develop expertise? How does the teacher facilitate this growing expertise? Preparing teachers to answer these questions in ways that facilitate deeper learning through social processes is a major goal of each of the seven teacher education programs.[7]

In each program, we observed teachers design lessons to make learning a joint productive activity with instructional conversations as the guiding strategy. They structured both small- and large-group opportunities for peer interaction in which students combined and constructed their knowledge. Teachers scaffolded students with questions and supports that moved from their current level of competence to demonstrate more advanced skill.

Each of the programs supports its teacher candidates to recognize and build on the social nature of learning in their courses, in their clinical experiences, and in the structure and cultures of the programs themselves. As the vignettes in the previous chapters of this book make clear, learning in productive communities intersects with the other dimensions of deeper learning. It is linked to how learning becomes developmentally grounded and contextualized and how students apply and transfer what they know to a variety of situations in and outside of school. And as we will see in chapter 9, it is very much a part of how learning becomes equitable and oriented toward social justice.

In the remainder of this chapter we provide examples of teacher candidates facilitating learning as a social process in their clinical work at K–12 school sites and then describe the strategies the teacher preparation programs use to help the candidates learn to teach that way.

DEEPER LEARNING THROUGH JOINT PRODUCTIVE ACTIVITY

Sara, a teacher candidate at CU Denver and her mentor Kim, a clinical teacher at Laredo Elementary in Aurora, Colorado, use these standards as they design lessons for the classroom of fifth graders they teach together. Laredo, a CU Denver professional development school, enrolls a diverse group of 513 K–5 students, 61 percent of whom are Hispanic, 19 percent black, 10 percent white, 4 percent Asian, and roughly 1 percent Hawaiian/Pacific Islander and Native American; 4 percent of students identify as two or more races. Nearly half are English language learners; 11 percent have special learning needs; 84 percent qualify for free or reduced-price meals.

In the lesson highlighted here, Sara and Kim engage students in contextualized learning through social interaction—in this case sharing their personal experiences with one another to generate and use sensory details to enrich their writing.

Joint Productive Activity in Action

A crisp wind and intense sun beat down on the carefully manicured lawn that lines the walkway up to Laredo Elementary. Below undulating American and Colorado flags, bold blue letters above the entrance exclaim: "Laredo Lions." At 9:15 a.m. on a Wednesday morning, in a portable classroom at the edge of a grassy courtyard, Kim's class is in full swing.

Nineteen fifth-grade students—all of them Hispanic or African American—are sitting on a carpet at the front of the classroom with an easy view of the screen that displays student work projected from a nearby document camera. Kim is standing and enthusiastically walking students through samples of student work that was turned in the day before. Sara, sitting nearby, is very much a part of the conversation.

The lesson is focused on how to infuse writing with sensory details so that readers can see/hear/feel/taste/smell the events that the student-authors are describing. The assignment asks students to pick any memorable moment in their lives that evoked strong emotion from them. One girl writes about breaking her leg during a soccer match; another writes about her first day in an American school after immigrating from Ethiopia; a third writes about being with her sister during her miscarriage.

Kim: Luis has come so far in his writing—everyone give him a hand! [Students enthusiastically clap.] Yesterday Luis shared with us about going to the Lantern Festival but, Luis, instead of just telling us you went, I want you to be able to *show* everyone. What were the lanterns doing? [Students start to chime in.] Hold on, give him a second. [pause]
Luis: Moving, crackling, flickering.
Kim: Which one do you like best? [pause]
Luis: [shrugs shoulders]
Kim: Okay, try this—close your eyes. Can you imagine it?
Luis: Yes! The lanterns were *flickering*!
Kim: Great—that word is more specific and now we can see it like you saw it!

This process continues for two more student-authors whose writing needs a bit more specificity. Kim ends her mini-lesson with: "We're going to continue to get better, and when I read what you work on today I'll expect to see this level of sensory detail in all of your stories. I want to be able to really visualize what you're describing—I want this from you today, tomorrow, and in ten years!"

At this point Sara launches into the next portion of the lesson wherein small groups of students work together to describe different sensory objects without looking at them first.

