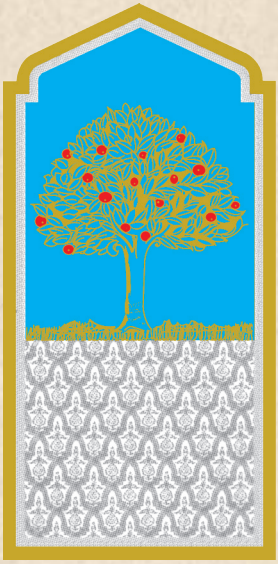

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LETTING THE LEARNERS LEAD: ADAPTING FCM TO ENHANCE LEARNER MOTIVATION, INTERACTION AND ACADEMIC ACHIEVEMENT[1]

Abdul Shakour Preece
Popoola Kareem Hamed

Abstract

The purpose of the research was to establish whether 'blended learner-led learning' could impact learners' motivation, interaction and academic achievement. The researchers set about adapting Flipped Classroom Method by allowing small teams of undergraduate students to share the responsibility of preparing online materials and then administering them using Flipped Classroom Method, under the guidance and supervision of the lecturer. Flipped Classroom Method is currently a popular pedagogical approach that utilizes instructional technology combining face to face learning with online learning. This has a number of advantages: it allows learners to access materials online at any time or place and engages learners in a more active, constructivist learning environment. However, it poses challenges for teachers and students who are more used to a conventional approach to teaching and learning because it challenges a traditional teacher-student relationship where the teacher is seen as the central authority for knowledge and learning. Moreover, it requires a lot of effort on the part of the teacher to prepare all the online resources. The researchers conducted a quasi-experiment with an undergraduate course called 'Curriculum and Instruction' that lasted five weeks. The purpose was to see the effects of blended learner-led learning on students' motivation, interaction and academic achievement. The results show that blended learner-led learning had a statistically significant impact on all three for the experimental group. Consequently, it represents a viable alternative for instructors

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seeking a constructivist pedagogy that maintains adab and respect for the teacher.

Keywords: Learner-led, FCM, Achievement, Motivation, Interaction.

Introduction

For Muslims, the Prophet Muhammad (S.A.W) is without doubt the pinnacle of pedagogical excellence, since he was divinely inspired and tasked with the job of transforming mankind, starting with his own community in the Hejaz (the Arabian Peninsula) in the 6th century CE and subsequently the whole Muslim *Ummah* (nation). From his example we learn the necessity of the pursuit for excellence (*itqān)* in all matters, not least education. It is therefore incumbent upon Muslim educators to draw on all the resources at their disposal; looking East and West to discover modern developments in education. The proponents of Islamization of Knowledge (IOK) refer to two realms of knowledge, revealed and acquired, which must be studied in order to reap the benefits of both, while protecting ourselves from the harms of the latter (Al-Attas, 1999). Yet one of the challenges facing Muslim educators today is how to reconcile modern pedagogies such as constructivism with teachers and learners who are used to a more traditional style of teaching and learning. An approach where students tend to be passive and teachers dominate instruction. In such cases, constructivism may be deemed to undermine the status of the teacher by encouraging learners to be overconfident or too independent.[2] It is the contention of the authors that this problem can be overcome by using an approach that combines modern constructivist methods utilising instructional technology, under the supervision of the lecturer. In other words, learners gain independence but still refer to the lecturer for guidance before, during and after the learner-led process. This promises more

[2] Adler, Nancy J., and Hans Hansen. "Daring to care: Scholarship that supports the courage of our convictions." *Journal of Management Inquiry* 21, no. 2 (2012): 128-139.; Chen, L. L. (2016). Impacts of flipped classroom in high school health education. *Journal of Educational Technology Systems,* 44(4), 411–420.

autonomy, interaction, motivation and academic achievement for learners.

