What the Flip? A Pilot Study Perspective on the Flipped Classroom for Medical School Physiology

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Abstract

Flipped classrooms have been shown to improve engagement in undergraduate classrooms, in general, but there have been fewer studies reporting on how they are received in the undergraduate medical education classroom. This perspective piece reflects on one instructor's experience with flipping the classroom as a pilot study when teaching medical students. Some preliminary survey data reveals student feedback with regard to the effectiveness of the flipped classroom sessions for first year medical students. While the response rate was very low for the survey, it still provided an indication of the usefulness of the sessions, as well as some helpful open-ended feedback from the participants. This pilot study will be repeated in the Spring 2023 semester. https://doi.org/10.21692/haps.2022.006

Key words: flipped classroom, medical education, physiology, engagement

Introduction

Traditional didactic lectures are a standard of content delivery for many medical schools. However, in recent years, there has been a push to include more active learning in undergraduate medical education. The active learning techniques typically include case-based learning, team-based learning, problem-based learning, flipped classroom, and small group projects/discussions (Ramnanan and Pound 2017). Other active learning techniques can include think-pair-share, one-minute papers, and check out quizzes (Lord et al. 2012).

The flipped classroom is a pedagogical technique that involves using class time for the processing parts of learning rather than the initial learning parts (Brame 2013). The flipped classroom can take many forms, but it often involves providing students with prescribed educational content in the form of a reading, a video, or some other form of preparation. The students preview this material prior to coming to class, allowing them to arrive with a level of understanding of the content to be covered in the class session which now consists of activities dedicated to enhancing application of the students' knowledge through discussion and collaboration with each other, with guidance from the instructor as needed (Ramnanan and Pound 2017).

There has been an increase in the use of the flipped classroom in medical education, with positive correlations made to the effectiveness of the approach for promoting knowledge acquisition in comparison to traditional didactic lectures (Chen et al. 2017). Additionally, the flipped classroom has been shown to increase engagement and satisfaction with content delivery in third year medical students (Chowdhury et al. 2019). This perspective focuses on a pilot study using the flipped classroom in a systems-organized block course in undergraduate medical education.

Methods

Description of the Intervention

The goal of the flipped classroom pilot study reported here was to increase student engagement and satisfaction during the lecture sessions. The student population consisted of students enrolled in the Gastrointestinal, Human Nutrition, Endocrine, and Reproduction (GIHNER) block course. There were 51 students in total divided equally between males (49%) and females (51%). The average age was 24 years and 7.8% of the cohort had completed a master's degree prior to enrolling in medical school. From the admission record, 13.7% were Hispanic/Latinx, 11.8% African American, Black and/or Afro-Caribbean, 31.4% Asian, 41.2% White, 11.8% "other", while 11.8% did not reveal their ethnicity upon admission. GIHNER is a ten-week, block-style course, categorized as the third course in basic science education for first year medical students. It is preceded by the Professional Immersion course, the Fundamentals (overview) course, and Hematology. The GIHNER course consists of non-mandatory lectures and mandatory problem-based learning (PBL) sessions that focus on anatomy, biochemistry, clinical applications, immunology, microbiology, nutrition, pathology, and physiology. There are also mandatory laboratory sessions for anatomy and histology that promote hands-on learning.

For the non-mandatory lecture components, teaching faculty were encouraged to use active learning techniques. Most sessions were fifty minutes in length and were held in a lecture hall. For most faculty, active learning included

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a sprinkling of questions throughout the session where the students could verbalize a response or use an electronic polling system to answer. For prework, students were given a variety of resources including pre-recorded lectures, videos explaining the topics to be covered, readings in the textbook, and/or journal articles related to the topics.

For the active learning sessions of this course that I taught, a mix of lectures with questions throughout and the flipped classroom approach was used, resulting in seventeen total fifty-minute sessions. To increase student engagement, the classroom was flipped for seven of the seventeen sessions for this pilot study. The seven sessions were the first seven that I delivered to the students and contained all but two of their endocrine physiology topics.

For the flipped classroom, a voice over recording was done on a PowerPoint presentation of a traditional didactic lecture and then posted for the students as a pre-session assignment, along with suggested textbook reading. During the fifty-minute in-class session, questions related to the material were discussed. The questions were a mix of those created by the author for the session and those taken from board examination preparation materials available through the university library. Using Bloom's taxonomy, the question difficulty ranged from low level (recall) to high levels such as asking the student to create a suitable treatment plan for the "patient" (Anderson et al. 2001).

