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February 19, 2012

### **How 'Flipping' the Classroom Can Improve the Traditional Lecture**

*By Dan Berrett*

Andrew P. Martin loves it when his lectures break out in chaos.

It happens frequently, when he asks the 80 students in his evolutionary-biology class at the University of Colorado at Boulder to work in small groups to solve a problem, or when he asks them to persuade one another that the answer they arrived at before class is correct.

When they start working together, his students rarely stay in their seats, which are bolted to the floor. Instead they gather in the hallway or in the aisles, or spill toward the front of the room, where the professor typically stands.

Mr. Martin, a professor of ecology and evolutionary biology, drops in on the discussions, asking and answering questions, and hearing where students are stumped. "Students are effectively educating each other," he says of the din that overtakes his room. "It means they're in control, and not me."

Such moments of chaos are embraced by advocates of a teaching technique called "flipping." As its name suggests, flipping describes the inversion of expectations in the traditional college lecture. It takes many forms, including interactive engagement, just-in-time teaching (in which students respond to Web-based questions before class, and the professor uses this feedback to inform his or her teaching), and peer instruction.

But the techniques all share the same underlying imperative: Students cannot passively receive material in class, which is one reason some students dislike flipping. Instead they gather the information largely outside of class, by reading, watching recorded lectures, or listening to podcasts.

And when they are in class, students do what is typically thought to be homework, solving problems with their professors or peers, and applying what they learn to new contexts. They continue this process on their own outside class.

The immediacy of teaching in this way enables students' misconceptions to be corrected well before they emerge on a midterm or final exam. The result, according to a growing body of research, is more learning.

While the idea is not new, the topic of flipping has consistently cropped up during discussions at recent conferences about teaching and learning—and often when the subject turns to science, technology, engineering, and mathematics, or the STEM disciplines.

The recent interest is driven by the convergence of several trends.

The first is technological innovation, which has made it easier to distribute lectures by the world's leading instructors. Some faculty members wonder whether it still makes sense to deliver a lecture when students can see the same material covered more authoritatively and engagingly—and at their own pace and on their own schedule. The supply of such offerings, at low or no cost, is increasing, as demonstrated by recent news of the Massachusetts Institute of Technology's [founding of MITx](#) and a Stanford University professor's [start-up of Udacity](#).

At the same time, policy makers, scholars, advocacy groups, and others who seek to improve higher education want to see more evidence that students are truly learning in college. As pressure mounts to graduate more students, and as cognitive psychology produces new insights into how students learn, these observers say professors can no longer simply pump out information and take it on faith that students understand it.

Adding to these forces is economic reality. Strained budgets make it difficult for colleges to decrease class sizes and create more seminars in which low student-to-professor ratios allow a high degree of personal attention. Even advocates for new approaches to teaching concede that the lecture is [not going away](#). The lecture model—putting dozens, hundreds, or even thousands of students in a room with a professor—endures because it makes economic sense.

Flipping allows colleges, particularly large research institutions with big classes, to make the traditional lecture model more productive, says Harrison Keller, vice provost for higher-education policy at the University of Texas at Austin, which held a recent seminar on course flipping for its faculty. "If you do this well, you can use faculty members' time and expertise more appropriately, and you can also use your facilities more efficiently," he says. More important, "you can get better student-learning outcomes."

Those forces are coming together to prompt a rethinking of the faculty member's role in the classroom. "I see a paradigm shift, and it's coming soon," says Michael S. Palmer, an associate professor of chemistry and assistant director of the Teaching Resource Center at the University of Virginia. "Content is not going to be the thing we do. We're going to help unpack that content."

#### Identifying Key Concepts

Professors have flipped courses for decades. Humanities professors expect their students to read a novel on their own and do not dedicate class time to going over the plot. Class time is devoted to

exploring symbolism or drawing out themes. And law professors have long used the Socratic method in large lectures, which compels students to study the material before class or risk buckling under a barrage of their professor's questions.

