

From: [Jonathan Eldridge](#)
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Subject: Spring 2023 Faculty Information & Updates, Volume XV
Date: Wednesday, April 26, 2023 4:14:50 PM
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Dear College of Marin Faculty:

We and our students live amongst any number of uncertainties and ambiguities, large and small, global and personal, and these get brought into the classroom. The attached article discusses research that suggests welcoming mistakes and ambiguity in the classroom—rather than avoiding them—can foster curiosity, promote metacognition, and spark active learning.

I'd also like to draw your attention to a CC ECHO course that was just released in Canvas Commons: Using OER and Open Pedagogy for Equity (self-paced version)
<https://lor.instructure.com/resources/9d794f7c020a4e29a125949b7e413fba?shared>

And in case you didn't realize it, today we are exactly one month away from Commencement!

Thank you for all you do.

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How to Embrace Uncertainty in Your Teaching

Five simple ways to spark your students' curiosity and learning by welcoming mistakes and ambiguity in the classroom.

By [Jeremy T. Murphy](#) and
[Meira Levinson](#)

MARCH 27, 2023

Faculty members tend to fear uncertainty in the classroom. You may worry that if you let students flounder, they will grow frustrated with the course material and with you. To know they are leaving class confused feels like a dereliction of duty. Worse yet, admitting to students when you don't know the answer seems the ultimate surrender of your intellectual authority. And time is precious. Shouldn't it be spent on the "right" answers, not the wrong ones?

Such fears are understandable. But we argue that instructors should often run headlong into uncertainty rather than run from it. Research suggests that welcoming mistakes and ambiguity in the classroom — rather than avoiding them — can [foster curiosity](#), [promote metacognition](#), and [spark active learning](#).

There are also practical reasons to embrace uncertainty. The professions that many students will ultimately enter — and for which we may be explicitly preparing them — are hardly straightforward. Fields like medicine, education, social work, business, and law require close engagement with people, and working with people is inherently messy work. Providing care and counsel can be confusing and ethically ambiguous. The abstractions that undergraduates learn comfortably from textbooks grow ever more complicated when encountered in real-world contexts. Giving students opportunities to regularly confront those complexities in the classroom offers invaluable preparation for life and work.

In writing [our new book](#), *Instructional Moves for Powerful Teaching in Higher Education*, we spent many hours observing classrooms at Harvard University and talking with faculty members and students there. A common theme of the most effective teaching we witnessed, regardless of school or discipline, was the instructor's embrace of uncertainty in teaching and learning.

Sometimes the invitation to confront uncertainty was elaborate and logistically demanding, such as the realistic, nerve-racking simulations we observed at Harvard Medical School, replete with bleeping heart monitors and role-plays of phone calls to a patient's family members. However, we witnessed other examples that required less or even no preparation but had a similarly large impact on student learning and engagement. In what follows, we detail five small practices that could be adapted by any faculty member, at any type of institution, as soon as tomorrow or next week.

Pursue the unanticipated in class discussions. Teaching is uncertain work by design. Determining what's happening in your students' heads is no small feat. And although you enter the classroom with clear

plans — sometimes even time-stamped ones — the diversity of perspectives and experiences before you undoubtedly steers the discussion into unanticipated territories. This can be frustrating, even scary, but it is part of what makes classroom dialogue so fruitful.

Timothy Patrick McCarthy, a lecturer whose undergraduate seminar on slave narratives we observed, shared an excellent metaphor for running a class discussion: It's jazz, not classical. Embracing a discussion's "improvisational moments," he argued, is key. That might mean letting a conversation run longer than expected or welcoming a discussion you hadn't scheduled for that day's class at all. It means pursuing different, unexpected tunes wherever they might lead. And in the process, your students might offer insights that even you had not considered.

Certainly, pursuing the unanticipated makes "coverage" of course content difficult. And you can't follow every tangent proposed during a class discussion. But you risk losing students' interest and attention when you fail to follow where they are taking a discussion. By making room for serendipity, you allow class discussion to do what it is best positioned to do: bring students and instructor alike to new, unanticipated understandings.

Welcome wrong answers and devalue right ones. For many undergraduates, nothing is more terrifying than giving an incorrect answer in class. Of course, mistakes are a key component of problem-solving, and wrong answers are often more illuminating and instructive than right ones. It's all too easy, however, to quash students' capacity for creative thinking and taking risks with a careless remark. Pretty soon, they may volunteer responses only when they are certain they are correct.

When Paola Arlotta, a professor of stem cell and regenerative biology, teaches undergraduates, she aims to topple the professor-student hierarchy so characteristic of college classrooms and instead create a culture more like that of an informal lab meeting among scientists. Seated around a long seminar table, she invites her students to think like scientists. Doing so, explained a student, means confronting uncertainty head-on: "You might be wrong. ... In fact, most of the time you're probably wrong." As Arlotta's teaching assistant told us, "Every idea gets churned in the classroom setting, whether it works or not." That approach allows students to experience the excitement of achieving scientific breakthroughs — and the recognition that such breakthroughs tend to come about only after, and even thanks to, many hours of pursuing false leads.