Sara: You may notice that there are brown bags on each of your tables. Inside of these bags is a mystery surprise. You know how I love my mysteries! [Students laugh, and some say "yes" and "she does like mysteries!"] The

(continues)

challenge here is that you have to come together as a team to describe what's in the bag and share out with the whole class. I'm going to walk around and listen to your conversations, but I want you to hold everyone in the group accountable, so that means you ask each other questions if you notice someone isn't talking.

Students immediately disperse to tables in groups of four—it's clear that they've done this sort of group work many times before as the transition is swift and precise. Students are immediately talking and on task. Some are sitting at their tables; some are standing; some are wiggling around, gesticulating with their hands, eyes closed, trying to find the most accurate words to describe the sensations associated with the objects. When Sara brings the class back together, the groups share out in a round-robin style.

> **Sara:** Tell us what your sense was and then give us a sentence that describes the item in your bag.
> **Group 1:** This smells like a sunflower after a storm on a Monday morning breeze.
> **Group 2:** The back of the heart is shining bright like a star on a summer day.
> **Sara:** Do you mean night?
> **Student:** No, *day*. Miss, the sun is a star. [smiling]
> **Group 3:** This popcorn is salty, buttery, and crunchy.
> **Group 4:** The cotton balls feel like the inside of a teddy bear after it's been ripped or like the inside of a pillow.
> **Sara:** [addressing one girl in the group who did not speak during the share] Do you want to add anything? [student shakes her head no] Not today? Okay, I'll be looking for it in your writing.
> **Group 5:** The coins hitting each other in an annoying way.
> **Sara:** "Hitting"? What else could you use?
> **Students:** Clanging or chattering.
> **Sara:** I'm not going to take simple words—your writing has to show your ability to go deeper. I won't accept "hitting" when you could use "chattering" or "clanging."

Kim then transitions students to the final portion of the day's activities where students are given time to work on their writing independently, in groups, or in pairs, as needed. When she says "go," two students immediately begin passing out notebooks, and five students move to the front of the room to sit on the carpet to work with Sara. Sara elicits more descriptive language from students by asking detail questions such as, What is an example of that? What else? How could you write that?

Meanwhile, Kim is circulating around the room to check on student progress. She pauses at one point to ask some probing questions of one student, saying, "How terrified were you holding your baby sister in the hospital? . . . Okay, great, add that detail to your paper." At another table Kim, reading over the shoulder of one student, says, "You're on the right track. I want you to keep going." These individual conversations with students about their work continue as the class proceeds.

In one instance, a student is considering adding another layer of detail to describe the sound of her mother weeping.

> **Student [reading from her notebook]:** "She cried with elephant sounds."
> **Sara:** Okay, put down your paper. I want to hear it and I want to see it. Tell me more.

The student tries to explain further the depth of sadness she wants to capture in adding the phrase "elephant sounds" and Sara follows up with, "Read back to me what you have. Okay, you're the author, so you have to decide if adding that detail makes the image better or is distracting." The student nods and then, grasping the pencil tightly between her fingers, bows her head low to the page and continues writing.

In our interview with Sara following the lesson, she was explicit about how her instructional approach reflects the principle—emphasized both in her CU Denver coursework and at Laredo—that learning is fundamentally social:

> We usually start with modeling, so kids can see what we're going to ask them to do—this is how we launch the lessons. We then share student work and focus on getting students talking to each other and sharing out as a way of testing out the "teaching point"—we usually do that piece on the carpet in the space at the front of the class. Then we do small groups where we'll rove around the room. If we see something important, we share it out with the class. At the end of the lesson, we always come back to the carpet to summarize learnings.

Sara also underscored how social interaction, such as that in this lesson, has the additional advantage of "making content relevant" to the students. She explained that she and Kim "always try to have the purpose for what we're doing connected to [students'] lives." Asking students to tell their own stories not only validates students' life experiences, but it also enables them to learn new writing skills by applying those skills to content (i.e., their own lived experiences) in which they are experts.

