

TEACHING

# Traditional Teaching May Deepen Inequality. Can a Different Approach Fix It?

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Travis Dove for The Chronicle

When Kelly Hogan learned that minority students got worse grades than white students in her classes, she saw it as her problem to fix.

**K**elly A. Hogan had no reason to think anything was wrong with her teaching. She had been hired at the University of North Carolina at Chapel Hill as part of a push to bring in teaching-oriented professors who would improve undergraduate education. And, on the face of it, Hogan was delivering on expectations: She received glowing course evaluations from students, who complimented her teaching style.

was researching large courses, including

the sections, shared some troubling data: About one in 14 white students earned a D or F in the course. About one in seven Latino/a students received those grades. For black students, it was one in three.

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For Hogan, seeing the data felt "like a punch in the gut." To make matters worse, she knew that introductory biology, which she taught to majors and nonmajors alike, was a gateway course. Students who got a D or an F in it were awfully unlikely to continue in STEM fields. Suddenly the underrepresentation of minorities in the sciences wasn't some far-off phenomenon. It was something her own biology course, which she had labored over and taught to some 3,000 students by that point, was contributing to.

College students aren't blank slates. They have spent years acquiring an excellent education, or a crummy one. They have been encouraged by the adults in their lives, or they have been undermined. Long before they arrive on campus, they have the assurance that the world is theirs for the taking, or the knowledge that their intelligence and worth will be questioned at every turn because of where they come from or what their parents do or the color of their skin.

So perhaps another professor might have chalked up the racial gaps in Biology 101 to these existing, and seemingly inevitable, inequities. But Hogan saw it differently. These gaps, she thought, were her problem. Inequality has plenty of time to fester in the 18 years or so it takes to get to college. But the way undergraduates are usually taught, Hogan is now convinced, makes it even worse.

In a typical college course, students hear dozens of lectures. They might be assigned hundreds of pages of reading. Then they're asked to demonstrate their understanding of what all of that information adds up to in a handful of high-stakes papers or exams. How they should prepare for those papers or tests is a matter usually left to the student. The arrangement works well for those whose high schools provided strong preparation or who are comfortable asking professors for help when they need it — traits that have as much to do with privilege as anything else. Students without those advantages, though, can flounder — not because they can't do the work, but because no one has taught them how to navigate the system.

Reducing the disparities in Biology 101, Hogan believed, was her responsibility. And she had an idea of where to start. Because she taught so many students each semester,

she could see patterns in the challenges they encountered. Because she ran study-skills workshops, she knew that succeeding in a course could come down to following a handful of practical strategies.

Hogan, who is now a STEM-teaching associate professor and assistant dean of instructional innovation at Chapel Hill, has radically altered what she does in the classroom. She has studied the results of those changes and further modified her teaching in response. Armed with evidence that her strategies work, she has become a kind of evangelist for an approach known as inclusive teaching, which seeks to level the playing field, equalizing the opportunity for students from all backgrounds to participate and succeed.

Inclusive teaching has two main components: putting more structure into a course, giving clear instructions so that all students know what to do before, during, and after class; and thoughtfully facilitating class discussion, so that everyone can participate.

After all, some students arrive in college already aware that effective studying involves notepaper, not a highlighter. Some already feel comfortable speaking up in a classroom of hundreds. But should those be the only students who succeed in a course? And, if they are, what is an instructor really accomplishing?

**S**tudents know that they should study. But that doesn't mean that they know how. Memorizing definitions and parroting the textbook might have secured students A grades in high school. In college those habits might earn an F.

When she redesigned Biology 101, Hogan flipped her classroom, devoting class time to activities rather than a traditional lecture. But she was more explicit than professors usually are in laying out what, exactly, students should do to benefit from this setup.

She emphasized the habits of a successful student and focused on the importance of practice. She broke down the things students could do before, during, and after class to give themselves the best chances of performing well. Then she made those tasks

mandatory, and a factor in students' grades.

Before each class, students don't just read the textbook; they also answer a set of "guided reading questions" and a homework assignment that she encourages them to complete without consulting their notes. During class, students participate. Hogan provides an outline that they fill in, ideally by hand. They should be prepared to answer her questions — without looking at their notes — and keep a list of their own questions so they know what to focus on ahead of the exam.

