e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2023; 15(8); 148-155

Original Research Article

Introduction of Flipped Classroom among Medical Undergraduates in Pharmacology

Madhulika Peter Samuel[1], Dinesh Kumar Badyal[2], Gagandeep Kwatra[3]

[1]Associate Professor & Head, Department of Pharmacology, Shree Jagannath Pahadia Medical College, Bharatpur, Rajasthan, India

[2]Professor, Department of Pharmacology, Christian Medical College, Ludhiana, Punjab, India

[3]Professor and Head, Department of Pharmacology, Christian Medical College, Ludhiana, Punjab, India

Received: 20-04-2023 / Revised: 21-05-2023 / Accepted: 25-06-2023

Corresponding author: Dr. Madhulika Peter Samuel

Conflict of interest: Nil

Background: The flipped classroom is not new but now become popular teaching learning method. FCR is student-centered as compared to lectured base classroom which is teacher centered. The flipped classroom has some disadvantages also like technology related problems, and lack of motivation. But advantages are always outweighing disadvantages of FCR. In spite flipped classroom is another innovative teaching modality for medical students, there are very few studies regarding flipped classroom teaching method especially in India. Hence, this study was planned to introduce flipped classroom among medical undergraduates in Pharmacology and as well to assess the students and faculty's perception regarding flipped classroom.

Methods: This prospective educational study was conducted in Pharmacology department at tertiary care hospital, among students of new M.B.B.S. batch. There were two main activities among students, first was pre-class activities followed by in class activities. At the end of topics being selected, feedback questionnaire form (prevalidated and pretested) was provided to all students as well to faculty to know about their perception and attitude towards flipped classroom including demographic characteristics. There was separate feedback questionnaire form for faculty and for residents. The collected data was entered in the MS excel sheet. The data was analysed using SPSS version 21.0. The findings were expressed as percentage, and frequency.

Results: The perception of faculty regarding flipped classroom (FCR) was assessed in the study and it was observed that 60.0% of faculty were having neutral response regarding feasibility of the FCR. None of faculty were in agreement for the FCR as the preferred method of teaching or choosing FCR as teaching method. Although 36.5% and 39.7% of students agreed for FCR for upcoming classes and for selected topic respectively, but only 22.2% students agreed to prefer FCR as teaching method and 23.8% agreed that it time consuming teaching method.

Conclusion: Students have responded favorably to implementation, feeling more involved and active in the learning process. We were unable to show that the assessment results had improved. Flipped learning will be expanded to other subject modules at our institution.

Keywords: Pharmacology, flipped classroom, Teaching methods, medical undergraduates, Faculty.

Introduction

Pharmacology is one of the most difficult subjects in medical course. Pharmacology subject is difficult to understand and to remember for longer period of time. Students usually lose their interest as well enthusiasm in learning pharmacology subject through traditional lecture-based classroom. Now we have many teaching methods which we can in cooperate in our teaching for betterment of students. Evolving concept of flipped classroom as another teaching learning method will be helpful for medical students. In a flipped classroom (FCR), this is also known as 'inverted' classroom [1]. The flipped classroom is not new but now become popular teaching learning method [1,2]. Bergman and Sams popularized the term "flipped classroom" [3]. In flipped classroom there is 180-degree shift in "traditional" education. FCR is student-centered as compared to lectured base classroom which is teacher centered. There are many benefits of using flipped class room like students get help for difficult topics, student- student interaction enhanced, student- teacher interaction enhanced, it creates an atmosphere of learning, student can learn at their pace, it allows for differentiation, lecture can re-used, dive deeper into subject, it help when students are absent, it help when teacher is absent, inter personal relationship are better in students [4]. Flipped classroom has some disadvantages also like tech-

nology related problems, and lack of motivation. But advantages are always outweighing disadvantages of FCR. One of the studies has mentioned that flipped classroom is an effective way of enhancing student's engagement and active learning among medical students [5]. Another study has demonstrated that use of flipped classroom not only engaged student in learning process but it enhances the scoring of students also [6]. A study has demonstrated that redesigned pharmacotherapy course by using flipped classroom could improve students test performance and perception of leaning in pharmacy students [7]. Some investigators have reported there were benefits of FCR like greater flexibility, lesser stress, lower failure rates, improved student attitudes and even scores better in test.