The teaching practices captured in the vignette, coupled with the teacher candidate's explanation of how she and her mentor craft learning experiences, illustrate perfectly how learning occurs through joint productive activity. Throughout the lesson, the interactions allowed experts and novices to work together (as they do in families and communities) and

talk about their work. There was an ebb and flow to the instruction where the teachers offered initial framing, students then worked with teachers as guides, and then embarked either on their own or with a partner to complete a challenging and meaningful task.

Joint activity also means teachers share power with students—they share decisions about the selection of topics as well as responsibilities for how to proceed. The teachers at Laredo recognize and honor student differences and preferences. When we asked Sara why some students were working alone, other in pairs, and still others in small groups, she explained that as teachers they "take into consideration that some kids might want to be more individualistic and want to work alone sometimes—though if they do feel like collaborating, they can, and if they don't want to, they don't have to." Joint productive activity requires dialogue, negotiation, and compromise.

In the following sections, we explore four aspects of joint productive activity that we observed in classrooms across the seven programs: instructional conversation, peer interactions, scaffolding, and classroom communities.

Instructional Conversation

Tharp and his CREDE colleagues used the phrase "instructional conversation" to capture the dynamics in classrooms where teaching and learning occur through student interactions supported by the teacher.

> To truly teach, one must converse; to truly converse is to teach. In the Instructional Conversation, there is a fundamentally different assumption from that of traditional lessons. Teachers who engage in conversation, like parents in their natural teaching, are assuming that the child may have something to say beyond the "known answers" in the head of the adult. They occasionally extract from the child a "correct" answer, but to grasp the communicative intent of the child requires the adult to listen carefully, to make guesses about the meaning of the intended communication (based on the context and on knowledge of the child's interests and experiences), and to adjust their responses to assist the child's efforts—in other words, to engage in conversation.[8]

The idea of teaching as engaging in conversation is not unique to the CREDE researchers. A team at the University of Wisconsin, which spent five years studying hundreds of classrooms, used the term *substantive conversa-*

tion for one of the most powerful strategies they observed for enhancing the intellectual quality of students' schoolwork.[9] They were referring to students' engagement in extended conversational exchanges about subject matter with the teacher and/or their peers that built a shared understanding of ideas. They stressed that these subject-matter conversations went beyond reporting facts, procedures, or definitions; they focused on making distinctions, applying ideas, forming generalizations, and raising questions.

Teaching through conversation is neither scripted nor controlled by the teacher. Rather, participants share ideas through conversations as they work to understand a concept or finish a project. Teachers use skill, artistry, their understanding of students, and their own subject-matter knowledge to guide the conversation, connect it to learning goals, and offer overarching themes and principles. Although such conversations may appear to require little more than students' interest and willingness to participate, they are not self-sustaining. The teacher's role is pivotal. Teachers attend to many factors, including the contributions of individuals, the group's construction of meaning, and what those reveal about students' understandings (and misunderstandings). They also make dozens of decisions—for example, whether and when to go with the conversational flow and when to interject or redirect. Instructional conversation is a strategy that teachers of any grade or subject can employ, but the knowledge, experience, and relationships that teachers bring to the equation will make all the difference in the quality of the learning that occurs.

Instructional conversation is a key element of the lesson we described earlier at Laredo Elementary. In large- and small-group configurations and in one-on-one interactions with students, the two teachers artfully posed questions and engaged students in questioning one another as they generated increasingly vivid sensory details in their writing. Nearby, at Hinkley High School, another CU Denver professional development school, we watched another teacher candidate facilitate instructional conversation in a mathematics class (see the box "An Instructional Conversation in Mathematics").

Following the lesson, Maria and Joan debrief the lesson, talking together as colleagues exploring whether their objectives were achieved and, more specifically, whether the lesson engaged the students in deeper learning. Joan explains, "When students ask me a question, I try to go to the deepest level of understanding that I can. I avoid the easy answer—not wanting students to be told what to do and doing it—and move away from the procedural." Maria observes with satisfaction that the lesson

An Instructional Conversation in Mathematics

On a spring afternoon, Maria Sanchez—a teaching candidate at CU Denver—is coteaching a diverse group of Hinkley High tenth graders with her clinical teacher, Joan Simmons. During their five-week unit on probability, Maria and Joan have been helping students learn to "write and answer questions about the likelihood of an event" and "prove whether two events are independent, using the multiplication rule.

