

Chapter 6

Explaining

INTRODUCTION

I suspect you could theoretically survive parenting a child without ever raising your voice in anger—an achievement I certainly can't claim to have made. All the restraint you may have demonstrated in the early years of parenting, however, will melt when your child begins learning to drive, and you find yourself in the passenger seat of a terrifying death machine with a 16-year-old at the helm. No matter how carefully they have studied the rules of the road and practiced in parking lots, 16-year-olds who are learning to drive do things like ignore yield signs or forget to look in both directions before pulling out into traffic. At those moments you can choose either to raise your voice or to crash.

I have chosen to raise my voice.

However justified I may have felt in barking an emergency instruction in potentially hazardous driving situations, my children never seemed to appreciate the value of what I was doing for us both (i.e., saving our lives). This meant that driving lessons in the Lang household, which were happily coming to a close while I was finishing this second edition, typically consisted of tension-filled rides around the neighborhood in which I was continually on the verge of boiling over and my children were continually on

the verge of tears. During the time when I was supervising these white-knuckled drives with my second-oldest daughter, I also happened to be doing some reading about self-explanation and learning, the basic premise of which is that *learners benefit from explaining out loud (to themselves or a teacher) what they are doing during the completion of a learning task*. Less to improve her learning than to diffuse the tension in the car, I began asking my daughter to tell me about what she was doing as she drove. One of her problems had been that she tended to drive too close to the right side of the road, perhaps out of an exaggerated (and understandable) concern for not drifting into oncoming traffic. When I asked her to talk about what she was doing as she drove, she noticed this issue herself, about which I had reminded her earlier (like a thousand times), and she made a self-correction. She navigated more to the center of the road. This happened several other times with other driving tasks. Whenever I asked her to explain what she was doing, she would analyze her own driving in ways that didn't seem to happen when she was just sitting there attempting to navigate the road and waiting for me to shout at her.

This helpful incident was my first real observation of the power of explaining, a learning strategy that can assist students in a variety of different ways. In the first edition of *Small Teaching*, I focused this chapter on the idea of *self-explaining*: speaking or writing to yourself (or to an instructor) about your learning as it happens. Prompting my daughter to explain what she was doing as she learned to drive (and why she was doing it) would fall into this category. As we shall see below, some excellent research suggests that self-explaining can help learners master skills they are trying to develop. But in this second edition I have broadened the scope of this learning activity to include the idea of *explaining* more generally. The research base on the power of explaining to promote learning takes the form of studies which demonstrate that when students are asked to teach something to other students, or even

just asked to prepare to teach something to other people, they learn it more deeply than if they were asked to study the material for an exam or other assessment. Explaining your newly learned skills or content aloud, to yourself or your instructor, helps your learning; but it may help your learning even more to explain your developing or newfound knowledge or skills to your peers, or outside audiences, or even to hypothetical outside audiences.

➞ But we all know this, right? Because I can almost guarantee that at some point in your teaching career you have either thought to yourself or remarked to someone else that your own learning in your subject matter was deepened by having to teach it to your students. This experience seems like an almost universal one for teachers, and it is well supported by research. We learn through teaching others. Of course, teaching consists of much more than explaining things to people, as I have been arguing throughout this book. But most of the research in this area has focused on experiments in which students taught someone else through explanation, and I think asking students to explain their learning to someone else represents the most basic route to learning through teaching. By all means you can go further than this, and have students develop more robust and creative ways to teach their newly learned content to someone else, but to keep this chapter within the realm of small teaching, I will focus on activities you can build into class which ask your students to explain or teach what they have learned to someone: themselves, their instructor, their peers, or outside audiences.

IN THEORY

We'll begin with the research that has supported the theory of self-explanation as a learning tool, and then expand into the research on the learning power of explaining to others.

The first study to demonstrate that self-explanations can support learning did so in an effort to analyze how students learned from worked examples—in other words, from sample problems that had been worked out in advance and then were reviewed step by step for the benefit of the students (Chi, Bassok, Lewis, Reimann, and Glaser 1989). The experiment consisted of two phases: a first one in which the subjects studied a series of worked-out examples from a physics textbook and answered questions to test their declarative knowledge; and a second phase in which they were asked to solve problems based on that knowledge. In this experiment the researchers did not so much prompt self-explanation as listen for it; they wanted to see if differences in understanding and problem solving would be tied to spontaneous self-explanations generated by the learners. The subject size was small, just 10 students, who were ultimately divided into 2 groups: *Good* and *Poor*. The *Good* students had a mean success rate of 82% on the problems, whereas the *Poor* students came in at 46%. The difference in the amount of self-explanations generated by the two groups is startling: *Good* students offered around 140 lines of self-explanation in the transcripts, whereas *Poor* students generated only around 20 lines. Not wanting to rely simply on volume of words, though, the researchers looked more carefully at the self-explanation transcripts and eliminated less relevant comments to tabulate only those that connected to the major ideas of the subject matter. The differences narrowed, but remained quite strong: 51 for the *Good* students versus 18 for the *Poor* students (pp. 158–159). The really interesting point about these results is that the first phase of the study showed almost no differences between the *Good* and *Poor* students in terms of their declarative knowledge of the physics principles in question. In other words, all students could score equally well when they were asked to do things like provide definitions; the stark differences between the two only emerged when they had to apply their declarative

knowledge to solving problems. Robust self-explanations correlated more with conceptual learning than they did with the memorization of content.

Ultimately, the authors of this study concluded that “self-explanations not only construct better problem-solving procedures, but they also help students to understand the underlying principles more completely” (p. 169). This study was incomplete in that it relied on the students to generate those self-explanations, which would have limited use for us as instructors. Obviously, we could advise students to engage in self-explanations while they are studying examples in their textbooks, but we advise students to do lots of things, many of which they ignore. The question then arises as to whether self-explanations generated in response to prompts from a teacher would have the same effect as self-explanations spontaneously generated by the students. It may certainly be the case, after all, that self-explanations worked for the Good students in Chi et al.’s initial study because those Good students were good students and self-explanation was simply one of a package of activities in which they engaged that helped them learn. However, if you isolate the single activity of self-explanation and require students of all levels to employ it in their learning activities, will it still have the same powerful effect that it had in this original study?

This was the question that Chi and another set of colleagues asked and answered in an experiment with a different group of students, this time shifting the content from problem solving in physics to understanding the circulatory system in the human body (Chi, DeLeeuw, Chiu, and LaVancher 1994). In the study, eighth graders were asked to read brief passages from a high school biology textbook about the human circulatory system and were prompted to self-explain what they were learning after each sentence they read. A second group of eighth graders were asked to read the same passages from the textbook twice but without self-explanation prompts. (This second reading ensured that they

spent equal amounts of time on the text as the self-explaining students.) The students who were prompted to self-explain did so in three ways: they were instructed in advance to self-explain after they read each of the 101 sentences of the passage; every few sentences they were prompted to answer a question about the *function* of the circulatory system part they were learning about (i.e., what is the function of the septum?); they were occasionally asked by the researchers to clarify or elaborate on their initial self-explanations. Both sets of students were given pretests on the circulatory system and then tested a week after their study sessions. In these final tests, students were asked multiple types of questions about the material they read: some required memorization of basic information about the circulatory system (i.e., “What does hemoglobin transport?”), and others required them to make inferences about the system based on what they had learned (“Why doesn’t the pulmonary vein have a valve in it?”). A final category of questions required them to make even more complex inferences about the implications of the circulatory system for human health (such as how the circulatory system would account for the effects of a poisonous snake bite). This range of questions seems to mimic what students typically find on exams in higher education, testing students on both memorization and more complex critical thinking skills (p. 448).

The study results confirm the findings of the first experiment. The self-explanation prompted students experienced a 32% gain in their knowledge of the circulatory system from the pretest to the posttest, whereas the unprompted students experienced a 22% gain (p. 453). Parsing the results a little more finely, Chi and colleagues noticed that the improvement was slightly more extensive on the more complex questions. In the third and fourth question categories, the prompted students improved 22% from pretest to posttest, whereas the unprompted students improved only 12% (p. 453). The study also looked at the volume of self-explanations

offered by those in the prompted group, separating them out into high and low self-explainers. Even in this more finely tuned analysis, the differences persisted. Analyzing both self-generated drawings made by the students and their verbal explanations to see how they reflected an accurate mental model of the circulatory system, they found that the high self-explainers were much more likely to develop such an accurate model than the low self-explainers. “Eliciting self-explanations,” they conclude, “clearly enhances learning and understanding of a coherent body of new knowledge, whether one compares the amount learned by the prompted and unprompted students, or whether one compares the amount learned by the high and low self-explainers” (p. 469). Good students, in other words, may naturally self-explain more than weaker students; however, we can still help those weaker students by prompting self-explanations.

Different theories have been proposed for the learning power of self-explanation. In Chapter One, we considered the notion that students come into our classes with pre-existing mental models of our subject matter, and that part of our work as teachers should involve surfacing those mental models with prediction activities that will help us understand and correct them. In a survey of much of the research that has been conducted thus far on self-explanation in education, Chi and another co-author argue that self-explanation supports this very process: “Learners can come in [to a class or new discipline] with their own ideas, or their own mental models of a concept. These mental models are typically flawed. When a learner encounters instructional material that conflicts with their existing mental models, self-explaining helps repair and revise their understanding” (Chiu and Chi 2014, p. 92). Sometimes when we encounter new information that conflicts with our existing mental models, we ignore it or we try to squash it into our existing frameworks. It’s not that we make a conscious decision not to learn; we probably do

this unthinkingly. The models are so deeply ingrained that we are not consciously aware of them. Self-explanation forces us to step back and see our existing model models. Once we have done so, then we can see what needs fixing, and engage in meaningful repair and revision in light of the new information we have been presented.