One of the recently done comparison study between FCR and lecture-based classroom in ophthalmology clerkship has concluded that the FCR approach shows promise. But it has some drawbacks. So, it requires furthermore evaluation and modifications before it can be widely accepted and implemented [8]. In spite flipped classroom is another innovative teaching modality for medical students, there are very few studies regarding flipped classroom teaching method especially in India. Hence, this study was planned to introduce flipped classroom among medical undergraduates in Pharmacology and as well to assess the students and faculty's perception regarding flipped classroom.

Methods and Materials

Study Design

This prospective educational study was conducted in Pharmacology department at tertiary care hospital, Christian Medical College and Hospital, Ludhiana among students of new M.B.B.S. batch. The waiver of student consent was obtained from IEC as per ICMR guidelines [9].

Procedure (Table 1)

All faculties of the department were sensitized about flipped classroom followed by a short orientation regarding flipped classroom for medical undergraduates. After orientation the mobile number of students were taken, and students were divided into the group of 5-6 by creating WhatsApp group required to post the assignments. There were two main activities among students, first was pre-class activities followed by in class activities.

Pre-class activities: The topics included were pharmacotherapy in Glaucoma, sedative hypnotic and drugs used for anxiety disorders. Three topics were taught by using flipped classroom technique. During pre-class activities, materials like reading material from textbooks, standard guidelines, research papers, PowerPoint presentation, pre-recorded videos, text handouts and important links etc., were shared 1 week prior to in-class activities, and students were supposed to read those provided materials and come for in-class activities. Two days prior to in-class activities, assignments were given to all students through WhatsApp group.

In-class activities: Initially it began with summarization of given topic followed by queries of students. Then they were dispersed into their respective groups. Assigned task were given to all students as per group activity. This assignment comprised of three questions which they needed to discuss and answer them by preparing a small presentation for specific questions. So, a total of 30 minutes duration was given for in-class activities out of which 20 minutes for group discussion and last 10 minutes for making small presentation.

At the end of topics being selected, feedback questionnaire form (pre-validated and pretested) was provided to all students as well to faculty to know about their perception and attitude towards flipped classroom including demographic characteristics. There was separate feedback questionnaire form for faculty and for residents.

Table 1: Flipped classroom activities.

Pharmacology topic/time period	Pre-class activities(1 week prior to class activities)	In - class activities	Time (minutes)
Pharmacotherapy of Glaucoma/Oct'18	Reading text material from books, standard guidelines, research paper, Videos & ppt depending on availability.	Summarization of given topics followed by question & answers session.	4-5
	Assignments: 1. Write note 2. Summarize the topic. 3. Write down their queries 4. Assigned task 2 days before class activities (MCQ, Reasoning question.)	Small group discussion (5 groups)-Assignment (30 min duration) will be given to all groups. This will comprise of three questions (within 20 minute) then small presentation from each group(10 minutes)	30-35
		Presentation from each group	6-12

		Feedback form given (at end of third flipped classroom)	10-12

Statistical Analysis

The collected data was entered in the MS excel sheet. The data was analysed using SPSS version 21.0. The findings were expressed as percentage, and frequency.

Results

In our department there were 5 male faculty members and no female faculty member. Among students 44.4% were males and 44.4% were in the age group of 20 years. Nearly nine tenth of students were residing in the college hostel (88.9%) (Table 2).

Table 2: Demographic profile of the medical undergraduates

Variables	Frequency	%
Gender		
Male	28	44.4
Female	35	55.6
Age (in years)		
18	3	4.8
19	22	34.9
20	28	44.4
21	10	15.9
Staying at		
College Hostel	56	88.9
Home	7	11.1

The perception of faculty regarding flipped class room (FCR) was assessed in the study and it was observed that 60.0% of faculty were having neutral response regarding feasibility of the FCR. 40.0% agreed on that FCR enhances the learning among students, but 60.0% disagreed with the on that FCR enhances the understanding among students. Also, 80.0% and 60.0% of faculty believed that FCR is a time consuming and exhaustive teaching method respectively. None of faculty were in agreement for the FCR as the preferred method of teaching or choosing FCR as teaching method, but 40.0% of were favour of telling others about FCR (Table 3 and Figure 1).

