown in Table 4 which indicates that the student achievement are not predictors of student interaction with ($F_{(1,83)}$=2.778, p>.05). The results provide evidence that student interaction in flipped classroom is not related to higher achievement. Previous studies have also shown inconclusive results. Similar to this study, Vinaja et al. (2014) found there is no correlation between the number of videos viewed and student achievement. This shows that accounting is learned by practice, watching a video or reading a text book may not be enough to acquire the KSAs (Adler and Milne, 2010). According to Foon and Sum (2014) study, the results shows that there is lack of student-student and student-lecturer interaction in online learning. Students also expressed their concern on the interaction outside classroom. Only gifted students interacted in the discussion board, others were afraid to ask questions and they felt that they could not understand the answer just by looking at the discussion board. Therefore, this study shows that, although students interact in the learning platform by watching the video lecture and completing the pre-class assignment, they would pass the test but not at a higher grade.

However, student satisfaction and student KSAs show a difference result with ($F_{(1,83)}$=96.21, p<.05); ($F_{(1,83)}$=34.44, p<.05). The results provide proof that student interaction in a flipped classroom is related to higher satisfaction and KSAs. Study by Kuo et al. (2014) also had found similar results that there is correlation between student interaction and student satisfaction and achievement but not equal depending on the course design. Thus, by using flipped classroom, students were highly satisfied with the interaction before class however they needed more hands-on and practical applications to have a higher skill (Cynthia and Joseph, 2014). Similar with this study, most of the students commented that they were prepared and have a little knowledge on what they will learn in the class. This means that, student interaction outside classroom in a flipped classroom gives higher satisfaction because more there is time allocated in-class and also increases student KSAs in accounting at a moderate level.

3.3. Difference between Student Engagement on Student Satisfaction, Students Ksas and Student Achievement in Flipped Classroom Environment

Table-5. Correlation between student engagement with student achievement, student satisfaction and student KSAs

Model	R	R²
Student Achievement	.107[a]	.011
Student Satisfaction	.545[a]	.297
Student KSAs	.609[a]	.371

a. Predictors: (Constant), Student Engagement
b. Dependent Variable: Student Achievement; Student Satisfaction; Student KSAs

Table 5 presents the correlation matrix for all dependent variables entering the regression model. The results show that all the dependent variable are positively associated with student engagement, the highest correlation coefficients, which are the model in a good fit for students KSAs with R=0.609 and student satisfaction, R=0.545 and student achievement are relatively low with R=0.107. These results also suggest weak associations between the student engagement and their achievement with only 1.1%. Although, student satisfaction and student KSAs correlations are significant, magnitudes of these correlations are relatively low with 29.7% and 37.1%.

Table-6. Significance of student engagement in student achievement, student satisfaction and student KSAs **ANOVA[a]**

Model		Sum of Squares	df	Mean Square	F	Sig.
Student Achievement	Regression	901.532	1	901.532	.962	.330[b]
	Residual	77822.962	83	937.626		
	Total	78724.494	84			
Student Satisfaction	Regression	6.863	1	6.863	35.119	.000[b]
	Residual	16.221	83	.195		
	Total	23.084	84			
Student KSAs	Regression	12.113	1	12.113	48.902	.000[b]
	Residual	20.559	83	.248		
	Total	32.672	84			

a. Dependent Variable: Student achievement; Student Satisfaction; Student KSAs
b. Predictors: (Constant), Student engagement

Table 6 shows no significant difference between the students' achievement and students' engagement in a flipped classroom (F $_{(1, 83)}$ = .962, p > .05). As a result, student engagement in a flipped classroom does not affect their achievement. Likewise, Siti *et al.* (2014b) results also show no correlation between the student engagement and student achievement. This shows that students that highly participate in-class may not get higher results although the achievement increases positively. In addition, Jaster (2013) had found that students who engage in note taking has an effect on their grades compared with watching the video lecture outside classroom. Therefore, this study has proved that student engagement in class by just doing discussion and presentation does not affect their achievement in the test.

On the other hand, student satisfaction and student KSAs shows contrasting results with the achievement, ($F_{(1,83)}$=35.12, p<.05); ($F_{(1,83)}$=48.9, p<.05). The results provide evidence that students with high engagement in-class activities in a flipped classroom has an effect on higher satisfaction and KSAs. Reeve (2013) shows that student engagement will lead to student satisfaction and achievement by adding agentic engagement which includes student's needs in the learning process. In this case, students were highly satisfied with the engagement in-class and improved their KSAs in the adjustment account topic (Adler and Milne, 2010). The results of this study also indicate that, although student engagement has a significant effect on satisfaction and student KSAs in flipped classroom, the variation of the effect is at a moderate level. Moreover, most of the students also desired that the lecturer provide more practice in the classroom with answers shown by the lecturer. They also commented on the role of lecturer in-class, to be activists on leading the discussion and not just let the students discuss among themselves.