The way STEM disciplines are traditionally taught makes them particularly ripe for change, Mr. Palmer says, because of their "long tradition of very didactic teaching, which involved disseminating content." By contrast, he says, the humanities and social sciences have been about exploring ideas.

Still, flipping has been adopted in isolated precincts of STEM disciplines, particularly physics. Some of the most notable examples illustrate the different forms the technique can take.

At the University of Michigan at Ann Arbor, for example, the math department has flipped its teaching of calculus since the mid-1990s, says Karen Rhea, a lecturer and director of the introductory mathematics program.

Michigan offers up to 60 small sections of introductory calculus, with a maximum of 32 students in each class, which meet for 80 minutes three days a week. Faculty members receive intense training: a weeklong course at the end of August, followed by weekly meetings and regular classroom visits throughout the semester from more-experienced instructors.

Consistent with the flipping model, students at Michigan do their reading before class. The instructor gives a brief lecture, asks them about the reading, and goes through an example from the textbook. Students take turns going to the board to present their answers or working in groups, which might be followed by another short lecture.

As the students work on the next problem, the instructor circulates. Rather than sending students home to struggle with a new concept, the instructors can hear—and correct—misunderstandings as they arise. "We're asking them to solve problems that are not template problems," Ms. Rhea says. "In your presence they're learning how to think, and we're learning what they're struggling with."

Class size is not the most important factor in teaching this way, Ms. Rhea says. What's more critical is teaching and testing a set of basic principles of differential calculus that are articulated in a test called a calculus concept inventory. This 22-question test focuses not on whether students can run through calculations but on whether they understand the underlying concepts.

"It's easy to measure if they can take derivatives out the wazoo," Ms. Rhea says, "but it's kind of harder to see what they're getting underneath."

Research by Ms. Rhea and two colleagues suggests that Michigan's teaching methods have led to greater gains in conceptual

understanding. The techniques have been lauded by the Association of American Universities, among others.

In 2008, Michigan gave concept inventories to students before they started calculus and after they finished, and calculated the difference relative to the maximum gain they could have made. Students in Michigan's flipped courses showed gains at about twice the rate of those in traditional lectures at other institutions who took the same inventories.

The students at Michigan who fared worst—a group of 12 who were at risk of failing the course—showed the same gain as those who demonstrated the largest increase in understanding from traditional lectures elsewhere.

#### A View From the Lecture Hall

Michigan's program did not randomly assign its own students to courses using different teaching models, as conventional education research would dictate. But the gains in learning that were observed at Michigan correspond with similar findings about teaching methodologies in physics, which have been documented by Richard R. Hake, a professor emeritus of physics at Indiana University at Bloomington.

In fact, the project at Michigan was modeled on similar work by physicists, who have been among the most innovative STEM scholars in trying new approaches to teaching and testing the results.

One of the most outspoken physicists is Eric Mazur of Harvard University. He has been flipping courses for 21 years using a method he calls "[peer instruction](#)," in which students work in small groups to answer conceptual questions during lectures. Mr. Mazur recently established [a network](#) of practitioners in the technique.

He began to use peer instruction after testing his own students on the force concept inventory, which predates the calculus concept inventory, and which tests understanding of the foundations of Newtonian mechanics. Despite his consistently high ratings from students, Mr. Mazur saw that they were not learning as much as he thought they were.

"We put a lot of emphasis on the transfer of information," Mr. Mazur said at a recent conference at Harvard on teaching and learning. But that model is making less sense as sources of information grow more plentiful. "Simply transmitting information should not be the focus of teaching; helping students to assimilate that information should."

At the conference, he demonstrated how his methods help students absorb information and transfer concepts. He briefly explained an aspect of thermodynamics: When molecules are heated, they move away from one another.

After asking if there were any questions on this concept, he told the attendees to pick up their electronic "clickers" to answer a question. It was not a simple test of comprehension; he asked people to apply the concept to a new context.

Imagine a rectangular sheet of metal with a circle cut out of the middle, he said. What would happen to the diameter of the circular gap if the metal were to be heated uniformly? Would the diameter of the hole get bigger, stay the same, or shrink?