Eight boys and eleven girls sit in preassigned small groups of threes and fours, each with a data set and poster paper. As class begins, they pair up and stand, swinging arms past each other to "wake them up" after lunch, as their teacher puts it. Then, as a preview to the small-group task they will be doing, the teachers pepper the students with questions, using familiar examples of two events that might or might not occur independently—being a girl and wearing sneakers, for instance—and having them generate ideas about how they could know.

After a quick reminder about the roles they will play in their groups, the students go to work to make sense of the data in front of them and create at least five questions that could be asked and answered using that data set. Then, on their poster paper, they write at least two simple probabilities, two conditional probabilities, and a fifth probability of the group's choice. Each group also needs to prove whether the events in their given data sets are independent using the multiplication rule. The two teachers circulate, probing, answering questions with more questions, giving hints—scaffolding the groups' work.

As the students finish their posters, they move casually into the wide and empty hallway outside the classroom and tape their posters to the wall, chattering about their own work and eagerly peering at what other groups have done. They do a "gallery walk," carrying calculators and graphic organizers to assist them as they write and answer questions posed on the posters and explain whether two events being reported on the posters are independent.

After the hallway activity, they return to the classroom and engage in a whole-group conversation about the experience—asking questions, reporting what they have learned, and boasting about what they have accomplished.

reflected their commitment to engaging students in thoughtful instructional conversations:

> [We wanted to] give students some private reasoning time (read this, make sense of it, see what you can do), then partner them up, give them time to talk, have them take on listener roles knowing what them time to talk, have them take on listener roles knowing what to listen for, switch and swap roles, then come together as a table to make sure that everyone's voice is heard. This gives a student who may not have generated such a response access to the mathematical reasoning of their peers, something that doesn't happen very often in a math class.

In many ways, this math class defies commonly held stereotypes about instruction in comprehensive high schools like Hinkley High, located in neighborhoods of concentrated poverty and racial isolation, and the teaching and learning that goes on inside them. Conversational problem posing and solving was the dominant mode of instruction in this International Baccalaureate class, with question-asking, head scratching, hypothesizing, and scribbling ideas on paper as the primary activities. Students applied principles of mathematics and constructed complex knowledge, rather than engaging in rote memorization. The atmosphere was friendly, noisy, and easy, but very much on task.

The two CU Denver clinical experiences we highlight here are typical of what we observed in this and the other programs. Teacher candidates and alumni spoke about learning to create classroom activities where teachers are the guide, but not the "main event," as one teacher candidate explained. In university courses and in the partner K–12 schools, we observed teacher candidates, cooperating teachers, and university professors respond to student questions with more questions to prompt thinking and unpack potential misunderstandings.

Evidence of these practices also emerged in the LPI survey of teacher candidates, where 97 percent of respondents across all sites reported experiencing "opportunities for students to raise questions, discuss, and debate ideas" in their coursework, and 94 percent reported the same of their field placements. Additionally, 98 percent of all candidates reported that they had been prepared to "develop students' questioning and discussion skills" and to "encourage students to see, question, and interpret ideas from diverse perspectives." Candidates experienced "opportunities for students to research and investigate ideas or events," with 93 percent seeing this in their coursework and 90 percent in their field placements. Fully 98 percent of candidates at all programs reported they had been prepared to "engage students in cooperative group work as well as independent learning."

In all, the "heavy lifting" done in the classroom was the job of the student, not the teacher, whose own major effort occurred not in lecturing, but in careful planning for the lesson and intense listening during it, in order to evaluate and continue to scaffold student learning. One teacher candidate characterized the pedagogical approach as a true "focus on student learning, which means we're the guide. . . . We facilitate students working together and we ask critical questions to help them delve deeper." Another teacher candidate explained, "When [students] are talking, they're learning. . . . We have to make sure that the students' voices are heard more

than ours." And indeed, across the programs, instructional conversation was a key strategy. Several teacher candidates used the Socratic seminar, a specific technique for engaging students deeply in instructional conversations among teachers and peers about subject-matter content. We provide examples of this technique in the next chapter.

