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Using the Flipped Classroom to Bridge the Gap to Generation Y

Veronica Gillispie, MD, FACOG

Department of Obstetrics and Gynecology, Ochsner Baptist, New Orleans, LA
The University of Queensland School of Medicine, Ochsner Clinical School, New Orleans, LA

Background: The flipped classroom is a student-centered approach to learning that increases active learning for the student compared to traditional classroom-based instruction. In the flipped classroom model, students are first exposed to the learning material through didactics outside of the classroom, usually in the form of written material, voice-over lectures, or videos. During the formal teaching time, an instructor facilitates student-driven discussion of the material via case scenarios, allowing for complex problem solving, peer interaction, and a deep understanding of the concepts. A successful flipped classroom should have three goals: (1) allow the students to become critical thinkers, (2) fully engage students and instructors, and (3) stimulate the development of a deep understanding of the material. The flipped classroom model includes teaching and learning methods that can appeal to all four generations in the academic environment.

Methods: During the 2015 academic year, we implemented the flipped classroom in the obstetrics and gynecology clerkship for the Ochsner Clinical School in New Orleans, LA. Voice-over presentations of the lectures that had been given to students in prior years were recorded and made available to the students through an online classroom. Weekly problem-based learning sessions matched to the subjects of the traditional lectures were held, and the faculty who had previously presented the information in the traditional lecture format facilitated the problem-based learning sessions. The knowledge base of students was evaluated at the end of the rotation via a multiple-choice question examination and the Objective Structured Clinical Examination (OSCE) as had been done in previous years. We compared demographic information and examination scores for traditional teaching and flipped classroom groups of students. The traditional teaching group consisted of students from Rotation 2 and Rotation 3 of the 2014 academic year who received traditional classroom-based instruction. The flipped classroom group consisted of students from Rotation 2 and Rotation 3 of the 2015 academic year who received formal didactics via voice-over presentation and had the weekly problem-based learning sessions.

Results: When comparing the students taught by traditional methods to those taught in the flipped classroom model, we saw a statistically significant increase in test scores on the multiple-choice question examination in both the obstetrics and gynecology sections in Rotation 2. While the average score for the flipped classroom group increased in Rotation 3 on the obstetrics section of the multiple-choice question examination, the difference was not statistically significant. Unexpectedly, the average score on the gynecology portion of the multiple-choice question examination decreased among the flipped classroom group compared to the traditional teaching group, and this decrease was statistically significant. For both the obstetrics and the gynecology portions of the OSCE, we saw statistically significant increases in the scores for the flipped classroom group in both Rotation 2 and Rotation 3 compared to the traditional teaching group. With the exception of the gynecology portion of the multiple-choice question examination in Rotation 3, we saw improvement in scores after the implementation of the flipped classroom.

Conclusion: The flipped classroom is a feasible and useful alternative to the traditional classroom. It is a method that embraces Generation Y's need for active learning in a group setting while maintaining a traditional classroom method for introducing the information. Active learning increases student engagement and can lead to improved retention of material as demonstrated on standard examinations.

Keywords: *Education–medical–undergraduate, faculty–medical, flipped classroom, Generation Y education, intergenerational relations, problem-based learning, schools–medical, teaching*

Address correspondence to Veronica Gillispie, MD, FACOG, Department of Obstetrics and Gynecology, Ochsner Baptist, 4429 Clara St., Suite 500, New Orleans, LA 70115. Tel: (504) 842-9617. vgillispie@ochsner.org

INTRODUCTION

A generation is "a group of individuals belonging to a specific category at the same time."[1] Their shared experiences greatly influence the way they process information. Academic medicine currently involves the coexistence of four generations—Traditionalists, Baby Boomers, Generation X, and Generation Y—and each generation has a unique teaching and learning style (Figure).[2,3] In the classroom, we often find the oldest generation (the physicians) instructing the youngest generation (the medical students), creating a generation gap. Because of the different teaching and learning styles associated with the generations, this gap can be an obstacle to both teaching and learning. The flipped classroom may be a way to bridge that gap.

