

Comparison between Efficacy of Flipped and Traditional Methods in Teaching-Learning Human Physiology

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Abstract

Objective: To compare the efficacy of flipped classroom and traditional teaching techniques in topics from Physiology.

Method: It was a comparative descriptive study conducted at Physiology Department, Sharif Medical and Dental College, Lahore from July to September 2022. It included 100 second year M.B.B.S. students. Students were categorized into two groups (Group 1 & Group 2) comprising of 50 students each, by lottery method. Flipped technique was introduced for teaching two topics in Thyroid physiology to second year MBBS students. In the first part, Group 1 attended traditional lecture and Group 2 attended flipped technique. The same pretest and posttest was given before and immediately after each session. In the second part, the two groups were interchanged, where Group 2 attended traditional lecture and Group 1 attended flipped classroom technique. The data was entered in SPSS version 22 and analyzed.

Results: The significant p-value of posttest by both techniques showed that both teaching techniques do not equally enhance students' perception, and the mean value of traditional lecture technique is superior to the flipped technique to enhance the students' perception in Physiology.

Conclusion: In the present study the mean value of traditional lecture technique was superior to the flipped technique to enhance the students' perception regarding any study topic in Physiology.

Keywords: Traditional Lecture, Flipped Classroom, Physiology

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Introduction

Transfer of knowledge to students occurring through a traditionally based setting such as in-class lectures within the institute, somehow has lost its charm to the upcoming generation students. This has been observed in their poor attendance, lack of attentiveness and average result outcomes.^{1,2} Physiology is an essential branch of health sciences, and many advancements are continually occurring in key physiological mecha-

nisms, making it very important as well as complicated for medical students to understand.³ They are deficient in critical thinking and problem solving.⁴ Consequently, students have started showing more interest in interactive learning.^{1,5} This new competency based medical education demands for the progress in critical thinking and problem solving abilities. It also lifts up the use of novel interactive teaching, demanding methods, and technology in teaching. Some teaching methods like small group discussions are helpful in this regard but do not always suffice. To fulfil these demands we decided to test the efficacy of an alternative learning also known as “flipped classroom technique”. It is a type of hybrid and mixed-mode learning where study material and full guidance about what, how, and from where to study is provided to students beforehand. Therefore, students come well prepared for an interactive session. In this

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way they can apply their learned knowledge in critical thinking. In recent times, many studies have also been conducted in different areas of the world to get feedback from both teachers and students about flipped classroom technique.^{6,7,8}

This study was designed to determine and compare the efficacy of both the flipped and traditional teaching techniques in teaching and learning physiology. Results were built on the basis of outcomes from the Thyroid Physiology MCQ test. This study will help us to obtain students perspective about flipped technique verses traditional lecture technique in learning physiology. This study will also help to reinforce the thought process of learning, critical thinking, and problem-solving skills in Second Year Medical students of Physiology.

Materials and Methods

This comparative descriptive study included 100 second year M.B.B.S. students enrolled in Physiology course for 2021-2022, after taking informed consent and with permission from the institutional ethical committee. The study was conducted at Physiology Department, Sharif Medical and Dental College, Lahore from July-September 2022. Students were categorized into two groups (Group 1 & Group 2) comprising of 50 students each, by lottery method. Students of both gender who were fresh entrants in the Second Year MBBS between the age group 20-23 years, and were present in class were included in the present study. Any student who was absent or a repeater in any of the classes during the activity was excluded from the research.⁹ Students who did not agree to participate in the study were also excluded. Flipped technique was introduced for teaching two topics in Thyroid physiology to second year MBBS students. In the first part, Group 1 attended traditional lecture and Group 2 attended flipped technique class on the topic of Synthesis and Regulation of Thyroid Hormone. Specific topics were taught by specific teachers using traditional lecture and flipped classroom methods. Reference material was provided a day in advance to those attending flipped class, in the form of standard book references with specific page numbers (Reference from Guyton & Hall Medical Physiology & Sherwood), whereas no reference material was given to students attending traditional lectures. A 10-minute question-answer session was held after the traditional lecture and at the end of flipped classroom a discussion related to the topic was held, facilitated by the specific teacher. The same pretest and posttest (consisting of 10 MCQS

with 1 mark each) was given before and immediately after each session to judge students' critical thinking and problem solving skills. In the second part, the two groups were interchanged, where Group 2 attended traditional lecture and Group 1 attended flipped technique class on Hypothyroidism and Hyperthyroidism. The efficacy was measured by the level of effectiveness of flipped classroom method and traditional lectures in teaching-learning Thyroid physiology as concluded by paired t-tests performed on each type of study. The data was entered in SPSS version 22 and analyzed. Mean and standard deviation was calculated for quantitative characteristics. Paired t-test was applied to compare the pretest and posttest results of both techniques. Independent sample t-test was applied to conduct the comparison between flipped and traditional lecture techniques' pretest/posttest results. Pearson's correlation was applied to observe the association between flipped and traditional lecture techniques on the basis of posttest results. Box plot was plotted to assess the normality of results obtained through pretest and posttest by using flipped classroom or traditional lecture techniques.