Table 3: Distribution of faculty Perception regarding flipped class room

Perception variables	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	Frequency				
Feasible method	0	1	3	1	0
Enhance Learning	0	2	1	2	0
Enhance Understanding	1	3	1	0	0
More Time Consuming	0	0	0	4	1
More Exhausting	0	0	2	3	0
Prefer FCR	2	1	2	0	0
Tell Others	1	1	1	2	0
Chose FCR	2	1	2	0	0

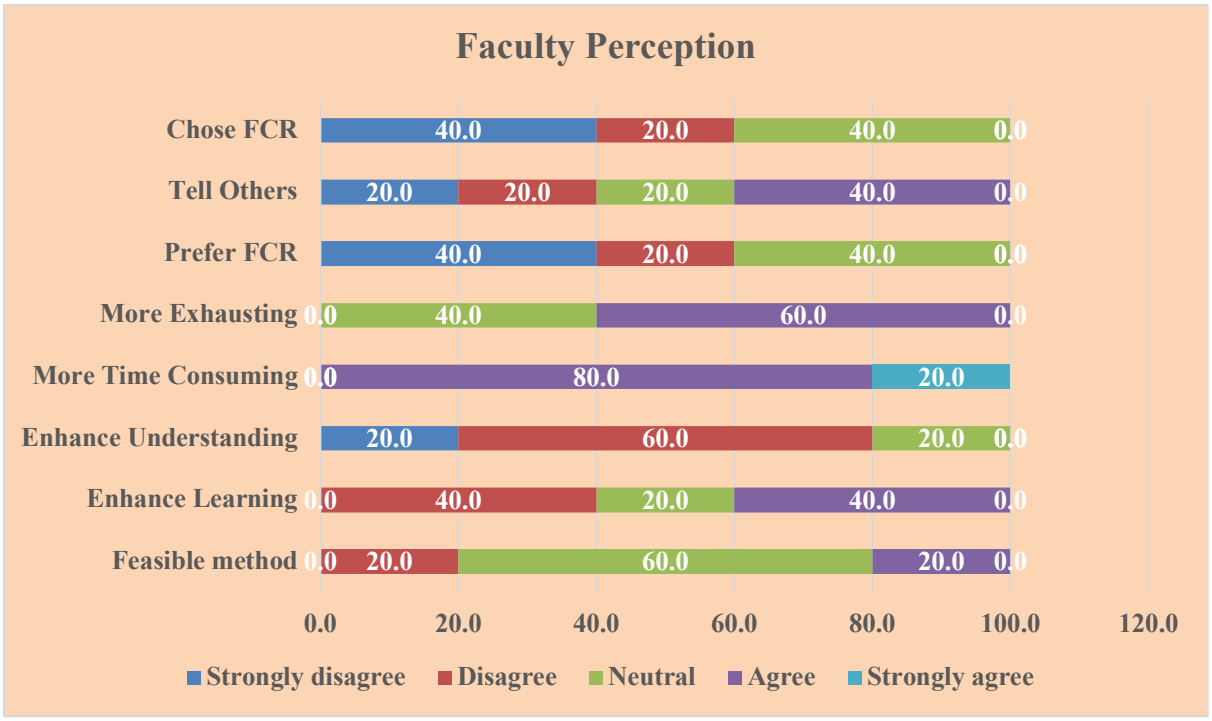
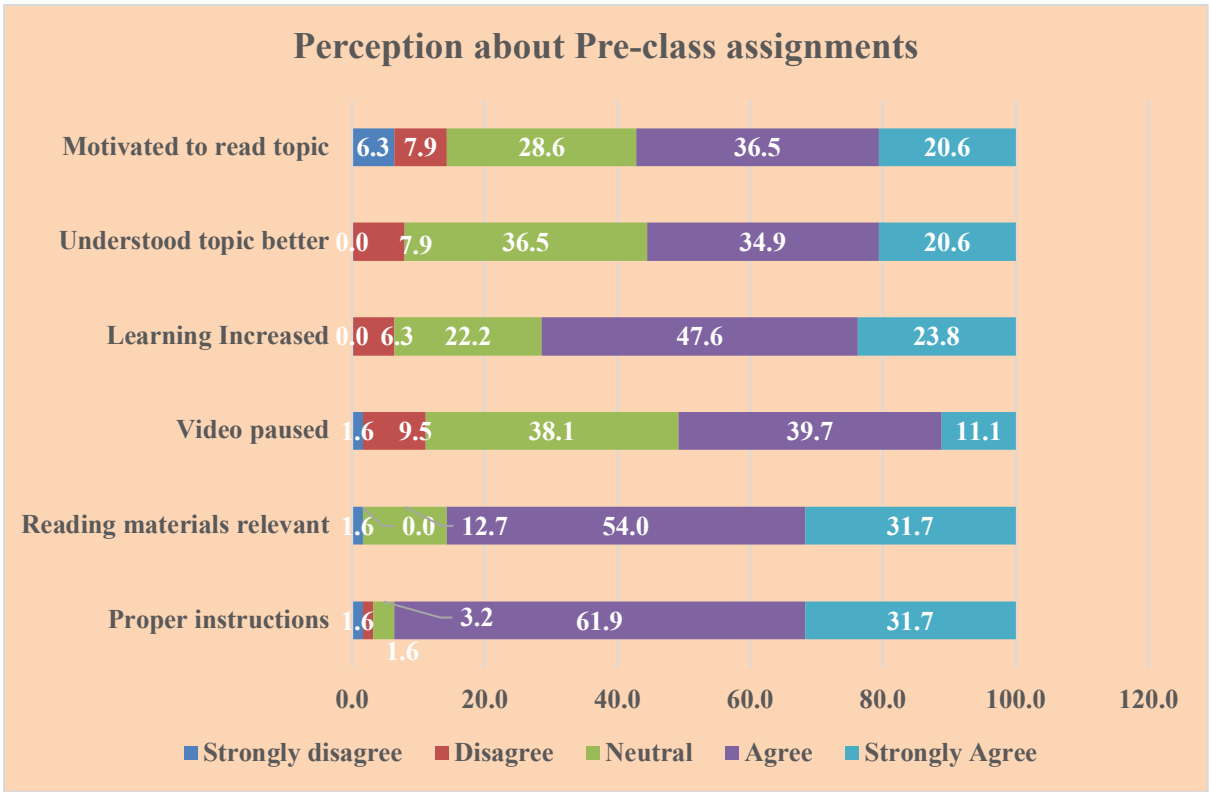