In spite of the advantages of Flipped Classroom Method (FCM), Stayer claims that there is a lack of quantitative data confirming the effectiveness of FCM[3] in higher education. A review of the limited literature about FCM reveals mixed views from students about FCM. In some studies learners found it to be superior to conventional lecturing, while in other studies, students recounted a lower level of engagement, motivation and interaction.[4] It is for this reason that the researchers set out to measure the extent to which an adapted version of FCM called 'blended learner-led learning' (B3L) could influence undergraduate learners' motivation, interaction and academic achievement.[5]

Blended Learning and Flipped Classroom Method

According to Staker and Horn (2012) blended learning equates to formal education that combines online learning with face to face learning. The online content delivery gives students choices about where, when and how they access the online materials, whereas face to face instruction, by a teacher or lecturer, occurs at a formal location that is remote from learners' homes. FCM, on the other hand, is a rotational-model that provides learners with teacher-guided practice in-class as well as online content. Like blended learning if offers flexibility about where, when and how learners study the online component; however, unlike blended learning, FCM does not require instruction by a teacher in the classroom. Instead, learners experience activities and tasks that test their understanding and application of the online content.[6]

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[3] Strayer, Jeremy. "The effects of the classroom flip on the learning environment: A comparison of learning activity in a traditional classroom and a flip classroom that used an intelligent tutoring system." PhD diss., The Ohio State University, 2007

[4] Huang, Hsiu-Mei, Shu-Sheng Liaw, and Chung-Min Lai. "Exploring learner acceptance of the use of virtual reality in medical education: a case study of desktop and projection-based display systems." *Interactive Learning Environments* 24, no. 1 (2016): 3-19.

[5] Grypp, Lynette, and Jennifer Luebeck. "Rotating solids and flipping instruction." *Mathematics Teacher* 109, no. 3 (2015): 186-193.

[6] *Classifying K–12 Blended Learning By Heather Staker and Michael B. Horn (May*

Blended Learner-led Learning

To address the needs of teachers and learners in the 21st century, the authors adapted FCM making it learner-led. The model evolved over several years being administered to numerous classes of undergraduate and post-graduate students. Eventually after development and refinement of the different processes such as: modeling, consultation, record keeping, assessment, materials design and instructional strategies, it culminated in learners team-teaching their own classes using FCM. This was essentially flipping the flipped classroom. The name given to the approach was 'blended learner-led learning' or 'B3L'. In B3l, student-teams are assigned topics from the course outline and take turns to prepare and implement a classroom session, under the supervision of the lecturer. In this way, B3L combines a constructivist learning environment with learner-centred approach; offering learners several advantages in terms of interaction, motivation and academic achievement, as will be seen. Nevertheless, it maintains respect between the lecturer and the students because students operate under the guidance of the lecturer. It was only after implementing B3L for several years that the authors discovered a study conducted at Monash University that combined blended learning with team teaching for pre-service Music teachers. This was encouraging as it gave support and credibility to the ideas of the authors of B3L with Crawford and Jenkins claiming that, "Team teaching and blended learning provided a platform from which to deconstruct this complex triad and its interrelated dimensions, providing visible understanding that connected contemporary skills to practice"[7]

Conceptual Framework

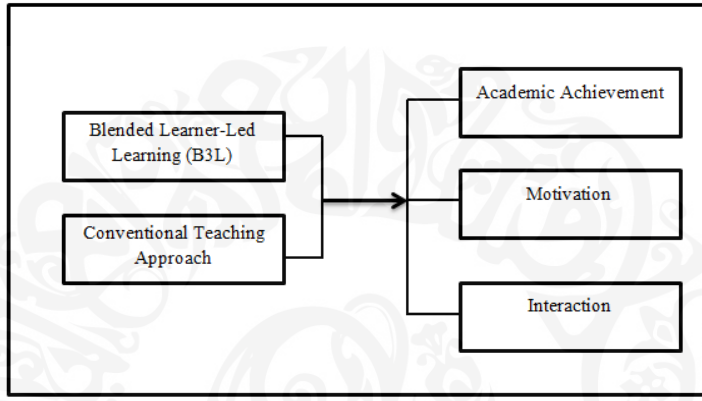
In order to assess the effectiveness of B3L on students' motivation, interaction and academic achievement, the researchers used a quasi-experimental design based on the conceptual framework seen

2012) https://files.eric.ed.gov/fulltext/ED535180.pdf (accessed 2/12/18)

[7] Crawford, Renée, and Louise E. Jenkins. "Making Pedagogy Tangible: Developing Skills and Knowledge Using a Team Teaching and Blended Learning Approach." *Australian Journal of Teacher Education* 43, no. 1 (2018): 8.

in Figure 1 below. Figure 1, shows the dependent variables (DV) and independent variables (IV) with B3L and Conventional teaching being the IV's and 'motivation', 'interaction' and 'academic achievement' being the DV's.[8]

Figure 1. Conceptual Framework



The research questions of the study that were derived from the conceptual framework are as follows:

1. Is there a statistically significant difference between the control group and experimental group in terms of motivation, interaction and academic achievement?
2. What are the relationships between motivation, interaction and academic achievement?

