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Professors have been " ipping" their courses for years, but the idea still elicits controversy.

While the term is often applied to a range of approaches to teaching, ipping in its various forms involves a key trait: It inverts the traditional relationship of students and faculty members. Instead of passively receiving course content during class, students digest the information outside of class on their own time. They might read written materials, watch previously recorded lectures, or listen to a podcast. Once they are in class with their instructors, students spend time answering questions, discussing material, or working in groups. The method has attracted particular attention in recent years in science, technology, engineering, and mathematics courses.

At its root, advocates say, ipping seeks to put the learner at the center of a course instead of the teacher. While proponents say it's a more e ective technique than a traditional lecture, many students chafe at it. A signi cant number of professors try it, struggle, and quickly revert to straight lecturing. What do you need to think abou

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 oor. 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 e ectively 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 “ ipping.” As its name suggests, ipping 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 ipping. 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 witadcprofto rmlass11.5(n)13.5(g721.2(s)-3.t)-15.4(c4(a)-27(sb)12.8(23[(A)-)12.6(i)8.11.6(n

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 di erential 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

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center on the revamped chemistry course, but it did consult with other proponents of the technique, as part of a project, supported by the Howard Hughes Medical Institute, aimed at making Southwestern’s science curriculum more hands-on.)

Many of the national center’s course redesigns have been in remedial math, nanced by $2.2-million from the Bill & Melinda Gates Foundation. The center has also helped ip courses in subjects as diverse as Spanish, psychology, nutrition, and anatomy.

“The traditional classroom typically consists of a lecture of some kind where students are listening or watching the professor,”.1(8(s)-8.1 <.5(i)-9.6“)-37.4(1(r w)-9.1(a)1.7(t)-(t)-15.4(h1-15.g.2(u)(e)e)3.2y)56.4-11.yse

Shortly after the class begins, students cluster their desks into groups of three or four to work on

I was getting ready for the coming semester when out of the blue I got a call from my sister, a high-school chemistry teacher. She had “ ipped” her chemistry class, and loved it. I should try it, she said. There was a note of conviction in her voice that was hard to ignore.

For those who haven’t been paying attention, “ ipping” is a teaching technique that involves abandoning the traditional lecture (or just not relying on it so much) and replacing it with interactive approaches that experiment with technology and require students to gather information outside of class and be prepared to engage the material in class, rather than sit passively listening to a faculty member talk.

So this semester in my chemistry courses (yes, the discipline runs in the family), I’m making videos about concepts like acid-base theory, uploading them onto YouTube, and using class time for interactive work. The in-class sessions are problem-based and often computational, so my videos range from “How do you ‘ ll down’ in Excel?” to “What do antibonding orbitalhrsk. TiO. ororo7.6(h)-5.3(WO. o)2-14.9(e)

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Of course, those shifts are not the result of ipping alone. They're happening because of Wikipedia, integrated high-school classrooms, and innovative high-school teachers who know how to bring out the best in their kids (and who have led the ipping revolution).

Maybe that's the shape of the future. Parents send their kids to college because it is a place their (possibly brilliant) teenagers might not merely survive but discover new routes to a 97 percent on killer exams, or nd the courage to call out aggressions (even if it's a professor who commits them), or to learn how to think, argue, explain, listen, and get chalk on their hands. All of which is high-octane liberal-arts education, desperately needed in the very challenging world these students will soon face.

As for me, I just hope I'm ready for my sister's next phone call.

Steven Neshyba is a professor of chemistry at the University of Puget Sound.

April 4, 2013
http://www.chronicle.com/article/Its-a-Flipping-Revolution/138259/

not mean that the idea itself is bad. It just means that students are uncomfortable and are trying to figure out what the rules are, and this manifests itself some times in conflict. The issue brought up in the comment, in other words, isn't really a skepticism about flipped learning per se so much as a concern about getting it to work. For those who are skeptical about flipped learning because you're convinced it will never work, keep reading:

- Student resistance does not have to be permanent even if it's widespread. I've found that students can change their minds about this, and it's not because my students are any smarter or more mature than anybody else's. This isn't about intelligence or maturity but about communication.

they'll default to what they think those objectives ought to be, which is 100% calculations just like those that were in the homework and the lecture. The instructor has the necessary job of setting the agenda.