But what if it were possible to improve that repair and revision process by offering your explanation not just to yourself, or to a researcher sitting with you in a laboratory, but to a peer who was also trying to learn the subject matter? This was the question posed by a research team that put students in three different conditions as they learned Darwin's theory of natural selection (Coleman, Brown, and Rivkin 1997). One group was told to study a textbook explanation of the theory and then explain it to a peer afterward (peer-explainers); a second group was told to study the same material and then self-explain the main ideas to a researcher (self-explainers); a third and final group didn't see the textbook material at all, but listened to their peers explain it to them (hearers). After they had completed their initial exposure to the material, and explained it to the researcher or a peer, they were tested on their knowledge of natural selection and given some problems to solve. Both the self-explainers and the peer-explainers beat the hearers on the test of basic knowledge, which doesn't seem all that surprising. The more interesting difference emerged in their efforts to solve the problems, which tested both near and far transfer (near transfer problems are similar in form to the original problem; far transfer problems are different, and require more critical and creative thinking). The peer-explainers outperformed both the self-explainers and the hearers on both kinds of problems, those requiring near and far transfer. The deepest learning of the material, in other words, occurred *when the students had to explain the material to a peer*, more so than when they were just asked

to self-explain their understanding to a researcher—who, in this case, was functioning as a sort of stand-in for the instructor.

Keiichi Kobayashi conducted a recent meta-analysis of more than two dozen research studies like this one on the learning power of teaching-by-explaining, and concludes that when students study or learn new material with the understanding that they will have to explain it someone else, such as a peer or outside audience, it deepens their learning (Kobayashi 2019). Logan Fiorella and Richard Mayer refined this research a little further by conducting an experiment in which they sought to determine whether students can benefit from learning something *as if they were going to teach it*, even if they don't actually teach it (Fiorella and Mayer 2013). Students in their experiment were asked to study materials on the Doppler effect in three different conditions: one group studied as if in preparation for a test (control); one group studied in preparation for teaching the material to someone else—but then did not actually undertake that teaching (preparing-to-teach); a final group studied in preparation for teaching and then actually recorded an explanatory video lecture designed to teach the material to someone else (actually-teach). All three groups were tested on their mastery of the material immediately after the experiment and then a week later. In the first test, the preparing-to-teach students and the actually-teach students outperformed the control group. But in the delayed tests, a week after the experiment concluded, the control and preparing-to-teach students were both bested by the actually-teach students. The students who had to go through the actual exercise of explaining the material to someone else, even when it was just to a camera in the form of a video lecture, significantly improved their longer-term understanding of the material.

This summary of the research, coupled with the self-explanation research, provides us with categories of activities we

might develop as we ponder opportunities for our students to learn through explaining.

- Prompting students to articulate their understanding to the instructor (or to themselves) through self-explanation.
- Creating assessments in which students will develop teaching materials for someone else, such as their peers or an outside audience: slides, videos, texts, etc.
- **Putting students in the actual position of having to teach something they are learning to a live audience, whether that be their peers or some other audience beyond the course.**

↳ Based on my own review of this research, my hunch is that self-explanation is probably most appropriate for newer learners, while creating teaching materials and actually teaching make most sense for experienced learners. You have to have a basic mastery of the material in order to explain it to someone else, so someone who is just getting their feet wet with it probably should not be actually teaching someone else. It would not have made sense for me to ask my daughter to teach her younger siblings to drive while she was still mastering the basics of the road. Self-explanation made the most sense while she was doing her own initial training. But once she has acquired her license and been on the road for a while on her own, she likely would deepen her own skills as a driver by having to teach those skills to my younger children.

Which, now that I think about it, sounds like something I should have done. There would have been a lot less yelling.

MODELS

The models in this chapter begin with a suggestion for how to incorporate self-explanation into classroom practice sessions.

The subsequent three models then invite you to try activities or assessments in which students will create teaching materials or offer their teaching explanations to other people, either their fellow students or audiences beyond the classroom.

→ ***Why Are You Doing That?***

As we saw in the previous chapter, giving students brief periods of time in class to practice the skills they will need for their papers or projects constitutes one highly recommended small teaching strategy. One helpful thing that we can always do during those practice sessions is remind students to use the theories and principles they have learned while they are practicing. I have seen too many times that students seemed to understand a writing principle I have taught them, but then when they sat down to write their essays, they forgot about it and went back to their old habits. Providing timely reminders about learned principles and theories, and gentle nudges to apply them in practice, are great ways to prompt effective self-explanations.

Assume your students have a paper due in three weeks that requires them to make use of four or five specific writing or analytic skills you have worked on in class. You might allow the final 10–15 minutes of one class per week for students to do some drafting of those essays, informed by the lessons of that specific class period and focused on a specific step in the paper-writing process. One such brief session might be reserved, for example, for drafting an opening paragraph designed to grab the attention of the reader and entice her to keep reading. While the students complete this work, you can walk around and prompt individual students with some form of a very simple question: “Why are you doing that?” Or more specifically: “What introduction-writing principle are you using here? Playing on the reader’s emotions? Surprising the reader with a shocking statistic? Seeking to find common ground

with the reader?” Asking the student to pause and articulate the reason for her writing choices should help tap into the learning power of self-explanation. This general approach—pausing students who are working and prompting them to explain the principle or reason for a choice they are making—could help any time students are working in class, but it seems to me like it would be particularly helpful when students are moving toward paper or project assignments. The simple small teaching strategy here consists of pausing working students now and again to ask them to link their practice to principles.

You could just as easily require this of students who are completing projects online. For example, say you are asking students to put together a presentation for an online course you are teaching. Assume as well that you have taught them a few things about how to give presentations, such as how to combine text and graphics in ways that are visually appealing or how to ensure that slides are not overly busy with text or are clearly organized. Instead of simply asking the students to turn in the final presentation, ask them to select any three slides and write an explanation for their design choice in the notes section of those slides. What strategy for creating effective presentations did you use, you might ask them, in constructing and organizing these specific slides? Again, the hope here would be that the students who have to articulate their design strategy for three slides will learn to think about and apply that design strategy to all of the slides they are creating.

One important benefit of asking students to self-explain while practicing is that it gives you greater insight into the thought process of your students, which should help you continue to improve your teaching. Nursing educators frequently ask students to engage in “think-aloud” exercises when they are attempting to make clinical diagnoses—a consummate

form of self-explanation (Banning 2004). For the teacher, this think-aloud approach can “provide insights into the types of question(s) that are asked, the train of thought, the ability to make connections and form bridges between core concepts and peripheral subjects, the use of prior knowledge and experiential learning to problem solve and the assessment of the challenges and difficulties encountered during reasoning” (p. 10). Instructors who teach in fields in which students are frequently working individually on developing specific skills (e.g., performing arts, mechanics of various kinds, etc.) should have frequent opportunities to make use of such think-alouds, as can teachers who are having students doing in-class experiments or laboratory work. Consider the think-aloud as another potential way to frame the activity of asking students to explain their reasoning, problem solving, or other cognitive work to help them both connect to principles and allow you both to better understand where they still need help.

Finally, you might consider students who visit you in office hours as ripe candidates for self-explanatory learning. When a student wants help with a paper or project or concept in your office hours, keep this research in mind and prompt the students to self-explain as much as possible, rather than simply reviewing the correct answers or strategies for them.

Peer Instruction

The use of peer instruction, a teaching strategy made famous by Harvard physicist Eric Mazur, offers a great opportunity to incorporate explanations into a class, especially larger lecture-style courses. More than 25 years ago, Mazur helped develop electronic polling as a teaching technology to support the process of students learning from one another in his courses. What he labeled as

peer instruction process can take a variety of forms, but the basic model looks like this (Schell 2012):

1. The instructor poses or projects on the classroom screen a question that requires thinking or problem-solving skills.
2. The students take a minute or two to attempt to solve the problem or answer the question on their own and to record their answer with their phones or other personal response system technology (even colored index cards will work for this purpose). Answers are immediately visible to the instructor.
3. The students then are asked to take a few minutes to turn to a neighbor and explain their answer. Mazur asks students to find a neighbor with a different answer, which means that they can't just agree with one another quickly and be done.
4. The students then resubmit their answers, which again are immediately visible to the instructor.
5. The instructor asks a few students to provide their explanations for their answers to the whole room and provides the correct answer.

After this final step, the instructor has a variety of options available. If most of the students answered the question correctly the second time and the explanations elicited from a handful of students seem to be on target, the instructor can move forward to the next course topic. If, however, the answers from the class are mostly incorrect or the student explanations seem confused, the instructor can pause and revisit the topic that has been under review and then undertake the process again. Derek Bruff's *Teaching with Classroom Response Systems: Creating Active Learning Environments* offers an excellent guide for instructors interested in exploring this teaching format in greater depth (Bruff 2009).

