

ORIGINAL ARTICLE

Comparison of Team-Based and Flipped Classroom Learning on Academic Achievements of Doctor of Physical Therapy Students

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ABSTRACT

Aim: In this study, the post-implementation effects of two active learning strategies i.e., team-based learning (TBL) and flipped classroom learning (FCL) on academic achievements in terms of test scores were compared in undergraduate physical therapy students.

Methods: This was a quasi-experimental study. Fifty undergraduate physical therapy students were included in this study. Students were equally divided into two groups i.e., team-based learning (TBL) and flipped classroom learning (FCL). The perception of students about this mode of learning was assessed by using the Likert scale. To assess post-implementation performance multiple choice question (MCQ) based test was used.

Results: The average age of students in TBL group was 19.12±0.60 years whereas, in the FCL group average age was 19.04±0.45 years. 52% of students of the TBL group and 56% of students of the FCL group preferred the implemented active learning strategies as a better learning mode as compared to the conventional method. Both learning strategies i.e., FCL and TBL increased the post-knowledge level of students (p-value <0.05 for both). But while comparing FCL and TBL, the post-knowledge level in TBL was 68.88±7.08 and in FCL group was 79.48±10.02 with p<0.05 showing that FCL was better than TBL.

Conclusion: Team-based and flipped class room learning increased the knowledge level of students. As compared to team-based learning, flipped class room learning was a better learning strategy.

Keywords: students learning, academic, learning in classroom, Team based classroom learning, flipped classroom learning

INTRODUCTION

The academic achievements of medical students are very important for their professional study. To get achievements in academics learning styles, motivation, and self-believe are important ingredients¹. Lack of proper learning technique and attention on the academic side can lead to failure in the academic domain and increase the costs of education². The ability of the teacher to assess or investigate the details of preferred learning style by students can help the students to become more attentive in academic lectures and can also help to improve their academic status³.

Due to this centralized importance, education should be provided in a better and effective way with special emphasis on the learning styles of students⁴. The traditional and most common method of teaching is Lecture-based instruction. In this method of teaching, primary transmitters of knowledge are teachers whereas knowledge receivers are students. Lecture-based learning is efficient but it involves less engagement of students⁵. Medical students need to acquire a large amount of knowledge and that knowledge must be retained by students for long-term use. This long-term retention of knowledge can be facilitated by employing methods of active learning that ensure huge involvement by the students: and a team-based learning and flipped classroom learning strategies falls in the category of active learning⁶.

Team-based learning (TBL) is the type of active learning strategy in which the instructor divides the large number of students into small groups. Each group is assigned a topic and they discuss and solve the problem all together. It gives the students better involvement in learning, a better understanding of core concepts, and development of the sense of responsibility towards team members. However, TBL include limited time to complete problem-solving activities, and less emphasis on the student-centered approach including clinical reasoning in the group of students⁷.

A flipped classroom learning (FCL) is a type of active learning in which the reversal of homework and lecture occurs. It means the students have to take their online lectures on their

laptops or smart phones at home whereas they do the assignments or homework in their school or colleges under the supervision of their teachers⁸. It help students to learn core concepts of a lecture before the class so students can use the time of class to actively apply and discuss those core concepts with their instructors⁹. The students can pause and rewind the difficult concept as many times as they want. This repeated exposure and in-depth learning made the students to better perform in front of their teachers in the classroom. On the other hand, the instructor has more time to interact with students and can listen to their problems one by one. Taking an account of the advances in technology the FCL is the future gold standard tool of learning¹⁰. Medical students have shown a very good response to FCL because of the accessibility of pre-class lectures at any time and any place whenever they desire¹¹.

Flipped class-room learning is emerging rapidly and need to be tested so that the effectiveness of this learning strategy could be determined and implemented to improve the quality of the education. We anticipated that students will benefit more from rapidly emerging learning strategy i.e., FCL as it allows them to complete the lecture on their own pace¹².