The following null hypotheses were addressed:

$H0_1$ = There is no statistically significant difference between the blended learner-led learning classroom and the conventional classroom in terms of academic achievement.

$H0_2$ = There is no statistically significant difference between the blended learner-led learning classroom and the conventional classroom in terms of motivation to learn.

$H0_3$ = There is no statistically significant difference between the blended learner-led learning classroom and the conventional

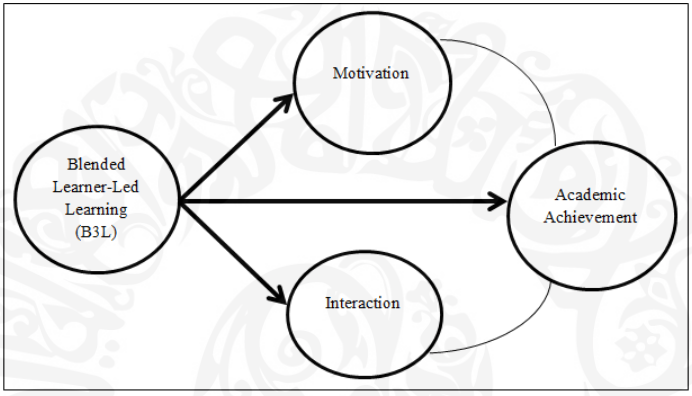
[8] Cooper, Karyn, and Robert E. White. *Qualitative research in the postmodern era: Contexts of qualitative research*. Springer Science & Business Media, 2011.

classroom in terms of learning interaction.

$H0_4$ = There is no statistically significant relationships between motivation, interaction and academic achievement.

The model in Figure 2 below illustrates the relationships between the variables of the study.

Figure 2. Relationship between Variables of B3L



Research Design

The data collection instruments for the quasi-experimental study were surveys and pre-post tests, for both the experimental group and the control group. Kerlinger refers to a quasi-experimental design as a "compromise design" when applied to educational research where random selection of schools, classrooms or participants is impracticable.[9]

The pretest comprised of 100 objective questions administered before the commencement of the treatment. This test was given to both the control and experimental group to measure learners' prior knowledge about the course content. Next, the treatment was applied by implementing B3L for the experimental group, and conventional teaching methods for the control group. Both groups received the same

[9] Kerlinger, Fred N. "A social attitude scale: Evidence on reliability and validity." *Psychological Reports* 26, no. 2 (1970): 379-383.Freire, P., *Pedagogy of the Oppressed* (M. Bergman Ramos, Trans.). (New York: Continuum, 2014).

content and were taught by the same lecturer. The period of treatment was five consecutive weeks with a posttest being administered to both groups at the end of each week. The posttest consisted of 20 objective questions taken from the pretest. The aim of the post tests was to measure gains in students' learning for the two groups. In addition, a questionnaire surveying learners' motivation and interaction was administered to both groups at the end of the treatment period (See Table 1 below).

Table 1: Quasi Experimental Design

Treatment	pretest	X_1	X_2	X_3	X_4	X_5	posttest	MCQ
Control	pretest	O_1	O_2	O_3	O_4	O_5	posttest	MCQ

Notes: X=Treatment (B3L); O= (Conventional Methods).

Population and Sampling

The course chosen for the intervention was Curriculum and Instruction, a required course for undergraduate students at a faculty of education in Kuala Lumpur. The researchers chose this course because the content lent itself to 'hands-on' application of teaching. To minimise confounding threats to validity, the participants had to study the same course, in the same semester, taught by the same lecturer. However, B3L is unknown to other lecturers in the university. Therefore random sampling was not possible as there was no population who had been exposed to B3L. Instead, the researchers sought permission to teach two sections of the same course, making the first section the experimental group and the second section the control group. The total number of participants of these two sections was 78 undergraduate students, with the experimental group comprising 45 students and the control group comprising 33 students. Participants belonged to four different specializations in the faculty of education, namely: 1) B.Ed in Teaching English as a Second Language (TESL); 2) B.Ed in Teaching Arabic as a Second Language (TASL); 3) B.Ed Counseling, and 4) B.Ed in Islamic Education (ISED).