Peer instruction strikes me as somewhere on the line between self-explanation and other-explanation. The students are talking

to a peer, but typically they are explaining their reasoning in a more exploratory way, rather than teaching their peer. Still, adding the peer into the mix might push their learning beyond what they would gain from just explaining their reasoning to the teacher. It's worth noting that the success of peer instruction depends on the quality of questions you are asking. Ken Bain profiles Mazur's work in his book *Super Courses: The Future of Teaching and Learning* (Bain 2021), and points out that the questions developed by Mazur, which he calls ConceptTests, require students to engage in "higher-order thinking," and should not be ones that they can just "plug and chug." The questions are often drawn from everyday life and can seem very simple, as in this example: "You are looking at a fish swimming in a pond. Is it deeper than it appears, more shallow, or exactly as you see it?" When students have to explain the reasoning behind their answer to such questions, they are forced to apply learned theories or concepts to novel situations. Through peer instruction, Bain writes, Eric Mazur "created a space where people could struggle with their own understanding as they attempted to explain it to someone else, hear it from others, respond, and improve their thinking" (p. 89). If you need help getting started on developing these kinds of questions for your course, search online for "ConcepTests" and you will find plenty of examples from lots of different disciplines. And you can find plenty of step-by-step instructions for using peer instruction in your teaching by searching with that term as well.

Although people most frequently associate peer instruction with STEM disciplines, I have used it in my writing and literature courses on many occasions. I love to use peer instruction with my English composition students when we are learning how to navigate the process of conducting research online. This skill has become increasingly challenging for students with each passing year, especially because we should not rely on simple rubrics or acronyms to evaluate the quality of sources or individual pieces

of information. Everything depends upon context, and how the source or piece of information will be used (a personal story from someone's blog can work great in an introductory or concluding paragraph, for example, but wouldn't serve well as body-paragraph support for an argumentative claim). While we are learning these skills, I put the students in pairs, throw a source up onto the screen at the front of the room, and ask them to respond to an electronic poll about whether that source offers reliable information they could use in their research papers. Then I set them loose on their laptops to explore the source in more depth, and ask them to explain their reasoning to one another. After a few minutes I invite them to respond to the poll a second time, to see if anyone has changed their mind, and then we talk about the source together as a class. This model of peer instruction has made the challenging task of teaching students about sources a much more engaging and interesting one for me—and, I hope, a more effective learning experience for my students.

Creating Teaching Materials

Recently I have been experimenting with a new assignment that requires students to teach one another by creating materials that become part of our course content. Just as we often do with presentations, I use this assignment to invite groups of students to study a course topic in greater depth than their peers, and then share their learning with everyone in the course. But in this assignment, instead of standing up and presenting their research during class, the students collect and annotate the resources they have discovered and post them to the course learning management system. In a recent literature survey course, for example, each student group had to collect the following resources for their peers on a specific topic: 2–3 accessible articles, 1–2 images, and 1 video. They needed five total sources, and for each source

they had to write a one-paragraph annotation explaining to their peers what they could learn from that source. They also had to write two questions about their collections that could be used on a course exam. This was a challenging part of the assignment, as it took a little work for me to help them understand how to pitch an exam question at the right level for their peers. Finally, they had to write a concluding paragraph in which they linked the resource collection to one of the works of literature we had to read in class. Helping students understand how to complete this assignment was somewhat time consuming—I asked each group to first identify 7–10 potential resources, review them with me during office hours, and then use my feedback to winnow them down to the 5 resources they wanted to show to their classmates. I did ask each student group to finish this assignment by previewing their collections in class in a 2–3 minute presentation, but this was highly informal and ungraded. My evaluation focused solely on the quality of their resources and their annotations. I should note that as with many effective teaching strategies we devise, this one had an unexpected benefit for me; it exposed me to a wealth of new articles, images, and videos that I can use with future students.

The specific parameters of that assignment might not make sense to you, but think of all of the teaching materials that you develop for students over the course of the semester. These might include annotated resources, presentation slides, outlines or overviews of textbook readings, live or recorded lectures, handouts of various kinds, guided reading questions, written summaries of complex issues, and more. [Expand your thinking even further by considering all of the sources by which people learn today: social media posts, short videos, podcasts, websites, listicles, and more.] Any of these genres could become an avenue in which you ask students to create teaching materials and explain course content to one another. Our learning management systems can work very

well as repositories for these materials. Of course, traditional student presentations to the class serve this purpose, but get creative and think beyond the traditional format: How *else* could your students create educational materials that would teach one another about essential course content?

Expanding Audiences

Those last examples move us into the final and perhaps most powerful method of using explanation for learning: inviting your students to teach other people what they have learned—not just you, in the form of self-explanations, and not just their peers through peer instruction or resource collections. Although this might sound like an intimidating teaching strategy to develop, it can simplify the challenge if you think about what you are doing as creating new *audiences* to whom your students can explain what they have learned, or are still learning. For the most part, students in higher education teach to an audience of one, as my colleague Carl Keyes likes to point out (Lang, *Distracted*, 2020). Students in my courses write their papers to me, complete their exams for me to evaluate, and even when they are giving presentations I find they are almost always talking directly to me, rather than attempting to present to the other students in the room. But if we want them to use the ultimate power of explanation to support and enhance their learning, then we can expand the audience for their work into new territories.

Carl Keyes provides a really outstanding example of what this looks like through his Adverts 250 Project. As a part of his own scholarly work as a historian of colonial America, Carl runs a website to which he posts every day—yes, every day—an advertisement from a colonial newspaper that appeared exactly 250 years ago to the day. Accompanying each advertisement is a brief

analysis of the advertisement and its content, normally written by Carl. But Carl has folded this project into his pedagogy, and when he teaches certain courses his students take over as guest curators: they are responsible for identifying the ads, doing the research, and writing the analysis of that day's ad. Strikingly, Carl does not limit this work to upper-level students; even the students in some of his lower-level survey courses participate in this project. When he asks his students to write the brief essays analyzing the daily advertisement, he is asking them to write to a public-facing audience, one that includes both professional historians and people generally interested in American history. They have to think about how to provide context for the advertisements that will help anyone understand the nature of the advertisement, and why we might care about it. Carl's innovative pedagogy on this project has been recognized by many academic and educational organizations.

Plenty of other teachers provide inspiration for thinking in creative new ways about audience, some of whom I have written about or profiled in other contexts. Two other teachers on my campus, psychologist Sarah Cavanagh and biologist Michele Lemons, once taught a pair of linked courses in their disciplines that had a strong focus on understanding the brain. They asked their students to give a presentation on the brain for sixth-graders at a local elementary school. My colleague Cinzia Pica-Smith has asked her student to create recorded Public Service Announcements, the kind that celebrities make on television ads, to educate the campus or the wider public about an issue they have studied in class. What elements of your discipline should the wider public have a better understanding about? More recently, I wrote about the work of a scientist on my campus, David Crowley, who asks his biology students to identify something in the course that they are passionate about, and then identify an audience they think

should know more about that topic. They can pick any audience they want: their parents or siblings, their dorm mates, or even a specific group of friends. Their assignment is to create some kind of project or campaign that educates their chosen audience about their chosen topic (Lang 2020). If you look around, you are likely to find plenty of examples, even on your own campus, of people asking their students to explain their learning to external audiences.

If you want to start small, though, you can even just ask students to explain their learning to a hypothetical audience. For the first few weeks of my British literature survey course, we read poems by Romantic writers such as William Wordsworth, whose work often addressed the conflict between the natural world and an increasingly industrializing and technologizing society. I can, of course, ask my students to write a standard three-page analysis of one of his poems, but one year I tried something different. At the time plans had been announced for a new technology building on campus, which would be erected in a formerly wooded area. That year I asked my students to write a three-page letter to the college president in which they used a work of Wordsworth (or another writer from the period, some of whom wrote in praise of industry and technology) to make an argument about whether it was wise to replace these woods with a new building devoted to technology. They still had to write body paragraphs in which they analyzed the poem they had selected, but in their introductions and conclusions they had to think more creatively about framing their argument. The papers were a treat to read, and I hope helped them engage with the material more deeply as they reflected upon the impact the new building would have on their campus—and their access to new technologies.

If you are looking to put this teaching approach into practice, and not sure where to begin start small. Select or create just one

assignment in which students have to explain their learning to an outside audience of some kind, whether it's real or hypothetical.

PRINCIPLES

Students can explain their learning aloud to themselves, to their instructors, to their peers, or to outside audiences. The research suggests that all of these audiences for their explanation should help deepen their learning. Follow these principles as you seek to develop explanatory activities for your students.

Point to Principles. When students are self-explaining as they learn or practice a new skill, keep pointing them to principles that should be guiding them. For me the most convincing theory about why self-explanation works is that it nudges students to connect theory with practice, or principles with concrete steps, or knowledge with doing. As students are engaging in practice sessions of any kind in your class, keep asking them questions that help them make this connection: What principle/theory are you applying here? How does what you are doing connect to what we discussed earlier in class today?

Utilize Peer Power. Give students opportunities to teach one another, whether that means explaining their reasoning to a peer or creating materials that other students will learn from. When Eric Mazur asks his students to turn to a peer, he doesn't have them select their partner randomly; they are actually supposed to find a peer who has given a different answer than the one they gave. This puts increased demand on the explanation they are giving to a peer: How do I explain my thinking to someone who doesn't seem to have the same understanding that I do? That same question will apply to students who are having to create teaching

materials about aspects of the course material they have studied in more depth than their peers.