The flipped classroom is a student-centered approach to learning that increases active learning for the student compared to the traditional classroom approach.[4] In the flipped classroom model, students are first exposed to the learning material through didactics outside of the classroom, usually in the form of written material, voice-over lectures, or videos. During the formal teaching time, an instructor facilitates student-driven discussion of the material via case scenarios, allowing for complex problem solving, peer interaction, and a deep understanding of the concepts. A successful flipped classroom should have three goals: (1) allow the students to become critical thinkers, (2) fully engage students and instructors, and (3) stimulate the development of a deep understanding of the material.[5]

The flipped classroom model has components that can be appealing to all four generations in the academic environment. Traditionalists and Baby Boomers prefer the traditional classroom setting. In the flipped classroom model, didactic instruction, although it occurs outside classroom walls, is conducted in a traditional manner. Generation X students enjoy learning through high-tech videos and computer-aided instructions. Generation Y students are highly collaborative, thrive on technology, and benefit from group problem solving. In the flipped classroom, the background information is delivered in forms that appeal to Generation X. Group problem solving is the component of the flipped classroom that appeals to Generation Y. The flipped classroom has elements that can meet the needs of all generations and can be a bridge between generations, but does the flipped classroom model of instruction translate into better performance on examinations?

During the 2015 academic year, we decided to implement the flipped classroom in the obstetrics and gynecology clerkship for the Ochsner Clinical School in New Orleans, LA. Students enrolled in the Ochsner Clinical School are a part of a collaboration between the Ochsner Clinical School and the University of Queensland in Brisbane, Australia. Through this unique collaboration, students matriculate at the University of Queensland for the first and second years of medical school. They then spend their third and fourth years of medical school—the clinical years—at Ochsner Health System in New Orleans. In the years prior to 2015, students were taught in the traditional manner: lectures were presented by various clinical faculty in the Ochsner Clinical School. In an effort to veer away from the traditional lecture style of teaching, we decided to implement the flipped classroom to meet the needs of our students, most of whom belong to Generation Y, and to compare student performance before and after implementation.

METHODS

At the beginning of the 2015 academic year (Rotation 1), voice-over presentations of the lectures that had been given to students in prior years were recorded and made available to the students through an online classroom. Weekly problem-based learning sessions were based on the Association of Professors of Gynecology and Obstetrics (APGO) Medical Student Educational Objectives Teaching Cases.[6] We matched the cases provided by APGO to the subjects of the traditional lectures. The faculty who had previously presented the information in the traditional lecture format facilitated the problem-based learning sessions. The knowledge base of students was evaluated at the end of the rotation via a multiple-choice question examination and the Objective Structured Clinical Examination (OSCE) as had been done in previous years. The multiple-choice examination has 60 questions: 30 related to obstetrics and 30 related to gynecology. A passing score is determined by the Hofstee method. The OSCE is an oral examination in which students are given 6 structured scenarios—3 obstetric scenarios and 3 gynecology scenarios—and are expected to formulate an assessment and plan based on the structured case. Students are graded based on their ability to meet 4 key identified objectives for the case, as well as their overall performance. The 5 areas are each worth 20 points for a total of 100 points. A score of 50 or higher is considered a passing grade.

We compared demographic information and examination scores for traditional teaching and flipped classroom groups of students. The traditional teaching group consisted of students from Rotation 2 and Rotation 3 of the 2014 academic year who received traditional classroom-based instruction. The flipped classroom group consisted of students from Rotation 2 and Rotation 3 of the 2015 academic year who received formal didactics via voice-over presentation and had the weekly problem-based learning sessions.

We compared demographic information (ie, sex and age) between the traditional teaching group and the flipped classroom group using the Fisher exact test.

We compared student performance as measured by student scores on the in-service examinations from Rotation 2 of the 2014 academic year (the traditional teaching group) to the scores from Rotation 2 of the 2015 academic year (the flipped classroom group) via *t* test to determine if the difference in the scores was statistically significant. We also used the *t* test to compare student performance from Rotation 3 of the 2014 academic year (the traditional teaching group) to the scores from Rotation 3 of the 2015 academic year (the flipped classroom group).

RESULTS

During the 4 rotation blocks, a total of 70 students matriculated: Rotation 2 had 14 students in the traditional teaching group and 22 students in the flipped classroom group; Rotation 3 had 16 students in the traditional teaching group and 18 students in the flipped classroom group. As

