FLIPPED CLASSROOM STRATEGY EFFECTS ON STUDENTS' ACHIEVEMENTS AND MOTIVATION: EVIDENCE FROM CPFS LEVEL 2 STUDENTS AT WIUT

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ABSTRACT

This study was carried out to investigate the effects of flipped classroom strategy on students' achievement and motivation to learn Math and English Language among pre-foundation students at Westminster University in Tashkent. The study population includes all CPFS (Certificate of Pre Foundation Studies) students who committed to study Basics of English for Academic purposes (BEAP) and Basics of Quantitative Skills (BaQS) at Westminster International University in Tashkent, overall 400 students during the academic year 2018-2019. The study sample contains 60 level 2 students who were chosen deliberately from the study population. Selected students were broken into two special groups: the experimental group that comprised 30 students (15 BaQS and 15 BEAP) who has studied using flipped classroom approach, and the control group that included 30 students who has studied in the traditional teaching approach. To succeed the objectives of the research, an achievement test and motivation scale have been developed and their validity and reliability were tested performing t-test, Pearson equation and Cronbach's alpha equation. MANOVA, ANCOVA, Means and Standard deviations were performed to estimate the collected research data. The research inferred the following results: firstly, there are statistically significant differences in the average values on the academic achievement test credited to the educational teaching approach, in favor of learners of the experimental group, and secondly, there are significant variance in the means of the motivation scale among experimental and control group members. Thus, estimation results urge governments, principals and educationists to employ the teaching approach enriched with the elements of blended learning, particularly, implementing flipped classroom model.

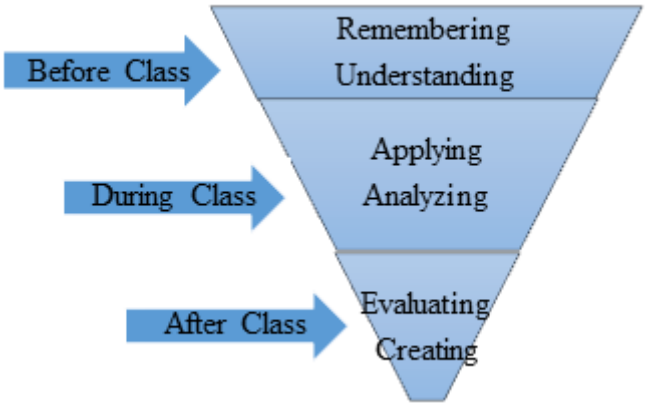
Keywords: Flipped classroom strategy, learning efficiency, achievement, motivation, traditional teaching, t-test, mean, CPFS.

INTRODUCTION

It has been witnessed rapid changes in information and communication technologies for decades. In turn, it led to modify and adjust teaching methods to cope with acceleration resulted from rapid changes in knowledge and information field. Thus, 21st century individuals are expected to be dynamic in discovering and interpreting knowledge rather than directly gaining knowledge and requiring to be focused. Accordingly, governments and educational institutions have implemented innovative projects and programs to create individuals to discover, criticize, identify how to obtain the information and develop 21st century skills, in this respect, educationists have already stepped to implement updated information and communication technologies in their teaching process. Information age has shifted educators' role from a teacher to a facilitator who guide and facilitate learners in active learning, while students have

become active participant in the knowledge acquisition process rather than being a passive information receiver. As a result of shifts in teacher and students' positions, the teacher-centered classroom has been occupied by student-centered classroom where learners are responsible for their own learning and performance, to manage their own learning process, to engage in deep approach to learning. Thus, self-directed learning in education is the core stone skill for students who are expected to bear a dynamic role in creating and analyzing knowledge. The flipped classroom strategy has become one of the modern trends in the learning and teaching approach. Applying flipped classroom approach in Math and English language classes while taking the traditional values of face-to-face teaching techniques and incorporating the best practices of online learning enables us not only step together with ever-increasing technology, but also create dynamic, challenging, supportive and self-guided student learning environment within and outside of the class.