Think Audience. The quickest route to the generation of explanatory activities for your students is to move them beyond the audience of one. Start small: select one assignment or activity that students usually direct to you, and direct it to a different audience. That audience can be hypothetical or real, it can be one person or the general public, it can be their peers or their parents or the president of your institution. Help them think through what that audience would need to understand your course material, and how they will have to organize and present it make an effective explanation.

SMALL TEACHING QUICK TIPS: EXPLAINING

The strategies in this chapter lend themselves both to quick implementation in the classroom and to more extensive activities that you might create for students through audience-based assessments. Start small with self-explanatory activities in class and build up to audience-expanding assessments.

- Allow class time for students to practice the skills they will need to succeed in assessed activities (as outlined in the previous chapter) and circulate and prompt self-explanations individually while they work.
- Use peer instruction with personal response systems and three key steps: students provide an answer, pause and explain it to their neighbors, and then revise their answers.
- Have students create teaching materials for their peers on essential course topics. Think beyond the traditional presentation: What else could they create?

- Invite students to direct one of their major assessments to another audience. You can pick that audience for them or let them identify an audience to whom they would like to teach some aspect of your course content.

CONCLUSION

While I was working on the second edition of this book I had a vivid reminder of the power of learning through explanation. A few years ago, I began collaborating occasionally with the Center for Teaching and Learning at Central European University, providing workshops or short courses on pedagogy for their graduate students who were considering teaching careers. In the spring of 2021, I taught a virtual four-week seminar on teaching by discussion. This was a subject near and dear to my heart. What got me interested in higher education pedagogy over two decades ago was a short article by the historian Peter Frederick called “The Dreaded Discussion: Ten Ways to Start.” When I first encountered this article, I was teaching as a graduate student, floundering around in discussion sections and looking for help. I still remember what an astonishing discovery it was to realize that I could do things other than just ask questions and see if I could get anyone to respond. From that day discussion has played a central role in my teaching; nothing gives me more satisfaction than leading a great discussion about a work of literature.

I continue to read articles and books about discussion, but I am always doing so as a practitioner—I want to get new techniques I can use in my class. As I read back through my favorite texts on discussion in preparation for my seminar at Central European University, I realized that I had to take a different approach. I wasn’t going to spend four weeks providing a menu of

discussion teaching tricks. I needed to think more about the theoretical underpinnings for the strategies I wanted to recommend. I had to remind myself of the reasons we teach by discussion; what are we hoping to accomplish? I had to think categorically about the different types of discussions we can have in the classroom, and the different purposes they served. Doing all this preparation for the seminar forced me to re-think the use of discussion in my own teaching. I realized I had been routinely using certain strategies over and over again without really considering how they supported the larger purpose of discussion in my courses. I abandoned some things that I had been doing unthinkingly and picked up some new strategies. The process of thinking through the underpinnings of discussion, which I did in service to the seminar students, ultimately improved my work as a discussion leader.

Much of this impact, I noticed, happened during the preparatory process—both as I was doing the initial reading and as I was preparing my presentations and teaching activities. That confirmed for me the findings that learning-to-teach or preparing teaching materials can have a positive learning impact, even if we don't actually teach it to someone else. But my learning was intensified when I actually presented the material to the students, heard their responses and questions and arguments, and had to keep thinking as a result. Of course, that's ultimately what we want for students, so take that final step when you can. But ultimately the research on explanation gives us plenty of options—from self-explanation to preparing-to-teach, from preparing teaching materials to actually teaching—and they all should add a new layer of learning for your students.

Inspiration

The final three chapters of this book stem from an acknowledgment of the fact that both learners and teachers are more than collections of neural networks, or receptacles of information, or practitioners of cognitive skills. They are fully realized human beings with emotions, histories, families, communities, and more. They need inspiration as much as, if not more than, they need knowledge and skills. Connections to the human beings around them are just as important as the connections that we foster for them in the cognitive realm. We are a social species, after all, and learning is a social process. Our earliest learning comes from observing how the humans around us behave and doing our best to imitate them. As we enter school, our learning continues at the hands of teachers, but also deepens through interactions with our peers. Classrooms are thoroughly social settings, and our connection to the people around us—or lack of connection—can have a significant impact on the quality of our learning. When we feel comfortable and connected, we have plenty of brain space to devote to learning; when we feel isolated or threatened, valuable cognitive resources are being drained away in response to those feelings, and we will not learn as deeply or effectively.

In the second edition of this book, then, I have added a new chapter on belonging. When students feel as if they don't belong in our courses—because they are not smart enough, because they don't look or act like their peers, because they don't come from the same background or have the same amount of money—their learning will suffer. Their negative feelings will interfere with their learning, in the same way that fear or anxiety can interfere with a student's performance on a test or an athlete's performance in a big game. Helping students feel like they belong on campus, and in our courses, is work that faculty tend to view as outside of their purview: they see that as the work of student affairs professionals. But as more and more students are coming into higher education from non-traditional backgrounds, and as they expand the diversity on our campuses in every way, all of us need to provide our support to this essential work. Faculty can play a crucial role in helping students believe that they belong at our institutions, on our campuses, in our courses. We can help instill that belief, that sense of belonging, in many small ways which we will consider in Chapter Seven.

Emotions like isolation and anxiety can interfere with student learning, but emotions can also play a positive role in the work we do. We should think not just about how to drive out negative emotions, but also how we can engage the positive emotions that support learning: curiosity, wonder, purpose, and even joy. Emotions have a deep connection to learning, as I will argue in Chapter Eight. When we are emotionally aroused, our attention is heightened and our cognitive capacities enhanced. We are more likely to remember highly emotional experiences than we are to remember emotionally neutral ones. Instructors can be deliberate about stirring up positive emotions in the classroom and orienting them toward learning, and it doesn't take as much work as you might expect. A few minutes at the beginning of class inviting

students to gaze in wonder at an image from your discipline, or listen to a story that will provoke their curiosity, can make all the difference in the world. As George Orwell once wrote, “The energy that actually shapes the world springs from emotions” (Orwell 1968, p. 141). That energy can enhance student learning in your classroom, even when you only evoke it through small teaching strategies.

The final chapter of this book arises from the conviction that teachers, over the course of a long career, also need inspiration. Just as we want students to adopt a positive and flexible attitude toward their learning, so must we. You should expect that over a 20- or 30- or 40-year teaching career you will have moments when you feel stuck in a pedagogical rut. You will undoubtedly have opportunities to step back and recharge your teaching batteries occasionally, whether that comes in the form of a sabbatical or even just two or three weeks between fall and spring semester. During those times, and throughout the various stages of your career, you might want to think about pushing into new territories as a teacher. The challenge we face right now is that the number of resources available to help you down that road are growing exponentially. We are in the midst of a glorious flowering of new books, articles, websites, social media pages, and people devoted to improving teaching and learning in higher education. In Chapter Nine, I will provide you with some directions to help navigate that swelling tide, highlighting books and other resources that should keep you engaged and learning for many more years.

You might wonder, given the crucial role that motivation and attitudes can play in learning, why I have saved these chapters for the final part of the book rather than opening with them. I did so because I wanted you to see first how small teaching changes can make a big difference to student learning, and one can see that principle displayed most clearly with concrete activities like

retrieval or prediction or connecting. Thinking about inspiration, and about student emotions and attitudes, might seem like we are pushing into large and amorphous realms of the teaching and learning enterprise. However, small changes can make a major difference in these areas as well. We will therefore tackle inspiration just as we have approached our previous theories, principles, and models—by thinking small.

Chapter 7

Belonging

INTRODUCTION

One of my daughters finished her secondary education and started her college career in the fall of 2020, in the midst of the COVID-19 global pandemic. Throughout both her elementary and secondary education, she had always been a diligent and successful student. She needed no reminding or haranguing about doing her homework. She worked hard at her assignments, and took pleasure in her academic successes. But in the summer months leading up to her first semester of college, as it became clear that the pandemic would make that semester an online or hybrid one, her self-confidence began to erode. Doubts surfaced about her ability to succeed in college. She had the usual concerns of a first-year student about fitting in socially and managing life on her own, and these were magnified by the fact that the social situation on campus would be severely restricted by social distancing and other measures. But for her as for most of her peers, the transition to online learning in the spring semester of her senior year of high school had been a rough one. Her teachers, like teachers everywhere, were scrambling to adjust to the new situation we all faced and doing so with mixed success. Learning in school, which had always been such a source of pleasure and satisfaction for her, had become a stilted and unfamiliar process. The typical measures that her teachers used to measure student progress and

provide feedback were disrupted. The final exams and grades and rituals that would have normally served to affirm her abilities before heading off to college were shattered by the educational train wreck that was the spring of 2020.

Because of the negative experiences she had with online courses in the spring, she sought desperately for fall semester classes which had some kind of face-to-face component. She knew how to succeed in those classes, after all, as her years of K–12 education had demonstrated to her. But the pickings were slim; she ended up with three fully online courses and two hybrid ones. Every college student will harbor some doubts about their ability to succeed in their first semester, but those doubts were magnified for my daughter by the fact that it would take place in two largely unfamiliar modalities for her. Throughout her orientation weekend and first week of classes, I spent plenty of anxious hours wondering how she was faring and sending her encouraging texts and e-mails. I knew perfectly well that she was capable of succeeding in college—I just needed to convince her of this fact.

