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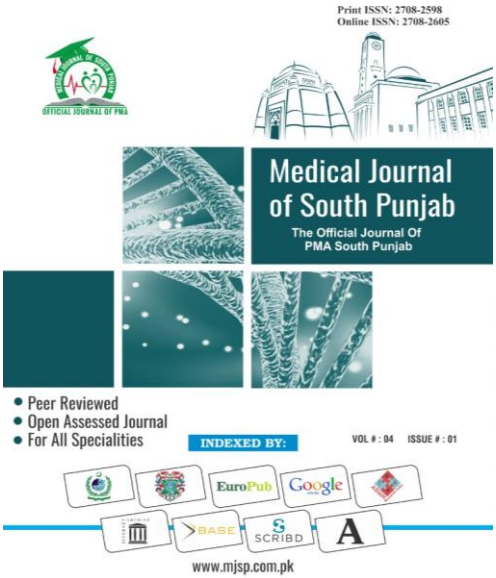

Comparison between Flipped Classroom Model and Traditional Lectures in Undergraduate Pediatric Students in terms of Knowledge Retention

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Original Article

Comparison between flipped classroom model and traditional lectures in undergraduate pediatric students in terms of knowledge retention

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ABSTRACT

Objective: *To make a Comparison between Flipped Classroom Model (FCM) and Traditional Lectures (TL) in Undergraduate Pediatric Students in terms of Knowledge Retention.*

Methods: *It is an Interventional, quantitative Study with Post-positivism paradigm. It was carried out in Pediatrics students in MBBS, MC, Mirpur from April 01, 2022 to 30th September, 2022. Students were divided into 2 groups by randomization. Group A was given traditional lecture in the lecture hall for 2 weeks and group B received Flipped classroom instruction via audio recorded lectures and interactive sessions. Both groups were switched over after 02 weeks. At the end of 4 weeks, knowledge retention was assessed by marks obtained. Student's perspective was assessed by a questionnaire. The data was analyzed in SPSS version 20.*

Results: *The Pretest results of FCM group were higher as compared to TL group. The mean scores of pretest of FCM were 41.30%, 44.60%, 44.70% and 45.00% respectively. The post test scores of FCM group were significantly improved. The mean post test scores were 78.40%, 76.80%,76.50% and 76.30% respectively. The average increase in scores was 33.10 - 37.10%. The Pretest scores of TL group were significantly lower than FCM group. The mean pretest scores of TL group were 33.30%, 34.30%, 35.00% and 34.90% respectively. The mean post test scores were 64.10%, 68.10%, 69.20% and 67.77% respectively. The increase in scores was 27.90 - 34.80%. Regarding "FCM increases internal motivation" p-value was found to be significant (p-value 0.001) and FCM leads to better knowledge retention as compared to traditional lectures (p-value 0.002).*

Conclusion: *FCM leads to significant improvement in knowledge retention.*

Keywords: *Flipped Classroom model (FCM), traditional lectures (TL), Pediatrics, Knowledge retention.*

1. INTRODUCTION

For centuries, medical education has been delivered via traditional lectures, with an instructor and a student passively taking information. This information is later reviewed when assessment approaches [1].

Andragogy, the art and science of adults learning, is a student centered conceptual framework. Adult learning principals uses the abilities and motivations of students for learning apart from passive content transfer. These include internal will, readiness to learn, and relevance to one's own life. "FCM", an interesting educational tool, aligns with "Adult learning principals" as it uses classroom time for application of knowledge and critical thinking [2].

Flipped classroom model (FCM) has emerged as an innovative teaching methodology in COVID era. In FCM, Learners acquire baseline knowledge by audio or video-based material provided to them beforehand and in face to face sessions, active learning including discussions, quiz and other activities are done to promote active learning [3].

We can use digital technology to provide learning material before class for basic understanding. Face-to-face sessions are then utilized for interactive activities. Therefore, students can apply new knowledge, and deep learning takes place with the collaborative effort of students and teachers [4].

FCM emphasizes upon Priming i-e beforehand preparation, for example, reading books, watching videos, listening pre-recorded lectures etc. The face-to-face sessions apply that knowledge in collaborative learning, peer discussion, case-based learning, think-pair-share and simulations. The Flipped classroom model applies student-centered approach for learning process [5].

Discussing the merits and demerits of both tools, traditional lectures (TL) is without student's participation[6]. It is cheap, covers larger chunk of curriculum and concise teaching experience. The supportive and less threatening learning environment in TL transfers knowledge in a positive manner. A well prepared teacher in TL inspires even the less motivated learner to read further about the subject [7].

Similarly, Objections imposed upon FCM included, in FCM, students have to spend much time before class. They have difficulty to understand prior material given to them and false concepts further lead to poor absorption in class[8]. Similarly, students disliked to be ''put on the spot'' in the class, felt like being criticized [2].