Peer Interaction to Combine, Iterate, and Construct Knowledge

In the lessons we've described so far, teachers used multiple forms of social interaction to create productive learning conditions, including structured peer interaction. The rooms were abuzz with productive peer-to-peer conversations in which students were learning. Peer interaction in small groups expands the number of social learning opportunities for students far beyond what teacher-student interactions alone will permit. Peer interactions enable students to serve as experts as well as novices, asking questions and offering suggestions to help their peers stretch beyond their current levels of understanding and skill.

Giving students the opportunity to exchange ideas and learn from each other reflects Vygotsky's theory that individuals learn as they participate in communities working together. Through carefully structured collaboration in small groups, students participate in a shared practice or a group project that takes up a real-life situation, as in the box "Learning Through Peer Interaction."[10]

Throughout the lesson, Lily makes sure that all students have an opportunity to make valuable contributions to classmates' work and have their work appreciated by others. She explains that there are multiple ways that groups can solve the problem, emphasizing the importance of the problem-solving process, as opposed to the correct answer. Despite (or perhaps because of) all the interactions among students, any one student's strengths and weaknesses need not become fodder for comparison or embarrassment. When working with others, students can safely watch and learn how others become successful. In addition, well-designed tasks for peer interaction offer a variety of paths to success, so they stand a good chance of accommodating students' differences.

Lily told us after the lesson that collaborative teaching and learning is a core strategy she and her mentor teachers use with their shared group of students. Note that, in addition to engaging the students in mathematics learning through peer interaction, Lily also taught her students about the process itself. When she asked them what it means to work in a group, the students' responses revealed their awareness of social behavior, which

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Learning Through Peer Interaction

Lily, an Alverno College candidate in her last semester, is student teaching at Walker School in a former suburban factory town outside of Milwaukee, where more than half of the students qualify for free or reduced-price lunch. The innovative, student-centered, technology-rich school features multiage elementary grade classes that span multiple classrooms and incorporate multiple teachers. Walls have been removed from many classrooms to make them open and collaborative. On this day, in Lily's classroom of sixty students and three teachers (Lily and her two mentor teachers), she is engaging twenty fourth graders—each with a computer tablet in hand—in a collaborative mathematics lesson.

Lily supports her students' growth as mathematical thinkers by helping them see how quantitative thinking can solve a real-world technology problem. Because her students frequently use technology, Lily focuses the lesson on a common mathematical question for tablet users. Lily explains to her students, who are seated together cross-legged in a circle, "Mrs. Lily is out of storage on her iPad. She needs to delete 157 MB to upload her newest lesson on problem solving." She makes the problem concrete by using a box with pictures, a lesson-planning book, a DVD, and papers to ensure that students understand what "storage" means when talking about technology. She explains that on her iPad, a picture is 10 MB, an old lesson is 47 MB, a video is 171 MB, and a Google Doc is 5 MB. Her framing also demonstrates the relevance of the lesson to the students' lives.

Lily provides a framework, known as CUBE, to help her students read the instructions actively:

C = circle numbers that are important to a problem

U = underline the question

B = box math words

E = evaluate

Lily has her students work with one another to share and combine their ideas and strategies for solving the iPad storage problem. The students first work in pairs to read the question on their iPad, using the CUBE strategy and their pointer finger to circle, underline, and box words, and then evaluate the question after they are done reading. After a few minutes, Lily calls the class back together: "Students, turn your apples up" [referring to the glowing apples on the back of their iPads]. The students place their tablets on the ground, with the screen facing down so they are not distracted. Lily begins by asking the students what they know about Lily's iPad:

"It's full!" one student exclaims.
Another calls out, "You need to delete 157 MB."