4. Conclusion and Implications

The findings of the study indicated that the students' interactions and engagement in a flipped classroom had no correlation on the levels of achievement in the adjustment account topic in a flipped classroom. The literature (Flumerfelt and Green, 2013; Kazu and Demirkol, 2014) indicates increased or high levels of achievement in flipped classroom courses. However, the findings of this study proved otherwise. Murray *et al.* (2013) and Missildine *et al.* (2013) pointed out students' positive perceptions of flipped classroom courses. Further to this, this study show significant differences in student interaction and student engagement on student satisfaction and student KSAs toward the adjustment accounts topic, and had high levels of satisfaction in this study. It can be stated that this result is concurrent with the literature. One of the reasons for positive high level effect of student interaction on student satisfaction and moderate level on student KSAs might be students have preparation before class and basic knowledge on the subject matter attract them to learn the adjustment accounts topic covered in the course. The course was a compulsory course for the participants of this study, and they have been informed on the implementation of a flipped classroom on adjustment account topic a week earlier for preparation. This could be the reason on the effect of student interaction and engagement with average level of student KSAs. Even though it was not included as a measured variable, student motivation (Keller, 2010) and motivationally supportive classroom condition (Reeve, 2013) could be one of the reasons for the positive effect of student interaction with high satisfaction levels. Another consideration could be flipped classroom courses addressed the students' needs before class, and resulted in a positive effect on student engagement in the classroom with high satisfaction. Therefore, it can be concluded from the findings that a flipped classroom in adjustment accounts topic is approximately similar to a traditional classroom in regard to achievement, satisfaction and KSAs in Polytechnic institution.

In the literature, there are some research studies that examine students' achievements and KSAs in flipped classroom instruction by focusing at student interaction outside classroom and student engagement inside classroom. In that point, the current study believes that these results could help and guide other lecturers in designing and developing flipped classroom courses. Before pointing out the implications of this study, it should be considered that which variables lead to success in flipped classroom have not been proved yet. Indeed, flip leads to a change in pedagogical approach, which considers integrating technology, especially outside the classroom. This is because researchers believe that all students have an excellent foundation on using the technology, especially in online communications. However, results may be due to familiarity of a traditional classroom that presents difficulty for students to adapt the technology with their practice in daily lives. Considering the output of a flipped classroom at the end of the design and development depends on the procedure and process of learning and how it will be

supported. There is no doubt that the focus should not be only on the use of technology and in-class activities but also emphasize the role of student and lecturer as motivational support so that students, lecturers and instruction will not slip but flip. The design and development should be based on deeply rooted learning theories such as Gagne Nine Events of Instruction (Gagne *et al.*, 1992) and supported by Cognitive Theory of Multimedia Learning Mayer (2001) and Ryan and Deci (2000) Self Determinant Theory, in order to apply innovative and interactive learning strategies to instructional design. This could be applied for more structured and effective flipped classroom instruction.

Flipping of technical courses, such as accounting, requires students to understand technical terms and format that should be made based on students' prior knowledge of accounting. Students with no background can be lost and give up easily when they have difficulty in understanding and knowledge about the subject matter. Therefore, it is recommended to consider student knowledge background and to provide students with detailed flipped classroom lesson plan when designing the flipped classroom course. At the same time, when developing flipped classroom instruction with new and interactive learning tools, student, lecturer and institutions facilities ability to support should be emphasized on producing the best instruction. The main finding of the current study was that there was no significant difference in effectiveness between student interaction and student engagement on student achievement. However, it is effectively significant on student satisfaction and student KSAs. This is positive result, since students full face to face class time that were successful in completing the assignment and tutorial in-class, which means about 0% of teaching time and 100% of cost reduction by using free and easy instructional tools. The question is how could this finding be used for changing the culture and to deal with the high demand in the working field? That might be a generalization beyond the variation of this study, as we can claim there that flipped classroom instruction can be implemented for Fundamentals of Accounting course. To make more generalizations there is a need for further research studies in different topics, other courses at different higher education level, and with different design and development models and process. Therefore, implementing flipped classroom is not only dependent on the method, but involves a change of culture and mind on both good students and lecturers as instructional designer in higher education specifically to Fundamental of Accounting course in Malaysian Polytechnic.

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