METHODS

The written consent was taken from each individual who participated in the study. This Quasi experimental study was conducted at University of Health Sciences, Lahore and data was collected from Afro-Asian Institute in a time period of six months. Non-probability convenience sampling was used with sample size of 50. All present undergraduate third semester DPT students were included in the study. Those who refused to take part were excluded. (50) Fifty students of the third semester DPT were divided into two groups with twenty-five students in each group. The upper limb pathologies were covered in this study.⁽¹³⁾ One group was assessed before and after implementation of team-based learning technique and other before and after implementation of flipped classroom learning technique. The topic for assessment of academic achievement in terms of knowledge was upper limb pathologies in biomechanics. An attitude survey of the students was done to evaluate the perception of students about team-based learning and flipped classroom-based learning

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on a five-point Likert scale ranging from strongly disagrees to strongly agree^(14, 15). Multiple-choice questions (MCQs) based questionnaire was used for pre and post assessment in each group. These MCQs questionnaires were validated by ten expert physical therapists with more than 5 years' experience in the field.

Statistically analysis: After the data was collected, it was entered in IBM SPSS version 20 for analysis. The quantitative variables were presented as mean (average) and standard deviation (S.D.) while qualitative variables were evaluated as proportions (%). Shapiro wilk test of normality was used to assess the normality of data. Paired t test and independent t test were used to compare the difference within and between the groups respectively.

RESULTS

The average age of twenty-five (25) enrolled students in TBL was 19.12±0.60 years. The average age of twenty-five (25) enrolled

students in FCL was 19.04±0.45 years. Out of twenty-five (25) students of TBL, 22(88%) were female and 3(12%) were male and among twenty-five (25) students of FCL, female and male students were 20(80%) and 5(20%), respectively. Table 1 and 2 describe the perception of students about the active learning strategies that they experienced during the study. Comparison of academic achievement in terms of knowledge within both groups has shown that knowledge was improved within both groups ($p < 0.05$), as shown in table 3.

Comparison of FCL and TBL at baseline and after implementation of learning technique has shown that level of knowledge in both groups were similar at baseline but post implementation scores has shown that FCL was better technique in improving level of knowledge as comparison to TBL as mean score in FCL was 79.48±10.02 while in TBL was 68.88±7.08 with $p < 0.05$ as shown in table 4.

Table 1: Perception of TBL Group Students about TBL

Parameters	Strongly agree/agree	Neutral	Disagree/Strongly Disagree
TBL is a better teaching method as compared to the conventional one	13 (52%)	9 (36%)	3 (12%)
TBL promotes the self-study and problem-solving abilities of the students	14 (56%)	6 (24%)	5 (20%)
TBL helps in the recall of basic biomechanical concepts	8 (32%)	10 (40%)	7 (28%)
TBL helps in better retention of knowledge	7 (28%)	11 (44%)	7 (28%)
TBL helps in improving communication skills	15 (60%)	9 (36%)	1 (4%)
TBL deprives students to get knowledge from experienced and good teachers	5 (20%)	8 (32%)	12 (48%)
TBL facilitates a better teacher-student relationship	10 (40%)	8 (32%)	7 (28%)
TBL is time consuming and not applicable in our educational setups.	10 (40%)	10 (40%)	5 (20%)

Table 2: Perception of FCL Group Students about FCL

Parameters	Strongly agree/agree	Neutral	Disagree/Strongly Disagree
FCL is a better teaching method as compared to the conventional one	14 (56%)	8 (32%)	3 (12%)
FCL promotes the self-study and problem-solving abilities of the students	13 (52%)	9 (36%)	3 (12%)
FCL helps in the recall of basic biomechanical concepts	13 (52%)	9 (36%)	3 (12%)
FCL helps in better retention of knowledge	11(44%)	10(40%)	4(16%)
FCL helps in improving communication skills	11 (44%)	10 (40%)	4 (16%)
FCL deprives students to get knowledge from experienced and good teachers	3 (12%)	12 (48%)	10 (40%)
FCL facilitates a better teacher-student relationship	15 (60%)	7 (28%)	3 (12%)
FCL is time consuming and not applicable in our educational setups.	4 (16%)	10 (40%)	11 (44%)