The attendees entered their answers on their clickers. Mr. Mazur told them to find someone sitting near them who had chosen a different answer and try to persuade them that their answer was correct. The room quickly grew noisy.

I answered that the gap would get smaller, figuring that the material would melt and the hole would start to close. Behind me, a psychologist explained how he thought it would remain the same because the interplay between the expanding metal and the air in the middle would balance each other. We went back and forth, failing to change the other's mind.

Mr. Mazur ended the discussion and began to move on to a new point when people in the audience started protesting. As it turns out, both my neighbor and I were wrong: The hole would expand, as happens when a jar's metal lid is heated.

"Once you engage the students' minds," Mr. Mazur said, "there's an eagerness to learn, to be right, to master."

#### Active Learning

But such eagerness is not much in evidence on students' evaluations, says Melissa E. Franklin, chair of Harvard's physics department. While she does not defend the traditional lecture and lauds Mr. Mazur for advancing the cause of teaching, she views flipping with some skepticism.

Harvard colleagues have tried flipping, Ms. Franklin says, but few have stuck with it. It demands that faculty members be good at answering students' questions on the spot, even when their misconceptions are not yet clear because they are still processing the information.

It can also be very labor-intensive for faculty members who do not have teaching support, she adds, if it requires a professor to read questions that students submit before class (which is characteristic of just-in-time teaching). "For a normal, straight-ahead professor, there's a steep learning curve," Ms. Franklin says.

But her chief critique is based on the intensity of students' responses. The average score on a student evaluation of a flipped course is about half what the same professor gets when using the traditional lecture, she says. "When the students are feeling really bad about required courses, it doesn't seem like a good thing."

Mr. Mazur concedes that some students resist participating to the extent his technique demands. Many students have done quite well receiving information and spitting it back out, he says. But while some come to embrace the flipped classroom, others never do.

Liking the class is ultimately beside the point, Mr. Mazur says. He says his results from using peer instruction show that, on the force concept inventory, nonmajors who take his class outperform physics majors who learn in traditional lectures.

"You want students to like class, but that's not the goal of education," Mr. Mazur says. "I could give them foot massages and they'd like it."

Matt C. Hudson, a senior who is double-majoring in physiology and evolutionary biology, learned to appreciate the flipped classroom while taking Mr. Martin's class at Colorado, just as Mr. Mazur says his students sometimes did in his classes at Harvard.

"I really was caught off guard at first," says Mr. Hudson, who was initially adamant that students taking a lecture class should be lectured to. About three weeks into the course, his view changed. Mr. Martin split the students into small groups to discuss the heritability of beak sizes in finches, and how that trait related to a bird's chance of survival.

When a fellow student explained the relationship to him, the link became clear. "Having six or seven ways to think about a problem is better than just having your own way to think about a problem," Mr. Hudson says.

As both Mr. Mazur's and Mr. Martin's classes indicate, the cognitive strain that flipping imposes on students accounts for much of its success—and the resistance it engenders. Ultimately that strain is what is most important, not whether the course is flipped, says Carl E. Wieman, associate director of the White House Office of Science and Technology Policy. He has documented gains when relatively inexperienced physics graduate students and postdoctoral researchers [lecture hundreds of students](#) but stop intermittently to quiz and give feedback on the students' understanding of key concepts.

Whatever method a faculty member attempts, Mr. Wieman says, he or she should start by defining the underlying concepts to be taught and the learning outcomes that will be demonstrated. And it is not enough, he says, to simply declare that the learning outcome is to cover the first four chapters of a textbook.

"It's a whole different paradigm of teaching," says Mr. Wieman, likening the professor's role to that of a cognitive coach. "A good coach figures out what makes a great athlete and what practice helps you achieve that. They motivate the learner to put out intense effort, and they provide expert feedback that's very timely."