Under this model, low cognitive process 'knowledge acquisition' is allocated to the students to be touched outside the class time, they can watch online video, film and voice or read online learning materials uploaded by a teacher and digest the information as a homework. Usually absorbing information requires primarily comprehension with little critical thinking involved. Applying theory into practice, on the other hand, is a high cognitive process and it occurs in class with the teacher present to facilitate, monitor and further challenge learners. It gives teachers the opportunity to allocate classroom time for active learning practices such as question-answer, discussion, problem solving activities. Comparing with traditional classroom, in which the content of the theory is introduced in the classroom by a teacher, while higher level areas of application happens outside of the classroom without guidance of teacher. Thus, under flipped classroom strategy, the role of teachers shifts from teacher to facilitator, while status of students is also changed to active and self-confident participants (Halili and Zainuddin, 2015). However, flipped classroom entails students to manage and retain motivation to create self-confident and self-directed students and to enable learners to succeed their own learning developments. Thus, Boeve at all (2016) confirms that student motivation is a crucial factor for succeeding learning process and for achieving high performance in assessment. Learning atmosphere that encourages students to engage in active and challenging learning, in which individuals have tolerable competences, identify their own values, characteristics and be able to experience success and failure, can be prime determination of motivation. Recent studies reveal that educational environments which have been enriched with technological development such as web-based learning, online learning, blended learning models definitely influence students' motivation (Dede & Argun,2004; Unsal, 2012). Thus, this paper investigates the effects of applying flipped classroom in teaching process on students' achievement and motivation. On this purpose, the following research questions will be answered through empirical estimation:



i) Are there any significant differences between achievement test results of experimental group and control group?
ii) Are there any significant differences between scale of motivation to learn English and Math between experimental group and control group?

Part 1 Literature review

Science and technology have ever been increasing. A number of experiments are being conducted in order to analyze the effectiveness of blended learning method in teaching. Blended learning became to be the most used pedagogical concept at the beginning of 2000. The studies showed that it was advantageous to learners to use blended learning method in order to get information. Akkoyunlu and Soylu (2008) who examined the learners through this method, revealed positive results while using blended learning method. Blended leaning combines e-learning with traditional methods, such as face to face interaction between a teacher and students. As Finn &Bucceri (2004) claimed blended learning brings a traditional learning style with the mixture of virtual education. According to Chandra and Fisher (2009) who measured the students' perceptions on blended learning, which were web-based was very productive, reachable and suitable for learners.

As Yeh and Huang (2011) states the areas where blended learning is effective in the usage. However, he explains difficulties faced by this method like organizational and technological. Lopez – Perez et.al (2011) analyzed that blended learning method can provide learners and teachers with a new innovative learning environment atmosphere to enhance in learning and educating process. The studies gave positive effects on dropout rates and examination marks. Therefore, Salama (2005) claimed that blended learning method can be used as an alternative to e-learning which is flexible and interactive for learners and learning environments independent from space time and cost. According to Julie (2005), blended learning is a new method, however, it was prevalent before; which can be used for many educational purposes such as leaning through computers. Moreover, it can save traditional methods where the teacher has a major role in the classroom.

Nowadays, the international educational system has had huge changes. Besides blended learning flipped classroom method is becoming to be commonly used by many teachers during the classes. These methods make learners and teachers reach proficiency level in education sphere. The model called flipped classroom is one of the modern strategies which can help a learner and a teacher to interact effectively with the help of technology tools. This method can help create fundamental changes in many educational places. According to Alzwekh (2014) flipped classroom is a model which can be used in an advanced level in funny, original and smart ways. At present time, this usage can be really helpful, informative and productive for the learners. Moreover, he believes that using flipped classroom model can be beneficial in checking and giving home assignments.

Moreover, DeLozier and Rhodes (2017) claims the strategy of using flipped classroom can help to grade the students outside the classes which can be beneficial to organize the rest of the lesson with different activities. The teacher prepares home tasks in variety of ways like videos or questionnaires and students can do these tasks from home using their gadgets. This can be positive and handy in saving time for both teachers and students. As Shorman (2015) indicates that the traditional method is being prepared for the lesson mostly happens after the lessons. while revising materials at home. However, using flipped strategy helps the student to enable materials at home ahead of time using suitable technology tools. Home assignment materials can be provided through educational websites and different videos by the teachers.

Another point is considered by Aliksoy and Ozdamli (2016) that flipped classroom is a student centered approach which makes students actively acquire information at any time before coming to classes. Students can use different tools such as IPads, laptops and cellphones. Thus, students are able to watch video lessons and listen tracks several times in order to understand

new materials. By implementing this model, students can demonstrate their individuality, improve performance and increase learning enjoyment.