After class, students take timed quizzes online to check their understanding, and Hogan points them to additional, optional resources like peer mentors and tutoring. On top of that, she encourages them to organize and review their notes from class and ask any lingering questions. Finally, she suggests that students spend some time studying for the course every day, starting by remembering everything they can without notes.

Going through all of those steps is meant to help students take specific actions that should aid their learning. Those behaviors, Hogan tells her students, will allow them to succeed in Biology 101 and, she adds, in any academic discipline.

To some professors, this level of guidance sounds like hand-holding. When Hogan hears that concern, "I put it back on them," she said. "Doesn't everybody like some structure or guidance?" People want to understand what's expected of them in their jobs and relationships, she said. No one would advocate throwing new swimmers in the deep end without clear directions, and even Olympic swimmers have coaches. "Why do we treat learning," she asked, "as something different or special?"

While closing achievement gaps motivated Hogan to change how she teaches, she rarely refers to those disparities when communicating with her students. One part of her syllabus comes the closest: "This course is designed to equalize your readiness

before class — while you may take several hours reading and preparing, another student may need less time. Yet when you get to class, your effort will pay off as we practice these concepts together and you gain confidence in your ability!"

On a rainy Tuesday morning this spring, the 300 or so students in Biology 101 sat in stadium-style rows that descended sharply to a stage. The room was better suited to watching a performance than working on a project, but Hogan did what she could to counter that.

The class period was the last one before students would take an exam, and Hogan was explicit about what students should be getting from class that day. It was a busy 75 minutes, and students seemed pretty focused as Hogan climbed up and down the two steep aisles, talking quietly with small groups of students in between making comments to the whole class over the headset microphone she wore.

At one point, she posted a slide labeled "Typical Test Question." It was a genetics problem about white- and gray-squirrel crosses. Students worked out a problem individually and answered in a software program before conferring with classmates in their assigned groups. Then Hogan brought the full class back together. Which coat color was dominant, and which was recessive?



Travis Dove for The Chronicle

Viji Sathy (left) and Kelly Hogan offer workshops on developing more inclusive teaching methods to their faculty colleagues at Chapel Hill and other colleges.

The group that Hogan called on to answer got the question right: White was recessive. More important, how they arrived at the answer was correct, too. The students had used a clue — a ratio that Hogan provided showing the proportion of a cross's offspring that were each color. She spent some time reinforcing this key idea and explained how the method could help them answer many questions about the squirrels and heredity. "If you haven't spent the time learning some of our basic ratios," she said, "now is the time to do it so that you can work backwards from them."

As it turned out, she put a similar problem on the exam. A different ratio served as the clue, but following the same process used in the squirrel problem led to the right answer.

Much of what happens in Hogan's classroom would look familiar to proponents of active learning. Hogan is all for that method, but she doesn't believe it goes far enough. A flipped classroom could still be loosely organized, creating conditions in which strong students are likeliest to engage in the behaviors that will help them succeed. That's why Hogan makes practice mandatory. A flipped classroom can also be one in which only the usual suspects are heard from. That's why Hogan also carefully facilitates students' discussions.

**C**lass discussions come with common pitfalls. Some students participate frequently and self-assuredly, perhaps so often that their raised hands prompt classmates to roll their eyes. They might ask questions designed to demonstrate how smart they are, or lead the professor on an unproductive tangent. Other students make it to the final exam without speaking once. Professors, for their part, can throw out questions that are unclear, rhetorical, or have one narrow right answer, so that answering means risking public failure.

Inclusive teaching has an answer to all of this: Asking professors to be better facilitators so that they can democratize discussion.

Among the most enthusiastic of Hogan's converts is Marsha Penner, a teaching assistant professor in the department of psychology and neuroscience. She has become adept at inclusive teaching, confidently facilitating discussions, even on sensitive topics.

One Wednesday this spring, some 35 students sat in groups of four to six around rectangular tables in Penner's "Neural Connections: Hands on Neuroscience" course. Before class, she asked them to come up with some questions from the day's readings, which covered the experiences of members of the LGBTQ+ community in STEM fields. Early in the class period, she directed each of them to write one question on a notecard. "Don't put your name on this," she instructed, "because we're going to shuffle."