Table 3: Within group comparison of Pre and Post implementing learning techniques, TBL= Team based learning, FCL= Flipped classroom-based learning

Outcomes	Baseline		After implementing learning technique		Difference within groups Post learning minus baseline	
	TBL group n=25 mean (SD)	FCL group n=25 mean (SD)	TBL group n=25 mean (SD)	FCL group n=25 mean (SD)	TBL group Mean difference, p- value	FCL group Mean difference, p-value
Knowledge	65.64 (6.21)	66.92 (8.64)	68.88 (7.08)	79.48 (10.02)	3.23 (p=0.03)	12.56 (p < 0.05)

Table 4: Between group comparison of learning technique at baseline and after implementing learning technique, TBL= Team based learning, FCL= Flipped classroom-based learning (n=50)

	TBL (n=25) Mean (SD)	FCL (n=25) Mean(SD)	TBL minus FCL Mean difference	p-value
Baseline				
Knowledge	65.64 (6.21)	66.92(8.64)	1.28	0.55
After implementing learning technique				
Knowledge	68.88 (7.08)	79.48(10.02)	10.06	p<0.05

DISCUSSION

In this study, both active learning strategies, i.e., FCL and TBL helped the students to improve their knowledge as compared to the traditional methods of learning. As there is strong evidence p -value < 0.05 to prove significant improvement in post-FCL knowledge level of students. As well as, there is strong evidence as p -value is 0.03 to support that there is significant improvement in knowledge level of student post-TBL. In this study, we delivered the content of the Biomechanics subject while using FCL and TBL and evaluated the students on the basis of their scores in the MCQs based test. We not only compared the FCL and TBL with traditional learning but also compared the results of FCL with the

TBL scores of other groups. But the mode of assessment in all the comparisons were the percentages attained by the students in their MCQs based tests. Morton et al. used the assessment tool i.e. MCQs for the evaluation of the medical students¹⁶.

The exponentially increasing popularity of TBL is a clear indication that medical education is shifting from traditional lecture-based learning to active learning that not only include the memorization of the concepts but also the participation of the students¹⁷. Prober et al. used the learning strategy of FCL for the medical students of Stanford Medical School in 2012 for the subject of biochemistry¹⁸. Since then this mode of learning has been employed by many of the medical colleges for teaching medical syllabus¹⁹. According to previous study not even a single student fail after the implementation of TBL²⁰. In our study, while comparing FCL and TBL, pre-knowledge level of students of each group was same as p -value = .551 but the post-knowledge level was higher as (p -value < 0.05). The better academic performance of the students of TBL and FCL is that these learning models allow the students to use their reasoning, cognition, and technology for the synthesis and execution of information²¹. The reason behind the positive results of TBL and FCL for medical students is associated with the fact that medical students are disciplined, motivated, and independent in learning. The time that they gain in

the class by getting the educational material online can be utilized for the discussion and analysis of the knowledge that can enhance their clinical reasoning¹⁸.

The findings of this study may be used by administrator, educational planner or policy maker to plan or incorporate better learning strategies than the traditional learning approaches to enhance the quality of education in Pakistan.

CONCLUSION

Active learning strategies can help medical students to memorize, analyze, and execute the knowledge in a better way. Both active learning strategies increased post-knowledge level of students as compared to traditional mode of learning. But while comparing FCL and TBL, the post-knowledge level was more improved in the FCL group.

Author's contributions: **SU:** Conceptualization, methodology, writing the original draft, **AZ:** Supervision, formal analysis

MK: writing the original draft, **FMR and SJ:** Data collection

Ethics approval: Ethical approval was obtained prior to conducting the study from University of Health Sciences, Lahore. All participants gave written informed consent before data collection began.

Competing interests: None

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