Then, having made those learning objectives, it's our job to give assessments that truly measure what we want to see. If you only ever assess basic rote mechanics in a math course, then the course is about rote mechanics—regardless of the instructor's intentions. And by "assessment", I would encourage folks to think of other ways of assessing students besides timed quizzes and tests — methods like clicker questions, Guided Practice assignments, application projects, and so on. If the only assessments we have are tests and quizzes, then students will focus on tests and quizzes and nothing else. Balance is needed if we want more.

Third: There's an interesting thread in this kind of student reaction that combines where students have come from in their mathematical education and where they think they are headed. I said above that the lack of lecturing isn't usually the real issue with students—mainly because there's no factual basis for it. Instead, I think the issue is uncertainty. Students have made it to where they are, mathematically speaking, because they've acclimatized to the lecture model. Changing this model violates their expectations and introduces a lot of uncertainty—and conflict can be a coping mechanism.

There are a couple of things that an instructor could say to a student who is feeling this uncertainty.

If the student is in a remedial mathematics course, you can simply ask: So, you're used to having the instructor show you what to do, and then you do it. How is this working out for you? This isn't snark (or at least it shouldn't be) but rather an honest question about the effectiveness of the teaching method that the student is clinging to.

If the student is in a non-remedial course, you can ask: Let's look beyond this class for a minute and think about what you'd like to be doing five, ten years from now. How does a person who does the same things, become successful? For example, say the student is an engineering major. What does a successful engineer do, and how does she get that way? Or what about a doctor? Or a stay-at-home mom? Or an electrician? If the student doesn't really have a clear idea about the answer to that question, it would be a good exercise to have the student go do some web research or talk to other professors to find out. And once they do have an idea, what ought to be clear is that

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Most physics professors have heard of and tried a teaching method beyond the traditional lecture, but one-third of those who have sampled such a technique later abandoned it, according to a new study

"The surprising thing we found was the high rate of faculty willing to try these things," said Charles R. Henderson, an associate professor of physics at Western Michigan University and the lead author of "Use of Research-Based Instructional Strategies in Introductory Physics," which was published in the current issue of Physical Review Special Topics—Physics Education Research

About 88 percent of the physics faculty in the study knew about "research-based instructional strategies." Of that group, 82 percent had tried the strategies, wrote Mr. Henderson and his co-authors, Melissa H. Dancy, a physics-education researcher at the University of Colorado at Boulder, and Magdalena Niewiadomska-Bugaj, chair of the statistics department at Western Michigan.

The researchers conducted a Web-based survey of 722 faculty members in physics, a discipline that, among the sciencee stsikaratene tene tersiadfcshtfrcsict,æa mnreaew-1.8(c)2(o)3.4(t)-14.9(e l

In a way, there are two Norman Nemrows. There's the real-life professor who spent much of his career teaching accounting students at Brigham Young University. And there's the one I'll call Video Norm, the instructor immortalized in lectures on accounting that he began recording nearly 15 years ago.

For more than a decade, students at BYU learned from both Norms. About half of the class sessions for his introductory-accounting course were "software days," when students watched an hour or two of video lectures on their computers anywhere they wanted and then completed quizzes online. The other class periods were "enhancement lectures," in which students—as many as 800 at a Hollywood actor had come to campus. Students showed up early to take sel es with the professor they had spent so many hours watching on video.

“We got front-row seats,” said Celeste Harris, a junior in the course. “We said, we have to see what this guy is like in real life.”