Even though flipped classroom approach can be advantageous, Tully (2014) mentioned some obstacles according to the usage of flipped classroom model. Some of the learners may not be provided with variety of gadgets at homes which can lead some students to stay behind their peers. Moreover, teachers who use this strategy should have extra time for sending tasks which take additional working hours and effort from the educators.

The development in technology encourages educators to apply blended learning, in particular, flipped classroom methods during the lessons in the classroom. This modern approach towards learning and teaching may be predominated and have a great role in teaching in the future.

Part 2 Methodology

Experimental research was carried out which enabled the researchers to test the hypothesis by examining the relationships between independent and dependent variables in BEAP and BaQS classes. The following research hypothesis have been formulated for the study:
H0: There are no significant differences ($\alpha = 0.05$) between means of CPFS students' scores in English and Math based on learning style (Blended Learning or Traditional method)

H0: There are no significant differences ($\alpha = 0.05$) between means of CPFS students' scores on the English language and Math learner motivation scale based on learning style (Blended Learning or Traditional method)

Data

In this piece of work, it is intended to use primary data for econometric modeling and estimation analysis. Study sample consisted of 60 Level 2 students who were enrolled in pre-foundation studies for Basics of English for Academic Purposes (BEAP) and Basics of Quantitative Skills (BaQS) at Westminster International University in Tashkent in 2018-2019 academic year.

2 BEAP and 2 BaQS classes were selected and divided into experimental (30 students, 15 BaQS students and 15 BEAP students) and control (30 students) groups, which studied English and Math through Blended Learning (Flipped Classroom) and Traditional methods, respectively. The modules they were undertaking were core and intended to improve students' English Language and quantitative skills. Ethics approval had been obtained before undertaking the research from the Head of the pre-foundation studies and module leaders of BEAP2 and BaQS2 modules. A written agreement was taken from each participant of survey.

Study Tools and Procedures

Flipped classroom, one of the most effective Model of Blended Learning, has been applied in English and Math classes while taking the traditional values of face-to-face teaching techniques and incorporating the best practices of online learning. Flipped classroom enabled us not only step together with ever-increasing technology, but also created active, self-guided student learning field within and outside of the class. Besides that, an achievement Test in English and Math, and a scale for measuring students' motivation to learn English and Math have been developed.

The following steps have been undertaken to conduct this experimental study. They are as follows:

i) Before starting to experimental group through blended learning, achievement test and motivation to learn English and Math ranking scale have been implemented.
ii) Participants of experimental group were taught the English and Math applying flipped classroom Model of blended learning during the academic year 2018-2019.
iii) Control group students were taught English and Math through regular educational approach to teaching and learning during the academic year 2018-2019.
iv) At the end of the Academic Year, both experimental and control group students took achievement test and the motivation ranking scale was administered to students of experimental group.

A. Choice and measure of Variables

In this experimental research, it will be employed 2 independent and 2 dependent variables to examine the effectiveness of Blended learning on students' achievements and motivation. The effect in the research is learning efficiency and the cause is the blended learning methodology. Thus, achievement test results are used as a proxy for learning efficiency or students' achievements. Therefore, it has been developed scale to measure students' motivation to learn English and Math (Math classes are delivered in English).

Dependent variables:

i) Achievement/Learning efficiency (means of study sample scores on items of academic achievement test)
ii) Motivation to learn English and Math

Achievement test.

To measure students' knowledge in English language and Math, achievement test for English and Math had been developed. Test included 10 questions at English and 10 questions at Math. Each question had been derived from the intended Learning Outcomes of the Course. Thus, maximum score of each module test was 50 marks, with difficulty transactions ranging from 0.5 to 1.0, therefore, discrimination coefficients for questions varies from 0.40 to 0.90.