The composition of the two sections vis a vis subject-specialization can be seen in Table 2 below:

Table 2. Students specialisation in two sections

	TEASL	TAASL	GUIDE	ISED	Total
Control	29	******	4	******	33
Experimental	******	27	2	16	45

Achievement Tests

Five achievement tests were administered to the two groups at the end of each week, spanning the five weeks of the intervention, as described above. The tests consisted of 100 objective questions designed to measure learners' achievement. The test questions comprised 50 multiple choice and 50 true-false questions covering five topic areas from the course outline. These questions focused on recall and understanding rather than high order thinking. The latter was measured using alternative assessment; for example, students planned and designed FCM sessions in teams.

Learner Motivation Questionnaire

In addition to the achievement tests, a 25-item questionnaire was used at the end of the five week period for both groups to measure learners' motivation. The instrument for motivation was developed using Keller's ARCS model which was developed by Keller[10] to improve the motivational appeal of instructional methods and materials. The ARCS model has four main dimensions which are: Attention, Relevance, Confidence and Satisfaction.[11] Examples of questionnaire items measuring student motivation are shown in Table 3 below:

[10] Keller, J. (1983). "Motivation Design of Instruction". In C. Reigeluth (Ed.), *Instructional Design Theories and Models: An Overview of Their Current Status*, (1983), 383 - 434.

[11] Keller, John M. "An integrative theory of motivation, volition, and performance." *Technology, Instruction, Cognition, and Learning* 6, no. 2 (2008): 79-104.

Table 3. Sample of items measuring Motivation

No	Item Statements	Dimensions
1	This course got my attention	Attention
2	I felt bored by this course	
3	In this course, it was hard to pay attention	
4	The content of this course will be useful to me	Relevance
5	I could relate the content of this course to my own life	
6	It is clear to me how the content of this material is related to things I already know	
7	This course was easy	Confidence
8	I was confident that I would be able to pass the assessments	
9	I felt confident that I could learn what I was supposed to learn from this course	
10	I am really satisfied studying this course	Satisfaction
11	I enjoyed this course very much	
12	I am happy with the course	

Learner Interaction Questionnaire

The questionnaire measuring learner interaction consisted of 22 items adapted from Moore's framework of interaction. The framework comprises three main categories:

1. Learner – Instructor
2. Learner – Learner
3. Learner –content interaction[12]

Examples of questionnaire items developed using Moore's model are shown in Table 4 below.

Table 4. Sample of Items measuring Interaction

No	Item Statements	Mode of Interaction
1	I learned from comments made by my instructor	Learner-Instructor
2	The instructor explained the course material clearly	
3	The instructor was effective in replying to my questions.	
4	In-class activities helped me interact with other students in this course	Learner – Learner
5	I shared on-line materials with other students	
6	It helped me get to know other students in this class	
7	The online materials were clear	Learner –Content
8	The online materials were easy to understand	
9	The online materials were appropriate for my needs	

[12] M. Moore, "Three Types of Interaction." *American Journal of Distance Education*, *3*(2), (1989), 1–6.

Validity and Ethical Considerations

In experimental research, validity refers to the extent to which results are attributable to the treatment. In other words, the extent to which differences between the learning gains of the control group and experimental group are attributable to the independent variable (the treatment) which in this case is B3L and not to other factors, such as differences in learning due to participants being able to recall the test items from the pretest.

The researchers took pains to ensure that the experiment was conducted in a tightly controlled manner. For example, the time period between the treatment and posttests was the same for both groups i.e. immediately after each session. Additionally, the same lecturer taught the control group and experimental group to minimize 'experimenter effect'; the influence exerted by the experimenter's expectations, or subtle cues affecting the performance of subjects which could skew the results. Having the same lecturer teaching both groups also minimized the threat of a difference in lecturing styles which could contaminate the results.

Statistical Analysis Procedure

The quantitative data collected during the study was analysed using ANCOVA, independent sample t-test and Pearson's correlation model (See Table 5).

