

Students Are Busy but Rarely Thinking, Researcher Argues. Do His Teaching Strategies Work Better?

A math professor has spent 20 years experimenting with ways to improve student engagement, and now his teaching strategies are going viral.

By Jeffrey R. Young Nov 7, 2023



Many teachers are trying teaching approaches known as "thinking classroom," outlined by Peter Liljedahl, a professor at Simon Fraser University, and sharing them on YouTube and other social media.

Tim Bedley, via YouTube

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This article is part of the guide: [Recalculating Math Instruction](#).

Students can be excellent little actors in a traditional classroom, going through the motions of “[studenting](#),” but not learning much. At that critical moment when a teacher chalks a problem on the board and asks everyone to write out an answer, for instance, one kid might stall by sharpening a pencil, another might doodle or feign writing, and another might stare into space — though not thinking about the problem at hand. Yet all seems well to the teacher at the front of the room, who, after a brief pause, reveals the answer.

That’s the argument of Peter Liljedahl, a professor of mathematics education at Simon Fraser University in Vancouver, who has spent years researching what works in teaching. And he’s found that in this common classroom format, very few

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students are actually thinking: maybe no more than 20 percent of them, and only 20 percent of the time, according to his experiments.

By thinking, he means actively engaging with the course material. The most problematic strategy that many students try instead, he argues, is what he calls “mimicking,” which he has especially found in the math classes he studies. These mimickers dutifully copy the problems presented in classes, but never grok the conceptual underpinnings, so they’re left able only to do problems that are nearly identical to what the teacher showed them.

These are the students who end up hitting a wall when math courses move from easier algebra to more advanced concepts in, say, calculus, he argues.

“At some point, mimicking runs out,” says Liljedahl. “And when that happens, students don’t go from an A to a B, they go from an A to a D, because they haven’t actually learned the things that they need to learn to set them up for success.” He argues that that’s why so many students get to college and have to repeat their first-year calculus course.

Liljedahl has developed a strategy for teaching that he says greatly improves how many students in a class are actually thinking about course material. He’s outlined the strategies in his book, [“Building Thinking Classrooms in Mathematics.”](#)

But he has decided not to try to convince schools and school systems to adopt his system. Instead, he’s spreading the word to teachers one by one, through the book and by tirelessly speaking at conferences and other education forums.

And his ideas appear to be going viral. A search of YouTube or TikTok shows seemingly endless videos of teachers sharing examples of their adoption of the approach in their courses. That has made the book an unusual bestseller for a title on teaching practice, with more than 200,000 copies sold and editions translated into a dozen languages.

EdSurge connected with Liljedahl recently to hear what he’s found and learn why what he sees as faulty teaching practices have stuck around for so long.

Some [educators on Reddit discussion boards](#) have pointed out that Liljedahl has not published research on whether his approach leads students to earn higher marks on standardized tests, focusing instead on student

engagement. But the researcher says he has heard from hundreds of teachers who have reported improvements in test scores.

Listen to the episode on [Apple Podcasts](#), [Overcast](#), [Spotify](#), [Stitcher](#) or wherever you listen to podcasts, or use the player on this page. Or read a partial transcript below, lightly edited for clarity.

EdSurge: Early in your teaching experiments, you tried a classroom with no furniture at all. How did that go?

Peter Liljedahl: So early on in the research, what we realized was we're going to have to break norms. And that kind of became the mandate: Break norms and see if it improves student thinking. Can we get more students thinking? Can we get them thinking for longer? And we were trying anything and everything.

And one of the things was, let's take the furniture out of the room. Let's see what effect that has. It was almost a lark.

The kids come in and there's no furniture — no desks, no teacher desk, no file cabinet, nothing, just blank. And we didn't really expect that much out of that.

Well, here's the problem: Thinking improved. We had more students thinking and thinking for longer. And it took a year and a half for me to understand why that was.

For those of you who are listening, I don't recommend taking out the furniture. Teachers don't like teaching in classrooms without furniture. Teachers hated it. And this actually raised an interesting tension in the research, because it was so participatory and collaborative, but one of the things I've learned is there's no point coming out with solutions that teachers don't want to implement. We don't need another socially engineered solution that nobody wants to do. It has to be something that's within reach, within feasibility and within approachability by teachers.

But at the same time, I'm not going to use their comfort level to limit the things that we explore. It just all has to work together.

So why did it work?

It actually comes from a theory from the 1970s. It's a theory called systems theory. So we have to think of any social situation, any sort of situation that we engage in, whether it's scouts or Brownies or a ski club or a track club or

a book club or a classroom, any place that has an organization, any structure, think of that as a system. So what is a system? A system is a collection of agents and forces.

So in a classroom, who are the agents? There's a teacher and there's the students. Now what are the forces? Well, the teacher's applying force to the students and the students are applying forces on the teacher through their resistance or compliance and so on. But the students also apply forces on each other. And I don't mean every student applies a force on every student, but some students apply forces on some students and so on and so forth, but they're not the only agents in the system.

