

Flipped classroom versus traditional lecture in training undergraduates in pediatric epilepsy

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ABSTRACT

Introduction: Pedagogical constructs such as flipped classroom are used to engage students in the learning process by their active participation. The aim of the present study was to compare the two models of flipped classroom and traditional lecture in training undergraduates in pediatric epilepsy. **Methods:** The study was conducted among the 3rd-year undergraduate medical students. They were divided to either of Group I or II. Pediatric epilepsy was taught in two parts (clinical diagnosis and management). Group I received Part A as traditional lecture and Part B as the flipped classroom and the reverse for Group II. The difference in posttest and pretest scores was compared between two groups for each part. **Results:** There was a significant increase in posttest scores when compared to pretest scores in both the groups. Mean (standard deviation [SD]) difference in scores for epilepsy diagnosis was comparable in Group I (3.33 [2.3]) and Group II (2.46 [2.17]) ($P = 0.16$). Mean (SD) difference in scores for epilepsy management was significantly higher in Group I (3.41 [2.09]) when compared to Group II (1.30 [1.84]) ($P < 0.01$). **Conclusion:** Flipped classroom model resulted in better scores than the traditional teaching method for training undergraduates in the management of epilepsy in children. This teaching-learning method could be adopted in training of primary care physicians.

Keywords: Epilepsy training, medical education, medical teacher, professional competence

Introduction

Flipped classroom is a teaching-learning method in which students develop a basic understanding of the course materials before class by listening to podcasts or by viewing video-recorded lectures and use the class timing for active learning such as group discussion, presentation, and case scenario analysis. It is an educational model in which the lecture and homework elements of a course are reversed or “flipped.”

Flipped classroom model has been demonstrated to improve the examination scores, as well as student satisfaction, when compared to traditional lectures.^[1-3] However, in an intensive mode of teaching, the model has failed to improve the student's performance.^[4] Hereby, we explored the flipped classroom educational model with an aim to compare flipped classroom and traditional lecture in training undergraduates in the diagnosis and management of pediatric epilepsy.

Methods

This study was conducted among 3rd-year undergraduate medical students. An institutional ethical committee clearance was obtained before the commencement of the study. Information notice regarding a scheduled teaching session on diagnosis and

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management of pediatric epilepsy was placed on undergraduate institutional notice board. The students who expressed their willingness to participate were considered eligible and enrolled sequentially till a maximum sample of 60 students was achieved. There were no specific exclusion criteria adopted. An information sheet was provided to those who expressed their willingness to participate apprising them of content of the course and the method of assessment. Written informed consent was subsequently obtained.

Baseline knowledge was determined in both the groups using problem-based multiple-choice questions (MCQs) as pretest. There were 10 questions each on “clinical diagnosis of epilepsy” and “management of epilepsy.” A total of 20 MCQs with one mark each were computed, amounting to a total of 10 marks for each part as their pretest scores. We did not use negative marking for wrong answers. MCQs were framed covering all three domains of cognitive learning including knowledge, combined comprehension/application, and problem-solving. Clinical diagnosis of epilepsy was included in Part A consisting of identifying seizure semiology, types of epilepsy, and recognition of epilepsy syndrome. Part B included the management of epilepsy comprising investigations and medical management of epilepsy.

Participants were subsequently divided into two groups (Group I and Group II). Group I received “clinical diagnosis of epilepsy” by traditional lecture and “management of epilepsy” through flipped classroom and the reverse for Group II. On day 1, both the groups received traditional lecture for their respective topics by the same teacher. The lecture lasted for 30 min followed by open house clarification of doubts. Talks were followed by the distribution of handouts as reading material, problem-based learning exercises, and answer key to pretest questions. Prerecorded lecture videos and handouts for flipped classroom session were provided to the respective groups. Both groups were encouraged to go through prerecorded lecture videos as well as handouts. They were sent a reminder the next day to go through the same. Students were requested not to share the videos with their colleagues till the completion of the study.

On day 3, both groups were invited to their respective flipped classroom session. The flipped classroom sessions were conducted separately for the two groups in the same classroom with a time gap of 1 h apart. Each group was divided into five subgroups. A problem-based assignment was prepared to cover the whole spectrum of topic assigned. A set of 10 such questions was distributed among all participants. Each subgroup was provided with the task of two questions each. The problem was discussed in their subgroup, and a group leader presented the viewpoint to the whole group. The same faculty who delivered the lecture and had prerecorded his lecture conducted an open house discussion among all subgroups during the flipped classroom session. The session lasted for 1 h for each group. Both the groups were provided with a key to pretest and were subsequently encouraged to go through the material.