Table 5. Analysis Procedures of Quantitative data

Instrument	Construct	Analysis Procedure
Multiple Choice Questions(MCQ)	Achievement	ANCOVA
Questionnaire	Motivation	Independent sample T-test and Correlation
Questionnaire	Interaction	

ANCOVA

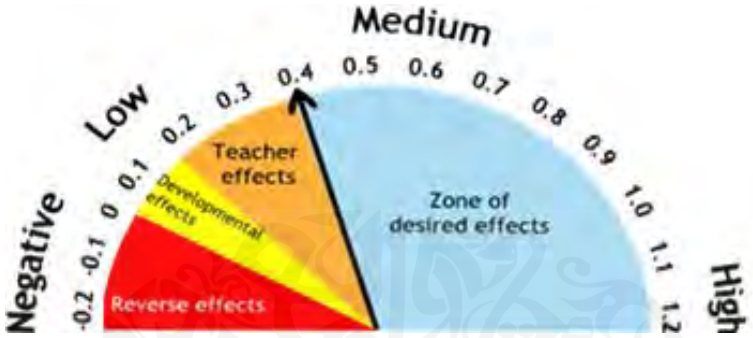
Participants for this study were not assigned randomly, therefore ANCOVA[13] was used to establish whether there was a significant difference in the mean scores of the control and experimental group for academic achievement, based on the results of the pre and post tests. Continuous variables that are not part of a main experimental manipulation, yet exert an influence on the dependent variables are known as covariates. In this study, the researchers used the pretest as a covariate, to reduce errors in variance and eliminate confounding variables within the groups i.e. to reduce mean square error.

Independent Sample t-test

An independent sample t-test was employed to establish the difference between the means of the two independent variables, the experimental and control groups, to ascertain whether the groups were significantly different in terms of motivation and interaction. To this end, the researchers computed the total scores of the dependent variables (Motivation and Interaction) and then compared them for the two categorical independent groups (the experimental group and control group). The researchers further calculated the effect sizes using Cohen's d. The mean score and standard deviation of obtained results were then imported into an online effect size calculator (http://www.uccs.edu/Ibecker/) to determine the effect size (Cohen's d of the mean difference). The Cohen's d values for effect sizes are: d=0.2 for a small effect, 0.5 shows a medium effect and 0.8 is a large effect (See Figure 3).

[13] Nancy L.. Leech, Karen Caplovitz Barrett, and George Allen Morgan. *SPSS for Intermediate Statistics: Use and Interpretation*. (Lawrence Erlbaum Associates, 2008).

Figure 3: Cohen's d Effect Sizes



Results

Influence of B3L on learners' Academic Achievement

Prior to the analysis of the findings, the researchers used the Levene's test of homogeneity to ensure that variance in the scores was the same for each of the two groups. The p-values for academic achievement, motivation and interaction were .865, .724 and.550 respectively. All p-values were greater than 0.05; thus, the homogeneity of variances was not violated and supported the method of analysis used for this study.

Wolfe and Johnson suggest that students' past achievements are the best prediction for their future results[14]. Thus, the covariances in academic achievement, using the posttest scores, were compared for the experimental group and control group using ANCOVA, with the pretest score serving as a covariate (See Table 6 below).

[14] Wolfe, Raymond N., and Scott D. Johnson. "Personality as a predictor of college performance." *Educational and Psychological Measurement* 55, no. 2 (1995): 177-185.

Table 6. Covariance of Academic Scores Obtained by Control and Experimental Groups

Source of variance	SS	df	MS	F	Sig.
Student pretest scores (Cov.)	14.909	1	14.909	.407	.526
Group (Experimental versus Control)	638.260	1	638.260	17.402	.000
Error	2750.735	75	36.676		
Total	287694.000	78			

a. R Squared = .219 (Adjusted R Squared = .199
b. R Squared = .219 (Adjusted R Squared = .199
c. * P < .05.

Table 6 shows a significant difference in the scores obtained by the experimental group and control group for academic achievement: F (1, 76) = 17.402 p = .000 which is below the threshold of .05. Hence, B3L appeared to influence the academic achievement of the experimental group.

