

Getting Under the Hood: How and for Whom Does Increasing Course Structure Work

There has been some buzz about teaching practices in higher education that is getting louder. Instructors listening to the noise may feel a pressure to change the way they have been teaching for years. In fact, I'm part of that noise. I encourage faculty and administrators on my campus to reimagine teaching to better fit with what we currently understand about the science of learning and student success.

I wasn't always a part of the noise. However, five years ago I was motivated to redesign my approach to teaching introductory biology, and I often reflect upon what motivated me to make these changes. I also think about what might encourage other instructors in other disciplines to throw away the PowerPoint lectures they have used for a decade.

I've come to the conclusion that what motivates each of us is different, as different as the culture and disciplines in which we teach. Thus, I can tell you what motivated me and what resonates with me now, but your path to reimagining aspects of your teaching may be different.

It's Not Them, It's Me

Imagine a swim instructor who meets her students for the first time only to find out that a few can already swim, some cannot swim, but are comfortable in the water, and a few have never even been in a pool before. This swim instructor stands outside of the pool giving verbal instructions. After a week of lessons, the two students who could already swim are better swimmers, and, not surprisingly, a lot of the students still cannot swim. It is reasonable to think that all children can learn to swim. So, how could the instructor have been more successful at making swimmers of them all? What would have happened if the instructor got into the pool alongside her students and corrected their mistakes as they practiced?

This story applies directly to my own teaching. I teach introductory biology to 400 students at the University of North Carolina at Chapel Hill, a large public institution. For years, I was the instructor standing outside of the pool, simply giving instructions to students who had already come to my class better prepared. I stood on the side, lecturing for 50 minutes, taking credit for the success of my better-prepared students, and figured that the others would just never be "swimmers." On student evaluations I received high marks and comments that

expressed admiration, which made me feel good about my life's work. And so it went.

Not many faculty members in higher education get to see the kind of data that woke me up. I received a spreadsheet from a colleague at our faculty development center showing that 1 in 3 African-American students in my course were receiving a D or F grade, while only 1 in 20 White or Asian students fell into this category. Oh boy, this was not just a national or institutional problem, this was MY problem. I wondered what other inequities existed in my own course among student groups, and I questioned whether I could make all students "swimmers" by rethinking the diversity of my students.

Over the next several years, I entirely revamped my teaching to be more student-centered. I looked at the data again with help from my collaborator, Sarah Eddy. We compared three semesters of my redesigned class to three previous semesters. All students performed significantly better with my new methods, but two types of students benefitted the most: first-generation college students (first in their family to attend college) and black students. The achievement gap for first-generation college students was removed when student ability was controlled. This was significant since 25 percent of my students are first-generation college students. Additionally, the achievement gap had been cut in half for black students, who make up 14 percent of the class. The failure rate for all students was reduced by 40 percent. (See our published work on these data [here](#).) I was surprised and proud that changes in my teaching had made such a positive impact for so many students. I had no additional teaching assistants, no extra "help sessions," and no additional tutors available than I did the year before. I concluded that after all these years, I had evidence that it wasn't them at all—the problem was *me*. What if every teacher took steps in this direction? Nationally, only 40 percent of students intending to major in science actually do so. How many more students would succeed and remain in the science "pipeline" with wide adoption of high-structure methods? I'm now "diving in" daily with my students, practicing beside them, and explicitly stating that all students have the potential to be "swimmers."

Practice, Practice, Practice

Not being trained as a teacher, I had to gather a lot of the knowledge about teaching and learning in pieces, and I didn't acquire these pieces in any logical sequence. At some point along this path, someone asked me, "How do you know your students are learning?" What a simple and wonderful question, I thought. In a traditional,

lecture approach, I focused mostly on exams and what the students demonstrated to me on those exams. Unfortunately, exam time was too late for me to help students master concepts, and it was certainly too late for students to realize they didn't understand them either.

Now, my course has been entirely redesigned to include many opportunities for students to practice and make mistakes, because let's face it, we all learn some of life's most valuable lessons from our mistakes. The research around learning supports this too.

The model I used to transform my class is not simply a flipped classroom. It is a high-structure class, which holds students accountable before, during, and after class for their learning through required assignments. The high structure provides me with many chances to examine what the students are or are not learning, and it gives them multiple chances to assess their own understanding.

To prepare for class, my students complete open-ended Guided Reading Questions that I design as worksheets to help students read actively, teach them study skills, and guide them through my expectations for their learning. "Expecting" my students to read is not enough, because they will find reasons not to make it a priority. There must be accountability, using the currency students use, which are "points" assigned to the work I expect of them. Combined with the ungraded Guided Reading Questions, I require students to complete a graded online homework assignment. This homework provides students with a chance to practice and make mistakes while supporting them with instant feedback, hints, and coaching.

During class, students have many chances to practice higher-level thinking skills, alone, with peers, and with me. We uncover misconceptions, practice modeling through drawing, and practice typical exam questions. I develop activities in three-minute chunks, which fits what neuroscience tells us about attention. I deliver "skeleton notes" to students via the learning management system prior to class. These notes contain images, outlines, and data to make our activities more efficient and keep students organized. Importantly, I want student to feel as though they are participating during each class, and so I implement a variety of techniques. One typical strategy I use is to pose a question related to the reading, and then allow students time to think, write, or draw alone. *Silence*. Other methods I use require technology, like clickers or cell phones, combined with peer discussion. *Noise*. The activities I plan are fun and sometimes they have unpredictable outcomes. Often, I find myself in disbelief at students' misconceptions I uncover daily, and I love the continual challenge of thinking about how best to correct their misconceptions. This kind of effort takes time and some trial and error, but it has been so much more fulfilling to me than making the perfect PowerPoint slide for a lecture.

Although I didn't intuitively recognize it, student survey data revealed to me that students were not reviewing after class. Because I had not assigned value

"points" to a review activity, they didn't make it a priority. Thus, I added routine quizzes to the course. These quizzes are yet another opportunity for all students to be included in the practice of learning from their own mistakes.

In the course I teach now, just because a student comes in with less experience, it doesn't mean he or she is destined to be left behind. In my high-structure class, the multiple *required* chances to practice alone, with peers, and alongside me means that more students have the opportunity to master the material—or "learn to swim."

Those Shoes Don't Fit Me!

I was motivated to make these changes to my teaching to improve student learning and include more students in the practice of learning. The results make me proud because more students are making it to the next class in the major. Equally important, they report feeling like more of a community than they did years ago. This might be a contributing factor as to why certain student groups benefitted more from the changes I implemented than others.

Truth be told, these changes also benefit me. Moving away from the instructor-centered classroom was a much better fit for my personality. While I can hold my own in an extroverted world, I have many introverted tendencies. I don't like to be the center of attention, and I don't have the personality to put on a big show. I used to think that teaching required the giant personality possessed by other excellent instructors I admired. I always felt a slight discomfort trying to wear those peoples' shoes.

With my student-centered approaches in the high structure classroom, I feel totally comfortable in my own shoes. I facilitate the learning without long monologues and do what an expert in the room does best: clarify and explain. Best of all, I get a chance to engage with individual students while I take these moments to regroup before reconvening the whole class again.

Find Your Own Motivation

Data about inequities in my own course initially motivated me to make changes to my teaching. From this, I've learned that faculty members should not blame students for how they arrive in our class. With the proper knowledge and trying methods considered "best practices" in teaching and learning, we can help all students learn, despite their backgrounds. By closing achievement gaps, we can produce more scientists and engaged scholars. Lastly, the effort is worth it personally, too. After all, finding more fun and passion in a career you already care deeply about can't feel bad, right?

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