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**ser27834**

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Sort by **Oldest first** Follow comments: [by e-mail](#) [by RSS](#)Real-time updating is **paused**. ([Resume](#))**mycantarella** 1 week ago

What I like about the flipping idea is that it takes the onus off the student who is intimidated about asking questions or somehow revealing a lack of understanding of what is going on. It makes for more active learning in a way that puts everyone on the spot to some degree. It is most often the first generation, low-income and minority students -- those most at risk of dropping out that are also most likely to be least engaged in class. Flipping forces them to be part of the learning experience in a supported, collegial and collaborative way. It is also how things function in the "real world". One rarely sits in a meeting and gets lectured at in the workplace. It is more likely that the workplace will look like the flipped classroom. Good practice for learning how to get better answers by information sharing and collaboration.

Marcia Y. Cantarella, PhD, Author, I CAN Finish College: The Overcome Any Obstacle and Get Your Degree Guide.

2 people liked this. [Like](#) [Reply](#)**ssaulvolk** 1 week ago

I have "flipped" my (history) lecture classes for a number of years (preparing my own narrative on videos which they watch over the weekend, and using classes for discussion and other activities). There are many reasons for this: here is one. I'm a good lecturer (according to my students, colleagues, and the profession). Yet in every lecture, some students (I call them the "back row boys") would fall asleep. This was unacceptable. I could embarrass them by throwing a piece of chalk at them or calling them out. I could berate student behavior in general. Or, I could engage them. I'm happy to say that with a "flipped" class, I no longer have "back row boys" because there is no back row. (I could comment more on what/how they are learning, but suffice it to say that they can't learn if they're asleep.)

5 people liked this. [Like](#) [Reply](#)[Load more comments](#)**okieinexile** 1 week ago

Forget throwing chalk. Use technology, perhaps a taser... :)

5 people liked this. [Like](#) [Reply](#)**lj\_shaffer** 1 week ago

Don't tase me bro! ;D

7 people liked this. [Like](#) [Reply](#)**mindnbodybuilding** 4 days ago

Too funny!

[Like](#)**agyorke** 1 week ago

Oddly enough, we (Penn State) just published a video explaining the concept of Flipping the Classroom - which is similar in style to the "... In Plain English" videos on YouTube:

<http://www.youtube.com/psutlt#...>

And there is an Educause Learning Initiative white paper called "7 Things You Should Know About Flipped Classrooms" that was published two weeks ago:

<http://www.educause.edu/Resour...>

5 people liked this. [Like](#) [Reply](#)



**Bob Killoren** 1 week ago

Thank you Mr Barrett for the excellent summary of "flipping" in the classroom. I am going to share it with all the faculty because it is precisely where we want to be heading as a polytechnic institution. I concur that the greatest resistance to active learning comes from those who are, frankly, stuck in a rut. Lectures give a sense of accomplishment to them -- they are doing their jobs. It is up to the student what is done with the material imparted. Well, this will no longer work in our society. We need leaders who can think and ask the right questions when approaching a problem or challenge. If students come out of college with nothing more than fading memories of past lessons, it is not necessarily the fault of the student; the faculty bear a major part of the responsibility for that failure. In order to adapt to the ever changing needs of society our pedagogical approach needs to be flexible and adjustable. The teacher needs to also understand that each student in the classroom learns differently and thus he or she must create a learning environment where all the needs are met.

1 person liked this. [Like](#) [Reply](#)



**eric\_mazur** 1 week ago

Keep me posted on how your colleagues react. Be prepared for the type of skepticism expressed by my Chair, Melissa Franklin (who cares about end-of-semester evaluations and apparently not about learning, ignoring or refusing any solid assessment) and from some students, as exemplified by the post of tressiemphd below, based on gut feeling and/or anecdotes. Just remember Lee Shulman's quote: "The plural of anecdotes is not data" -- and collect data!

[Like](#) [Reply](#)



**profjrdn** 4 days ago

All the data in the world won't change the fact that the profs with good student evaluations get pay raises while those of us who are mere 4's on the 5 point scale get nothing. I'll let someone else play with this fire. I'm tired of getting burned.

[Like](#) [Reply](#)



**wigoffe** 1 week ago

This is a very nice article and gives prominence to teaching ideas that deserve to be more widely known. STEM researchers, particularly physicists, have done a great deal of interesting work that other disciplines should be able to use to increase learning by their students.