The questions were presented in Poll Everywhere (www.polleverywhere.com/) to encourage students to answer anonymously, and then the class was given the opportunity to compare and discuss the answer choices. These in-class deliberations with peers led to some robust discussions about why certain answer choices were correct or not correct and guided the students to arrive at the correct answers with very little intervention from the instructor.

Survey Method

Student perceptions of the flipped classroom sessions were collected with a thirty-question anonymous survey developed by Aljaraideh (2019), which was supplemented with several additional questions to tease out unique aspects related to our course. The additional questions are shown in Table 1. A Likert scale of 1 (strongly disagree) to 5 (strongly agree) was used in this survey, which was created in Microsoft Forms and distributed as a link both in class and through an email sent to all students in the course, since everyone had the opportunity to view the recorded flipped classroom sessions, whether they had attended in person or not.

This project was approved as exempt (project # 2022-86-NSU) by the Institutional Review Board of Nova Southeastern University, and informed consent was obtained from all participants who completed the survey.

Results

Unfortunately, only 2 participants filled out the survey for the pilot study, despite the fact that all 51 students received an initial invitation to complete the survey as well as a reminder. The preliminary results of the survey are mostly positive with both students liking the flipped classroom approach and indicating that it enhanced their learning (Table 2).

Multiple Choice Questions	Free-response Questions
For Dr. O'Malley's lectures, do you prefer flipped classroom or standard didactic lectures? A. Flipped B. Standard didactic C. Depends on the topic	Which topics would you prefer to see as standard lectures?
	Which topics work well for flipped classrooms?
	Do you have any comments on what went well in the flipped classrooms?
	Do you have any suggestions for improvement for future sessions?

Table 1. *Additional Questions for the Flipped Classroom Survey*

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Question	Mean ± SD
I feel that watching videos and taking notes contribute efficiently to my learning.	4.0 ± 1.41
With flipped classroom model, I feel more prepared for my exam.	3.0 ± 1.41
I like watching the lessons on video.	4.0 ± 0
I try to learn as much as possible while watching the videos.	4.5 ± 0.71
I wish more instructors use the flipped or inverted classroom model.	5.0 ± 0
I frequently pause or repeat parts of the videos in order to increase my understanding of the material.	5.0 ± 0
Flipped classroom encourages me to practice critical and creative thinking.	4.5 ± 0.71
Learning foundational content prior to class greatly enhances my understanding of material.	3.5 ± 2.12
Flipped classroom gives me the opportunity to ask more questions inside the classroom.	3.5 ± 0.71
Flipped classroom attracts my attention to learning and teaching process.	4.5 ± 0.71
With flipped classroom, we have to do more work out of the classroom.	5.0 ± 0
Flipped classroom can be a suitable teaching strategy.	4.5 ± 0.71
Flipped classroom can improve interest in exploring topics.	3.5 ± 2.12
I felt prepared to complete course tasks in class after listening to the video content.	3.0 ± 1.14
Flipped classroom is more engaging than the traditional classroom.	5.0 +/- 0
Flipped classroom gives me less class time to practice the concepts of course.	3.0 ± 1.41
Flipped classroom reduces the effort to understand the basic knowledge of the subject matter.	2.0 ± 1.41
Flipped classroom, along with delivery of content outside class and problem solving in class, is an instructional method appropriate for my specialization.	5.0 ± 0
I am more motivated to learn the concepts of course via the flipped classroom.	4.0 ± 1.41
Flipped classroom improved collaborative learning.	4.5 ± 0.71
Flipped classroom can improve interest in class.	4.5 ± 0.71
I got the ability to self-pace my learning with flipped courses.	3.5 ± 2.12
Flipped classroom gives me greater opportunities to communicate with other students.	2.5 ± 0.71
I believe that I am able to learn material with flipped classroom instruction better than with traditional lecture-based instruction.	4.5 ± 0.71
I would recommend flipped classroom to a friend.	5.0 ± 0
Flipped classroom matches my learning style.	4.5 ± 0.71
I feel that mastering learning through flipped classroom improved my academic achievement.	4.5 ± 0.71
Flipped courses did not limit my interaction with instructors.	5.0 ± 0
I feel that mastering learning through flipped classroom improved my course understanding.	4.5 ± 0.71
Flipped classroom learning has reduced my dependency on the instructor.	3.5 ± 2.12

Table 2. *Results from the Flipped Classroom Survey (2 respondents)*

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For the free-response questions, both students stated that they preferred the flipped classroom to the standard didactic lecture. There were no specific topics mentioned that would be better flipped than standard didactic; although it was stated that "most" topics would be better as flipped. Additionally, one comment indicated that their engagement was higher, likely due to the pre-recorded lecture as preparation for the session: ***"I think the standard lecture prior to flipped classroom sessions increases level of engagement."*** It was also stated by a student that the flipped classroom helped ***"…… students to communicate what they learned and build upon that knowledge……".*** This statement supports the idea that the flipped classroom focuses on the application side of learning and helps the students to take the additional step to understand the topics they are learning.

