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Innovative teaching strategies: Experiential learning with plastic spoons and marshmallows

iscovering biodiversity with Dr. Shoshannah Jacobs

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Dr. Shoshanah Jacobs is not easy to forget. She has purple hair, cut short and asymmetrical, and she co-teaches first-year biology (BIOL*1070)—a course that is either a game changer or a dream killer for the students who take it.

Imagine you've just come out of high school; you've adapted to many years of obedience training. You were told what to know and taught how to regurgitate those facts all over a paper while your palms sweated and your mind blanked.

Then there's BIOL*1070, where Jacobs doesn't tell you the facts or concepts. She asks you—in a room full of 600 students in Rozanski Hall.

“...Jacobs doesn't tell you the facts or concepts. She asks you...”

When I took the course, there was one activity in particular that I could never forget. Marshmallows and plastic spoons were used in an effort to teach evolutionary theory. Students volunteered to kneel at the front of the room beside a big pile of marshmallows. They used plastic spoons to scoop up marshmallows, and the spoons that didn't get enough marshmallows “died.” The ones that did “lived” and passed on their spoon-y genes. Then, some students were given forks, but that only made marshmallow scooping harder since using your hand to pluck the marshmallows off was prohibited. Many forks didn't make it due to a deleterious mutation.

This activity was an example of “high stakes/high risk active learning,” or experiential learning. It's what Jacobs calls “Student Centred Active Learning.” She insists, however, that active learning does not require moving your body.

“Marshmallows and plastic spoons were used in an effort to teach evolutionary theory.”

“Active learning is about actively participating in the process of learning, and learning is usually achieved by a conversation. When students are engaged in a conversation, you can say they are actively learning. There are low stakes ways and there are high stakes ways. The marshmallow lesson is considered high stakes and high risk. Students have to move around the room, be singled out, and do silly things. They have to answer questions on the spot,” explained Jacobs.

One risk is that more timid students get alienated from the experience.

Jacobs's solution: "The idea is to present a mixed bag of risk levels. By asking insightful or big questions, even if they don't answer it, students are forced to think, for at least a second, before they move onto Facebook or whatever. That's a way of creating an active learning situation. Making students think about a question instead of going through their memory banks for an answer they memorized a while ago. They should be thinking about big questions, like what are the implications, the consequences. Then they actively engage their minds. That's a very low stakes, low risk active learning activity."

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She also emphasizes the risks that instructors face when implementing active learning in the classroom. There is the risk of getting in hot water due to negative course evaluations and the risk of looking like a fool instead of an expert.

"[Integrative Biology] relies heavily on course evaluations and that has direct consequences on our careers. You can choose to ignore the inevitable student resistance that comes with active learning... I get comments all the time about how active learning doesn't work, just tell us the answers, just tell us what to memorize—and I respect that, but it's the wrong view."

Jacobs is revolutionary. In a society that constantly emphasizes academic and professional success, she wants to lift the stigma of failure. She believes learning should be an uncomfortable and vulnerable experience.

"This whole idea of being vulnerable is important to acknowledge. I think the way to get students to accept their vulnerability is by demonstrating our own. It backfires though... A lot of comments from student evaluations say that 'Professor Jacobs doesn't know anything.' [Laughs] Which is awesome! 'Cause the more I learn, the more I realize I know *nothing!*"

"I get comments all the time about how active learning doesn't work, just tell us the answers, just tell us what to memorize—and I respect that, but it's the wrong view."

Times are changing and perhaps an active learning revolution is long overdue. In a time of Google, the internet, and complex problems, we should be expecting more from education. Jacobs agrees.

"There's nothing wrong with traditional approaches. But it is wrong to just spew out facts that students should memorize. There's an ethical problem with that. I could Google all those facts for free. As a taxpayer, I don't want to be paying thousands of dollars for someone to give our future society some facts. We should be teaching students how to sift through and figure out which ones are credible and relevant to our problems."

Active learning teaches people to truly understand and address problems. Jacobs is not alone because the provincial government has started to address active learning in the system, and the University is now in the process of reviewing more ways to involve students in active learning.

“...the provincial government has started to address active learning in the system...”

There is evidence that shows active learning is the current best way to guide students, and therefore the rest of society, to success. Jacobs says that in the employer reports she has read from across Canada and the USA, there is less emphasis on knowledge of information pertaining to the discipline than there is in fundamental skills, the most desirable being: “Critical thinking, problem solving, and the ability to work in a team.” Those skills can’t be learned through tell-and-practice styles of teaching.

Amongst the wealth of evidence to support active learning, one study stands out to Jacobs. Elementary students were given a rudimentary physics lesson on mass and force using clowns on a tightrope. One group was given an equation and used it to figure out how many clowns would bend the rope. Another group of students was essentially told to derive the formula for themselves to find the answer. Both groups performed similarly when tested afterwards. But when they were retested months later, the second group did much better.

There must be a method to the madness, because after the struggle that was BIOL*1070, I’ve been consistently pulling As in biology courses.

Photo by Tyler Elliot.



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Marika Li is a class of 2018 student at U of G in the Environmental Sciences program and has been writing for The Ontario since Fall 2016. You can find her doing random stuff in the real world.

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