



The fallacy of the traditional classroom: why we need to flip the classroom

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Abstract: This perspective describes and justifies the need for looking for alternatives for the traditional lecture classroom such as the “flipped classroom”. We describe a 4-step process for building the class. Suggestions are made on how to create or curate material for lectures and software for generating interactivity in the active part of the classroom.

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The fallacy of the traditional classroom, regardless of grade level, rests in the essentially random grouping of students based upon their perceived ability to learn, that is to say that, across the board, educational institutions are consigning all students united under a single heading whether it be high school, university or post baccalaureate, to one classroom in which the teaching strategy (thus implicitly) learning capacity is uniform.

Little leeway is given as far as learning style differentials and different levels of previous (real) knowledge thereby leading to a homogenized classroom environment which fails to adequately prepare that next generation. With residency programs especially, our future ophthalmologists, categorized as one in the same in that they are expected to learn via lecture the material which we present, and asked to then take this information and apply it when seeing actual patients.

The traditional lecture system can be considered less than ideal (1), particularly when it comes to putting knowledge learned into actual practice. Simply put, in the traditional classroom the teacher uses class time to give a lecture; when learners go home they are left on their own to complete homework, a task that requires them to use the knowledge gained from the day's class to solve problems. Taking it a step further, in residency training, while we generally do not assign homework, we expect much more of our lecture recipients by way of expecting a literal transformation of

lecture topic into on-the-job performance.

Here is where the “flipped classroom” veers in both purpose and practice (2). Taking into consideration the different learning strategies and innate abilities of the audience to which one would otherwise lecture, the flipped classroom enables the instructor to offer an essentially limitless lecture format and in turn accommodate a much wider array of learning styles and intellectual capabilities. By recording his/her lecture, allowing residents to listen and absorb the information at their own rate and in their own unique style, the instructor paves the way then for classroom interaction that allows students to interactively practice their newly acquired knowledge, consequently gotten in the most effective way for them.

When you give lectures, especially to large groups, audiences can be very heterogeneous. Even though you may prepare your lecture knowing the kind of audience you will have, you will always be preparing for an average audience, as it is impossible in a large group setting to ascertain the intelligence/learning level of each and every student. Therefore, no matter where your aim is, some will fall back, some may skip ahead, and some will inevitably be bored (3). However, if instead of attending a live lesson, learners attend a recorded one, each of them can sustain their own pace, such that is most advantageous for them as far as comprehending the lesson of the day. Slower learners

can stop and repeat, while learners with less background knowledge can visit other links or books to procure that extra data they may need. On the other hand, fast learners can skip or fast-forward through their video lesson accordingly.

Beyond giving you the ability to accommodate a multiplicity of learners and learning styles, the flipped classroom also accounts for far greater efficiency. Either recording your lecture or searching for a relevant lecture already in existence, you save an inordinate amount of time (4), time that can now be spent preparing and executing more hands-on in-class instructional approaches, such that will enable your residents to actually put into practice the information they have garnered from the now self-paced lecture.

Bloom's taxonomy, regarding learning objectives, classifies them from low to high regarding the level of expertise a learner should have reached to achieve them (5). These objectives from low to high are: memorize, understand, apply, analyze, assess, and create. The lower the objective the easier it is to attain with no help from teachers. So, what happens in traditional classrooms is that we use class time to achieve low level objectives that could be easily attained by learners with no teacher support (memorize, understand), but we leave our learners alone when they have to attain higher level objectives (apply, analyze, assess, create). This embodies the essential fallacy of the traditional classroom structure.

Thus, the introduction of the flipped classroom, particularly in our type of setting which demands that all residents absorb the material at its highest level enabling them ultimately to go out into the world and actually practice what they've been taught, is long overdue. The implementation of this classroom structure is relatively easy, and again, will save an incredible amount of time that will be more effectively spent on demonstrable endeavors. Actually, there is a rise in the number of universities that are implementing the flipped classroom to some degree (5). Beyond time to see it put into action in our field, this learning model will not only ensure that our graduates are "real-life" ready, but make it so that they are far more comfortable when it comes to their own skills and knowledge.

Now that we have established the background and supporting arguments for considering implementing the "flipped classroom", let's take a look at its implementation. Preparing a good flipped classroom is more difficult and will take more time than creating a traditional one, the first time you prepare to run it. You will need to prepare the lecture

and record it and then prepare the classroom activities. Later we will consider using lectures prepared by others, a strategy that will save a lot of work for us (6).

Let us use a concrete example to show the proposed process. Suppose your lecture is on Topography and Refractive Surgery. You first identify the objectives for that specific lecture or series thereof (7). For instance you define them as: "*Identify risk factors for corneal ectasia in candidates for refractive surgery*".

This objective will in turn guide what you need to include in your lecture or what, the lecture you look for, has to have.

Next, you need to determine how you will assess that the objective has in fact been attained (8). Often, defining assessment is left for last. This pattern of thinking is frequently used but possessing clear learning objectives and knowing beforehand how you will assess, makes building the lecture much easier. So we decide we will assess the objective by: *present topography prints to determine the normality or abnormality of them, present complete clinical cases to determine whether surgery could be performed and with which technique and finally, present clinical borderline cases and ask what other studies could help to make a decision*.