Effects of B3L on Learner Motivation

The researchers conducted an independent sample t-test to examine the differences between the control and experimental groups in terms of motivation. The result shows that the mean score of the experimental group was higher than the control group with a mean of (M = 84.155, SD. = 9.851) compared to a mean of (M=64.727, SD 16.150). This indicates that students who experienced B3L appeared to be more motivated than those experiencing a conventional teaching approach. Table 7 below summarises these results:

Table 7. Differences in Motivation for Control Group and Experimental Group

	T-test for Equality of Means					**95% Confidence Interval of the Differences**	
	t	df	Sig. 2	MD	Std. Error	Lower	Upper
Motivation	6.579	76	.000	19.428	2.952	13.547	25.309
	6.125	49.181	.000	19.482	3.171	13.054	25.801

The differences in motivation for the two groups were: t (76) = 6.579, and p –value = .000, which is below the threshold of 0.05, with a 95% confidence interval. These statistics suggest that students in the experimental group were more motivated to learn than those in the control group.

Effects of B3L on Learner Interaction

An independent sample t-test was used to examine the differences between learner interaction within the two groups. The result show that the mean score for the experimental group was higher than that of the control group with a Mean of (M = 79.422, SD. = 17.233) compared to (M=45.242, SD 10.577) for the control group. This indicates that students experiencing B3L interacted more than students who experienced a conventional teaching approach. Table 8 below summarises these results:

Table 8. Differences in Interaction for Control Group and Experimental Group

		t-test for Equality of Means				95% Confidence Interval of the Difference	
	t	df	Sig. 2	MD	Std. Error	Lower	Upper
Interaction	10.07	76	.000	34.179	3.391	27.424	40.935
	10.81	73.975	.000	34.179	3.160	27.882	40.477

The t-test results show a statistically significant difference in favour of the experimental group for interaction: t (76) = 10.07, with p –value = .000. This is below the threshold of 0.05, with a 95% confidence interval. These figures suggest that students in the experimental group interacted more than those in the control group.

Relationship between Motivation, Interaction and Academic Achievement for B3L

The last research question asked whether there was a statistically significant relationship between learners' academic achievement, interaction and motivation. Correlation was used to examine the relationships between these variables. The results indicate a weak but positive correlation between students' academic achievement and motivation (r = 018), indicating that B3L enhanced students' level of motivation. The weak but positive correlation between students' academic achievement and interaction (r=.147) suggests that B3L increased learner-interaction. Table 9 below summarises these results.

Table 9 Summary of Results

Alternative Hypotheses	Analyses	Decision
H_1 = There is a statistically significant difference between a blended learner-led learning classroom and a conventional classroom in terms of academic achievement	ANCOVA	Supported
H_2 = There is a statistically significant difference between a blended learner-led learning classroom and a conventional classroom in terms of learning motivation	Independent Sample t-test	Supported
H_3 = There is a statistically significant difference between a blended learner-led learning classroom and a conventional classroom in terms of learning interaction	Independent Sample t-test	Supported
H_3 = There is a statistically significant relationships between motivation, interaction and academic achievement	Correlation	Supported

Discussion

The results of the study are discussed according to the following categories: i) academic achievement, ii) motivation and iii) interaction.

The results of the study indicate that B3L had a significant impact on students' academic achievement and whilst the focus of the paper is not qualitative, the researchers did observe some interesting things about the results for academic achievement. For example, students in the experimental group were seen to exit classes smiling and looking energized. The researchers put this down to the activities designed by student-teams in the experimental group which were often lively and fun. Students knew their peers' interests and preferences and were able to design the learning activities to match these. It was also noticeable that the teams began to compete with one another trying to top the efforts of previous team by making lessons more interesting and engaging. As a result, student-teams got better as they

learnt from each other in conducting FCM. It is possible that these factors affected students' enjoyment and recall of the content, thereby affecting academic achievement. Quint, Martin and Farah support this stating that students in an FCM group scored higher marks compared to a group exposed to conventional teaching.[15] It is also in-line with the results of a study conducted by Clack (2015) that sought to improve secondary school students' classroom engagement and performance in a mathematics class via FCM.

Another possible factor contributing to achievement could be the short-answer quizzes that student-teams were required to administer at the beginning of each class in the experimental group. The researchers introduced these quizzes as a way of encouraging students to read online materials before B3L classes. Students were seen printing out these online materials and bringing them to class. They also discussed them with other students during classroom activities. Hence the quizzes may have increased extrinsic motivation to study in the experimental group.

