ERIK DEMAINE: So with every sort of advanced class that I teach there's a final project. And the goal of the final project is for students to somehow get their feet wet with the material and sort of experience it at a more researchy level. In general, this can be things like surveying papers that I didn't cover in the class because there's only so much you can fit in one semester. So they'll go and read other material and kind of aim to teach that to the students. So there's a written project part, and then there's also a presentation in class. So this is an opportunity for students to learn more.

But actually most students in this class aim for a particular type of project, which is to solve an open problem. So actually advance the field and then present their solution. Now, of course, not everyone succeeded. And that's fine for a project. You don't have to solve the problem that you set out to solve. But at least you try different approaches and see what doesn't work.

But actually most students actually solved their problem. Often in groups. So the group size is unlimited. So sometimes 2, or 3, or maybe more, I think maximum 4 students got together and solved their problem jointly and then present their solution. So I think, I mean it's really exciting for me to show that they engaged with the material so much they can actually add new material. But it's also, I think, really exciting for the students to show, hey, I can actually solve these problems.

Many of the students were not theoretical computer science students. This is not their kind of main area. But they were able to conquer it anyway and have fun doing it. So I think it's a nice confidence builder that actually-- you know, it sounds hard. The field is called hardness. But actually it's pretty accessible. And I think it gives them the confidence that they can go back to their research fields and say, hey, how can we prove that our problems are hard. And justify why we're using heuristics or why we're using exhaustive search. Maybe there's something better? Actually, no. We can show that's the limit.

We encouraged, for all the projects, not only to collaborate with other students but to collaborate with us, the teaching staff, the TAs, and myself. So we would give them advice, especially in the beginning. So there's like a project proposal stage, we would confirm that, to our knowledge, this problem had not been solved before. And then we would give them lots of pointers for, you know, you might try this technique. You should rewatch lecture seven video and see how those techniques apply. Or maybe you could reduce from this or reduce from

that. Lots of different ideas for how they might solve their problem.

And then some of them came to us afterwards like, well, I've gotten this far but I'm stuck again. Any ideas? And so I think the more you can talk to people about where you're stuck the less stuck you will get. And so that helped a lot, I think people generally found the solution. Some people brought their problems to the open problem session and had all the students look at it. So there were lots of ways to do it. But generally, collaboration was the answer.

So the last part of the project is for students to present their work in class. Usually it's a whole bunch of student presentations, one after the other. So each presentation is relatively short. I forget if it was like 10 or 15 minutes. But I think it's really valuable experience. Presenting is also hard. And the way to get good at presenting your work is to do it a lot. And so, generally, I find MIT students are quite good at this. They've had, I think, a lot of experience presenting their work.

But one of the things I like to stress in my classes is, because most of the projects were joint with multiple students, how to navigate a joint talk where one person talks for a few minutes or one slide and then they switch back and forth. And I give general advice about how to do this but for the most part the students just kind of figure it out. And by practicing they find a good way to do it.

There are no videos of the student presentations because I think that would be a little bit too intimidating. It takes a lot of practice before you're comfortable being video recorded like this and in your lectures. But they are totally of video quality, so it's a shame we can't share them. But it's a chicken and egg problem, I guess.

And so at the end of the class the TAs and I each write a bunch of bullet points about their written project, and the work that they did, and their presentation. And I pay particular attention to like how strong their voice is, do they have good presence, and that kind of thing. And try to give them that feedback so they know where they need to improve, or where they're especially good, or that the slides needed more figures. That's my number one comment. Usually the answer is yes. Can never hurt to have more figures.

And also, on the research side, we think-- we look at their results, tell them whether we found any bugs. But for the most part we're thinking what would be the next step? Like, oh, here's another open problem that would advance your problem a little farther. And here's some ideas for solving it. And that often leads to papers that we publish.

And some final projects are basically done. Their papers are ready to submit. And then we give them feedback on where they should submit it, what would be a good conference, a good journal, we can basically help them publish it. So that's part of the full service.