There is one slight oversight -- it would have been nice to mention Jerry Epstein, who developed the Calculus Concept Inventory used at the University of Michigan.

2 people liked this. [Like](#) [Reply](#)



**urbanized** 1 week ago

Flipping \*can\* work, but it needs to be accompanied by the traditional lecture. Even in Literature classes (my area), pure activity or discussion based learning is not very effective. As nice as it would be if students could show up to class to "explore symbolism or draw out themes" (not quite what happens, but I get the point), many students are not intellectually prepared for such a challenge. The lecture needs to be in place in most instances to help students understand how connections are made between ideas. How, for example, form and content are related in a particular work. Flipped classes -- or as they were called when I was an undergraduate in the UK, "seminars" -- come into play after students have received some explanation so they can ask questions and model ideas introduced in the lecture.

10 people liked this. [Like](#) [Reply](#)





polaris54 1 week ago

If the lecture content is pre-recorded and viewed by the student outside the classroom, then in class discussion will be quite fruitful. The out-of-class work should also include periodic quizzes and an opportunity to communicate with the instructor via e-mail. With all of this interactivity, a lot more learning will happen. Once you've been involved in a properly executed course, you will not want to go back to the simple, passive lecture.

2 people liked this.

[Like](#) [Reply](#)

joncrispin 1 week ago

"  
It demands that faculty members be good at answering students' questions on the spot,"

Heaven forbid a faculty member be able to answer a student question on the spot! I can't believe this administrator actually said this.

chris

12 people liked this.

[Like](#) [Reply](#)

wlgoffe 1 week ago

I understand what you're getting at, but what the administrator might have been getting at is the following point. If you're really getting to deep learning, as you can do with these methods, you'll likely be getting at deeply held misconceptions held by students (this is something physicists do -- they understand the incorrect model most students have of motion and they directly challenge them on it). As in "The 'Curse of Knowledge' or Why Intuition About Teaching Often Fails," Carl Wieman, <http://www.cwsei.ubc.ca/resour...>, experts think of a subject very differently than novices (he even quote fMRI studies that finds different portions of the brain are utilized in examining the same problem). I've started to use these methods in my classes (I'm an economist) and occasionally I simply don't understand student thinking -- I think that differently about economics than my students do. That's one reason why Eric Mazur pushes peer instruction so hard -- someone who just learned a topic might well be able to explain it better than someone who's known it for decades.

A bit more on Carl Wieman, the author of the paper I mentioned above. As in the article, he's in White House Office of Science and Technology Policy, but he's also a Nobel Laureate and a former U.S. Professor of the Year (given for teaching). He and his physics colleagues have done very useful work not only on how students learn but they can demonstrate improved learning as a result. Not many of us in higher education can say that.

For more on what physicists have done, see "Why Not Try a Scientific Approach to Science Education?" <http://www.cwsei.ubc.ca/resour...> or "Don't Lecture Me" <http://americanradioworks.publ...> . For some of the primary literature, see "Improved Learning in a Large-Enrollment Physics Class," Deslauriers, Schelew, Wieman, Science 13 May 2011, [http://www.cwsei.ubc.ca/SEI\\_re...](http://www.cwsei.ubc.ca/SEI_re...), "Interactive-engagement versus traditional methods: A six-thousand-student survey of mechanics test data for introductory physics courses," Richard Hake, American Journal of Physics, 1998 <http://web.mit.edu/rsi/www/200...>, or "Peer Instruction: Engaging Students One-on-One, All at Once" Catherine H. Crouch, Jessica Watkins, Adam P. Fagen, and Eric Mazur, <http://www.compadre.org/Reposi...>

8 people liked this.