Figure 1: Faculty Perception regarding flipped class room

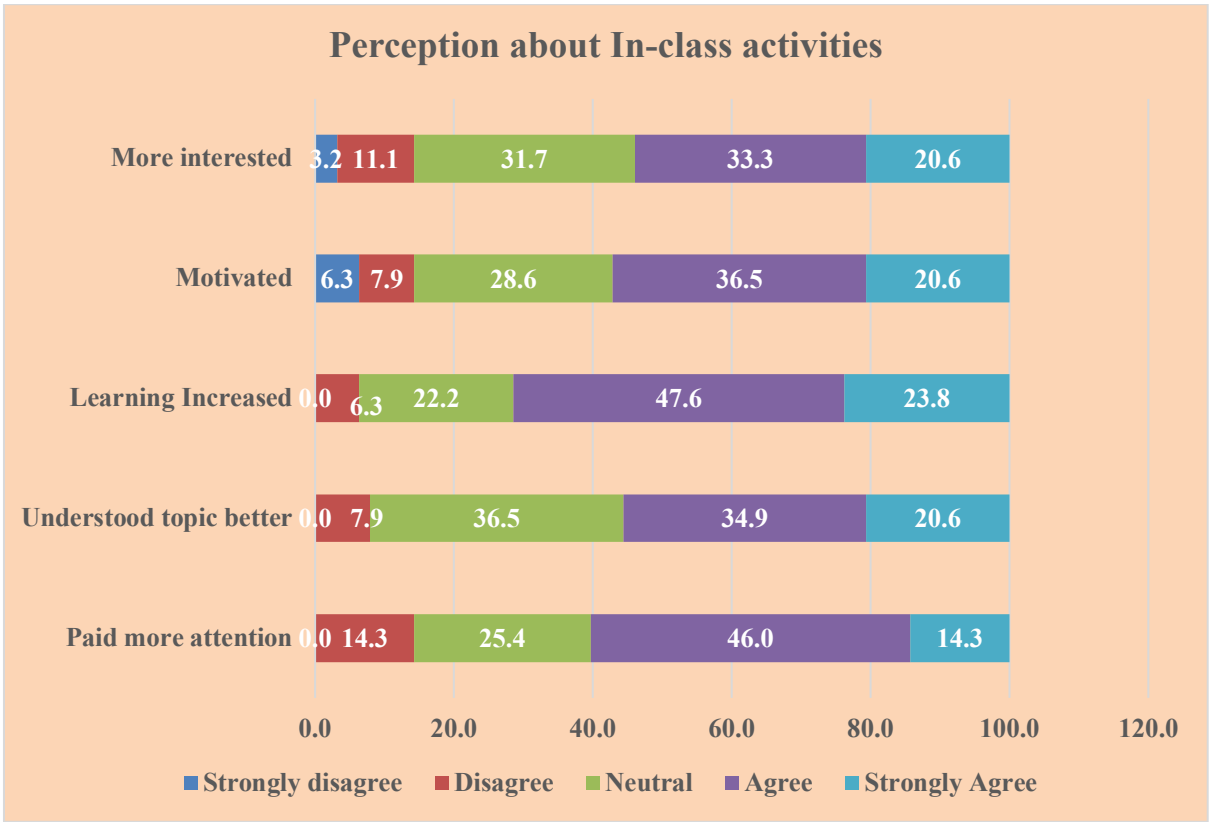
A more positive responses were observed among as compared to faculty regarding FCR. When asked specifically about pre-class assignments, 61.9%, 54.0%, 36.5 of students agreed that they were provided proper instructions, and relevant reading materials, and were motivated to read the topic respectively. 39.7% students agreed that they paused the video for more understanding. But only 47.6%, and 34.9% students agreed that it has increased their learning, and they understood the topic better. When asked specifically about in-class activities, 47.6%, and 34.9% students agreed that it has increased their learning, and they understood the topic better. 33.3%, 36.5% and 46.0% of students agreed with the fact that they were more interested, motivated and more attentive during in-class activities (Table 4 and Figure 2).

Table 4: Distribution of student Perception regarding pre-class and in-class activities of flipped class room

Perception variables	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
	Frequency				
Pre-Class assignments					
Proper instructions	1	1	2	39	20
Reading materials relevant	1	0	8	34	20
Video paused	1	6	24	25	7
Learning Increased	0	4	14	30	15
Understood topic better	0	5	23	22	13
Motivated to read topic	4	5	18	23	13
In-class activities					
Paid more attention	0	9	16	29	9
Understood topic better	0	5	23	22	13
Learning Increased	0	4	14	30	15
Motivated	4	5	18	23	13
More interested	2	7	20	21	13



(A)



(B)

Figure 2: A). Student Perception regarding pre-class assignments of flipped classroom. B). Student Perception regarding in-class activities of flipped classroom

When students were asked about their overall perception about the FCR, 41.3% of students agreed that FCR is a useful teaching method and provides in-depth understanding. 52.4% and 39.7%

of students agreed that during FCR they interacted with both classmates and teachers respectively. 39.7% students agreed on that their queries were resolved. Although 36.5% and 39.7% of students agreed for FCR for upcoming classes and for selected topic respectively, but only 22.2% students agreed to prefer FCR as teaching method and 23.8% agreed that it time consuming teaching method (Table 5 and Figure 3).

Table 5: Distribution of students Perception regarding flipped class room

Perception variables	Strongly disagree	Disagree	Neutral	Agree	Strongly Agree
	Frequency				
Useful Teaching	3	4	16	26	14
In-depth Understanding	1	9	19	26	8
Able to interact with classmates	1	2	13	33	14
Interact more with teacher	2	3	21	25	12
FCR for Upcoming	4	8	14	23	14
Queries resolved	0	7	21	25	10
Prefer FCR	6	11	19	14	13
Selected Topic	5	1	13	25	19
Time Consuming	10	16	18	15	4