Students continue to share the key numbers, questions, and mathematical concepts in the problem. As the students share, Lily synthesizes their insights by drawing a visual representation of the problem on the board, drawing her iPad, with an

arrowing pointing from a drawing of her lesson-planning notebook to the iPad, and then an arrow pointing away from her iPad to all the things she could remove, such as a DVD, a picture, or old lessons. She then divides the class into groups of four, so that students of different skill levels can work on the problem together, combining their knowledge and strategies as they use their iPads to record their solutions on a shared Google Doc.

Before students split into their groups, Lily asks, "What does it mean to work in a group? What is one thing we need to do when we're in a group?"

"Be collaborative," eagerly shares Emma.

Lily inquires, "What does *collaborative* mean?"

Emma explains, "Be quiet and respectful to others."

Dylan, who is sitting next to Emma, adds, "Just what Emma said, but collaborative is also involving everyone and not leaving anyone out."

Lily concludes, "And making sure that everyone has a chance to add their thinking." Lily continues, "You will all be responsible for your own thinking because in a Google Doc, when you share it, I can see who did the adding of information. You are all responsible for the thinking of the group. You have the remainder of the time today to work on this. Tomorrow the goal is that you present your solution to the group, because not everyone is going to solve it the same way."

As students work together, they take charge of the assignment.

helps create a collaborative and caring environment that nurtures student learning. Lily explained:

> For the kids, the communication and collaboration piece is very important to their learning and the college and career readiness standards at this school. So, you notice when I asked about what it means to collaborate, they knew what it means to collaborate in a group. Whether it works out that way or not is something else—they're ten and eleven years old—but they understand what it means, that everyone's got to have some sort of say, and that we've got to be working together for a common goal.

As we explain more below, Lily's careful structuring of peer interaction didn't happen by chance.

Scaffolding

A third strategy we observed teachers use to facilitate learning through social processes is scaffolding. As we noted in chapter 1, Vygotsky, as part of his development of sociocultural learning theory, postulated that the development of higher mental processes is most likely to occur when learners move beyond what they can do and understand independently to what they can do and understand with targeted assistance, or "scaffolding." The space between these two points is what Vygotsky called the *zone of proximal development* (ZPD).[11]

Accordingly, one of the teacher's principal roles is to support, or *scaffold*, students to acquire knowledge and skills that they cannot learn on their own but can learn with targeted assistance. A teacher can provide several kinds of assistance, as can peers: Teachers can provide a model to show a learner how something is done, or they can demonstrate a process or skill both physically and by talking aloud about how an expert thinks. A teacher can also assist by breaking up a task into smaller units or by reorganizing the sequence of a complex task. Both teachers and peers can assist through questioning, explanations, feedback, encouragement, and praise.

Students who have had less experience with an area, a field, or a domain will need more scaffolding than those students who have had more experience with that field or domain. They may need more sequenced supports, more attempts, and more opportunities to revise to develop expertise. Assistance can also be provided by more capable peers, by resources in the classroom, or by the Internet, software, and books. The teacher's role is to make sure that the student has access to a variety of resources appropriate to the student's needs and an understanding of how to use them. Inherent in the notion of scaffolding is the idea that the teacher eventually fades her support as students become more skilled.

In the lesson above, Lily scaffolded students' mathematics learning by relating the problem to a familiar experience, by reviewing skills needed to solve the problem, by providing tools for students to work with, and by offering support while allowing the students to find their own solutions.[12] Lily also artfully used technology as a scaffold. We typically think of technology-assisted learning as an individualized activity. However, used in the context of authentic and active learning communities, these same technologies can help scaffold learners' collective explorations beyond the bounds of their current knowledge. Lily's lesson illustrates her effective use of technology to build on students' ability to collaborate and communicate with one another as they engage in real-world mathematics problem solving. Well used, technology can provide scaffolding for investigation, concept attainment, individual and/or collaborative sense-making, and community building, to name but a few possibilities.

