

**Dr. Liam Watson** (University of British Columbia)  
*Vice President-Pacific*

I recently received a scathing teaching evaluation.

I could leave it at that; nothing much to say here, really. I have received relatively few negative reviews on my teaching, on the whole, and I recognize that I occupy a space of privilege on this front—there is a growing body of evidence suggesting teaching evaluations in their current form have a built-in bias against underrepresented groups [1].

And, questions of unconscious bias aside, I get it. Students are under increasing stress along many axes. If we give them one place to vent, at the end of a term, we can be sure to hear from the disgruntled. In fact as institutions moved from paper to online evaluations, the general thinking [2] seemed to be that the averages should stay roughly the same even though the number of total responses would decrease—the very pleased and the very upset would not stop taking the time to evaluate professors. I suppose if I never saw a single negative review, I'd have to wonder if something was amiss.

Also, there is a lot of support available to me among my colleagues and peers, through which I can easily—indeed am encouraged to!—ignore any bad press. We know what we are doing, right?

But all of this said, here is a student that went to great lengths to describe their issues with my class, and even after it becomes clear that there was a mismatch between this student's expectations and the course I envisioned and delivered, I feel that there is something to learn from an evaluation like this. We did ask for comments, after all.

“Learning goals” is a term that has come up more and more in my career. In mathematical terms, I believe that these are meant to convey the list of topics—definitions and theorems—students should expect to be familiar with (and, I suppose, tested on) should they complete a given course. The intention here is to set expectations. And reflecting on this, it would seem the expectations are what is key here. I have expectations as an instructor; students certainly have expectations having paid tuition. But, even if a list of learning goals has been provided, have I communicated my expectations of students, in my courses, effectively? I suspect not [3].

I contend that more inclusive teaching spaces might result from better articulation of expectations—what we expect of students and, crucially, what they can and cannot expect from a class they have enrolled in.

Here I want to be very careful not to identify the class, and hence the pool of students from which this evaluation originated. But it is helpful for my purposes to work through an example, suitably abstracted. Not to nit pick, but rather to think about expectations and inclusivity.

Here is the example: One complaint was that I introduced X in one lecture, but then never returned to the construction of X in later lectures. The student clearly identifies X, and they are absolutely right—I did not come back to its construction. The aim was to provide a motivating example drawn from outside the course. And in fact, one might even argue it was drawn from outside of math, given a suitably narrow definition of math. The purpose of the example was to illustrate a transition from technique A to technique B and the example was not important, really. What was important was the fact that technique A was useless for studying certain natural phenomena, suggesting that another approach might bear fruit, which would in-turn (hopefully) motivate the further heavy lifting required in order to set technique B on firm footing. It is worth noting that the two techniques really look similar at the outset, with the exception that technique B requires strictly more work, so it is not hard to imagine a student questioning whether the added work is worth the trouble to begin with. Indeed, for the techniques in question, I have heard this complaint from students.

Evidently, this was not what the student in question took away from what was meant to be a stand-alone lecture. Could I have been more clear? I am sure that I could have, but to this end, what might have gotten in the way of missing this key point? Without attempting to guess, it is easy to imagine a wide range of issues getting in the way when two people attempt to communicate. But it could just as well stem from a rigidity of ideas

about “what math is” garnered over time through no real fault on the student’s part beyond the classes taken to that point. Overall, I am compelled to read this evaluation as coming from a strong student who has equally strong views on the structure of a good math lecture.

But this mismatch seems like a bad reason to give up.

We should strive to make our classes as diverse as possible in as many ways as possible: in addition to endeavouring to make anyone motivated enough to take a course feel welcome, we might *also* create an inclusive environment by demonstrating an inclusive attitude towards our material. For example, there is a place for stepping back and trying to view the bigger picture; just as there is a time to dive into the details in a careful didactic manner. I can remember being equally frustrated with courses that never gave any details at all as much as with courses that never stopped to think about what it was we were trying to accomplish. It is also the case that, listening closely to how students talk about their mathematical preferences, you often hear that they “like area such-and-such, which is the very best sort of math”. Everyone has different mathematical tastes, and that is a good thing—but it seems likely that silos are maintained by subtle choices we make in how new material is presented to students. And, compounding this, the ill-placed use of jargon or a machinery-heavy choice of motivating example can make the bar for entering a given sub-discipline unnecessarily high. If diversity begets diversity, then surely we should endeavour to give courses that show how broad math is, and how many interconnections there are between the diverse range of sub-disciplines, in a way that is accessible to as many students as possible.

Ultimately, we want our classes to include motivated students from as wide a range of backgrounds as possible—personal experience suggests that this leads, at the very least, to livelier and more engaged discussion. So I am left to conclude that I do not have the problem of working out how to make *all* students happy *all* of the time, but rather clearly communicating (and, likely, repeating myself often) just what it is that each and every student is getting themselves into here. To achieve this, perhaps more is needed than a simple set of new strategies that I can draw on for communicating *my* expectations in courses that *I* am responsible for. It may be that, towards more inclusive and diverse environments in mathematics, a more profound cultural shift is necessary. One that reflects on the boundaries, visible and invisible, that exist within mathematics as a whole and between mathematical sub-disciplines; one that makes clear from early in a sequence of math courses that there are a lot of ways to think about and communicate new ideas.

*The ideas expressed and editorial choices made in this piece are those of the author, though many people read and gave valuable advice on drafts of this reflection: Erin Despard, Dagan Karp, Tye Lidman, Robin Wilson*

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1. I was aware of this fact in a colloquial sense but I was completely blown away when I saw the volume of research that an internet search returned. I am not particularly interested—for the purpose of reflection here—in whether we should do away with evaluations altogether. Suffice to say, there is a strong case for doing so.

2. Here I am thinking solely of things I heard said assuaging seemingly reasonable concerns from colleagues that online evaluations would be significantly more useless than paper ones because of an expected drop the student response rate.

3. I have tried, obviously, but here is a great example of what does not work: A professor in Tennessee gave instructions in his course syllabus to finding a \$50 bill hidden in a locker. Nobody collected the money; nobody reads the syllabus. It is easy to find this story online, but I cannot help including the link to the As It Happens story on the experiment: <https://www.cbc.ca/radio/asithappens/as-it-happens-the-monday-edition-1.6284012/this-prof-hid-50-in-a-locker-to-see-if-his-students-read-his-syllabus-nobody-found-it-1.6284015>