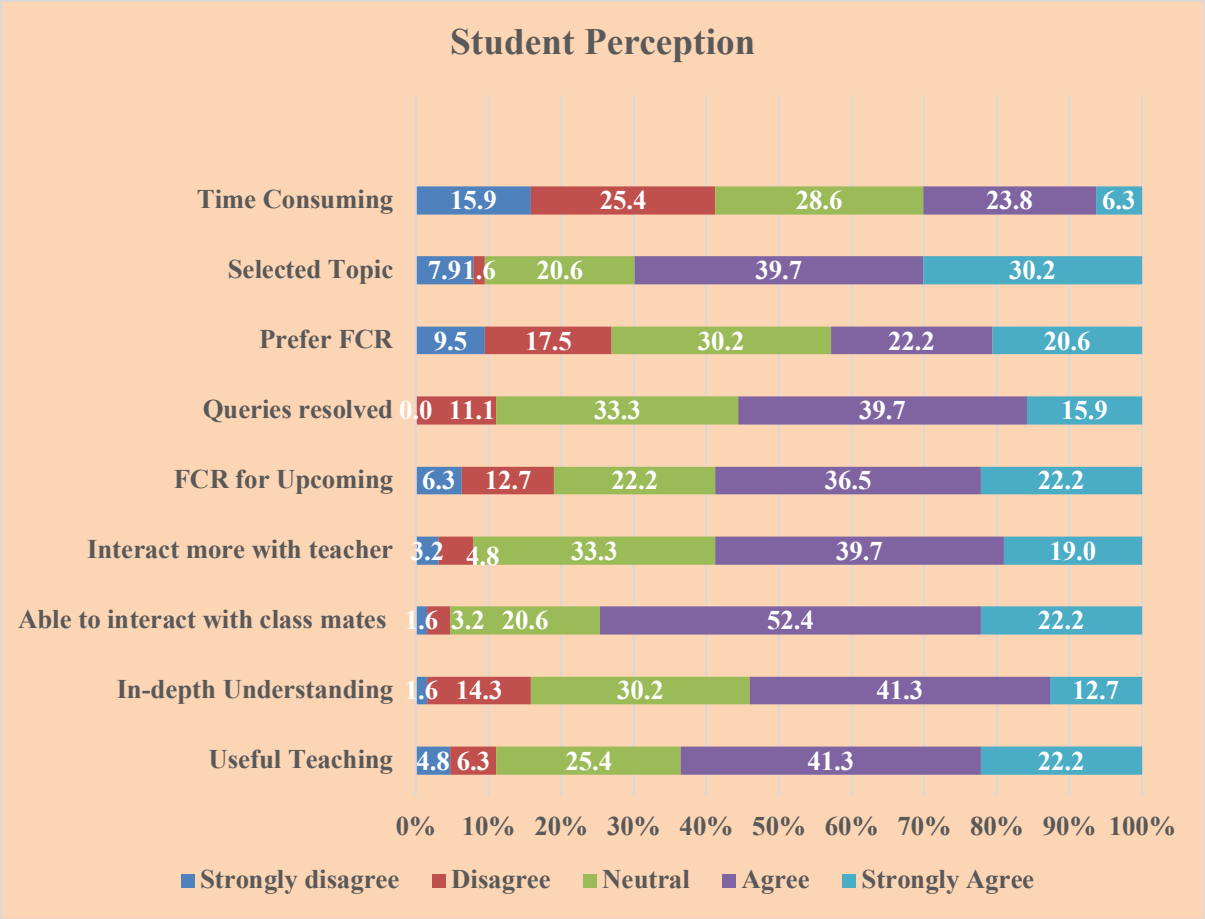


Figure 3: Student Perception regarding flipped class room

50.8% of students preferred videos more than power point presentations more than texts. 9.5% of students preferred power point presentations more than texts more than videos (Figure 4).