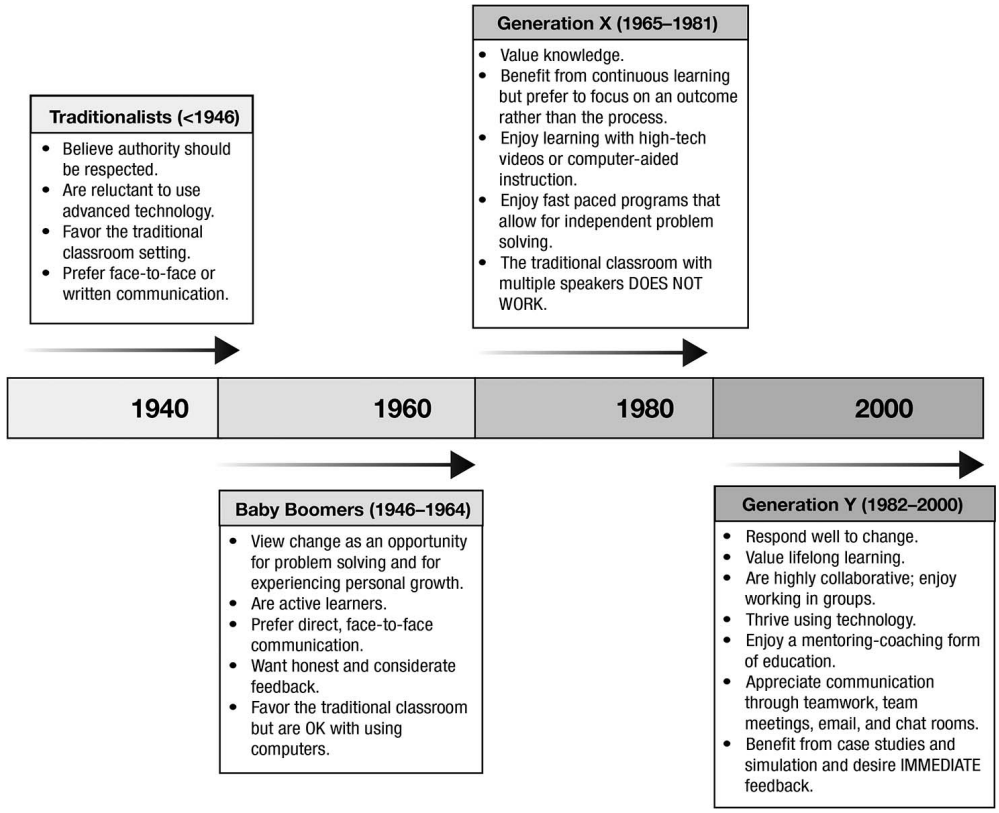

Figure. Teaching and learning styles by generation. Adapted with permission from Moreno-Walton et al.[3]

shown in Table 1, no statistical difference was observed in sex distribution or age between the comparison groups.

Results for the multiple-choice question examination are presented in Table 2. The average score for the obstetrics portion of the multiple-choice question examination in Rotation 2 for the traditional teaching group was 52% compared to 59% for the flipped classroom group, and this difference was statistically significant. The average score for the obstetrics portion of the multiple-choice question examination Rotation 3 for the traditional teaching group was 64% compared to 67% in the flipped classroom group, but this difference was not significant.

The average score for the gynecology portion of the multiple-choice question examination in Rotation 2 for the

Table 1. Demographic Characteristics of the Medical Student Cohorts

	Traditional Teaching Group 2014 Academic Year	Flipped Classroom Group 2015 Academic Year	*P* Value
Rotation 2			
Sex, n			
Male	10	13	0.501
Female	4	9	
Mean age, years			
Male	27.9	28.5	0.380
Female	27.5	29.7	
Rotation 3			
Sex, n			
Male	9	9	0.744
Female	7	9	
Mean age, years			
Male	26.8	28.8	0.353
Female	27.1	27.6	

Table 2. Comparison of Average Scores on the Multiple-Choice Question Examination in the 2014 and 2015 Academic Years in Rotations 2 and 3

		Traditional Teaching Group Academic Year 2014	Flipped Classroom Group Academic Year 2015	*P* Value
Rotation 2	**Obstetrics**	52%	59%	0.03
Rotation 3		64%	67%	0.247
Rotation 2	**Gynecology**	58%	68%	0.0017
Rotation 3		75%	65%	0.00011

traditional teaching group was 58% compared to 68% for the flipped classroom group, and this difference was statistically significant. The average score for the gynecology portion of the multiple-choice question examination in Rotation 3 for the traditional teaching group was 75% compared to 65% for the flipped classroom group, and this difference was statistically significant.

Results for the OSCE are presented in Table 3. The average score for the obstetrics portion of the OSCE for Rotation 2 for the traditional teaching group was 74% compared to 82% for the flipped classroom group. In Rotation 3, the average score for the traditional teaching group was 70% compared to 82% for the flipped classroom group. Both comparisons were statistically significant.