Perhaps the most important form of scaffolding is the well-timed question, which can serve many purposes. Questions can determine when and what a student is ready to learn. They can also press students' thinking

further and provide them opportunities to articulate and reflect on their thoughts. Questions can guide the student through a logical thinking process or prompt the learner to think about a problem in a new way, as we saw in the first vignette, where Kim and Sara helped students envision vivid language as they asked the children questions about their ideas and perceptions.

This lesson also illustrated how scaffolding is an iterative process of assessing and assisting with sensitivity to the needs and the readiness of the learner. Apparently, this was not the lesson that Sara, the CU Denver teacher candidate, and Kim, her mentor, had originally planned for the day. But after assessing the work the children had produced the previous day, the teachers decided to dig in more deeply before moving on to the next segment of the unit. They assessed students' current understanding and skills, as reflected in the work they were producing, and decided to engage them in doing more advanced work with the assistance of more capable others, both teachers and peers. Sara described this nimbleness, where their instructional choices are dependent on the performance and needs of the students, as "typical."

These teachers realized that the process of scaffolding is not necessarily a linear one. In fact, it is probably best compared to a spiraling process where the teacher anticipates when the students will be competent enough to work independently but is also prepared to step back in to support students who are not quite ready. Instead of designating a specific time when they will relinquish control to the learners, effective teachers are aware that they are always trying to enable greater independence on the part of students, while being available for needed assistance. Even as they give students more room to direct their own learning, they are mindful of the indicators that will signal when students can continue to move forward in productive ways and when they will need to step in again. The teacher is always ready to provide additional scaffolding if withdrawal of the support was perhaps premature, and she is also ready to step back in when the level of challenge increases.

The following mathematics lesson (see box "Scaffolding Through Questions"), taught by Amy, a Montclair University MAT program graduate now teaching fourth grade in Newark, New Jersey, provides another rich example of scaffolding through questions—this time from students to one another, as they learned to engage in productive instructional conversations in a collaborative learning space. Note that Amy ends the lesson by asking metacognitive questions that scaffold her students as they reflect on their own learning is this social activity.

Scaffolding Through Questions

"I want you to turn to your partner. Tell them something that you know about area and perimeter. Go!" The excited chatter of students sharing their ideas fills the air. It is another busy day at Benjamin Franklin Elementary School (BFES) in Newark, New Jersey. Bright and colorful student artwork adorns the walls along the hallways as well as in Amy's classroom on the second floor. A graduate of Montclair's MAT teacher preparation program, Amy is now in her ninth year of teaching, and an instructional coach. She's been at Benjamin Franklin her entire career.

After the pair/share, students transition into their collaborative groups to work on word problems. The fourth graders are sitting in groups of four. Each student has a laptop open and paper is spread around the group. Amy circulates around the classroom, pauses at one student's desk, and bends down to answer a question about the math problem. Then she stands up and praises the student by telling her she's on the right track and going in the right direction. The student smiles and jumps back into the group discussion with confidence. The name of the class is Math Congress, and groups of students are engaged in solving mathematical word problems that incorporate error analysis. One problem is displayed on the smartboard:

> A student uses square tiles measuring 1 inch on each side to find the area of the rectangle. Her reasoning is shown: "I covered the top and bottom edges of the rectangle with 7 tiles each. I then covered the left and right edges with 3 tiles each. I added up all the tiles I used to get the total area of 20 square inches. 7 plus 7 plus 3 plus 3 equals 20."
>
> Identify the two errors in the student's reasoning and describe how to correctly use the tiles to find the area of rectangle.

The problem synthesizes and applies the concepts the students reviewed the previous day: area and perimeter, multiplication and division of whole numbers, multiplication of fractions and whole numbers, factors and multiples, and strategies for solving word problems. Each student has a defined role to play in answering the problem: data collector, group leader, encourager and timekeeper, and materials manager.

As Amy continues to circulate around the room, she listens in on the conversations and asks where each group is with their problem. There is a digital timer on the smartboard that tells the students how much time they have left to complete the problem. After the timer goes off, the groups submit their work online, so their responses can be displayed on the smartboard.