In his undergraduate physics classroom, Eric Mazur, a professor of physics whom we interviewed and observed, has made it a policy that teaching assistants don't affirm students' answers. Instead, instructors circulate around the room and pose rejoinders like "What makes you think this?" or "What else should we consider?"

In the absence of quick validation (or rejection) of their answers, students are encouraged to pause and think, to provide stronger justifications, and to get help from their classmates. Your first instinct may be to briskly intervene and correct a misconception, but you should be wary of the kinds of learning environments that such impulses nurture. In some cases, keeping your mouth shut can be the most productive response of all.

Leverage uncertainty to build suspense and surprise. Withholding a correct answer can stir greater engagement than divulging it. In a statistics class at the Harvard Kennedy School, we observed Dan Levy, a senior lecturer in public policy, spend 60 minutes pulling apart the standard-error formula with his students. To end class, he polled students to gauge their understanding of the formula. After the vote, Levy told the students, “I’m going to end class in a rather unconventional way.” He announced that a majority had answered incorrectly. Grinning, he closed, “I’ll see you on Tuesday.” Students gasped, then enthusiastically turned to their neighbors to debrief.

Afterward, Levy told us that ending class with students scratching their heads was a spur-of-the-moment decision. Devoting the last two minutes of class to some frantic reteaching would have been a doomed endeavor. But interestingly, the energy among students after Levy’s unconventional ending was palpable. “I saw something very interesting happening,” Levy reflected. “There was visibly more conversation and more noise in the room as class ended” than usual. And when the class reconvened, days later, students were eager to debate and discuss. Letting them sit with uncertainty piqued their interest and curiosity.

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Model not knowing. It takes courage to say “I don’t know” to students in a campus culture that casts professors as all-knowing authorities. Steeped in our disciplines, we may hold more expertise and experience than students do — but that doesn’t mean we know all. Admitting as much to your students signals that learning is unfinished, by design, for everyone.

One way to model not knowing is through strategic storytelling. We saw that technique in action in a graduate course taught by Gretchen Brion-Meisels, a senior lecturer of education. She pulled up a chair to a small group that was wrestling with a discussion prompt: “Talk about a time when you had trouble ‘stepping up’ ... a time when you think you should have used your power but didn’t.”

Brion-Meisels participated just as she hoped any student would, and shared a recent dilemma she’d experienced while collaborating on a research project at a local school. She felt the school had acted unjustly. Should she have used her clout as a Harvard instructor to step up and say something about it? Would doing so jeopardize her ability to continue working with students at the school? Would keeping quiet imperil the relationships she had nurtured with those young people over many months? In the end, Brion-Meisels said she did say something but less forcefully than she thought she should have. “I don’t know if that was the right decision,” she told her graduate students, shaking her head, a pained look on her face. “I’m not sure if anything will come of what I did.”

Bringing that level of vulnerability to your teaching can close what is too often a large and clinical distance between teachers and students. Sharing your own uncertainties is a powerful act in modeling. Although it may appear to contradict your status as “the expert,” it demonstrates to students that you expect the same honest participation from them.

Create systems for honoring the unknown explicitly. At Harvard Medical School, the cases that Barbara Cockrill, associate dean of faculty development, uses to teach pathophysiology spur all sorts of inquiries

during class. Many times, students raise questions for which Cockrill herself doesn't have answers. She honors such queries via two bulletin boards on her classroom wall: the "Nobel Prize Board" and "Nobel Prize 'Lite' Board." On the first, students post questions no one knows the answer to. On the second, they list questions that, between classes, Cockrill and her students will try to figure out.

"Medicine is huge," Cockrill told us. "You can't possibly know it all." Showcasing so prominently on the classroom wall what she and her students don't know serves as a tangible reminder of science's mysteries but also normalizes uncertainty's place in the classroom and the learning process.

Those five instructional moves send the powerful message to students that it's OK to stumble in class, to be wrong or confused about something — that uncertainty is not only unavoidable in learning but also a continuing and necessary component of it. It's a message that students don't often receive. After all, many postsecondary students are where they are because they have, over many years of schooling, developed a talent for ferreting out single right answers.

Acclimating students to uncertainty may be itself an uncertain process. When you cultivate a classroom that defies simple solutions and devalues right answers, you may experience resistance from students. A classroom that embraces ambiguity may represent a substantial shift from those to which many students are accustomed. But don't be deterred by some initial pushback. From the more elaborate simulation exercise to one of those five simple strategies, the idea is to embrace uncertainty so that your students can, too.

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