[Like](#) [Reply](#)

trainer12 4 days ago

What I know and understand about economics comes from one professor I had as an undergraduate and my high school economics teacher. I still have my note book from my high school economics teacher Myron Feinstein. Not only were they well organized, but delivered with stories, examples and a quick wit. He had a passion for the "dismal science." He made it come alive with examples from everyday life and the news. Dr. William K. Tabb was my economics professor at Queens College of CUNY at the time. About half the students in our class were not mastering the material. He changed the style of his lectures and the format of the class. It was a large lecture hall with fixed seats. But despite that he broke the class up for part of the class sessions, into mixed groups of people who did well on the quizzes and exams with those who did not. He came around to each group to see how peer to peer instruction was working and if people were understanding the material. I lost the notes from the class but I still have the textbooks, highlighted, underlined and with notes in the margins. Fusfeld's, "Economics" and "The Capitalist System" by Edwards, Reich and Weisskopf, I am convinced that Tabb's radical approach at the time helped me pass that course.

1 person liked this.

[Like](#) [Reply](#)



**mindnbodybuilding** 4 days ago

Thank you for the links! This is my homework assignment for the weekend :-)

[Like](#) [Reply](#)



**tressiemcphd** 1 week ago

This coverage of the anti-lecture is bordering on fetishization. I'm glad this works for many students and gives some teachers immediate feedback. However, as a learner this kind of chaos would have totally retarded my learning process. Totally. And I cannot be the only one. In all of our getting I hope we get an understanding that not all learners benefit in a flipped lecture environment.

18 people liked this. [Like](#) [Reply](#)



**Robert Talbert** 1 week ago

It's not "anti-lecture". It's about putting lecture in the context that gives learners the best opportunities to learn.

1 person liked this. [Like](#) [Reply](#)



**eric\_mazur** 1 week ago

I wonder also if tressiemcphd has any data to show any lack of learning or retardation. There certainly is more than 20 years of data to refute such anecdotal statements. Talking about anecdotal evidence -- this is one of the main barriers to improving education. The other one being flawed assessment of learning.

2 people liked this. [Like](#) [Reply](#)



**sparkles** 4 days ago

I submit any instructor or administrator who contents to know "the best" way to handle student learning is inherently flawed in their approach. Diversity of methods (including lecture as a valuable and strong teaching tool) is a good thing for students. I applaud all faculty who take the time to find what works best in their discipline and their individual classrooms. I detest the idea that one way can be labeled as "giving learners the BEST opportunity to learn" - BUNK!

3 people liked this. [Like](#) [Reply](#)



**mbelvadi** 1 week ago

"Many students have done quite well receiving information and spitting it back out" - this is probably the key to understanding Harvard students' dislike. Talk about selective bias, Harvard pulls together a cohort of students specifically based on their enormous success under the traditional model of teaching. It's no surprise that such students would find flipping to be threatening to their tried-and-true way of learning, especially since the grade competition there can be incredible, and curving highly punitive. Given the overall success of Harvard grads, maybe that's not the best place to tamper with the learning model. Maybe places with lower retention and GRE scores would benefit more from flipping.

2 people liked this. [Like](#) [Reply](#)



**mnprof** 6 days ago

My understanding is that grade competition at Harvard is not "incredible"--or at least not the way you think it might be. I don't know the exact statistic (maybe some other Chron readers can help me out?), but doesn't some vast super-majority of Harvard students graduate with "honors"? Median grade is an A? etc.

[Like](#) [Reply](#)



**mbelvadi** 6 days ago

Perhaps it depends on the major. In the 80s, I watched my pre-med roommate struggle with intro organic chemistry, telling me that anything less than a 90% raw score would end up being recorded as at best a C, because of the curve, and she couldn't even be sure of exactly where the A/B line would be, so everyone was just killing themselves to get 100%.

Maybe someone there now could enlighten us as to whether this has changed?

[Like](#) [Reply](#)



**mnprof** 6 days ago

In any case (since I didn't say so in my initial reply), I agree with the rest of your comment.

[Like](#)



**Julie Schell** 1 week ago

Knowing the contexts referred to in this article well, it gives me pause when institutional leadership puts so much stock in "the intensity" of comments and scores on SETs, given what the literature demonstrates about their validity. In order for change to occur in teaching and learning, we need to change the conditions that impede real innovation--both on the part of teachers, but even more on the part of learners. When institutional leadership fails to support and cultivate innovation in teaching and learning based on SETs, not clear, valid measurers of student learning, the conditions for change stagnate and the system remains broken.