After the class finishes the math problem, everyone gathers in front around the smartboard, so each group can present, argue, and clarify their answer to their specific word problem. The Green group goes first; one student represents the group and explains the method used to solve their problem. After the presentation, a classmate asks the presenting group, "Why did you choose this strategy? Was there a better way to solve this problem?" To answer the questions, all of the students in the presenting group speak about why they chose the strategy. A student asks the presenting,

group, "How did you use the blocks to solve this?" Another student asks "How did you add and subtract to get to the final number?" Then a student from the presenting group walks through each step to solve the problem.

Amy then asks the class to give suggestions for solving the problem using a different method. Hands fly up to offer suggestions, and Amy tosses a stuffed animal to a student (a turn-taking strategy). The student suggests that the group "use a bar model next time to explain their work." Amy asks the class, "What would be a benefit to using a bar model?" After a student answers, Amy repeats and affirms, "To create a picture, which helps visualize word problems."

Amy circles back to the initial pair/share activity to close out this group's word problem: "Before this group presented, you all shared some of what you know about area and perimeter with a partner, yes? Think about some of the ideas you had shared with your partner, and if any of your understandings or misunderstandings were changed by this group's presenting and sharing their thinking with you."

Building Classroom Communities

A fourth aspect of classrooms where learning occurs through joint productive activity is a culture of community—characterized by an ethic of care, trusting relationships, and clear norms of cooperation and sharing. Candidates' learning about structuring their classrooms in this manner came through in LPI's survey, where 96 percent of all respondents across all programs reported being prepared to "set norms for building a productive classroom community." Such classrooms are safe for the self-disclosure and risk-taking that learning in groups requires, and creating such classrooms requires the attention to development and contextualization that we described in previous chapters.

At CU Denver, building classroom relationships that are supportive and nurturing is considered foundational for teaching for deeper learning for every student, and is particularly important for those in urban settings. One teacher candidate expressed his convictions about the centrality of relationships as follows:

> Why would a kid who saw their mom arrested last night [care] about math? You can talk about growth mind-set and grit and that's all nebulous, but when you get down to it, why should a nine-year-old have that intrinsic motivation to say, "I really want to be an astronaut, so I am going to learn my math facts." It's more about the relationships and creating a place where they *want* to be. I don't expect the drive to

come from intrinsic motivation, though for some kids it's there. So, the question is, how do I, as a teacher, reengage kids who don't have "grit"? For me, that's where the relationship comes in.

One CU Denver alum we spoke to referenced the power of relationships for inspiring student motivation and engagement in the classroom. As we discussed in chapter 3 and will elaborate in chapter 9, many of the programs prepare their candidates to use relationship-oriented practices, such as restorative "discipline" practices, to develop a sense of responsibility to the community on the part of each student. Establishing and fostering those relationships *always* matters when it comes to the practice of teaching. However, having strong and trustful relationships becomes *even more* crucial when working with students living in poverty in historically underserved schools and communities. Arguably such relationships can be harder to develop in schools where things like police profiling, violence, and racism are a part of young peoples' day-to-day realities. Of course, even the best relationships can't fix the structural and policy harms that such communities face, but they can help students cope with them and learn despite them. The teacher candidates were well aware of this reality, given the explicit social justice focus of their coursework.

LEARNING TO TEACH FOR DEEPER LEARNING THROUGH SOCIAL PROCESSES

In the first half of this chapter, we've highlighted examples of teaching for deeper learning through social processes. Consider Amy's ability to scaffold her fourth-grade students (and enable them to scaffold each other) in collaborative, inquiry-based learning. She makes the process of students working together and with her to solve complex math problems look natural and easy. How did she learn to do this? Her skillful facilitation did not happen by chance or by dint of her personality alone. Rather, there was much work and intentionality in her pedagogical moves, which she developed through her coursework and fieldwork in Montclair State University's Teacher Education Program. In what follows, we describe three ways the programs support their students in learning about teaching as a joint productive activity and experiencing their own learning in the same way.

Teaching the Theory and Practices of Learning as a Social Process

The teaching of candidates Kim and Maria, featured in two of the earlier vignettes, reflects CU Denver's unrelenting focus on collaboration,