We also got colleagues pushing, putting forces on the system, and then parents and administrators and then the curriculum. So what you get is you have all these agents and they act like nodes. And then you have these forces and they act like edges, and they're pushing on each other. And then when you have all these forces and agents pushing on each other, eventually the system reaches a stable point, a stasis, right? It stabilizes and everything is sort of in harmony with each other. That doesn't mean that the forces have disappeared, they're still there, but everything's sort of balancing each other out.

Now, how do we change a system? Number one is when you try to change the system, the system will defend itself because you have all these forces that have now reached the stable point. If you now move one of these agents or introduce a new agent or increase a force from one of these agents, the system wants to restabilize and the most with all those forces and all those agents, it's more likely to restabilize back to the way it was.

And this is what we were seeing in the students in these 'studenting' behaviors we talked about earlier. When students' studenting behaviors are just their habits, that's how they behave. And when a student walks into a classroom that looks like every other classroom they've ever walked into, they're going to invoke those same habits. If they're a slacker in this lesson, they're going to be a slacker in that lesson. They are constant in this regard.

So they bring these habits into the room, and then the room pretty much rewards that because it's got its own forces and those forces are more like every other room and so on and so forth.

So how do you achieve change in any setting if that's the case? Well, the way you affect change is you have to overwhelm the system. You either

have to apply a single force or multiple forces in a way that overwhelms the stability of the system. So the system has to restabilize into a new form. And what taking the furniture out did was it was an overwhelming force. When those students walked into the classroom, this didn't look like anything they'd seen before. So they left their habits at the door and then they were willing to construct new habits inside this setting.

You don't recommend taking out the furniture, but you do have a set of strategies you recommend for what you call a "thinking classroom." What are the main aspects?

Well, for one, the workspace. What was the optimal workspace?

Before I tell you that, let me tell you what the worst workspace was. The worst workspace was having students sit and write in their notebooks. That one performed worse through a metric of thinking than any other workspace.

What was optimal? Having students work in groups at vertical whiteboards. Except it didn't have to be a whiteboard, it just had to be vertical and erasable. So like a window would work, the side of a file cabinet would work. ... Blackboards worked. It just had to be vertical and erasable.

They stood in their groups.

Why standing?

It's not that standing is so good, it's that sitting is so bad.

It turns out that when students are sitting, they feel anonymous, and the further they sit from the teacher, the more anonymous they feel. And when students feel anonymous, they disengage. And that's both a conscious and a subconscious act. And what standing up did was it took away their anonymity.

Just think back to the last time you went to a professional development workshop. Think about that. You were in this room and you were sitting down and you felt anonymous. And in fact, you may have put yourself in the back row of this room so that you could feel anonymous, so that you could disengage, right? This is not a phenomenon that's unique to kids. This is human nature.

So what was the optimal way to form a group? Well, it turns out that strategically constructing the groups like we see in a lot of elementary

schools turned out to be a disaster. That was not conducive to thinking. Likewise, having students set their own groups was a dumpster fire — that was not conducive to thinking.

The optimal was to form groups at random. And it wasn't good enough that it was random. It had to be visibly random. They had to see that it was random, and it had to change frequently. About once every 60 to 75 minutes, we re-randomized.

And any task we give them had to be a thinking task. Thinking is what we do when we don't know what to do. If we already know how to do it, it's not a thinking task, it's an exercise.

Or busywork, I guess somebody might call it.

A thinking task had to be something that they don't know how to do — which means that if they're going to have to think, they're going to get stuck. But it also means that we can't pre-teach them how to do it.

So here we have in a thinking classroom: The students standing at the whiteboards in their random groups of three, one marker per group, working on these thinking tasks.

And that produced thinking classrooms. All of a sudden, overnight, we went from 20 percent of students thinking for 20 percent of the time to 80 percent of students thinking for 80 percent of the time.

You paint a pretty critical picture of common teaching practices. What are you doing to get the word out about these issues and your approach?

Building thinking classrooms is not a curriculum, first of all. It's a pedagogy, it's a framework for helping teachers enact whatever curriculum that they have to work with. Curriculum is mandated, pedagogy is professional. So this helps teachers enact whatever curriculum content that they have to get through.

And I respect teachers' professional autonomy. I think teachers should have the professional freedom to judge for themselves what's going to work for them. And if this is going to work for them, I'm there trying to support it. I don't want to mandate this because I don't believe that mandating pedagogy is an effective way to change pedagogy.

And it's like growing everywhere. ... The projection for the number of teachers using it in Denmark is in the 90 percent [range]. It's starting to gain traction in Australia. And the book is also coming out in Mandarin. It's coming out in Korean, it's coming out in Greek and Turkish and Polish and French. And so we're starting to see this. It's all these exponential curves at different points of time.