The above directives are an example of how we came to define our assessment. This ultimately allowed us to develop and/or locate the lecture we needed in order to convey all necessary information. We knew we had to explain in detail the different prints from the topographer. We knew we had to explain what findings would contraindicate surgery. And we knew we had to explain what alternative exams they would have to order in borderline cases.

Determining whether or not you wish to create or find a readymade lecture is largely dependent on preference. Some prefer their own insights, and some, understanding that virtually any topic can be located online, will opt for this more expedient route.

A veritable treasure trove of information and resources, the web offers a number of platforms and channels conducive to finding the information you need. One of the more complete ones is the ONE Network from the AAO. To access all of it you need to be a member; if you are not currently, check with your local ophthalmological society. The AAO has many arrangements with country societies where their members get access to ONE for free.

For recording and adding narration you can use the narration capabilities of PowerPoint, or, as an alternative, you can use any screen capturing software. Using PowerPoint has the advantage of allowing you to narrate

slide by slide. Additionally, it is always possible to go back and change the audio of individual slides. The new versions of PowerPoint will convert the narrated presentation into a video, ready for internet upload.

Conversely, screen capture software (9) has the added advantage of enabling you to include in your capture anything that appears in your screen; for example, if you want to show how to navigate a web site. They usually allow you also to capture a video of yourself on the side. Screencast-O-Matic is a highly effective and efficient form of screen capture software that incidentally is free if you make your recordings less than 15 minutes long. The charge thereafter is only 15.00 USD/year for a version that eradicates time limitations, with an additional 10.00 USD if you wish to include a menu alongside of your presentation.

Of course, the easiest (and free) way to publish to the web is to use YouTube. YouTube allows you to make your videos public or only accessible to those that have the link. Accessing your personal channel, you simply click on the upload arrow. Generally speaking, YouTube lectures tend to be of the shorter variety—seven minutes or less. You can create longer videos or you also have the choice of building a sequence or series of shorter segments; thereby creating a comprehensive program for your students.

Once you've investigated the resources and created a seamless lecture or lecture series, the task at hand is now to develop classroom activities which will afford students the opportunity to apply this knowledge they have learned in a more robust and dynamic way than would otherwise be possible had you stuck to traditional class lecture format. The best activities for this portion of your educational protocol tend to be discussion followed by delving into the actual process of solving clinical scenarios.

Begin with a knowledge question. One of the drawbacks of the flipped classroom is that on occasion students will not review the requisite material beforehand. Broader knowledge based questions will help determine whether or not any deficiencies stem from lack of knowledge as a result of not having seen the video, or lack of overall problem solving skills and knowledge application abilities. So, you might ask for example: "*What is a corneal ectasia? What corneal ectasias do you know?*"

Once you have established your learners have enough base knowledge you move into presenting real life problems as the examples that follow.

- ❖ You present different topographic patterns where learners will then have to decide if the risk for ectasia in this specific instance was low, moderate or high.

- ❖ You ask them to estimate the thickness of the residual stroma in a 28-year-old patient with myopia in OS that is sphere – 2 D combined with cylinder – 5 at 165 degrees, central corneal pachymetry of 515 microns, using 130 micron microkeratome. They should calculate the thickness of the residual stroma post LASIK and post PRK.

When working with your residents in small groups, interactivity can certainly be maintained; however, once you have asked an open-ended question and one resident answers, you will never really know if the rest had the answer in mind. That is to say, the voice of one unfortunately is all you are going to be privy to, thus making it impossible to ascertain whether or not the remaining residents in the group truly understood the case information and corresponding answers.

Certainly, most are familiar with the audience response systems that utilize clickers which allow students to send their responses. These systems are expensive and usually only accommodate multiple choice question answers, not open ended questions. With "Socrative" however (10), we replace the clickers with the participants' cell phones. Socrative, a free software that transforms a cell phone into an answering device, is unique in its flexibility. Not simply a solution in terms of collecting answers for multiple choice questions, the software actually allows you to establish open-ended questions and then set the parameters for the respective answers.

So for instance, let's say you ask: what is your favorite animal? Students can answer freely, unhampered by the A, B or C of a multiple choice scenario. You, in turn, can see all of their answers by virtue of this software. The voice of all can now be heard.

The point is, there are numerous ways to engage learners within the classroom. The objective would be to increase awareness of all students' content knowledge. This can be done through a variety of means, and given the day and age in which we live, the software available makes it so that there is absolutely no excuse not to have access to each individual learner and their consequent style.

Let's review the ideals of the flipped classroom, and what it could mean for the future of medical training.

Pros: (I) residents "primed" with material before in-class discussion; (II) able to get to higher level thinking; (III) very interactive; (IV) once narrated, most of the work is done.

Cons: residents may fail to look at narrated lecture in advance.

And again, in relation to the one major con associated

with the flipped classroom, beginning your instruction with knowledge questions can better help you to navigate the student's overall comprehension.

Summarizing, we have seen that in the flipped classroom residents are sent to attain lower learning objectives such as memorizing and basic understanding on their own, allowing us to reserve teacher time for supervising higher learning objectives, such as applying and analyzing. This in the end, will make residents much better prepared for the workforce, much better equipped to deal with patient situations and far more aware in terms of their own inherent and learned capabilities. Our job as instructors should not merely be to talk about a topic or dispense information, but above and beyond that, it needs to be to make sure that our students are actually getting and applying that information as they need to.

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