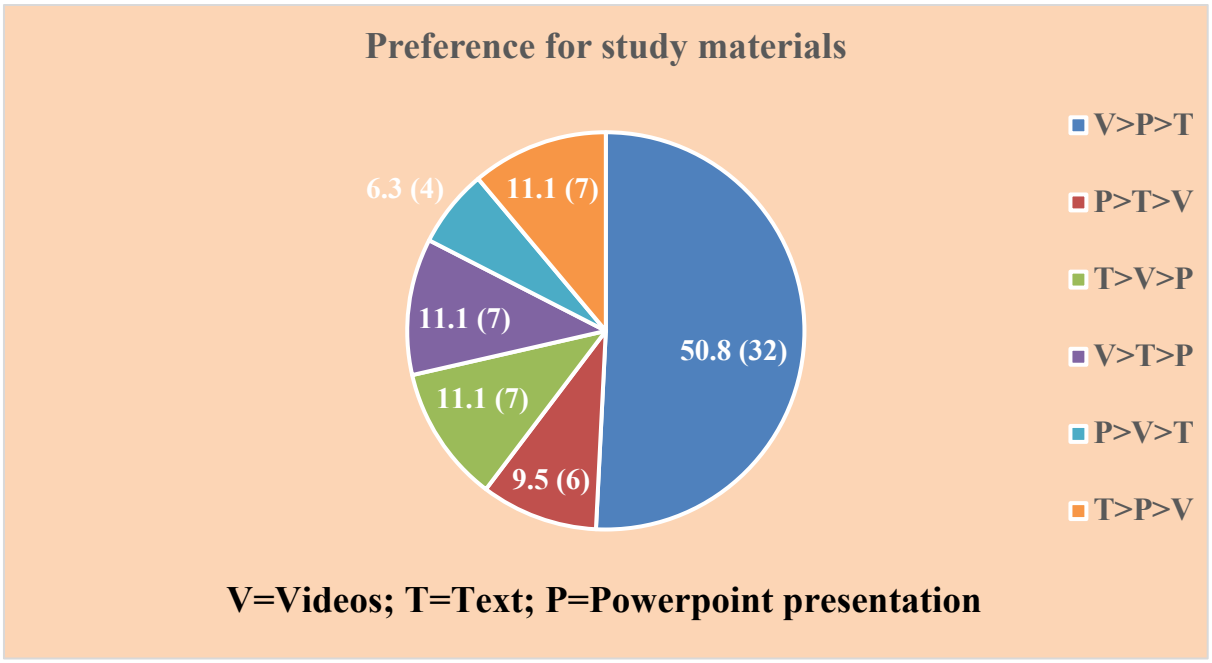


Figure 4: Student preference for the study materials in the flipped class room

Discussion

Flipped learning involves more than merely sending lectures to students outside of class so they can watch them whenever they want. Coherence between the in-person and online components of the course must be ensured. Several of our students' feedback indicated that some of the reading materials were not relevant, demonstrating that this is not always possible.

The findings of this study demonstrated a generally favourable response to support for the FCR as an efficient method of teaching certain pharmacology topics. When students were asked about their overall perception about the FCR, 41.3% of students agreed that FCR is a useful teaching method and provides in-depth understanding. Although 36.5% and 39.7% of students agreed for FCR for upcoming classes and for selected topic respectively. According to several studies, medical undergraduate students believe the FCR approach is beneficial to their knowledge and learning[10,11,12].

Because the current study results are promising, we can use this innovative method to teach our students active self-directed learning. Research comparing the various teaching methods in this context found that problem-based learning and video lectures may be effective ways to teach both theory and clinical skills during medical education[13,14].

52.4% and 39.7% of students agreed that during FCR they interacted with both classmates and teachers respectively. 39.7% students agreed on that their queries were resolved. A study by Fatima et al., indicated that students thought the FCR was a better teaching method in their setup, which is similar to the findings of the current study [5]. Furthermore, a number of recent studies in the literature have shown that flipped elements have a variety of valid advantages over conventional teaching methods [15,16,17].

The FCR technique has been useful in fostering opportunities for critical thought [18].47.6%, and 34.9% students agreed that it has increased their learning, and they understood the topic better. This may be explained by the flexibility in learning offered by video lectures, which also allow for review and repetition by the students [19]. One should exercise caution since the online lectures run the risk of failing to provide medical students with a solid knowledge base [20].

Some students who have been exposed to the FCR technique have expressed worries by providing neutral or negative comments, even though the majority of their responses have been positive. 22.2% students agreed to prefer FCR as teaching method and 23.8% agreed that it is time consuming teaching method. Similarly, faculty factors such as teaching abilities, the increased workload, and the time-consuming nature of the FCR exercise could all contribute to its unfavourable response [11]. However, these problems can be resolved by capacity building through good planning, training sessions, and efficient implementation.

The evaluation of higher levels of cognitive learning and behavioural change between flipped learning and lecture-based learning, as well as longitudinal research to see whether flipped learning can promote learning retention over longer

periods of time, have been recommended by a systematic review of the method [12,21].

