

Education

Teaching & Learning Tips 6: The flipped classroomConnie R. Shi¹, BS, Jasmine Rana¹, MD, and Susan Burgin^{1,2}, MD

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Abstract

Challenge: The “flipped classroom” is a pedagogical model in which instructional materials are delivered to learners outside of class, reserving class time for application of new principles with peers and instructors. Active learning has forever been an elusive ideal in medical education, but the flipped class model is relatively new to medical education. What is the evidence for the “flipped classroom,” and how can these techniques be applied to the teaching of dermatology to trainees at all stages of their medical careers?

Introduction

“Many people think the flipped class is all about the technology. In fact, this is not correct. It is about changing the pedagogy with the aid of technology.”

-Jonathan Bergmann (2012)

In a traditional instructional model, class time is focused on dissemination of information from teachers to students with students spending time outside the class applying factual content presented in the lecture.¹ The “flipped class” model of teaching, also called the “inverted class model,” redefines in-class and out-of-class tasks for learners and educators.² First popularized for K-12 education by the nonprofit online educational platform Khan Academy at the turn of the century, the “flipped classroom” has been steadily gaining traction in medical education.^{3,4}

In the flipped class, informational content is provided in advance of class, which learners review independently in a self-paced, self-directed manner. Time in class is centered on activities that engage learners in applying skills they have learned in a participatory and dynamic fashion, with the educator acting in a facilitative role to refine learner mastery of core concepts (Table A1).

Flipped class is one of several collaborative learning approaches that have been proposed and gradually adopted in various educational settings. Others include team-based

learning (TBL) and problem-based learning (PBL).⁵ Similarities among these approaches include emphasis on active student engagement in class, as well as the shift away from lecture-based and educator-centered didactics. However, whereas flipped class is a pedagogical framework of reversing roles and tasks in traditional education settings, PBL and TBL are learning techniques centered on clinical case-based problem solving in the class setting.^{5,6} A flipped class may incorporate PBL or TBL exercises during the class session but may also utilize a variety of other active learning formats in class, such as experiential learning or simulation exercises.⁶

Cognitive and Affective Learning Benefits of the Flipped Classroom

Benefits of the flipped class model include (i) emphasis on active learner participation, (ii) learner collaboration during class time, and (iii) focus on using class time to develop and practice higher-order thinking skills such as applying, analyzing, and evaluating information, rather than memorizing or understanding facts.^{2,7}

Successful implementations of flipped class instructional methods in medical student education have been reported in a surgery clerkship,⁸ radiology clerkship,⁹ and obstetrics and gynecology clerkships.^{10,11} Students in flipped class curricula had higher post-test scores and reported increased satisfaction,

engagement, interest in the subject material, and knowledge of surgical skills compared to students in didactic curricula.^{8–10}

At the postgraduate level, the flipped class has been implemented in emergency medicine residencies,^{12,13} among others. Like medical students, residents scored higher in post-tests and reported high levels of satisfaction.^{12,13} Importantly, however, these studies did not compare resident performance in flipped class curricula to corresponding traditional didactic curricula.

Applications in Dermatology Education

To date, there are no published reports of “flipped classroom” implementation in dermatology education at the undergraduate, graduate, or continuing medical education level. However, clinician-educators at our own institution are already being challenged to adapt their traditional instructional methods to flipped classrooms in our medical school curricula, and we anticipate that dermatological faculty at other institutions are doing the same.

Fortunately, some notable aspects of dermatology education already incorporate active learning principles that the flipped class promotes. For example, whereas grand rounds in some specialties have moved toward didactic lectures, many dermatology grand rounds continue to incorporate patient viewing and collaborative discussion,^{14,15} which encourages trainees to actively participate in formulating differential diagnoses and articulating treatment approaches. Conferences centered on review of clinical images can also be productive forums for audience participation in building differential diagnoses for each image.

In a survey of dermatology residents in the United States, dermatology grand rounds and clinical image reviews are among the highest-rated educational conference styles.¹⁶ Medical students surveyed about dermatology teaching methods also indicated high levels of satisfaction with live-patient sessions and other interactive visual teaching methods,¹⁷ demonstrating that interactive learning formats are effective and well-received in dermatology teaching.

The Flipped Classroom In Dermatology: Opportunities and Challenges

The flipped class requires fundamental redesign of both pre-class and in-class activities and the commitment of both learners and educators who will need to adapt to new roles in the class setting. Moffett describes common challenges encountered in the implementation of a flipped class.⁶ In particular, there is substantial effort required on the educator’s part to identify new course material and find modalities of content delivery suitable for the course and for the students.⁶ It can be overwhelming to try and overhaul polished lectures and create new online modules and videos that convey the exact material an educator wishes to teach.