Table 1. Coefficients of difficulty and coefficients of discrimination of achievement test questions (exploratory sample)

English №	Diff.Co	Disc.Co	Math №	Diff.Co	Disc.Co
1	0.5	0.41	1	0.75	0.40
2	0.61	0.56	2	0.59	0.65
3	0.55	0.88	3	0.88	0.42
4	0.70	0.32	4	0.81	0.88
5	0.95	0.90	5	0.92	0.77
6	0.87	0.53	6	0.98	0.51
7	1.0	0.71	7	0.65	0.65
8	0.98	0.45	8	0.50	0.54
9	0.75	0.66	9	0.55	0.90
10	0.56	0.47	10	0.95	0.41

Validity of the Achievement test

The syllabus of both BEAP and BaQS modules were carefully investigated and learning outcomes were recognized from each content. Achievement tests were presented to three university and lyceum teachers and moderated by them. Moderators were asked to comment on the following aspects: questionnaire design, degree of appropriateness of test to the level of

students, content of the intended research and appropriateness of questions to the learning outcomes of each module. Based on moderators' feedback, questionnaires were adjusted, including rewording, deletion and/or amendment.

Reliability of the Achievement Test

To keep reliability of the test at a higher level, it had been administered adjusted version to a group of 20 level 2 students who were not attending in the research process but committed to study the pre-foundation studies. To accomplish the test, students were given 30 minutes. After 10 days, the amended test was conducted to the same group of students. To calculate the Reliability of the test, the Pearson Equation was employed and percentage of reliability is 0.79. The homogeneity coefficient was calculated using the Cronbach's alpha equation and it is found 0.88. Both estimations reveal that test was valid and reliable.

Motivation Scale. Initially, motivation scale had been developed to detect students' motivation to learn English language and Mathematics. The ranking scale consisted of 12 sections, including 8 positive and 4 negative content sections. For each section a grading with four categories had been applied. For positive sections, four classes were ranked as follow:

3 Agree 2 Neutral 1 Cannot say 0 Disagree

The figures were reversed for negative sections. The highest and lowest possible scores were 36 and 0, respectively.

Table 2 result of T-test on scores achievement pre-test of group and experimental groups (Statistically significant at the level of significance α=0.05)

Instrument	Group	Number	Mean	S.D	df	F	Sig.
Achievement test	Experimental	30	37.55	9.18	64	0.180	0.89
	Control	30	37.89	10.01			

T-test was applied to check equalization of experimental and control group. It is clearly revealed that there is no statistically significance between average scores of students of both groups in the achievement pretest. Thus, it enabled us to make a decision that experimental and control groups were equal.

Independent Variables

i) Blended Learning - Flipped Classroom Strategy

ii) Traditional Teaching Approach

Flipped Classroom Strategy

In order to catch-up with advanced technology, teachers have to take steps to introduce innovative ideas to redesign the teaching methods. We decided to apply 'Flipped Classroom' into BEAP 2 and BaQS 2 modules for pre-university level 2 students. Flipped Classroom is one of the models of blended learning where students are introduced to a lecture part before the class (for example, at home), as an assignment, and practice working through it during a seminar, supported and facilitated by a teacher/facilitator (Bradford. M., etc, 2014). The reason of applying this model into English language and Math classes is that class is designed for the level 2 experimental students and usually one session consists of a lecture part and a seminar part. Within 20 minutes is spent on delivery of the theory and the remaining one hour and ten minutes is spent on applying theory into practice and discussions. In this type of a session some students may find the information very easy or the information covers what they have already known. Other students cannot grasp the concept or they lack knowledge or background to understand the theory presented. Using flipped classroom allows not only to bring more technology into students' learning process, but also promote self-oriented learners.

Traditional Teaching Approach

Within the scope of the classical learning method, students in the control group learn the theoretical part during particular seminar and they are supposed to practice seminar tasks in the classroom environment. They engaged in higher order learning oriented activities as a homework and submitted it next seminar. Conversely, experimental group learned theoretical part at home, and worked on higher order activities during the class time.

B. Research Question:

"Does Implementation of Flipped Classroom Strategy in the classroom improve students' achievements and motivation?"

Research Objectives:

There are several objectives to address the above question:

a) Identify the measure and indicator of effectiveness of blended learning in pre-foundation studies;
b) Develop a priori hypothesis and estimate econometric models;
c) Inspect the influence of flipped classroom strategies on students' achievements.