Conclusion

Students have responded favourably to implementation, feeling more involved and active in the learning process. We were unable to show that the assessment results had improved. Flipped learning will be expanded to other subject modules at our institution. There is no question that lecture-based learning is necessary in some aspects of medical education, but we propose that flipped learning might be taken into consideration in other medical education settings, including postgraduate teaching, as it may provide important advantages over lecture-based teaching.

References

1. Lage MJ, Platt GJ, Treglia M. Inverting the classroom: A gateway to creating an inclusive learning environment. JEcon Edu. 2000;31(1):30-43.
2. Day JA, Foley JD. Evaluating a web lecture intervention in a human-computer interaction course. IEEE Trans Educ. 2006;49(4):420-31.
3. Bergman J, Sams A. Flip your classroom: Reach every student in every class every day. Washington DC: International Society for Technology in Education; 2012.
4. Young TP, Bailey CJ, Guptill M, Thorp AW, Thomas TL. The flipped classroom: A modality for mixed asynchronous and synchronous learning in a residency program. West J Emerg Med. 2014;15(7):938-44.
5. Fatima SS, Arain FM, Enam SA. Flipped classroom instructional approach in undergraduate medical education. Pak J Med Sci. 2017;33(6):1424-8.
6. Tune JD, Sturek M, Basile DP. Flipped classroom model improves graduate student performance in cardiovascular, respiratory, and renal physiology. Adv Physiol Educ. 2013;37(4):316-20.
7. Koo CL, Demps EL, Farris C, Bowman JD, Panahi L, Boyle P. Impact of Flipped Classroom Design on Student Performance and Perceptions in a Pharmacotherapy Course. Am J Pharm Educ. 2016;80(2):33.
8. Tang F, Chen C, Zhu Y, et al. Comparison between flipped classroom and lecture-based classroom in ophthalmology clerkship. Med Educ Online. 2017;22(1):1395679.
9. National ethical guidelines for biomedical and health research involving human participants. Accessed: https://www.iitm.ac.in/downloads/ICMR_Ethical_Guidelines_2017.pdf
10. Singh K, Mahajan R, Gupta P, Singh T. Flipped classroom: A concept for engaging medical students in learning. Indian Pediatr. 2018;55(6):507-12.
11. Ramnanan CJ, Pound LD. Student perceptions of the flipped classroom. Adv Med Edu Pract. 2017; 8:63-73.
12. Hew KF, Lo CK. Flipped classroom improves student learning in health professions education: A meta-analysis. BMC Med Educ. 2018;18(1):38.
13. Muttappallymyalil J, Mendis S, John LJ, et al. Evolution of technology in teaching: Blackboard and beyond in Medical Education. Nepal J Epidemiol. 2016;6(3):588-92.
14. Papanna KM, Kulkarni V, Tanvi D, et al. Perceptions and preferences of medical students regarding teaching methods in a Medical College, Mangalore India. Afr Health Sci. 2013;13(3):808-13.
15. Gillispie V. Using the flipped classroom to bridge the gap to generation Y. Ochsner J. 2016;16(1):32-6.
16. Rehman R, Fatima SS. An innovation in flipped classroom: A teaching model to facilitate synchronous and asynchronous learning during a pandemic. Pak J Med Sci. 2021; 37(1):131-6.
17. Shiau S, Kahn LG, Platt J, et al. Evaluation of a flipped classroom approach to learning introductory epidemiology. BMC Med Educ. 2018;18(1):63.
18. Rajaratnam N, D'Cruz SM. Is the time right to start using flipped classrooms in Indian Medical Colleges? J Clin Diagn Res. 2015; 9(9): JL01-2.
19. DeRuisseau LR. The flipped classroom allows for more class time devoted to critical thinking. Adv Physiol Educ. 2016;40(4):522-8.
20. Mahmood A, Khatoon F, Ali M, et al. Perception and preferences of undergraduate medical students regarding the use of contemporary teaching aids at Dow international medical college, Karachi. J Dow Uni Health Sci. 2011;5(1):35-6.
21. Lundin M, Rensfeldt AB, Hillman T, Lantz-Andersson A, Peterson L. Higher education dominance and siloed knowledge: a systematic review of flipped classroom research. Int J Educational Tech Higher Edu. 2018; 15:20.