Another potential reason for the increase in motivation displayed by the experimental group may be the variety and creativity of the in-class activities designed by student-teams. These included: games, debates, role plays, discussions, songs and mind maps etc. These made B3L classes more intrinsically motivating with students stating that they looked forward to class to see what the next group of students would do. In other words, the learning experiences in B3L were innately pleasurable. This is in contrast to the control group where students knew ahead of time that content was likely to be presented either as a lecture or by student presentation.

The results of the study indicate that B3L promoted more student interaction, both inside and outside the class compared to the control group. This was apparent in all three categories of Moore's framework i.e. between the instructor, the learners and the content.[16]

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[15] M. Farah, "The Impact of Using Flipped Classroom Instruction on the Writing Performance of Twelfth Grade Female Emirati Students in the Applied Technology High School (ATHS)". (2014), (Unpublished master's thesis)

[16] Woo Younghee, and Thomas C. Reeves. "Meaningful interaction in web-based learning: A social constructivist interpretation." *The Internet and Higher Education* 10, no. 1 (2007): 15-25; M. Gordon, "Between Constructivism and Connectedness." *Journal of Teacher Education*, 59(4), (2008), 322-331.

The researchers put this down to several features of B3L Firstly, student-teams met outside class to discuss and prepare the online materials and in-class activities. Secondly, the in-class activities in the experimental group were very interactive in nature, namely: discussions, debates and role plays.

Thirdly, as mentioned earlier, students in the experimental group could access content online at any time or place, thereby facilitating the third category of Moore's framework, Learner –content interaction. Lastly, a crucial part of the B3L approach is student-lecturer consultations. Student-teams are required to consult with their lecturer about what they plan to do ahead of time. During these consultations the lecturer suggest ideas and alternatives that may work better based on his or her experience and expertise. These consultations act as a catalyst to make learner-led FCM sessions more engaging and effective. This mirrors the findings of a study on peer instruction conducted by Mazur who claimed that flipped classroom instruction promotes many types of in-class interaction prompting students to communicate, respond and give feedback to their lecturer and their peers through technology.[17]

Conclusion

The main purpose of the research was to determine whether B3L, an adapted version of FCM, influences the motivation, interaction and academic achievement of undergraduate students studying at an education faculty in Kuala Lumpur. The results of the quasi-experimental study showed there was indeed a statistically significant difference between the experimental group and control group. The implications of these results is that HEI lecturers, particularly those at faculties of education and teacher-training colleges should continue to be creative in their teaching methods and be willing to adopt new pedagogies, arising from the integration of instructional technology, since this offers many benefits for trainee-teachers in terms of motivation, interaction and academic achievement. Other advantages of B3L lie in its ability to place learners at the helm of the teaching process, making them responsible

[17] Mazur, Eric. "Farewell, lecture?." *Science* 323, no. 5910 (2009): 50-51.

and confident, while providing them with valuable opportunities to team-teach creatively. B3L applies the concept of constructivist learning environment in a realistic way, allowing students to acquire new knowledge and understanding independently; yet without threatening the status of the teacher or lecturer, since student-teams plan, design and lead the FCM under the guidance of the lecturer, affording him or her a vital supervisory role.[18] Crawford and Jenkins' study that combined team-teaching with blended learning supports the authors' claim for B3L as a potential teacher-training method, saying, "Team teaching and blended learning approach influenced the development of pre-service teachers' competency skills, and knowledge".[19]

In sum, B3L represents an exciting learner-led approach that prepares pre-service teachers to lead FCM in teams before they enter the world of teaching. The results of the study, along with the observations of the researchers and the experiences of students in the experimental group seem to confirm the well-known ancient Latin principle that states, "*Docendo discimus"* "The best way to learn is to teach".

[18] R. M. Felder, "Engineering Education–A Tale of Two Paradigms." In SFGE, 2nd. Int Conf on Geotechnical Engineering Education, Galway, (2012).

[19] Renée Crawford, and E. Jenkins Louise. "Making Pedagogy Tangible: Developing Skills and Knowledge Using a Team Teaching and Blended Learning Approach." *Australian Journal of Teacher Education* 43, no. 1 (2018): 8.

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