Estimation Technique

For estimation purposes, to answer above mentioned research questions and determine the level of significance of the effect of using Flipped classroom on students' achievement and motivation to learn English and Math, mean – the most used measures of location, standard deviation- the most used measures of dispersion, and analysis of Covariance (ANCOVA) had been employed. More specifically, means and standard deviations of students' scores of academic achievement pre and posttest are employed to investigate the academic achievement according to teaching approach. Therefore, MANOVA and ANCOVA had been used to examine the effect of flipped classroom on academic achievement and motivation of students to learn English and Math. Besides that, t-test was employed to reveal the equalization of the experimental and control groups.

Part 3 Empirical Results and Discussion

In the very step, independent sample t-test was conducted to investigate the equalization of experimental and controlled groups in terms of academic achievement and motivation.

Table 3. Independent Sample t-test results for pre-test Scores of the Experimental and Control Group on Learning Efficiency and Motivation

	Groups	N	$\bar{x}$	S	df	*t*	*p*
Academic achievement	Experimental Group	30	37.55	10.4	64	1.7	0.09
	Control Group	30	37.89	11.4			
	Groups	**N**	$\bar{x}$	**S**	***SD***	***t***	***p***
	Experimental Group	30	4.5	0.6	64	0.3	0.72
Motivation	Control Group	30	4.4	0.7			

Note: Experimental Group – the group of students who were taught using flipped classroom
Control Group – the group of students who underwent the classical educational method

T-test results reveal that there is no significant difference between average scores of the students of pretest achievement test and motivation which is t (64) =1.7, p>0.05, motivation t (64) =0.3, p>0.05, relying on t-test results it can be concluded experimental and controlled groups are same in terms of academic efficiency and motivation to learn English and Math.

Posttest Analysis

At the end of the academic year 2018-2019, achievement test and motivation scale were administered to both experimental and control group students. Achievement test results were

analyzed performing sample t-test to examine the differences between pretest and posttest results. The results are displayed in Table 4.

Table 4 Independent t-test estimations for academic achievement scores of students at the end of academic year

	Groups	N	x	S	*SD*	*t*	*p*	η^2
General Academic Achievement	Experimental Group	30	79.41	7.35	64	3.47	0.00	0.159
	Control Group	30	72.04	9.63				

Study findings reveal that implementation of flipped classroom has positive effect on students' achievement. It is clearly seen there is a significant difference between posttest results of experimental and control group on learning efficiency which is t (64) = 3.47, $p < 0.05$. The effect size is 0.159 which implies a high level of effect power. The scores of experimental group who were taught using flipped class were higher than the scores of those who underwent traditional learning system. Estimation result reveals that flipped classroom students are much more successful. This can be results of applying flipped classroom strategy into teaching and learning as it enabled students learn, study through online lectures where they had some control over the time, place and pace, and, we could use class time for teacher-guided practice, it allowed us to employ class time for more facilitation, for more hands-on application, and more interactive tasks. As Pankin (2012) claims use of blended learning models should lead to more time and more opportunities for students to learn deeply. For example, for kinesthetic learners who prefer more hands-on application, we provided quizzes, more exercises related to each topic. For auditory and visual learners, we created and uploaded more videos and more reading materials on the intranet. By transferring some traditional classroom's activities into the virtual world, we ended up spending less teacher talking time in front of the class, John Hattie (2012) claims that less teacher talking time establishes better relationship between teachers and students. As a result, it provided us with more time acting as facilitators setting the questions the student would response, directing them towards appropriate learning resources, managing them in their performance, ensuring they learn deeply through providing formative feedback for each student.

Furthermore, in this piece of work, we found out that student motivation is higher in the experimental group which is caused by high academic achievement in that group. It is found out by Boyraz (2014), Kettle (2013) flipped classroom model has increased student achievement, in turn, it leads to higher willingness to learn the subject. To investigate whether there is a significant difference between post application motivation scale results of experimental and control groups, a MANOVA test was estimated. Results of MANOVA test is displayed in Table 6.