4 people liked this. [Like](#) [Reply](#)



**j\_shaffer** 1 week ago

Prior to grad school, I was fortunate enough to teach high school students biology and environmental science in a low-income urban school - just the sorts of kids mycantarella mentions in her post. The learning curve in how to actively engage my students was very steep and frequently exhausting, but I am so glad in hindsight to have had that experience. I use many of the techniques (peer-to-peer discussion, small group problem-solving, games, etc.) in my classroom today. I'm very happy more attention is being paid to teaching methods that can supplement lectures and improve university student learning.

[Like](#) [Reply](#)



**\_perplexed\_** 1 week ago

I have a lecture-hall style classroom with 150 seats, all filled. Aisles are narrow, there is no lobby outside the classroom, and only a small space in the front of the lecture hall. My one attempt at flipping this classroom created an uncomfortable, even dangerous situation (inadvertent pushing/shoving as people lost their balance in the steep aisles). An suggestions more helpful than dismissing a third of the class to create some room would be welcome!

[Like](#) [Reply](#)



**benb8119** 1 week ago

Try organizing them in groups of four, 2 in the front row, 2 in the back row. The front group has to twist in their seats, but they can discuss things with each other. I have done this successfully, but not, it is true, with 150 students.

2 people liked this. [Like](#) [Reply](#)



**trainer12** 4 days ago

I remember from my undergraduate days having one to three class periods a week with a graduate assistant (not for all courses) which was called "recitation" where you could ask questions, go over assignments, review for quizzes, exams and go over grades, writing

assignment feedback from the professor. This format was for the 101 and survey courses not for the upper level courses in the department major. I found that this was helpful in mastering the material. Sometimes we would meet in the library and book a conference or meeting room to go over researching skills and how to secure books and articles on reserve. This was in the days before digitization of scholarly articles and books. We don't have to compete for the limited copies of things placed on reserve as much as we used to in the old days.

1 person liked this. [Like](#) [Reply](#)



**flipped4good** 1 week ago

While it may appear like chaos, if you move around to each group, there is very focused discussion and a rich conversation back and forth between students as they grapple with each other's conceptions about the nature of the world. Being able to drop in on these conversations is one of the highlights of having a flipped classroom. Additionally, as my classes have become more and more flipped, I find myself having more and more fun thinking about how best to capture student misconceptions and address the misconceptions in ways in which students have to grapple with their misconceptions instead of having the professor (me) tell them about their misconceptions. I've discovered that consolidation of what student's learn is best accomplish by having THEM address their misconceptions. My job is to identify them and lead them down a path so that they can discover that how they thought about the world could be replaced with a more accurate and richer picture.

[Like](#) [Reply](#)



**laura\_stone** 1 week ago

I teach developmental mathematics at a community college. After almost 10 years of lecture based instruction, I am now in my second semester of facilitating a "flipped classroom." Students watch online lectures that come with their textbook and do online guided examples before coming to class. We spend our time together presenting problems, clearing up confusion, discussing connections to other learning and sharing our confusion and success. I usually wrap up each session with a 10 minute lecture to summarize and synthesize our learning. With 25 teachers in the room, we are all learning more - me included!

An adult who starts their college math path in a Fundamentals of Mathematics course, (where we learn how to do long division and add fractions) is almost always a student who hates/is afraidof/has been lost in/burned by math. Since I "flipped" my class, attendance is up, completion rates are up, conceptual understanding is up, test scores are up... but the most important up? Attitude and confidence - students now leave my classroom believing in their ability to understand and do math. What teacher could ask for more?

1 person liked this. [Like](#) [Reply](#)



**11274135** 4 days ago

Do your student actually do the assigned pre-class preparation?

2 people liked this. [Like](#) [Reply](#)



**Richard Hake** 1 week ago

In a discussion-list post "Flipping the Classroom vs Traditional Lecture" at <http://bit.ly/wYdWIL> I give a highly condensed version of Berrett's Chronicle report, into which I have inserted some hot-linked academic references.