Fortunately, in her first week of classes, one of her faculty members made a small but powerful gesture that helped support me in this work. Teaching in a hybrid format, that professor was making use of the discussion board in her learning management system, to which students were supposed to post comments about the course readings every week. When the first discussion board question was posted, my diligent daughter jumped right in and posted a comment. A day or two later, the professor e-mailed the class to encourage those who hadn't already posted to make their contribution, and in that e-mail she did a very simple thing: she thanked my daughter, by name, for launching the discussion. Immediately after receiving this e-mail, my daughter sent us a text message with a screen shot of the message: "Check it out!" she wrote. "My professor gave me a shout out!" One could argue that the exclamation points in her text, and the happiness in her voice when we spoke to

her later, were perhaps not fully warranted by this experience. The professor, after all, didn't even say anything complementary about what my daughter had written. All she did was mention her name and thank her for starting the discussion. But even that tiny gesture, perhaps the epitome of a small teaching strategy, sent a powerful message to my daughter. This distinguished and distanced authority figure, one of the first she encountered in her new life in college, had taken the time to acknowledge her as a person and commend her for her contribution to the class.

My daughter's life has been rich with privilege, and she knows how to do school—her parents are both educators, after all. But all of that privilege and knowledge still didn't prevent her from having doubts about whether she belonged in college. Now imagine how magnified such self-doubts might be for students who have not enjoyed her many privileges: students who have made it onto your course roster in spite of mental and physical health challenges, discrimination based on their race or gender or sexuality or class, poverty and oppression and more. These students arrive on campus, and perhaps even to each new class they take, saddled with a question that can debilitate their learning: Do I belong here? When students walk across campus, or enter their hybrid and online classrooms, with that question at the forefront of their minds, it can represent a significant barrier to their learning. If we want to prepare students to succeed on all of the learning strategies I have been promoting in the first six chapters of the book, we have to make sure we are conveying, from the beginning to the end of the semester, an essential message: you belong here.

IN THEORY

Students might not feel like they belong on a college campus for many reasons. Students of color might see very few students and

professors who look like they do, and feel isolated from their white peers. International students perhaps can't find peers or mentors who understand their specific cultural histories and identities. Students with disabilities might encounter elements of the physical campus or even the classroom that subtly prevent them from gaining the access they need. Students without money find themselves shut out from opportunities their peers are embracing, such as study trips abroad or even everyday social activities. My three oldest daughters all attended institutions which were stocked with moneyed students who spoke casually about their parents' vacation homes in Aspen or Cape Cod, while my daughters were carefully conserving the money they had saved from their summer jobs. In a 2018 story about the experiences of the rural poor at elite institutions of higher education, one student coming to the University of Michigan from a tiny rural town in Michigan told an NPR reporter: "Everybody else has got the coin that I don't have . . . I'm walking down the road and I see people with Gucci or Versace" (Nadworny 2018). This sense of feeling outside of the campus community can of course have devastating effects on the social life of these students, and lead them first to isolation and unhappiness, and then to abandoning higher education altogether. In response to these forms of social exclusion, colleges and universities have taken welcome steps in recent decades to attend more carefully to creating a sense of belonging at their institutions. On my own campus we created a Vice President of Student Success whose office dedicates itself to helping students feel like they belong on campus, and in that office they are doing heroic work in welcoming students to our community and connecting them to the institution and to one another.

But the task of helping students feel like they belong in campus should fall to everyone on campus, including the faculty. We can most certainly contribute to this work by creating a strong sense of community in our classrooms, one in which we recognize

students by name and provide regular opportunities for them to interact and work collaboratively in and outside of class. We can go out of our way to reach out to the student who sits quietly in class, not interacting with peers, or whom we notice always walks across campus alone. When we have advisees or students in office hours, we can ask them about their well-being, and provide encouraging words about the work they are doing. We can refer students to the office on campus that will elaborate and intensify this work. In this chapter, however, I am going to focus your attention on an area in which I think faculty have a special role to play in supporting student belonging: affirming to students that they are intellectually capable of success in our courses. As an individual faculty member, working with an individual student at any given moment in time, I can't immediately remove systemic barriers that are standing in the way of their sense of belonging on campus as a whole (even if I am working with my colleagues to address those systemic barriers, as I should be). But I can absolutely make a difference in convincing individual students in my courses that no matter what else might be happening around them, they belong in my classroom—and more than that, that my classroom would be a poorer place without their presence.

To understand how to create that sense of *cognitive belonging* in your students, we have to clarify the barriers that stand in the way of achieving it. One very prominent line of research over the past couple of decades has demonstrated that students can feel excluded from an educational environment by a surprising obstacle: their own beliefs about their intelligence. This research originated from some experiments conducted by Carol Dweck and Claudia Mueller in the late 1990s, in which they were testing whether the type of praise we give to students after they have completed a learning task influences their approach to future learning tasks (Mueller and Dweck 1998). They gave more than 100 fifth graders 4 minutes to solve 10 math problems. At the end

of the four minutes, all the students were first praised for their achievement: “Wow, you did very well on these problems.” Then some of the students were given additional praise of two different types (a control group received no additional praise). One group of students received some additional *ability* praise: “You must be smart at these problems.” A second group was given *effort* praise: “You must have worked hard at these problems” (p. 36). After this second praise period, all the students were given 10 additional, much more difficult problems. No matter how well they did on these problems, all were told they performed “a lot worse” this time around. This was designed to give the students a setback in their learning and to test how they would respond to failure. In the final step of the experiment, the students were given a third set of 10 problems to solve, at the same level of difficulty as the first set. Dweck and Mueller used multiple measures, throughout and after the problem-solving sessions, to measure how the students thought about intelligence, learning, and their performance on the tasks.

The types of praise that the students received turned out to have wide-ranging effects on the students and their attitudes, motivation, and performance. For example, the students who had been praised for their natural abilities “enjoyed the tasks less than did the children praised for effort.” More disturbingly, “children praised for intelligence were less likely to want to persist on the problems than children praised for effort” (p. 37). What helps explain findings like this is a deeper lesson that the students seemed to be learning about the nature of intelligence and about the connection between their intellectual *ability* and their *performance* on the problem sets.

Children praised for intelligence appeared to learn that performance reflected their ability and thus attributed low performance to low ability. Children praised for hard

work, on the other hand, did not show such a marked tendency to measure their intelligence from how well they did on the problems. (p. 37)

In other words, the ability-praised students came to believe that their performance on the problem sets reflected clearly on their natural intellectual abilities. Students praised for their efforts, by contrast, believed that their performance reflected the effort they had put into the problems. This distinction has clear and profound implications. If students tie their beliefs about intelligence to particular performances, it means that they will attribute poor performance—such as a low score on an exam—to low or deficient intelligence. Rather than seeing a low exam score as the result of not enough studying, a bad day, or some other understandable reason, they will think, “I did not do a good job on this exam. I must be stupid.” The students who had been praised for intelligence thought like this. The students who had been praised for their effort did not think this way. They attributed their poor performance to their lack of effort on the second set of problems and buckled down to work harder on the third set.

But perhaps the most important result from this experiment appeared when the researchers compared the scores of the two differently praised groups on the third set of problems, the ones the students received after their “poor” showing on the second set, which were of the same level of difficulty as the first set of problems they had completed. The type of praise the students received seemed to impact *even their performance* on this third set of problems: “Scores for children receiving intelligence feedback dropped an average of .92. . . Children in the effort condition, however, improved their prefailure scores by 1.21” (p. 38). Dweck and Mueller pointed out that these results are especially surprising because all three sets of 10 problems were similar in nature, differing only in level of difficulty: “These results are particularly

striking because they demonstrate that the scores of children praised for intelligence decreased after failure even though their increased familiarity with the tasks should have bolstered, not weakened, their skills” (p. 38). In other words, everyone’s scores should have been improving somewhat, since they were practicing multiple examples of the same problem type. That didn’t happen, though, for the group praised for their intelligence; their scores dropped. It makes excellent sense to me that the praise we give to learners might impact their attitudes toward learning tasks or toward their enjoyment of those tasks. That it actually *decreased their performance* on the problems strikes me as both profound and potentially troubling for those of us who are charged with praising (or critiquing) learners for their performances on learning tasks.

This experiment, and many more like it conducted by Dweck and other colleagues, led her eventually to formulate the theory of mindsets, the most full and rich description of which she articulates in *Mindset: The New Psychology of Success* (2008). There she argues that people have either a *fixed* or *growth* mindset when it comes to their attitudes and beliefs about learning and intelligence. Individuals with a fixed mindset believe that their intelligence is a fixed, stable quantity; someone or something stamped an IQ on their forehead at birth, and they are limited to that IQ for the remainder of their lives. Individuals with a growth mindset, in contrast, believe that intelligence is malleable and can improve with hard work and effort. Perhaps they recognize that they must work within certain limitations, but they see themselves as capable of growing and improving throughout their lives. Although Dweck’s early research in this area focused on how mindset influenced students in the types of learning tasks outlined above, she came to believe that it influenced people in many aspects of their lives: “*The view you adapt for yourself* profoundly affects the way you lead your life. It can determine whether you become the person you want to be and whether you accomplish the things you value”

(p. 6, *italics in original*). In support of this broadening of her theory, Dweck explores in the book how the debilitating effects of the fixed mindset and the positive effects of the growth mindset have influenced major figures in the world of sports and business as well as people's successes and failures in teaching, parenting, and relationships.