Challenges in successful application of FCM include more time to curriculum modification, foster Self directed learning, helping students to properly schedule pre-class preparation [9]. As inconsistent claims are made for effectiveness of FCM over traditional lectures in terms of knowledge retention so further studies are warranted to clarify the concept.

2. METHODOLOGY

This study was carried out in teaching session of final year Pediatrics students in MBBS, MC, Mirpur. It was carried out over a period of 06 months in Pediatrics students in MBBS, MC, Mirpur from April 01, 2022 to 30th September, 2022. Inclusion criteria included final year student giving consent to participate in study. Exclusion criteria included refused consent to participate. An orientation session was given to the student by the author. Sample size was calculated by using WHO sample size calculator.

The sampling technique used was probability sampling with simple

randomization. The students were divided into 2 groups. Group A was given traditional lecture in the lecture hall for 2 weeks and group B received Flipped classroom instruction via audio recorded lectures prior to class and interactive sessions at the pediatric ward classroom at the formal lecture time. Both the groups were given similar pre-class and post-class tests to solve. Both groups were switched over after 02 weeks. At the end of 4 weeks, knowledge retention was assessed by overall marks obtained as well as difference between pre-class and post-class test marks. The data was entered in SPSS 20 for analysis. Descriptive variables like mean, median, mode were calculated and an independent sample t test for finding differences among both groups. A p-value of ≤ 0.05 was considered significant.

3. RESULTS

A total of 100 students participated in this study. The Pretest results of FCM group were higher as compared to TL group. However a consistency of results were observed in all pretest taken from FCM group. The mean scores of pretest of FCM were 41.30%, 44.60%, 44.70% and 45.00% respectively. The post test scores of FCM group were significantly improved. The mean post test scores were 78.40%, 76.80%, 76.50% and 76.30% respectively. The average increase in scores was 37.10%.

Table I: Pre-Test & Post test Scores of FCM

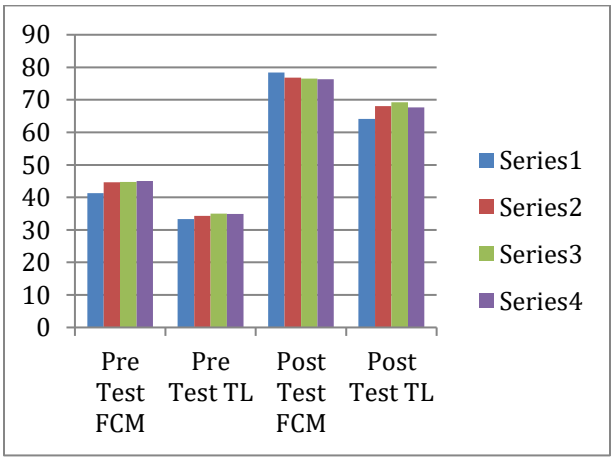
	Mean	**Std. Deviation**
Pretest 1 FCM	41.30	.997
Pretest 2 FCM	44.60	.686
Pre Test 3 FCM	44.70	.593
Pre Test 4 FCM	45.00	.577
Post Test 1 FCM	78.40	.717
Post Test 2 FCM	76.80	.615
Post Test 3 FCM	76.50	.670
Post Test 4 FCM	76.30	.703

The Pretest scores of TL group were significantly lower than FCM group. The TL group also demonstrated consistency of scores in all pretests. The mean pretest scores of TL group were 33.30%, 34.30%, 35.00% and 34.90% respectively. The post test scores of TL lecture group remained lower as compared to FCM group. The mean post test scores were 64.10%, 68.10%, 69.20% and 67.77% respectively. The increase in scores was 34.80%.

Table II: Pre-Test & Post test Scores of TL

	Mean	Std. Deviation
Pretest 1 Traditional Lecture	3.33	.585
Pretest 2 Traditional Lecture	3.43	.554
Pre Test 3 Traditional Lecture	3.50	.594
PreTest 4 Traditional Lecture	3.49	.541
Post Test 1 Traditional Lecture	6.41	.740
Post Test 2 Traditional Lecture	6.81	.813
Post Test 3 Traditional Lecture	6.92	.895
Post Test 4 Traditional Lecture	6.77	.737

Figure 1: Graphical Representation of Comparison FCM and TL Scores



Comparing both methods, the mean increase in scores in FCM between pretest and post test remained 33.10%, while the mean increase in scores in TL between pretest and post test remained 27.90%.

Table III: Comparison of Mean Pre-Test and Post test Scores of FCM & TL on Weekly Basis:

Variables	Mean	Median	Std. Deviation
PostTest 1 FCM	7.84	8.00	.717
Post Test 1 TL	6.43	6.00	.753
Post Test 2 FCM	7.68	8.00	.615
Post Test 2 TL	6.80	7.00	.813
Post Test 3 FCM	7.65	8.00	.670
Post Test 3 TL	6.90	7.00	.911
PostTest 4 FCM	7.63	8.00	.703
PostTest 4 TL	6.77	7.00	.733
p-value	0.02		

The questionnaire done at the end of study revealed student's perspective about FCM as well as TL. Maximum student response showed that FCM is more interesting than TL (n=70) followed by FCM leads to better knowledge retention as compared to traditional lectures (n=63) and FCM increases internal motivation (n=61). A significant proportion of students (n=58) also proposed that FCM put more pressure and burden in terms of study time as compared to traditional lecture. Similarly a significant proportion of students (n=42) felt to be more "put in front of others" or criticized in FCM showing peer pressure in FCM.