[Like](#) [Reply](#)



**Amy\_L** 6 days ago

I would like to hear how people motivate students to do the outside-of-class work. I have a really hard time getting students to read; how would I get them to watch lectures outside of class?

7 people liked this. [Like](#) [Reply](#)



**mfverderame** 4 days ago

Strategies from Team-Based Learning (<http://www.teambasedlearning.o...> may help here. TBL is another version of the 'flipped' classroom. Students come to class prepared (having actually read the assignment, watched the lecture before class, etc) because they know the first thing in class will be a Readiness Assurance Test. This is done in two steps - first everyone takes the test individually (iRAT), then each team works as a group taking the same test (gRAT). Consistent with what others have said in these posts, the teams, functioning as peer-to-peer teachers, almost always outperform the individuals (indeed the worse team usually out-performs the best individual). After the RATs, you move on to the Group Application Exercises - opportunities for teams to apply what they've learned on significant problems. After 5 years of a traditional lecture format for a Responsible Conduct of Research course to biomedical graduate students, in which I had to be the most frustrated professor on campus, I was finally able to move to a TBL format (Thanks Prof McCormack!). After the FIRST TBL class one of the students came up to me and said "That was a great discussion today" (it was). Never in 50 class sessions have I received that comment. That said, Professor Shulman is correct ("The plural of anecdotes is not data.") - we are conducting an educational experiment using Prof Mumford's ethical decision making measurement tools to determine if this approach improves ethical decision making (Prof Mumford has also shown that the traditional lecture approach does not).

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Amy\_L 3 days ago

Thanks, mfverderame! That's very helpful.

[Like](#) [Reply](#)



kivi3329 3 days ago

The question that comes to my mind is, how long are your lectures, video or otherwise? Do you intersperse your lectures with questions to the group? Do you call on students? Do you make them think?

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mitchkeller 2 days ago

I have the students use the course management system to respond to a couple questions about the reading. It's worth 5% of their final grade and is graded on a completion basis. (If they didn't understand and can't answer the question, they need to say where they got stuck and try to identify what's confusing them.) My response rate runs 65-85%, which allows for productive use of class time.

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richardtaborgreene 5 days ago

The above flip is talking about GROUNDING concepts in student experience seasoned with a dash of inquiry (not presentational) learning style supports. BETTER by far than the above flip is a technique invented 42 years ago---INVENT EVENTS, RESEARCH EVENTS, APPLICATION EVENTS (trade-marks of Knowledge Epitome), that is, Mass Workshop Events, replacing classes and courses. You take 20 DIVERSE expert protocols for doing something, assign two of them to each of 10 student teams in 2 12-hour-each days of intense building of partial workshop products that combine to make a powerful overall event product then sold. My teaching has, over the past 40 years, produced over 50 published books each produced in such intense 2 or 3 day workshop events. 30 students so organized typically produce a highly organized 1500 page book, that includes skype interviews of the world'S top 20 people on a topic, in 3 days of work. Three such events per term and a course of 30 students produces 4500 pages of final reports, sell-able by usual NYC big name presses. Throwing away homework is anti Liebig (the guy who invented research universities in Germany centuries ago). By the way China is dreaming Big these days--hint hint. Not just any workshop protocols will work because the teams have to warp and weave mid-process in certain specific ways not others. The guidance for this design is from something called Social Design Automata theory---I have 3 workshops in the Design Research Society conference coming up in Thailand on this that are over-subscribed.

1 person liked this. [Like](#) [Reply](#)



jmccargar 4 days ago

There has been some very good work done in chemistry as well by Rick Moog and colleagues at

Franklin and Marshall College. The Process Oriented Guided Inquiry Learning (POGIL) technique requires students work in teams of 4-5 students to respond to a series of questions that develops student understanding of key concepts. Students "construct" knowledge before moving on to the problem solving so important in chemistry courses. I've noted a vast improvement in the critical thinking abilities of students in my physical chemistry courses.

2 people liked this.

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