Research on how mindsets can influence our success or failure has been extended to college by multiple researchers. Consider, for example, a series of studies conducted by Laura Kray and Michael Haselhuhn on the mindsets of students in an MBA course on negotiating (Kray and Haselhuhn 2007). In one of their experiments, they measured students' mindsets at the beginning of the course by asking them the extent to which they agreed with statements like, "Good negotiators are born that way" or "All people can change even their most basic negotiation qualities" (p. 64). During the semester, they put pairs of students into an extremely difficult negotiating situation, one that guaranteed initial failure and required persistence and creative thinking to get beyond. As with Dweck's fifth graders, the growth-mindset students worked better in the post failure condition; they were more likely than their peers to persist through the early failures and find workable solutions. The researchers also discovered, as Dweck did with her fifth graders, that student mindset influenced learning performance more generally. At the end of the semester, they compared the students' final grades in the course with the mindset attitudes they had expressed on the first day of the semester, and found that the students with growth mindsets had significantly outperformed the fixed mind-set students on the final course grades. The students who saw negotiating skills as something capable of improvement actually did improve their negotiating skills more substantively than those who believed them to be stable. Their attitude toward learning, at least in part, expanded or limited their actual learning.

Two challenging questions should now be at the forefront of your mind: Can we change the mindsets of students? And if so, how? Research on these questions continues to emerge; in some experiments growth mindset interventions have done their intended work, and in other cases they have failed to replicate. The research remains ongoing, and the most prominent advocates for mindset theory (including Carol Dweck) have cautioned teachers and administrators not to view growth mindset work as a silver bullet. “The new motto for mindset science,” according to an overview of the debate in *Scientific American*, “seems to be this: tone down the hype and hone the details” (Denworth 2019). Whether or not growth mindset interventions have their desired effect seems to depend, as with everything else in this fallen world, on context. In the coming years I expect the research will get clearer on the implications of different contexts and the ways in which different interventions can be targeted toward them.

Still, a large-scale study published in 2019 in the journal *Nature* provides perhaps the strongest evidence yet that small, carefully designed growth mind-set interventions can have a positive impact (Yeager et al. 2019). A team of researchers gave a one-hour mindset intervention to more than 6,000 high school students who had relatively lower levels of school achievement than peers at their same institution. The intervention took the form of two 20-minute educational modules, scheduled three weeks apart, that the students took during the regular school day.

The first session of the intervention covered the basic idea of a growth mindset—that an individual’s intellectual abilities can be developed in response to effort, taking on challenging work, improving one’s learning strategies, and asking for appropriate help. The second session invited students to deepen their understanding of this idea and its application in their lives. Notably, students were not told outright that they should work hard or employ particular study or learning strategies. Rather, effort and

strategy revision were described as general behaviors through which students could develop their abilities and thereby achieve their goals.

Compared to a similar group of low-achieving students who did not receive the intervention, the students who had learned about the growth mindset experienced multiple positive effects, including the following:

- They were less likely to believe that intelligence was a fixed quantity.
- At the end of the academic year, they had higher GPAs than their control-condition peers.
- They were more likely to enroll in advanced mathematical courses at the next grade level.

Experiments like this one affirm precisely the argument that I have been making throughout this book: that small, research-based interventions *can* make a substantive difference to student learning and performance. I expect that few faculty members are going to ask their students to complete a growth-mindset intervention module in their courses, but this experiment does provide indirect evidence that education can change mindsets—even when it represents a very tiny slice of a student’s experience in a course (i.e., one hour over an entire year of high school). And it provides further evidence that changing mindsets improves student learning and achievement.

The models in the first edition of this book focused this chapter entirely on how you could make small changes that would promote a growth mindset in your students. But in the years since that first edition was published, I’ve come to believe that the desire to change student mindsets should serve a larger goal: **helping students believe that they have the tools they need to succeed. In other words, in addition to the kinds of social or emotional belonging we**

want to cultivate in our students, we want to promote a sense of *cognitive belonging*. When a student with a fixed mindset fails the first exam in a course, that sense of cognitive belonging will take a significant hit. *Maybe my failure on this exam means I don't have what it takes intellectually to succeed here. Maybe I don't belong.* Instilling a growth mindset in that student could repair that sense of cognitive belonging. But we should want to do more than just change their mind(set)s. We should want to equip them with the concrete tools they will need to achieve the success of which they are capable. We should want to show them that great students seek help, and provide them with clear pathways to the help they need. We should want them to recognize not only that they can improve, but that they already have accomplished much in their lives—enough that they have made it to an institution of higher education, where we are happy to learn from them as they learn from us. Finally and perhaps most meaningfully, we should want to convince them that they have something unique to contribute to the community, something that nobody else in the world can bring—and then we should provide them with concrete opportunities to make those contributions.

MODELS

The models in this chapter begin with an activity that you can use at the beginning of the semester to affirm the unique contributions students can make to your courses, and continue with small strategies that will promote cognitive belonging throughout the semester.

Value Student Assets

A few years ago, I gave some workshops at the University of Arizona, where I was hosted by mathematician Guadalupe Lozano.

During our conversations over the couple of days I spent there in the burning sun, Guadalupe introduced me to the notion of viewing our students, especially first-year students or those who might feel disconnected from higher education, from an *asset-based* perspective. As she explained in an essay she wrote on the topic for *The Conversation*, “there are two views to take with incoming students—a deficit view or an asset view. The first sees students’ weaknesses: what they lack. An asset view sees their strengths: what students bring to the table in terms of their culture, identity and knowledge” (Lozano 2020). In other words, students obviously have deficits in their learning, but they also carry assets into our classrooms. They bring the knowledge and skills they have developed in their prior schooling, and that can contribute to our common learning. They bring their unique life stories and experiences, which can help provide new perspectives on familiar questions and challenges. Students from diverse cultures or countries, students from privilege and from poverty, students with mental-health challenges or who have experienced trauma—all of them have the potential to spur new learning in our courses, and all of them challenge us to be inclusive and creative in our pedagogy. But simply *viewing* students from an asset-based perspective is not enough; if we really want to put this perspective in practice, we have to create opportunities for students to share their assets with us and with one another. When we do that, we are reminding them of the academic strengths that brought them into higher education, whether those strengths are specific knowledge and skills or unique talents or even just drive and persistence. When we ask them to tell us about and put their assets to use, we are giving them concrete opportunities to remind *themselves* that they belong here.

On the first day of the semester following my conversations with Guadalupe, I opened my class by handing out index cards and asked students to respond to the usual suite of getting-to-know-you

questions: name, hometown, major. But then I explained that I wanted them to turn the card over and write me a short paragraph in response to one final prompt:

What are you good at in school? What do you care about in terms of academics? Do you love to participate in class? Are you a good leader on group projects? This is an English class, but maybe your strength is with statistics or math. If so, tell me about it. If I know about what you're good at, maybe we can find a way for you to use it in this course.

As I flipped through those notecards after class, I was floored by the pride they took in their academic accomplishments and talents—I felt like I knew something important about each of them, and I was excited to begin working with them. I learned how hard they worked at their studies, how smartly they scheduled their homework time, how carefully they balanced coursework with sports and extracurricular activities. I realized how proud they were of their ability to work well in groups, participate in discussions, or tutor their peers. I read with joy how many of them loved to write outside of class. When I finished reading those notecards, all I could think was: What an incredible blessing to work with such hard-working and talented students. I felt so fortunate. And that perspective brought me a wellspring of fresh enthusiasm for a course that I had taught many times before, and for students whom I might otherwise have viewed as just another group of undergraduates filling the seats.

Of course the goal of an asset-spotlighting activity like this one is to make an impact on the students, not the faculty member—even though I do think any activity that freshens my enthusiasm for the course and the students will likely have positive ripple effects on them. But remember that the research on growth

mindset interventions showed a positive impact on student performance and retention as the result of just two 20-minute activities. Asking students to describe their strengths is not exactly the same as asking them to change their beliefs about intelligence, so recognize that I am extrapolating here, and cannot point to research underpinning this specific activity. But if you want to take an asset-based perspective on your students, consider opening next semester by asking students the kinds of questions that will remind them why they belong on campus:

- When it comes to school, what are you really good at? What are your academic talents?
- Do you have any specific experiences or features of your identity that might provide interesting perspectives on this course material?
- What other kinds of strengths and talents do you have that might help you succeed in this course?

Make sure you give students a formal opportunity to articulate their responses, whether that comes through writing on index cards or some other format. Some students might not want to share their strengths with everyone in the room, so I suggest that students describe their assets to you alone. That doesn't mean, though, that you can't begin the next class period by providing a general overview of what you learned from them—and letting them know how pleased and fortunate you are to have such a talented and interesting group of students in your course.