Fortunately, developments in technology have made available a vast array of web-based resources conducive to incorporation in a flipped class approach for dermatology. For example, the American Association of Dermatology recently published a free

online “basic dermatology curriculum” for trainees about common skin pathologies.¹⁸ In the flipped class model, trainees could review these and other online resources prior to formal didactics and clinic sessions, for example. Surveys of medical students who have used electronic learning resources specifically for dermatology (e.g. recorded lectures, interactive cases, and online learning modules) demonstrated high levels of student satisfaction with this format of content delivery.^{19,20}

In addition to the demands placed on the educator, learners also face new demands under the flipped class model. A study of undergraduate students enrolled in an experimental flipped class course concluded that students felt the new model was a more unpredictable learning environment and that they felt less supported in their learning.²¹ Traditional study strategies and methods of success may be less effective in the flipped class setting, and learners are likely to feel initially discouraged by the transition. However, emphasis on active, rather than passive, learning is beneficial for deep and durable learning (see *Teaching & Learning Tips 3: Active learning strategies*). Therefore, learners in the flipped class model should understand the purpose of this approach, and ideally their positive learning experiences will reinforce their commitment and engagement with this pedagogical style.

Because of these competing complexities, we recommend educators new to the flipped class model first identify areas of need within the existing curriculum that may benefit from incorporating these methods and then implement such changes to a select few areas at first. Lectures with low attendance or poor student engagement, subject learners struggling on exams, and topics requiring both mastery of cognitive and procedural skills are examples of scenarios in which the flipped class may improve the learning experience for students and educators. Visual-diagnostic and procedural components of dermatology education are well-suited to active learning methods fostered by the flipped class approach.

Case examples below offer suggestions on how to implement the flipped classroom in dermatology didactics at all levels of training:

Case 1. Teaching basic principles

Traditional format

Medical students attend a 1-hour introductory lecture about dermatologic morphology. Using a PowerPoint presentation, the educator explains what macules, papules, and other descriptors mean and provides images as examples of each. As homework, students are assigned readings to reinforce knowledge of morphologic terminology.

Flipped class

Medical students watch short online videos introducing morphologic terms before arriving to class. In class, the educator projects images of several different lesions on the board. Students work in groups to describe the lesions using the morphologic

terminology they have learned and present their descriptions to each other and to the educator.

Case 2. Teaching evaluation and diagnosis

Traditional format

An educator giving a lecture on skin cancer to medical students explains the pathogenesis of common forms of skin cancer and explains the ABCDE framework of evaluating pigmented lesions. As homework, students complete a multiple-choice quiz asking them to identify and diagnose images of skin cancers and pigmented lesions.

Flipped class

Medical students complete interactive clinical case modules online about skin cancer and evaluation of pigmented lesions. Each student is assigned one clinical image and its associated diagnosis to present to the class. Other students in the class participate by describing the lesion, contributing to the differential diagnosis, and agreeing on a final diagnosis. The educator moderates the discussion and offers clarification and commentary where needed.

Case 3. Teaching procedural skills

Traditional format

First-year residents attend a lecture describing the common types of skin biopsies and indications for their use. The next morning, they perform skin biopsies on patients in clinic.

Flipped class

First-year residents watch a short training video on how to perform skin biopsies. Before class, they complete an online quiz on the indications for skin biopsies. In class, attending physicians supervise residents as they practice performing biopsies. Residents observe each other and receive immediate feedback on technique.

Conclusion

The flipped class is a promising model for innovative content delivery that improves student engagement and participation in the learning process. Implementation in dermatology education has not been previously reported. There are many opportunities to integrate flipped class methods in dermatology education at the medical student and resident level, both in the teaching of cognitive and diagnostic skills and in the teaching of procedural skills.

Summary points

- The flipped classroom promotes active learning in class and factual delivery of content outside class

- Given cognitive and affective learning benefits of the flipped classroom, there is growing implementation of the flipped classroom in medical education
- Web-based learning resources (e.g. videos, interactive cases, online modules, etc.) can help educators “flip the classroom” for learners

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Appendix

Table A1 A noncomprehensive list of pre-class and in-class activities in a flipped class

Pre-class activities	<ul style="list-style-type: none"> • Short video lectures • Online modules • Online quizzes • Podcasts • Website and/or textbook readings
In-class activities	<ul style="list-style-type: none"> • Interactive case discussions • Collaborative problem-solving exercises • Experiential learning activities • Simulations • Group projects