How did Mr. Nemrow compare with the digital version? “He’s a little older than when he recorded the videos,” Ms. Harris notes, “but it was actually one of the best lectures I’ve heard.” It was inspirational, she says, because Mr. Nemrow recounted the story of this unusual accounting course, which has become a kind of legend on campus.

From Business to Teaching

Mr. Nemrow started out as a businessman. He worked at a consulting rm in California, then helped start a real-estate-investment rm. But he was drawn to the classroom. For years he taught accounting on the side, rst as an adjunct at California State University at Fullerton, then full time at Pepperdine University.

Around the time he turned 30, he sold his business and decided to retire early. He didn’t want to do nothing, but he no longer had to work for money, he says, even with a wife and ve small children.

“I didn’t really have a burning desire to create another business,” he says. He took some art classes. He played a lot of golf. “For a couple of years I was trying to kind of nd myself,” he recalls. “I decided what I really wanted to do is probably teach.”

So he called up the dean of the business school at his alma mater, Brigham Young, and asked if there was a teaching spot for him. He had a master’s degree but not a Ph.D., and at rst the answer was no. “When I told him I was willing to do it as a volunteer, his attitude changed,” Mr. Nemrow recounts, with a laugh. “He let me teach the intro course for a year.”

BYU hired Mr. Nemrow as a full-time professor. He donated his salary to the university, he says. A devout Mormon, he saw the work as a way to give back to the church. In his mind, that left his teaching in the category of volunteer work. “I wanted to have complete and total freedom, and I didn’t want to make a commitment to how long I’d be there.”

After several years of teaching the introductory course, he says, he began to get tired of repeating himself and answering the same questions. He considered writing a textbook and even drafted a couple of chapters. “But I thought to myself, this isn’t as e ective as when I’m explaining it in person.”

So, in 1998, he approached the university’s edgling instructional-technology group and pitched [illegible] course around a series of videos and [illegible] nates any pro ts to charities. Because the software and videos were developed at BYU, the university owns it and gets a portion of any revenue from its sale. And he made all of the videos for his intro course available free online.

Mr. Nemrow traveled to accounting departments and academic conferences around the country evangelizing his teaching approach and his software. But, to his surprise, he found few takers.

"When I talked to faculty, their eyeballs got big, but it wasn't excitement—they were scared to death," he says. Only a handful of professors tried it, but "all the rest of them saw it as threatening to their careers, and to the way they were teaching."

Mark H. Taylor was one of the few professors immediately excited by the idea. And his experience shows that professors were right to worry about their roles' changing. At the time, Mr. Taylor was at Creighton University, and he tried the ipped approach in a course with 40 introductory-accounting students. "The students at Creighton did not bond to me, they bonded to him," he says, meaning to Video Norm. "I wasn't really doing the instructing."

The experiment itself was a success, Mr. Taylor says. The students bene ted from being able to rewind the lectures and review anything they didn't initially understand. They also liked that they could play the lectures at double speed (something students at BYU typically do as well).

But he says he missed the feeling of connection with his students. "It was more of a pride thing on my part than any real problem with using these videos. I think some professors, including myself, love that lecture time." And in the ipped model, he felt, students were less willing to come to his o ce and ask questions.

'It's a Bit Tricky'

That was in 2007. Today Mr. Taylor chairs the accounting department at Case Western Reserve University, and he's thinking of trying the ipped approach again, believing that the exibility the videos e

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The use of the flipped model appears to be growing, and so is the body of research on its effectiveness. New insights are emerging. Here are a few resources to ground your own experiments.

"Interactive Engagement vs. Traditional Methods: A Six-Thousand-Student Survey of Mechanics Test Data for Introductory Physics Courses," by Richard R. Hake, 1998
http://web.mit.edu/jbelcher/www/TEALref/hake.pu.p(c)-12.9(e)-13.5v(a (r)-9.2p(cm -13.55(.)r 0 Tc 4w T* (4.5(5)]TJ 0