Discussion

Overall, the flipped classroom sessions were well received by the students. Comments from students in previous cohorts on my teaching performance reviews stated clearly that they liked the flipped-classroom question sessions. As far as verbal feedback from the students, they indicated that they loved the opportunity to think about the material in a friendly environment where their peers or instructor could correct misconceptions and encourage them to go to the next level with their thought processes. They think more about "what if this happens" rather than "what is happening". Additionally, I noticed that there was an increase in student attendance during the current year at the non-mandatory lectures that consisted of a flipped classroom. In a traditional lecture, we may get 7 students in attendance, while the flipped classrooms were often associated with attendance by 15-20 students. For the future study, attendance at the sessions will be tracked to determine the extent of this observation.

As an area for improvement, on the survey question related to how the flipped classroom could be improved, the statement was made that there ***"...should be a logical flow to the flipped classrooms that builds our knowledge in a progressive way. Through lectures, depth can be explored but with flipped classroom …... it seems we are thrown into the deep end every time and I would like to see us ease into the deeper topics with a flipped classroom."*** This comment likely came from sessions presented by a colleague of mine whose approach to the flipped classroom was heavily centered on clinical applications and used the Socratic approach to questioning. My sessions had a flow from very basic to more applied and thought-provoking questions as the session progressed. Moving forward, the plan is to work with the other faculty to refine the approach to the flipped classroom so that a consistent pattern is followed.

Many faculty are hesitant to approach the flipped classroom as a method of material delivery. When discussing with colleagues, reasons for this hesitation included issues such as not knowing enough about how to do it, not being confident enough that the students would prepare in advance, and/or not having the time to invest in preparing for the session in this way. I encourage all faculty to try this method out for just one session. Once they become comfortable with it and the students know the expectations for an appropriate level of preparedness, the flipped classroom is a wonderful method for content delivery. As shown by the limited survey results, the flipped classroom encourages engagement more than a traditional didactic lecture and also is something that the students wish more faculty would do.

The pilot study will be repeated in the Spring 2023 semester with more advertisement for the survey and a longer window for the students to participate. The future plan is to include a link through a QR code to the survey at the end of each of my sessions rather than waiting until the end of the block for feedback.

About the Author

Chasity O'Malley is an Associate Professor of Medical Education and Physiology at Nova Southeastern University. Her research goals aim to improve the learning experience for students by helping them learn to study and interact with the material and for faculty by helping guide them on implementing active learning into their classrooms. She is a co-principle investigator for an NSF grant related to this work. She also is actively involved in promoting diversity through her funded research projects centered around enhancing training for medical students related to the LGBTQ population.

Literature Cited

Aljaraideh Y. 2019. Students' perception of flipped classroom: A case study for private universities in Jordan. *J Tech Sci Educ* 9(3):368-377. https://doi.org/10.3926/jotse.648

Anderson LW, Krathwohl DR, Bloom BS. 2001. A taxonomy for learning, teaching and assessing: A revision of Bloom's taxonomy of educational objectives. New York: Longman.

Brame CJ. 2013. Flipping the classroom. Vanderbilt University Center for Teaching. http://cft.vanderbilt.edu/guides-sub-pages/flipping-the-classroom

Chen F, Lui AM, Martinelli SM. 2017. A systematic review of the effectiveness of flipped classrooms in medical education. *Med Educ* 51(6):585-597. https://doi.org/10.1111/medu.13272

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Chowdhury TA, Halima K, Druce MR, Drake WM, Rajakariar R, Thuraisingham R et al. 2019. Flipped learning: Turning medical education upside down. *Future Healthc J* 6(3):192–195. https://doi.org/10.7861/fhj.2018-0017

Lord SM, Prince MJ, Stefanou CR, Stolk JD, Chen JC. 2012. The effect of different active learning environments on student outcomes related to lifelong learning. *Int J Engineer Educ* 28(3):606–620.

Ramnanan CJ, Pound LD. 2017. Advances in medical education and practice: student perceptions of the flipped classroom. *Adv Med Educ Pract* 8:63–73. https://doi.org/10.2147/AMEP.S109037

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