Name Good Work

The global transition to remote learning in the spring of 2020 marked the first time that I taught fully online. And in those frantic early weeks of the transition, just like many of you, I was

in desperate need of resources and advice. Fortunately for me, just a few months prior to the arrival of the pandemic, *Small Teaching Online* had been published, and my author copies were sitting on my bookshelf at home. I had written the theory sections of each chapter in the book, and worked closely with Flower on the rest of the book, but this had largely been an academic exercise on my part, since I had no real experience with teaching online. In March of 2020 I pulled the book down from the shelf and read it with new and motivated eyes. I knew that one of Flower's deepest convictions about teaching online has been a belief in the value of the discussion board, so I had incorporated discussion board assignments into my revised course. When I re-read what she had to say about them, I remembered that Flower argues that we should not view discussion boards like slow cookers, which we can just set and forget. Discussion boards require our regular engagement; they need tending like gardens. I was convinced by her argument, and especially by her point that one of the best ways that we can engage with discussion boards is to surface and praise the most outstanding contributions we find there (Darby and Lang 2019, pp. 41–43).

There are good reasons to do this for learning purposes, of course, as Flower points out. She describes her method of providing a written or recorded summary of each major discussion thread which highlights the most important contributions, and argues that doing so can “reinforce the learning that happens within the module to help discern what is most relevant and what they need to retain from the lively conversation that can take place online” (p. 41). As students read through a couple of dozen discussion board posts, they are likely to have trouble identifying the essential ideas, or putting some kind of organizational framework on that mass of text or video recordings. But you can do this for them, and it doesn't take much. After each discussion thread was closed, I followed Flower's advice by recording a 3–5 minute video in which I thanked everyone for their contributions, and then

shared my screen and provided a brief commentary on three or four posts that I thought were most helpful for everyone to read and think about. This was actually one of the most enjoyable experiences of the semester for me. The discussion board was a low-stakes activity that was graded solely on completion, so for each new thread I read the posts primarily with an eye toward finding the thought-provoking posts that I could surface and praise.

I also followed Flower's advice by making sure I recognized the author of these posts by name. I didn't think much about the importance of this part of the process until my daughter's experience, at which point I became even more convinced of the value not only of highlighting the great work of students in your course, but doing so by name. This seemingly small and insignificant act might be the one that sends the message of belonging that your student needs in that moment. Discussion boards and online courses are obviously not the only place where you can do this. Get yourself into the habit of naming the students who make outstanding contributions to your course work, especially to the kinds of low-stakes engagement activities that I recommend throughout this book. You probably don't want to call out the names of students who ace your exams or write perfect papers, as there you might cross into privacy issues in terms of grades. But when a group produces an outstanding worksheet for an in-class activity, thank them for it. When a student makes a great contribution to a discussion, be explicit in your response: "That's a great point, Kiara, and it can really help us see this problem in a new way." If you are hesitant for some reason to do this in front of the group, which I would understand, get in the habit of sending short e-mails to students after class. They don't have to say anything more than this: "Just back in my office and wanted to thank you for your great comment in class today; it really helped me think in a new way about the topic." When a student who has recently done something good in your class comes into your office,

or even when you pass her walking across campus, start with this: “Hey, thanks for the way you helped lead your group yesterday; I really appreciated that.” Any one of these small comments might ease the self-doubt of a student on the margins and give her the confidence she needs to succeed in your class, or even in college more generally.

Whenever I recommend this strategy to faculty in workshops, someone will ask me about the impact that praising individual students will have on the students who *don’t* get named. (And I sincerely love to hear this question, because it reminds me how much faculty care about the welfare of all their students.) I’m not sure I have a solution to this problem for large classes, but I do for smaller ones. Create a spreadsheet roster for your class or print out a copy of your roster and keep it next to your desk. Every time you single out a student for good work, put a check next to that student’s name. Over the course of the semester, in a class of 20 or 30 students, everyone will do at least one thing worth praising; be deliberate about ensuring that every student name has a check mark next to it by the end of the semester.

Provide High Structure

Students spend a lot of time in my courses engaging in writing exercises or working in groups. For a long time my practice was to give them instructions orally and then set them to work. But invariably within the first minute or two of such an activity, and often to my annoyance, I would find myself having to repeat my instructions in response to the following question: “What are we supposed to be doing again?” Geez, I would think to myself, why didn’t you listen when I was explaining it the first time?

When I first encountered the work of Viji Sathy and Kelly Hogan, whose writing on inclusive teaching has become essential to my thinking about education, I reflected upon my impatience

with those questions with no small sense of shame. In their excellent guide to inclusive teaching in *The Chronicle of Higher Education*, Sathy and Hogan point out that one of the most fundamental ways we can support the sense of belonging in our students is by not taking for granted that students are already experts in everything we ask them to do in class (Sathy and Hogan 2019). Students who come from backgrounds of academic privilege have seen it all and feel confident in their abilities to tackle whatever the professor throws at them. If I tell students to get in groups and undertake some complex activity, those confident students are going to circle their desks and get to it. But there are always going to be some students in my class who don't come from those backgrounds of academic privilege, and who don't have that same level of confidence in their abilities or experience in doing the kind of task I am asking of them. When I put students in groups and casually throw out some directions, and those students see their classmates jump right to it while they are floundering, those debilitating questions about themselves are going to arise: "How come everyone but me knows what to do?" When I read Sathy and Hogan's work, I realized that students might have been asking me to repeat my instructions not because they hadn't been paying attention, but because they needed more help and clarification from me about what I was asking of them.

Sathy and Hogan's solution to this problem is to recommend that we put as much structure as possible on classroom experiences like group work. They advocate for what they call *high structure*, which they believe will help all of our students, but especially will help those students who come from less-privileged backgrounds:

More structure works for most undergraduates, without harming those who don't need it. Students come to your classroom today with different cultural backgrounds, personalities, learning differences, and confidence levels.

Their very diversity may seem overwhelming at times, but you can reach more of them by sharpening the structure of your syllabus, assignments, tests, and pedagogy. In our experience, all students appreciate and thrive from additional structure, and some benefit disproportionately.

As an example of putting more structure into your teaching, they address the exact context I describe above, when we are giving students instructions for an in-class activity of some kind: “Provide clear instructions on a screen or worksheet. We’ve observed many faculty members give a single oral prompt, but that leaves behind students who have hearing loss, who have learning differences, or who simply need to be reminded about the task at hand.” (Faculty Members Giving a Single Oral Prompt: The Jim Lang Story.) Fortunately, I have many more years yet to teach, and am happy that I can learn from experts like Sathy and Hogan on how to continue to improve.

If you too wish to create a more inclusive teaching environment through the use of high structure, continually ask yourself the questions that Sathy and Hogan pose in the article: Who might this particular teaching method leave behind? And could higher structure include those students?

- A single oral prompt for a writing exercise could leave behind students with hearing loss or an attention disorder. *Writing the instructions on the board or putting them on a slide* gives those students the information they need.
- Putting students in groups and expecting them to work out the group dynamics on their own might leave behind that quiet and self-doubting student who won’t assert herself in the face of a couple of dominant talkers. *Assigning roles in the groups, and rotating those roles throughout the semester*, makes sure every student has the opportunity to contribute to the group in different ways.

- Throwing out questions and calling on the first volunteer every time leaves out students who need a little more thinking time to process the question. *Using peer instruction* gives every student the opportunity to think about their answer, respond to a poll, and then talk through their reasoning with a peer.

All of these examples involve just a little bit of extra work by the faculty member, putting some additional structure on an engagement activity—but that extra work ensures that fewer students are left behind in the classroom, and more students feel like they belong.

I'll finish with my absolute favorite example of a small teaching strategy designed to include more students in classroom discussions, one that requires absolutely zero extra preparation or evaluation time on your part, but that has the potential to create greater engagement in your courses. On the website of the teaching center I direct, we publish occasional essays by our student fellows. A couple of years ago Kelliann Keaney, at that time a senior majoring in math and secondary education, wrote an essay in which she explained that she was often labeled as a non-participating student in her math classes (Keaney 2018). But this was not because she didn't want to participate—it was because it took her a little longer to process math problems than her peers, and her teachers always called on the first person that raised her hand. Until, that is, she took a class with my colleague Jessica de la Cruz, who had a very simple policy for class discussions: she didn't call on anyone until at least five hands were raised. This simple practice, Kelliann writes, "gave all students the opportunity to solve the problem, understand the concept, and feel confident in the answer shared with the rest of the class." A student who had previously felt left behind in her classes had suddenly been included as the result of one simple practice put in place by an inclusive instructor. As you review your own teaching practices, keep asking yourself about who might be left behind, and see whether adding just a little bit

more structure through techniques like this might bring them back into the community.

Normalize Help-Seeking Behaviors

In 2017 the sociologist Sara Goldrick-Rab published a *Medium* essay in which she explained that she had recently added a short new paragraph to her course syllabus, one that invited students to reach out if they were having trouble meeting their basic needs as humans:

Any student who faces challenges securing their food or housing and believes this may affect their performance in the course is urged to contact the Dean of Students for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable her to provide any resources that she may possess. (Goldrick-Rab 2017)

Goldrick-Rab has written extensively on the costs of higher education and the impact they have on our students, most fully in her book *Paying the Price: College Costs, Financial Aid, and the Betrayal of the American Dream*, and knows better than most of us how many of our students face these kinds of challenges. What strikes me as most important about her inclusion of this “basic needs” statement on her syllabus is a very subtle message it sends: Even if you are facing food insecurity or have no stable housing, *you still belong here*. In fact, the inclusion of such a statement implies—and could be clarified orally by the teacher—that there are plenty of students on campus who face these challenges. They don’t preclude you from success in college. Further, there are avenues for you to get help. These kinds of statements on a syllabus lay the foundation for a final piece of work I think we can do to support belonging in higher education: normalizing help-seeking behaviors.