Providing anonymity is one way to equalize participation. It's much harder to show off, and to be embarrassed, when no one knows which question is yours. Penner set a timer, giving students three minutes to formulate their questions. Some students are hesitant to contribute because they haven't had a chance to form their thoughts; creating a pause before diving into discussion allows them to be included.

The groups mixed up their cards, and each student drew one. "The person who got up the earliest this morning will be the person who reads the one that they ended up with," Penner said. This, too, was a way to democratize discussion. Often professors let group members decide which student will speak on their behalf. In practice, this usually means the most assertive students do most of the participating. Providing an alternative way to select each group's reporter means that a different cross section of students will contribute — and over the course of a semester, everyone will probably get a chance.

As she ran the discussion, Penner kept tabs on who had spoken and who hadn't. After hearing one response to a new question, about why one of the readings described STEM's culture as "militaristic," she paused the discussion. "I'd like to hear from someone I haven't heard from yet," she said.

Plenty of professors say things like that in an effort to bring more students into a discussion, but it can put students on edge. Besides, professors often just let it drop when no one new volunteers. Not Penner. And even though her words sounded like something many professors might say in this situation, her actions subtly invited a quiet student to participate.

It happened after she asked the groups to discuss at their tables the question about STEM culture. As they did, the professor hovered near one group. She paid close attention to the contribution of a student she knew was often hesitant to speak in front of the whole class. While other students weren't looking, Penner quietly asked if she would be OK being volunteered. The student agreed.

A few moments later, Penner reclaimed the class's attention and called on the quiet student. "Well, I was just thinking," the student told the class, "the STEM field in the past was white and male," and there has been a trailblazer of each sort of person who does not fit that mold. Even those who follow them, she added, will still find themselves in the minority for a long time.

The techniques Penner used probably make the biggest difference for students who are typically reticent, but all students benefit when more of their peers speak up. Selective colleges like Chapel Hill go to great lengths to bring a diverse group of students to campus. Among the main reasons: Students learn from one another. But they can't learn much from a classmate who never participates.

**P**rofessors have a great deal of latitude in the classroom, and they tend to cherish their autonomy. How could Hogan persuade them to change something as personal as the way they teach? And how could she point out the shortcomings of traditional teaching without it being taken as a reproach?



The tools of inclusive teaching offer one way. Hogan and Viji Sathy, her friend and frequent collaborator in spreading the word about this approach, conduct workshops that both explain and embody its tenets.

Like Hogan, Sathy, who is a teaching associate professor of psychology and neuroscience, teaches a large course: the introductory statistics course housed in her department, which has close to 200 students some semesters. Sathy had grown frustrated with the way the larger sections ran and with how defeated some of her students felt about math. When the two professors met, in 2012, Sathy was about to redesign the course. She turned to Hogan, who had recently overhauled Biology 101, for advice.



Travis Dove for The Chronicle

Kelly Hogan seeks to engage all the students in her introductory science classes at the U. of North Carolina at Chapel Hill, even with large groups. She has developed methods to encourage reticent students to speak up.

To Sathy, emphasizing practice made good sense. When she was in high school, she initially struggled with calculus. Her father, who loved math, would review the material she was learning and coach her through the hard problems. When Sathy got to class the next day, she would often be one of the only students who had gotten those questions correct. That taught her a lesson: "I knew," she said, "it was just hard work."

A presentation Hogan and Sathy gave recently at nearby Durham Technical Community College began with an arts-and-crafts project. The 90 attendees — a group that included full-time professors and adjuncts from a variety of disciplines — sat at round tables. Each table was broken into two groups, each of which had a plastic hanger and a small brown-paper bag of supplies.

Hogan and Sathy hadn't provided much in the way of instruction. Attendees were simply told that they had 15 minutes to make a mobile, which they would then present to the whole group.

The professors got to work. Some cut snowflakes out of construction paper and tied them to their hangers with string. Others drew with colored pencils. A few incorporated found objects, like leftover plastic silverware from their boxed lunches. If the attendees thought the activity was a strange way to begin the workshop, they didn't let on.

Only when the two Chapel Hill professors brought the whole group back together and started posing questions did the project's purpose come into focus. Among the questions: "How aware were you about what materials other groups had?" As attendees looked around the room, stark differences in their supplies became apparent. Groups sitting at tables near the front were equipped with scissors, markers, and construction paper in an array of hues. Those in the very back were given only brown paper and twine. In the busyness of the activity, many attendees hadn't noticed that different groups had different materials.