Results

Randomly allocated student's pretest mean with lecture technique was higher than the pretest means with flipped classroom technique. Similarly, the students' posttest results put on lecture technique was higher than the posttest mean of students put on flipped technique. In the present study, ratio of flipped classroom to traditional lecture techniques, lecture technique provided better results as compared to the flipped technique (Table-1). The significant p-values in Table-2 showed that both techniques significantly enhance the knowledge of students either they are put on flipped technique or traditional lecture technique, but the mean value in our study showed that the traditional lecture technique is better than the flipped technique. The insignificant p-value of pretest by both techniques showed that the students either put on flipped technique or traditional lecture technique had almost same knowledge/concept but the significant p-value of posttest by both techniques showed that both teaching techniques do not equally enhance students' perception, and the mean value of traditional lecture technique is superior than the flipped technique to enhance the students' perception regarding any study topic (Table-3). The insignificant p-value showed the positive relationship between flipped and

traditional lecture techniques (Table 4). It means that both techniques are enhancing the student's learning/perception/knowledge level but the mean value declare that the lecture technique is better than the flipped technique to enhance the student's learning, perception, and knowledge.

Table 1: Descriptive Statistics

	N	Mini- mum	Maxi- mum	Mean	Std. Devia- -tion
Pretest results with flipped classroom technique	49	1	7	3.53	1.324
Pretest results with traditional lecture technique	49	2	7	4.10	1.544
Overall pretest results with flipped classroom/traditional lecture techniques	98	1	7	3.82	1.460
Posttest results with flipped classroom technique	49	4	9	6.06	1.329
Post test results with traditional lecture technique	49	5	10	7.73	1.186

Table 2: Pretest vs. Posttest by both Techniques-Paired t-test

Technique	Pretest vs. Posttest	Mean	Std. Deviation	P-Value
Flipped classroom technique	Pretest	3.53	1.324	0.000
	Posttest	6.06	1.329	
Traditional Lecture technique	Pretest	4.10	1.544	0.000
	Posttest	7.73	1.186	

Table 3: Flipped classroom technique vs. Traditional Lecture Technique-Independent Sample t-test

Technique type	Test	Mean	Std. Deviation	P-Value
Flipped classroom	Pretest	3.53	1.324	0.052
Traditional lecture		4.10	1.544	
Flipped classroom	Posttest	6.06	1.329	0.000
Traditional lecture		7.73	1.186	

Table 4: Association between Flipped classroom and Traditional lecture Techniques-Pearson's correlation

Technique	Mean	Std. Deviation	P-Value
Flipped technique	6.06	1.329	0.639
Traditional Lecture technique	7.73	1.186	

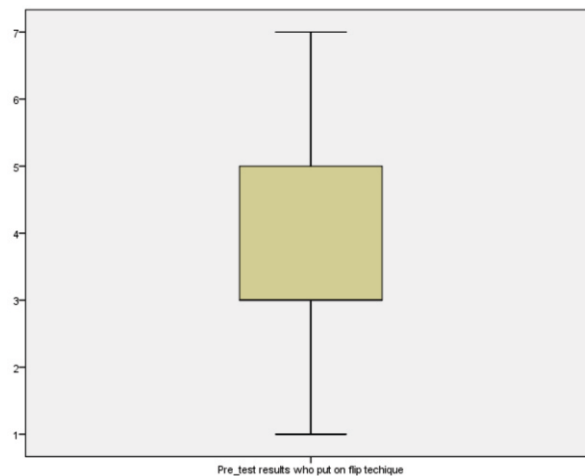


Figure-1: The pretest result of students who attended Flipped classroom technique followed the non-normal distribution.



Figure-2: The pretest result of students who attended Traditional lecture technique followed the normal distribution approximately.

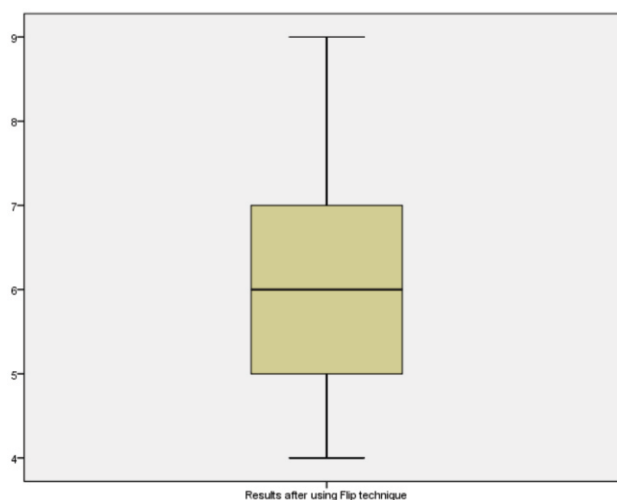


Figure-3: The posttest result of students who attended

Flipped classroom technique followed the normal distribution approximately.