Both groups were invited on day 4 and were administered 20 MCQs (problem-based questions) with 10 questions on each clinical diagnosis of epilepsy and the management of epilepsy. Each item carried one mark each, amounting to a maximum score of 10 as their posttest scores for each part. Feedback was obtained from the participants about their perceptions of the course and self-perceived confidence in their abilities to diagnose and manage epilepsy.

The pretest and posttest questions and its key were discussed among the study investigators (faculty), and a consensus was reached. All faculty members watched the prerecorded lecture and the entire plan of flipped classroom model. Utmost care was exercised to avoid errors in the questions and its key, to ensure that questions were clearly written without any ambiguity and that the questions matched the course content.

All data were entered in Microsoft Excel (MS Excel) and analyzed using SPSS 15.0 version (SPSS, Inc., Chicago, IL, USA). All categorical variables were expressed in numbers (percentage), while all continuous variables were expressed in mean (standard deviation [SD]). The pretest–posttest scores were compared using a paired *t*-test. The difference in pretest–posttest scores was compared between the two groups in each part using unpaired *t*-test.

Results

In a batch of 200 students, 57 (28.5%) students participated in the session. A total of 30 students were allotted to Group I and 27 students allotted to Group II. Three students in Group I and one student in Group II did not return for posttest. The pretest scores (2.8 [1.7] vs. 3.6 [2.2]; $P = 0.13$) and posttest scores (6.2 [1.7] vs. 5.9 [1.4]; $P = 0.62$) were comparable between the two groups. There was a significant increase in the posttest score when compared to the pretest score for both the groups in both parts of epilepsy training [Table 1]. Mean (SD) difference in scores for Part A (epilepsy diagnosis) was comparable in Group I (3.33 [2.3]) and Group II (2.46 [2.17]) ($P = 0.16$). Mean (SD) difference in scores for Part B (epilepsy management) was significantly higher in Group I (3.41 [2.09]) when compared to Group II (1.30 [1.84]) ($P < 0.01$). A total of 50 of 53 students who completed the study perceived a self-confidence in diagnosis and management of epilepsy in children. All students ($n = 53$) perceived the need for such novel educational models in medical curriculum.

Discussion

This preliminary study demonstrated that students had better performance in the epilepsy management and comparable performance in clinical diagnosis of epilepsy when taught by a flipped classroom model vis-a-vis traditional lecture model. The flipped classroom has shown to improve student performance as well as student satisfaction, when compared to traditional lectures in physiology, emergency medicine residency, and nursing topics.^[2,5-7]

Table 1: Comparison of pretest and posttest scores in Group I and Group II

	Pretest scores Part A	Pretest scores Part B	Posttest scores Part A	Posttest scores Part B
Group I	2.8 (1.7)	3.0 (1.7)	6.2 (1.7)	6.3 (2.1)
Group II	3.6 (2.2)	3.9 (1.5)	5.9 (1.4)	5.1 (1.6)
<i>P</i> (between group comparison)	0.13	0.04	0.62	0.03

Part A: Clinical diagnosis of epilepsy in children, Part B: Management of childhood epilepsy

The preclass assignments used by various authors in the flipped model include online videos, recorded lectures, online quizzes, and lecture capture back up.^[3,5,6,8] The success of the flipped classroom model largely depends on the level of active learning during class hours. Small group activities, case-based discussions, hands-on activities, and peer interaction were some of the commonly used methods in class learning.^[1,4,8] The present study had adopted a blended action of small group assignments, group discussion, and peer interaction followed by open house discussion. This gives students an ample opportunity to actively participate in learning. Since both groups were exposed to the traditional and flipped classroom model of teaching; students expressed their high satisfaction with the flipped classroom model.

It is important to note that positive student perception toward flipped classroom does not necessarily imply that this instructional approach will significantly improve student learning.^[9] It was demonstrated that students devoted substantially more time before the class in a flipped classroom model although the time spent after the course was comparable to a lecture-based learning model.^[10] Similar results were observed in a study on the effectiveness of the flipped classroom instructional model in teaching pharmaceutical calculations. They found that students who preferred a traditional classroom reported that watching video lectures took much additional time. Students were unhappy being asked to do work at home that was conventionally done in a face-to-face class format and considered watching the preclass videos as burdensome regarding time.

