ACTIVITY IS UNDERRATED —

College students think they learn less with an effective teaching method

They don't even realize they've learned more.

JOHN TIMMER - 9/4/2019, 8:40 AM

US Dept. of Education

Enlarge

One of the things that's amenable to scientific study is how we communicate information about science. Science education should, in theory at least, produce a scientifically literate public and prepare those most interested in the topic for advanced studies in their chosen field. That clearly hasn't worked out, so people have subjected science education itself to the scientific method.

What they've found is that an approach called active learning (also called active instruction) consistently produces the best results. This involves pushing students to work through problems and reason things out as an inherent part of the learning process.

Even though the science on that is clear, most college professors have remained committed to approaching class time as a lecture. In fact, a large number of instructors who try active learning end up going back to the standard lecture, and one of the reasons they cite is that the students prefer it that way. This sounds a bit like excuse making, so a group of instructors decided to test this belief using physics students. And it turns out professors weren't making an excuse. Even as understanding improved with active learning, the students felt they got more out of a traditional lecture.

Testing education

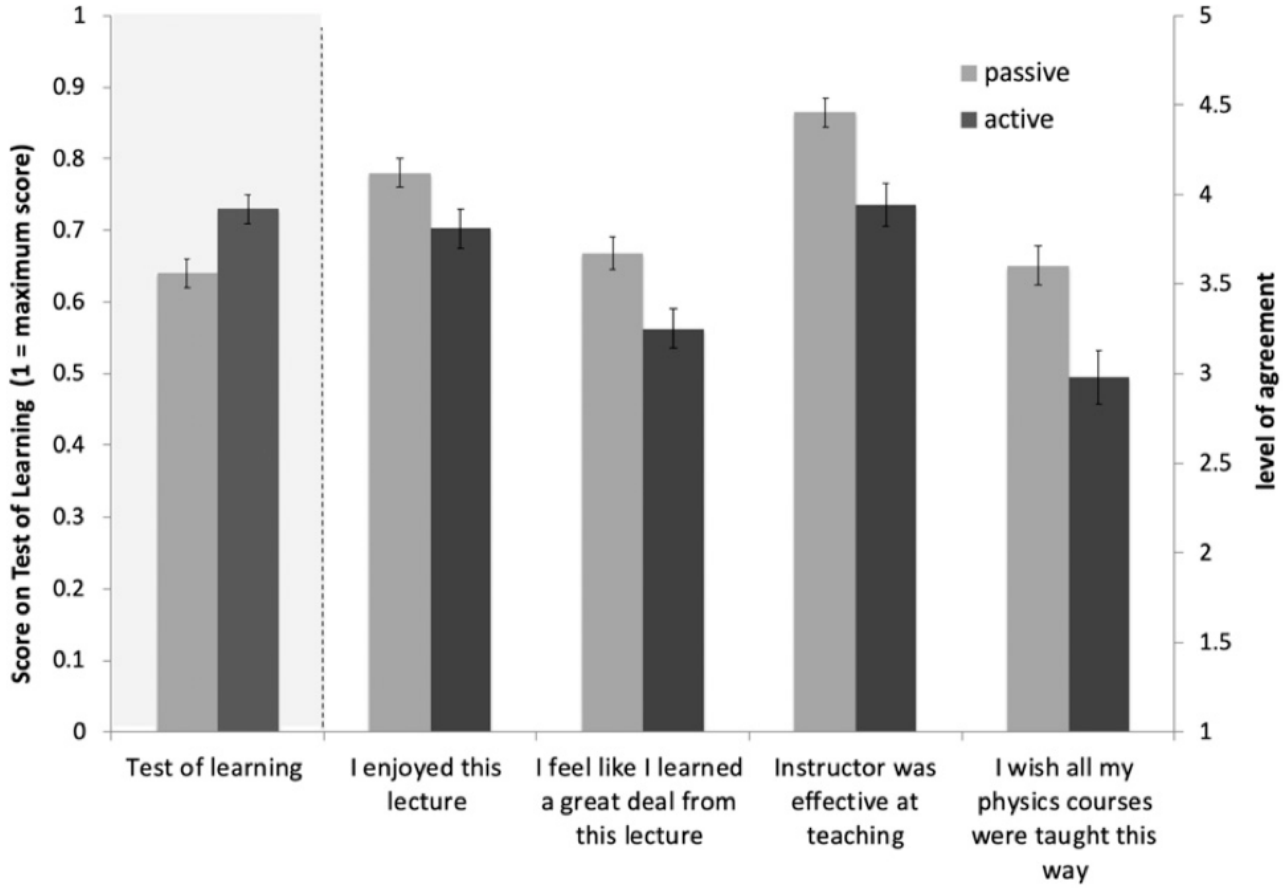
One of the challenges of tracking this sort of thing is that every class will have a different range of talents, and some instructors will simply have been better at teaching. Figuring out how to control for

this variability is essential if you want to understand the impact of teaching methods. Fortunately, the Harvard team came up with a clever way of doing so.

They essentially split a physics class in two. One half would get a standard lecture. The person teaching the other half would use the same slides and class materials but lead these students through an active learning process during the class. Then, two weeks later, the two groups of students would swap places; the first would now have an active learning class on a different physics topic, and the second would receive a standard lecture. That way, the same students experience both regular lectures and active learning, and the instructors would bring any talents they had to both approaches.

After each class, the students were surveyed about the experience, and they took a short quiz to determine how well they understood the subject of the class. The whole thing was done for both the spring and fall semesters of a class to provide a larger sample size.

As expected from past studies, the students in the active learning classes consistently outperformed their peers (and themselves), scoring a half a standard deviation higher on the quizzes.



Enlarge / **While students learned more with active instruction (left), every measure of satisfaction was lower.**

But based on the surveys, the students would have been surprised to find out that's the case. The students found the active learning classroom to lack a bit of coherence, and it suffered from the frequent interruptions, which made the experience frustrating and confusing. When asked how much they felt they learned, students in the active learning classroom consistently rated themselves as having learned less—the exact opposite of what the quizzes indicate. The students also indicated that they would prefer that all their future classes be standard lectures.

Explanations abound

So why is an extremely effective way of teaching so unpopular? The researchers come up with a number of potential explanations. One is simply that active learning is hard. "Students in the actively taught groups had to struggle with their peers through difficult physics problems that they initially did not know how to solve," the authors acknowledge. That's a big contrast with the standard lecture which, being the standard, is familiar to the students. A talented instructor can also make their lecture material feel like it's a straight-forward, coherent packet of information. This can lead students to over-rate their familiarity with the topic.

The other issue the authors suggest may be going on here is conceptually similar to the Dunning-Kruger effect, where people who don't understand a topic are unable to accurately evaluate how much they knew. Consistent with this, the researchers identified the students with the strongest backgrounds in physics, finding that they tended to be more accurate in assessing what they got out of each class.

Whatever the cause, it's not ideal to have students dislike the most effective method of teaching them. So, the authors suggest that professors who are considering adopting active learning take the time to prepare a little lecture on it. The researchers prepared one that described the active learning process and provided some evidence of its effectiveness. The introduction acknowledged the evidence described above—namely, that the students might not feel like they were getting as much out of the class.

In part thanks to this short addition to the class, by the end of the semester, 65% of the students reported feeling positive toward active learning. That's still not exactly overwhelming enthusiasm, but it might be enough to keep instructors from giving up on an extremely effective teaching technique.

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