Using the inclusive-teaching technique of anonymous notecards to kick off the discussion, Sathy drew out the idea that the paper bags represented the uneven resources that students bring to class.

Then the workshop turned to what professors can do about that. Inequity, Hogan suggested, is not intractable. Even small changes in teaching can help counteract it. "Adding structure to the learning environment," Hogan said, "can mitigate unfairness, build feelings of inclusion, and promote student success." If the facilitators had made the rules of the activity clearer, she said, groups might have noticed what others had to work with. They might even have shared what they had, or asked to borrow from someone else.

As Hogan and Sathy walked through the techniques they use, it was clear that some professors were already using a few of them, too. The professors seemed receptive to the presenters' message. And, as community-college faculty members, they needed no convincing that many students arrive to class with disadvantages.

Indeed, when Hogan and Sathy opened the floor for questions at the end of the workshop, they heard about the challenges students face at institutions that have fewer resources than Chapel Hill. Technology was one such inequity.

Some students, one participant said, don't even have reliable internet access. "You have to be aware that a lot of these things sound like good ideas," he said, "but they may actually fail for some particular students" who don't have access to the technology a professor wants to use.

Time was another scarce resource. "I'm guessing I'm not the only one here who has students who have full-time jobs in addition to taking classes," said another professor, who added that her students often ask for a weekend to complete homework. Students would surely benefit from having more practice — if they had time to do it.

Hogan and Sathy know that working at Chapel Hill comes with a lot of privilege, and they are careful not to sound as if they're telling anyone what to do. The presenters responded to their community-college colleagues' concerns diplomatically, suggesting that they survey their students about things like internet access and how long homework is taking them, and then adjust their teaching accordingly.

But the two professors do think inclusive teaching can work anywhere. Yes, Sathy reflected later, students with full-time jobs have less time to study. But that makes when and how they put in the time more important. "Students are going to spend time on our topic," she said, "it'll just be in a really sloppy way if you leave it unstructured."

**F**or some professors, inclusive-teaching workshops are persuasive. But they do have limitations. Such professional development is usually optional, and the professors who show up are often the ones who least need convincing. To address this, Hogan is using another tool: data. After all, combing through student outcomes played a major role in changing how she thought about her own teaching.

Data also let her see that the changes she made were effective. With a grant from the university's teaching center, Hogan was able to work with a statistician to do an early evaluation of the new version of her course. The results were promising, and so she presented them at a research conference on biology education where she met Scott Freeman, a principal lecturer in biology at the University of Washington.

Freeman, who was an author of a recent article in *Science* showing that increased structure and active learning could reduce achievement gaps between disadvantaged students and their classmates, encouraged Hogan to investigate her data further. He also connected her to a postdoc, Sarah Eddy, who helped her compare student performance in the old and new versions of Biology 101 in a 2014 study that built on the findings of the *Science* paper. Students performed better, across the board, in the new design, they found. But it was particularly beneficial for groups who'd gotten disproportionate levels of Ds and Fs before. The gap between black and white students was cut in half. Another gap, between first- and continuing-generation students, was closed.

Hogan and Eddy continued to examine Biology 101 periodically, and the professor used the results to inform further changes in her course, like required review quizzes. Since then the gap for Latino/a students — who had gotten Ds and Fs at about twice the rate of their white classmates in the original data — has closed.

Seeing the results from Hogan's course might persuade some professors to embrace inclusive teaching. But she isn't banking on it. Instead, she's working to give her colleagues at Chapel Hill better information about what's happening in their own

classrooms.

The information will be presented in an online dashboard, showing each professor data on student demographics and performance in each class they have taught with at least 10 students going back to 2010. Professors will be able to see how the mix of their students compares with the university's overall demographics. That will show them whether certain kinds of students are underrepresented in their classes, or perhaps missing altogether. And they'll be able to assess the academic performance of different student populations within the course.

Even that kind of instructor-specific data, Hogan knows, won't convince everyone that their teaching might contribute to inequality. But for some, she hopes, it will create the same sense of disappointment and responsibility that she felt herself when she saw data from Biology 101 a decade ago. And if it does, then maybe those professors will be willing to try something new.

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