The average score for the gynecology portion of the OSCE in Rotation 2 for the traditional teaching group was 71% compared to 84% for the flipped classroom group. In Rotation 3, the average score for the traditional teaching group was 67% compared to 81% for the flipped classroom group. Both comparisons were statistically significant.

DISCUSSION

When comparing the students taught by traditional methods to those taught in the flipped classroom model, we saw a statistically significant increase in test scores on the multiple-choice question examination in both the obstetrics and gynecology sections in Rotation 2. While the average score for the flipped classroom group increased in Rotation 3 on the obstetrics section of the multiple-choice question examination, the difference was not statistically significant. Unexpectedly, the average score on the gynecology portion of the multiple-choice question examination decreased among the flipped classroom group compared to the traditional teaching group, and this decrease was statistically significant.

For both the obstetrics and the gynecology portions of the OSCE, we saw statistically significant increases in the scores for the flipped classroom group in both Rotation 2 and Rotation 3 compared to the traditional teaching group.

With the exception of the gynecology portion of the multiple-choice question examination in Rotation 3, we saw improvement in all other scores after the implementation of the flipped classroom. We expected student performance on the OSCE to improve with the flipped classroom, as the scenarios for the problem-based learning sessions are very similar to the format of the oral OSCE. However, we did not just see improvement on the OSCE but also on the multiple-choice question examination, suggesting that students had better retention of the concepts taught during the rotation.

Our findings are similar to reports of implementation of the flipped classroom at other institutions. In a study conducted in an introductory physics class at the University of British Colombia, 538 students were divided into two large sections.[7] One section received 3 hours of lecture from a highly experienced instructor, while the second section was taught by teaching assistants via problem-based learning. Students in both sections were administered the same test. The average score of the students taught by traditional methods was 41%, while the average score of the students taught by problem-based learning was 74%.

When we review the science of learning posed by Bransford and colleagues, we can understand why the flipped classroom works.[8] Bransford et al state three fundamental findings regarding how teachers teach and how learners learn:

1. Engagement of students' preconceived ideas is necessary for understanding new concepts and information.
2. Students must have factual knowledge, understand concepts, and be able to retrieve and apply knowledge.
3. A metacognitive approach allows students to take control of their learning through self-monitoring.

The average attention span of a medical student is 15-20 minutes.[9] The flipped classroom increases engagement compared to the traditional teaching method and also puts

Table 3. Comparison of Average Scores on the Objective Skills Clinical Examination in the 2014 and 2015 Academic Years in Rotations 2 and 3

		Traditional Teaching Group Academic Year 2014	Flipped Classroom Group Academic Year 2015	*P* Value
Rotation 2	**Obstetrics**	74%	82%	0.0198
Rotation 3		70%	82%	0.0076
Rotation 2	**Gynecology**	71%	84%	0.006
Rotation 3		67%	81%	0.0052

students in the driver's seat of their education. In addition to attaining factual knowledge through the traditional lecture format, students are able to immediately apply the knowledge. The higher-order critical thinking necessary in the application portion of the flipped classroom is needed in medical education. From a generational perspective, the flipped classroom incorporates the traditional teaching that Traditionalists and Baby Boomers are accustomed to, while creating interaction and using technology that Generation X and Generation Y need.

In our observation of the implementation of the flipped classroom, we did not evaluate the students' or teachers' satisfaction with the teaching. Other institutions that have implemented the flipped classroom have reported great satisfaction from the students.[7,10,11] While the flipped classroom incorporates elements to satisfy the teaching and learning styles of the Traditionalists through the Baby Boomers, it is a change in the way that they teach. Their satisfaction with the process should be evaluated.

We plan to continue using the flipped classroom in the discipline of obstetrics and gynecology. Because our implementation is rather recent, we have not had many students matriculate through this process. As we continue using the flipped classroom, we will continue to monitor student performance to ensure the trend in improved performance. If successful, this teaching method could be used across all disciplines in our clinical school, as well as in our residency programs. Future studies could determine if the application portion of the flipped classroom increases student confidence in patient interactions.

CONCLUSION

The flipped classroom is a feasible and useful alternative to the traditional classroom. It is a method that embraces Generation Y's need for active learning in a group setting while maintaining the traditional classroom method for introducing the didactic information. Active learning increases student engagement and can lead to improved retention of material as demonstrated on standard examinations.

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