The present study provides preliminary evidence to support the efficacy of the flipped classroom model in improving the scores of undergraduate students in the management of childhood epilepsy. There were few inevitable limitations in the present study comparing two educational interventions. They include heterogeneity in the study participants; open recruitment rather than adopting stringent inclusion/exclusion criteria; small sample of students; participant dropouts after enrollment; and unwillingness to participate considering assessment as a part of the course. Considering the so-called neurophobia among undergraduate and postgraduate medical students, these newer educational models could be worth exploring further beyond childhood epilepsy in pediatric neurology. Flipped classroom model could be a useful alternative to traditional lecture for training medical undergraduates in basic concepts of the management of epilepsy in children.

As per recent studies, flipped classroom methodology has been tested and found to be more efficacious in student learning in

nutrition intern clinical training,^[11] in the 1st- and 2nd-year medical education program,^[12] and in teaching evidence-based medicine to medical technology students.^[13]

When applied in an internal medicine residency program, flipped classroom showed greater effectiveness not only in the knowledge acquisition immediately after the curriculum, but this effect was sustained several months later also. This indicates that flipped classroom might achieve the aim of “deep learning.”^[14]

In addition to higher education, this new teaching method has been shown to improve learning among schoolchildren after a dietary education program.^[15] This could emphasize its potential role in family medicine and primary education also. Flipped classroom is a teaching-learning method which needs to be introduced not only in the undergraduate medical training but also in postgraduate family medicine training program. Moreover, the method has far more implications beyond medical students. The same can be used for public education and training of paramedical workers. Authors intend to sensitize the primary care physicians to this teaching-learning method.

Conclusion

Flipped classroom model resulted in better scores than the traditional teaching method for training medical undergraduates. This teaching-learning method could be adopted in training of primary care physicians. However, further studies are required to consider its inclusion in the undergraduate and postgraduate medical curriculum and to study its potential role as a teaching method in family medicine and community education.

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Conflicts of interest

There are no conflicts of interest.

References

1. Tan E, Brainard A, Larkin GL. Acceptability of the flipped classroom approach for in-house teaching in emergency medicine. *Emerg Med Australas* 2015;27:453-9.
2. Tune JD, Sturek M, Basile DP. Flipped classroom model improves graduate student performance in cardiovascular, respiratory, and renal physiology. *Adv Physiol Educ* 2013;37:316-20.
3. Missildine K, Fountain R, Summers L, Gosselin K. Flipping the classroom to improve student performance and

- satisfaction. *J Nurs Educ* 2013;52:597-9.
4. Whillier S, Lystad RP. No differences in grades or level of satisfaction in a flipped classroom for neuroanatomy. *J Chiropr Educ* 2015;29:127-33.
 5. Morgan H, McLean K, Chapman C, Fitzgerald J, Yousuf A, Hammoud M. The flipped classroom for medical students. *Clin Teach* 2015;12:155-60.
 6. 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;15:938-44.
 7. Heitz C, Prusakowski M, Willis G, Franck C. Does the concept of the "flipped classroom" extend to the emergency medicine clinical clerkship? *West J Emerg Med* 2015;16:851-5.
 8. Mortensen CJ, Nicholson AM. The flipped classroom stimulates greater learning and is a modern 21st century approach to teaching today's undergraduates. *J Anim Sci* 2015;93:3722-31.
 9. Ilic D, Hart W, Fiddes P, Misso M, Villanueva E. Adopting a blended learning approach to teaching evidence based medicine: A mixed methods study. *BMC Med Educ* 2013;13:169.
 10. Rui Z, Lian-Rui X, Rong-Zheng Y, Jing Z, Xue-Hong W, Chuan Z. Friend or foe? Flipped classroom for undergraduate electrocardiogram learning: A randomized controlled study. *BMC Med Educ* 2017;17:53.
 11. Hsieh HM, Wang WN, Jui CY, Yang WC, Lin JH, Liu LC. The flipped-classroom in nutrition intern clinical training. *Curr Dev Nutr* 2020;4(Suppl 2):601.
 12. Zheng B, Zhang Y. Self-regulated learning: The effect on medical student learning outcomes in a flipped classroom environment. *BMC Med Educ* 2020;20:100.
 13. Huang HL, Chou CP, Leu S, You HL, Tiao MM, Chen CH. Effects of a quasi-experimental study of using flipped classroom approach to teach evidence-based medicine to medical technology students. *BMC Med Educ* 2020;20:31.
 14. Graham KL, Cohen A, Reynolds EE, Huang GC. Effect of a flipped classroom on knowledge acquisition and retention in an internal medicine residency program. *J Grad Med Educ* 2019;11:92-7.
 15. López Núñez JA, López-Belmonte J, Moreno-Guerrero AJ, Marín-Marín JA. Dietary intervention through flipped learning as a techno pedagogy for the promotion of healthy eating in secondary education. *Int J Environ Res Public Health* 2020;17:3007.