Table 6. Findings of Multi-Factor Variance Analysis for Motivation and Sub-Factor Score Differences of students under research

Variance Resource	Dependent Variable	Sum of Squares	*SD*	Mean Squares	*F*	*p*	R^2
Group	Intrinsic Goal Orientation	9.25	1	9.25	5.84	0.02	0.08
	Extrinsic Goal Orientation	0.21	1	0.21	0.12	0.73	0.00
	General Motivation	3.057	1	3.06	5.15	0.03	0.07

(Wilks' Lambda = 0.790, F (2,101)= 2.197, p =< 0.05)

Using one-way MANOVA test it has been determined that the effect of flipped classroom on student motivation was higher than its counterpart as it is shown in the table there is a significant difference between the experimental and controlled students motivation score. Therefore, it is found that intrinsic goal orientation scores of flipped class students were higher that its counterpart (F (1.64) =5.84, p=0.02, which is less than 0.05). On the other hand, it wasn't revealed any significant difference on extrinsic orientation score (F (1.64) =0.12, p> 0.05). Research results revealed that students' motivation to learn Math and English in the flipped classroom is significantly higher than those in traditional classroom. Higher level of willingness to study may result from efficient environment created by flipped classroom strategy. Under this model, low cognitive process 'knowledge acquisition' was allocated to the students to be handled outside the class time, they could watch online video uploaded by a researcher and digested the information as a homework. Usually absorbing information required primarily comprehension with little critical thinking involved. Applying theory into practice, on the other hand, was a high cognitive process and it occurred in class with the teacher present to facilitate, guide and further challenge students. It led students to be more motivated and feel more secure during the seminar. Comparing with traditional classroom, in which the content of the theory was introduced in the classroom by a teacher, while higher level areas of application happened outside of the classroom without guidance of teacher.

Conclusion and Further Recommendations

This research paper aimed at examining the effects of flipped classroom approach on students' learning efficiency and motivation to learn Math and English language among level 2 pre-foundation students at Westminster International University in Tashkent in 2018-2019 Academic Year. The findings revealed that students who taught under flipped classroom strategy obtained significantly higher achievement test results and higher motivation level to absorb the knowledge than those underwent traditional teaching strategy, as we rejected both null hypothesis determined in the very beginning of the research. Empirical results encourage English language and Math teachers to apply elements of Blended learning, specifically, flipped class approach as it enriched learning efficiency of students. In order to successfully implement blended learning in the education system, it is recommended to equip classes with adequate technology tools such as projectors, PCs, high speed internet, high quality internet applications to facilitate teachers' preparation process in accordance to flipped class strategy. Therefore, teachers who are planning to implement flipped classroom, should be equipped with necessary skills and experience since it has been important for ensuring learning and process efficiency. Thus, training courses and programs should be implemented to get the appropriate skills for applying this teaching strategy.

Furthermore, the success of implementation of the flipped classroom depends on the development of well-organized teaching materials. What materials do students learn in/outside of the classroom? Usually they come in different formats such as textual, audio, visual and graphical, etc. More clearly, one of the methods to create a learning material for flipped classroom is a video explaining the content we are going to cover in the next class. This can be uploaded onto the intranet platform as an assignment. Students are instructed to watch the video and take a quick digital quiz test to check how well they comprehended the theory. At the same time, the test results deliver us if any student faces difficulties in a particular phase of the content. This permits us to prepare effectively to ensure we are covering the areas where most students need help. Therefore, it enables us to establish separate time to facilitate students individually based on the estimation of who really needs help. This is exactly what we are expecting when flipping classroom that this method of teaching should promote a framework where students obtain tailored education regarding to their needs and learning styles

(Bergmamn and Sams, 2012). In the flipped learning process, it is crucial to ensure that individuals watch the video before attending class. Providentially, there are effective ways and techniques to get students to learn the assigned material and online content. Firstly, this issue can be solved by quick digital test after students complete the content. I prefer Quiz Slide, Classroom Marker and Gotoquiz tools for this purpose. This digital assessment becomes a part of a grade, which makes students come to class prepared. In order to minimize cheating, it is advised to randomize the question data, so each student takes a different test. Secondly, we can get students accomplish the online task by summarizing the video and discussing open ended questions about the online content on the forums.

This research was conducted with 60 level 2 students who were enrolled in pre-foundation studies in 2018-2019. Further studies can be carried out with different level students in different courses. Thus, the effect of flipped classroom on students' achievement and motivation in different courses can be investigated in further empirical research studies. Therefore, the effect of Flipped Classroom on collaboration of students, self-directed learning skills can be scrutinized by employing strategies and tools for developing and improving self-direction skills of learners.

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