Questionnaire:

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Does FCM increases internal motivation	61	25	10	3	1
Does FCM increases concept clarification as compared to traditional lectures	57	30	11	1	1
Does FCM leads to better knowledge retention as compared to traditional lectures	63	30	05	2	0
Did you watch online lecture before coming to FCM or came unprepared?	47	21	11	19	2
Is FCM more interesting than traditional lectures?	70	18	11	1	0
Is there any difference in class environment in FCM as compared to traditional lectures?	49	30	21	0	0
Did FCM put more pressure and burden in terms of study time as compared to traditional lecture?	58	07	21	14	0
Do you get feedback more by FCM as compared to traditional lectures?	57	28	11	2	2
Did you feel to be more "put in front of others" or criticized in FCM?	42	10	15	17	16

Regarding "FCM increases internal motivation" p-value was found to be

significant (p-value 0.001) and FCM leads to better knowledge retention as compared to traditional lectures (p-value 0.002). Similarly a statistically significant p-value was seen for FCM being more interesting than traditional lectures (p-value 0.001) and FCM put more pressure and burden in terms of study time as compared to traditional lecture (p-value 0.004).

4. DISCUSSION

"FLIPPED" pneumonic consists of Flexible Environment, learning actively, Intentional topics, Professional behavior, -rogressive mind, Engaging students and Diversified activities [10]. In this study, Pretest results of FCM group were found to be higher as compared to TL group. The mean scores of pretest of FCM were 41.30%, 44.60%, 44.70% and 45.00% respectively. In a study done in China, it was observed that learners who participated in FCM achieved higher academic scores as compared to students having TL ($p < 0.01$) [10].

The Pretest scores of TL group were significantly lower than FCM group. In a study done by Gray et al FCM students rated it very high as compared to TL ($p < 0.001$). They proved that FCM fosters new knowledge acquisition as well as knowledge retention more than TL. FCM new teaching modalities are more welcomed by students [11].

The post test scores of FCM group were significantly improved. The average increase in scores was 37.10% in our study. In another study done in Japan, pre test as well as post test scores were remarkably higher in FCM [12]. Similarly, FCM was applied in 02 modules of year 01 students which revealed a difference (p-value < 0.05) in post-test scores in both modules of FCM group [13].

The post test scores of TL lecture group remained lower as compared to FCM group. The increase in scores was 34.80%. It is argued that the improved pre test scores of FCM were due to priming and reading the topic before class. In a similar study in undergraduates, there was a marked difference, with FCM showing enhanced performance. They have depicted that FCM has no role in terms of knowledge retention. The grades of both groups were similar in midterm and final examinations [14].

In our study, the mean increase in scores in FCM remained 33.10%, while the mean increase in scores in TL remained 27.90%. In a similar study done in Turkey, the FCM students received a mean score of 33.15 for academic achievement in pre test and 82.10 in post-test i-e 48.95 % increased. TL students improved by 27.48% [15]. This study also strengthens our results although our results showed fewer score.

It is argued that the higher scores in FCM are due to pre class learning activities, student participation in class and timely feedback by the facilitator. FCM is considered to be a student-centered teaching modality with teacher playing the role of a facilitator. FCM enables the students to identify their academic potentials, enhance their knowledge and improves student engagement and satisfaction [16].

The questionnaire done at the end of study revealed student's perspective about FCM as well as TL. Maximum student response showed that FCM is more interesting, leads to better knowledge retention and increases internal motivation. In a study done in India, FCM Students (63.5%) felt more satisfied as compared to the TL students (58.3%) [17]. In another study, it was shown that the FCM students enjoyed less-stressful classes, were more satisfied and learnt beyond the module [18].

In our study, p-value was significant for "FCM increases internal motivation", "leads to better knowledge retention" and "more interesting than TL". Similar results were seen in final year medical students, 72.15% recommended that FCM greatly enhanced their understanding of subject &78.05%

strongly agreed with the activities done in FCM enhanced knowledge [19].

However, a significant proportion of students also proposed that FCM put more pressure and burden in terms of study time as compared to TL, felt to be more "put in front of others" or criticized in FCM showing peer pressure in FCM and more pressure and burden in terms of study time (p-value 0.004).These findings are consistent with the undergraduate Pediatric learners, who liked TL reported that priming in FCM utilized more time. They were annoyed to do that extra work at home which was previously done in classroom. They also found the videos monotonous and uninteresting [20].

5. CONCLUSION

"Flipped classroom Model" is an innovative teaching methodology. It leads to enhanced knowledge retention in terms of increased assessment scores.

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