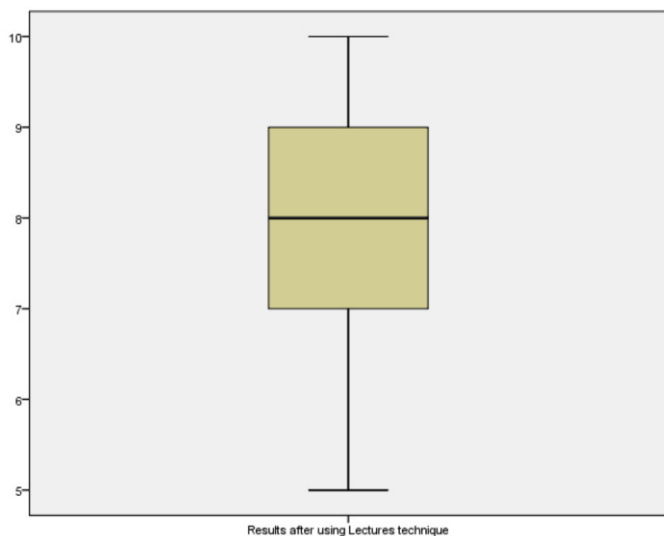


Figure-4: *The posttest result of students who attended Traditional lecture technique followed the normal distribution approximately.*

Discussion

The concept of flipped classroom is new and trending in medical teaching. In this teaching technique the students are provided with reading material prior to the class to familiarize them with the basic concept of the topic which is to be taught in the class.¹⁰

The present study was conducted to study and compare the efficacy of both the flipped classroom and traditional teaching techniques of teaching and learning Physiology. Our study showed that both techniques significantly enhance the knowledge of students either they are put on flipped technique or traditional lecture technique, but the mean value in our study showed that the traditional lecture technique is better than the flipped technique. In a study by Aggarwal K et al., concluded that a hybrid of both traditional and flipped teaching methods can be used as the mean assessment scores in the flipped and traditional classrooms were not statistically significant.¹⁰ A study by Alaagib et al., in 2019 pointed out a significant improvement in the understanding of Physiology concepts in lectures based on problems.¹ Another study by Aristotle et al., in 2021 showed that posttest results improved significantly as compared to pretest scores in both the traditional and flipped teaching techniques, however, student showed more satisfaction towards the flipped classroom technique.¹¹ These studies' results are comparable with our study.

In a study by Ming Ji et al., in 2022 showed that although flipped teaching technique is a promising technique to increase learning effectiveness, however, the time investment in the subject of Physiology increased by applying flipped technique.¹² Another study in 2013 concluded that flipped classroom teaching technique by providing pre-recorded lectures before class was a highly efficient way of improving important concepts in Physiology.¹³ Dharmendra et al., concluded that flipped class room improves teaching-learning outcomes as well as significantly enhances academic performances of Medical students in the subject of Physiology as compared to the traditional lecture based teaching.⁹ A study by Zhang et al., experimented a small online course flipped classroom teaching method in teaching Physiology to medical students of a Kuming Medical College in China. They found that as compared to lecture based learning, students' scores in both preclass and postclass tests improved a lot upon application of flipped class room method in a small online course.¹⁴ A recent study by Patkar et al., in 2021 concluded that flipped classroom technique was an efficient way of improving self-learning, critical thinking, and problem solving skills in Physiology when compared with traditional didactic lecture technique.⁸ Jain et al. also highlighted that flipped classroom method is more effective in teaching physiology as compared to the traditional lectures in a diversified group of students.¹⁵ All these studies favor the application and effectiveness of flipped classroom teaching technique both in online as well face to face teaching.

Conclusion

Our study is unique as it is a nascent attempt that shows that both the techniques are equally efficient in enhancing the understanding of taught concepts in Physiology. In fact, in the present study the mean value of traditional lecture technique is superior to the flipped technique to enhance the students' perception regarding any study topic in Physiology.

Conflict of Interest

None

Funding Source

None

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Authors Contribution

ZR, RA, M: Conceptualization of Project

SJ, Q: Data Collection

SQA, GM: Literature Search

SQA, M: Statistical Analysis

GM, RA: Drafting, Revision

SQA, ZR: Writing of Manuscript