Students who struggle in college in any way—with basic needs, with accessibility, and with their learning—should of course ask for help. But those students might view asking for help precisely as an affirmation of their lack of belonging. If I see everyone else getting along just fine, and I am struggling and need to ask for help, that might convince me that I’m not in the right place. In that same NPR story I cited above about rural students at the University of Michigan, one student expressed this exact sentiment: “The idea of going to someone and asking how [something] works . . . it was almost like I felt bad for not knowing” (Nadworny 2018). One of the Deans at my college likes to tell a story about the time she advised a struggling student to visit her faculty member in office hours to get additional help. “But,” the student asked, “what are we supposed to talk about for the entire hour?” This story always gets a laugh, but it illustrates the problem. I assume that students know that they should come to office hours and seek my help when they need it. But that takes for granted that a student knows what office hours actually *are*, that they are confident enough as students to come and ask for help, and that they know what will happen when they show up at my door. Not only should we not be taking these things for granted, we should be going a step further and emphasizing to students that asking for help is what successful students do. We should be normalizing help-seeking behaviors.

A statement like Goldrick-Rab’s can help normalize help-seeking for basic needs, but since I am focusing on cognitive belonging in this chapter, I’ll focus my recommendations there. From the first day of the semester to the last, consider how you can communicate to students the following messages: Successful students seek help, and these are the pathways to help in my course. The following practical steps would convey that message:

- Include a section prominently on your syllabus about how to find extra help in your course and review the options with them early in the semester. Describe office hours and review sessions, provide information about how they can make an appointment at the tutoring center on campus. Create a forum in the learning management system for questions about the course and urge them to contribute to it (and, of course, praise by name the first person who posts there).
- Make your first quiz grade or low-stakes grade of the semester a visit to your office hours. Everyone has to come in for two or three minutes, introduce themselves, and realize that coming to office hours is not like visiting Smaug in his lair.
- Offer to meet students outside of your office as well. I know lots of faculty members who hold at least one or two office hours per week in the campus coffee shop or the library. Now that we are all deeply familiar with Zoom and its ilk, you can also offer to meet students via video. This will make help more accessible to commuters, parents, students with disabilities, and more.
- Tell students any stories you have from your own experience about the times you struggled and asked for help.

The work of normalizing help-seeking should continue throughout the semester. Provide frequent reminders about office hours, and invite someone from the tutoring center to come give a quick pitch before your first major assessment is due.

You can, finally, enlist your students to help you in this work. One of my teaching-in-higher-education heroes is Joe Hoyle, an accounting professor at the University of Richmond whose work I have profiled both in *The Chronicle of Higher Education* and in a previous book (Lang 2013). Hoyle writes a regular blog on teaching in higher education and has won more teaching awards and accolades than I would care to count. In support of normalizing the fact that students will struggle and should ask for help, Joe

asks students who have earned A's in the course to write a letter to future students outlining how they managed it (Hoyle 2012). Hoyle has compiled the best of these comments into a single document that he hands out to each fresh new crop of students. The comments that he selects are almost entirely like the one below; they emphasize the challenges the students faced, and the fact that they sought help and ultimately became successful as a result:

DON'T GIVE UP on this class. Don't do it after the first test, after the second test, or right before the final. Just don't do it. I went into the final thinking that I had a very slim chance of making an A, but I tried my hardest to do the best that I possibly could and it paid off! And even if you feel like there is no chance you can do well, go talk with Professor Hoyle. I always left my talks with him with a drive to do better.

Consider whether your future students could use a document like this one; getting it started entails nothing more than an e-mail to the students who have earned As in your course asking for a paragraph description of how they succeeded. Most A students will relish an assignment like this. Be deliberate about the ones you highlight for the next semester's students, featuring at least a few that will normalize struggle and help-seeking.

PRINCIPLES

Emphasize Growth. Your constant goal in this area is to remind or convince students that they are capable of improvement, capable of getting smarter, capable of success in your courses. It is of course true that humans are all different, and some folks have greater academic potential than others. But everyone can improve. You don't have to tell your students that everyone is a genius,

everyone can earn a perfect grade in your course, or everyone has the same potential. I have had students in class that struggled mightily with writing, and it was clear that the Pulitzer Prize was likely not in their future. But that doesn't mean they couldn't get better. Everyone who finishes my class should be at least a little smarter than they were when they entered it.

Clarify, Clarify, Clarify. Success in school requires not only being smart, but knowing how to do a bunch of things that will help you succeed. It means knowing how to *do school*. You are always going to have students who have less know-how when it comes to doing school, and those students should not suffer because they didn't have teachers for parents, or attend a well-resourced high school, or come from a family in which education was the norm. Don't take for granted that students know how things work in your class. As you are creating documents for your students, or introducing new assessments or activities, or even just talking to them informally, ask yourself the question that Sathy and Hogan pose: Am I leaving anyone behind here?

Focus. The strategies recommended in this chapter will help support belonging for all students, but some students will need your help in this area more than others. If you have limited time and energy to devote to individual students, focus your efforts on the ones who need it the most. Those of us who have taught for a while can usually identify the students who feel excluded or are struggling in our courses, so make sure those students get priority when you are praising good work or sending out supportive e-mails.

SMALL TEACHING QUICK TIPS: BELONGING

Instilling a sense of cognitive belonging in your students can happen from the beginning to the end of the semester through strategies like these.

- Open the semester by asking your students to tell you about the assets they are bringing to the course: academic strengths and talents, experiences or cultural backgrounds that give them a unique perspective on the course content, or even just general talents of which they are proud.
- Surface and praise the excellent work of your students, especially on low-stakes assessments completed throughout the semester. Keep track of the students whose work you mention, if possible, and ensure everyone hears their name throughout the semester.
- Put high structure on the active learning strategies you use in class. Make instructions visible, assign roles in groups, solicit engagement through writing and peer instruction, and more.
- Normalize help-seeking behaviors. From the syllabus to your review sessions at the end of the semester, help students understand that the best students ask for help—that’s part of what makes them great students. Clear the pathways to help options.

CONCLUSION

All of the models in this chapter have focused on helping convince students that they belong at the institution—but I want to conclude with some research that suggests it’s equally important to convince *you*, dear reader, that students belong at your institution. This research returns us to the theory of mindsets, and gives us yet another reason to reject fixed mindset beliefs and practices. The researchers in this study surveyed 150 faculty members in all STEM disciplines at a research university in order to assess whether they held fixed or growth mindsets about their students (Canning, Muenks, Green, and Murphy 2019). Faculty were asked whether they agreed with statements like this one, for example: “To be honest, students have a certain amount of intelligence, and

they really can't do much to change it." Some of the faculty in their survey embraced fixed mindset statements like this, while others rejected them and took a more growth-mindset view of their students. The researchers then looked at the course grades of all students in the courses of these 150 faculty members over the course of seven semesters. This gave them a huge amount of data: 15,000 individual course grades. Within that total, they identified approximately 1600 of the course grades as associated with students they refer to as "underrepresented minority students" (abbreviated to URM students) who were largely in three categories: Black, Latino/a, or Native American. Because they had this demographic data, they were able to see whether the faculty mindsets had a differing impact on the URM students than it did on the white majority students.

And you bet it did. The average grades for all students in courses taught by fixed-mindset professors were lower than the average grades in courses taught by growth-mindset professors. But the size of the gap was *doubled* for students identified as URM in the study. The authors of this study looked at many other characteristics of the faculty members to see if other aspects of their identity or experience could account for this striking finding: age, race, gender, tenure status, teaching experience. None of these other factors revealed a similar achievement gap. The negative impact of these fixed mindsets was not just limited to course grades, by the way. The researchers also looked at four semesters of course evaluations for the professors in the study, and found that students of fixed mindset professors also reported lower levels of motivation in those courses.

The authors of this paper conclude with a statement that encapsulates the idea of small teaching as well as anything else I have read. As they point out, institutions are spending huge amounts of money trying to address achievement gaps in STEM courses and increase the success of all students on our campuses.

But they may be neglecting the very simple and cost-effective strategy of convincing faculty to see their students as capable of growth:

Millions of dollars in federal funding have been earmarked for student-centered initiatives and interventions that combat inequality in higher education and expand the STEM pipeline. Rather than putting the burden on students and rigid structural factors, our work shines a spotlight on faculty and how their beliefs relate to the underperformance of stigmatized students in their STEM classes. Investing resources in faculty mindset interventions could help professors understand the impact of their beliefs on students' motivation and performance and help them create growth mindset cultures in their classes at little to no cost. (Canning, Muenks, Green and Murphy 2019)

We obviously want and need funding for large-scale experiments and research that can help us discover new ways to support STEM education—and education in general—especially for URM students. But don't wait for massive grants to start improving the sense of belonging that students feel on your campus. As this final piece of research suggests, it turns out that perhaps the best way to convince students that they belong on campus is first to believe it yourself.