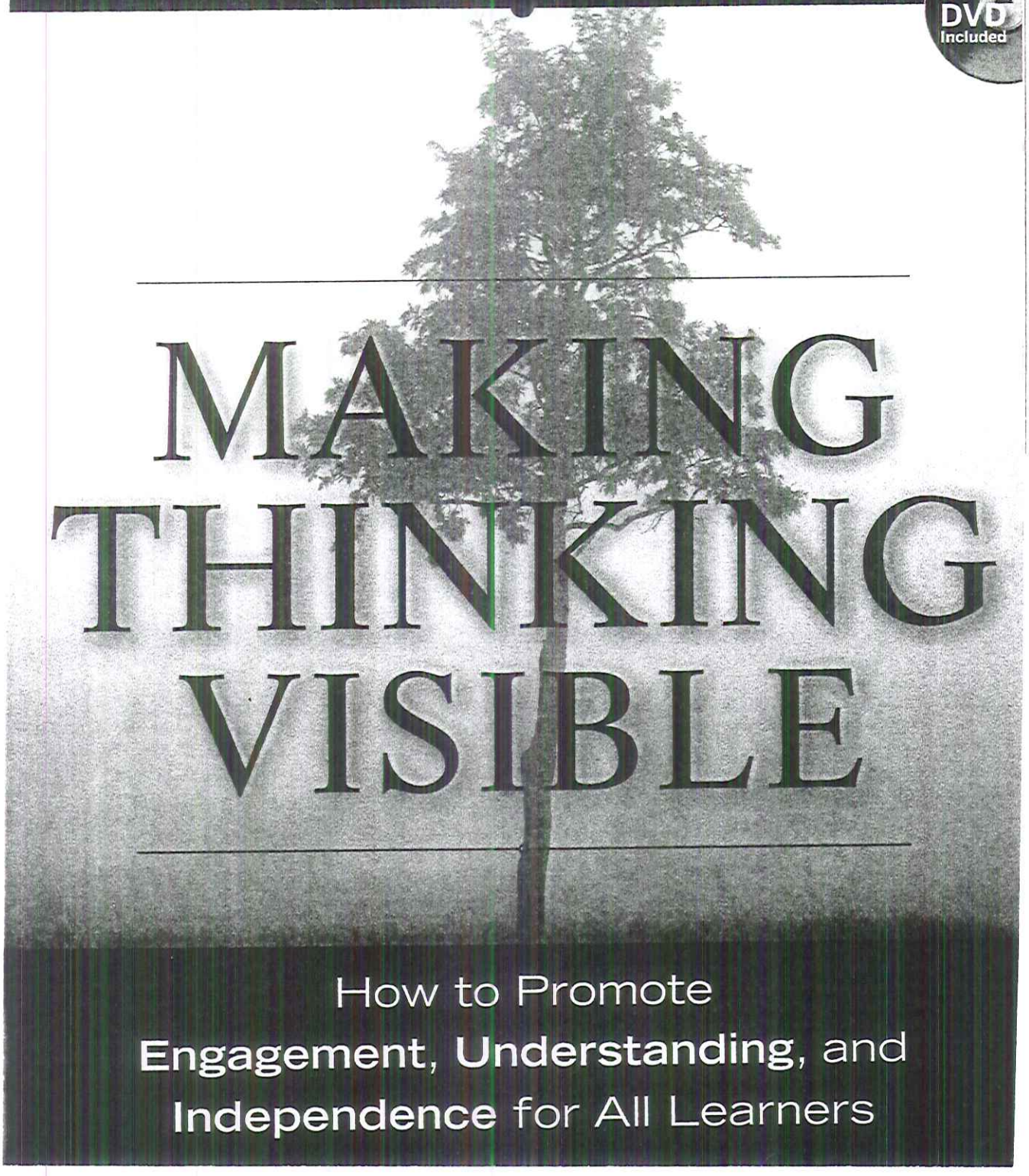
Ron Ritchhart • Mark Church • Karin Morrison

FOREWORD BY DAVID PERKINS

DVD Included



MAKING THINKING VISIBLE

How to Promote **Engagement**, **Understanding**, and **Independence** for All Learners

CHAPTER 2

Putting Thinking at the Center of the Educational Enterprise

to learn some good classroom management techniques to deal with students' rebellion against their imposed passivity.

In contrast, when we place the learner at the hub of the educational enterprise, our focus as teachers shifts in a most fundamental way that has the potential to profoundly affect the way we define teaching. With the learner at the center of the educational enterprise, rather than at the end, our role as teachers shifts *from the delivery of information to fostering students' engagement with ideas.* Instead of covering the curriculum and judging our success by how much content we get through, we must learn to identify the key ideas and concepts with which we want our students to engage, struggle, question, explore, and ultimately build understanding. Our goal must be to make the big ideas of the curriculum accessible and engaging while honoring their complexity, beauty, and power in the process. When there is something important and worthwhile to think about and a reason to think deeply, our students experience the kind of learning that has a lasting impact and powerful influence not only in the short term but also in the long haul. They not only learn; they learn how to learn.

In Chapter One, we shared how this deeper understanding of the educational enterprise was pivotal in Mark Church's evolution as a teacher. He is not the only one for whom this is true of course. The literature on teacher change suggests that this shift from a focus on teaching to that of learning is a central aspect of many teachers' professional growth and integral to the process of learning to be an effective practitioner (Hatch, 2006; Intrator, 2002, 2006; McDonald, 1992; Palmer, 1998). Rather than seeing learning as the passive taking in of information, we must honor the fact that learning occurs as a result of our thinking and active sense making. Consequently, as teachers interested in both students' learning and understanding, we have two chief goals: (1) creating opportunities for thinking and (2) making students' thinking visible. Although these goals are not the same, they are synergistic and interdependent. When we create opportunities for thinking, we establish both the context and the need for making students' thinking visible.

In his book *Smart Schools*, our colleague David Perkins (1992) makes a case for the importance of developing opportunities for thinking: "Learning is a consequence of thinking. Retention, understanding, and the active use of knowledge can be brought about only by learning experiences in which learners think about and think with what they are learning. . . . Far from thinking coming after knowledge, knowledge comes on the coattails of thinking. As we think about and with the content that we are learning, we truly learn it" (p. 8). Thus, thinking is at the center of the learning enterprise and not a mere add-on, something to do if there is time. We as teachers must acknowledge that

In contrast, our colleague Tina Grotzer, who directs the Complex Causality Project at Harvard Project Zero, has designed a series of modules on scientific concepts that directly confronts students' misconceptions and seeks to reveal their thinking so as to restructure it. For instance, in a unit on density, students watch as the teacher drops two candles of equal diameter, one short and one long, into two containers of liquid. The shorter candle floats while the larger candle sinks. Students are asked to write what they observed and explain why the event they witnessed happened. In doing so, students are encouraged to develop and put forth theories of explanation drawing on their scientific knowledge. Thus, at the outset students' thinking is surfaced through their words and drawings. The teacher then removes the candles from the two containers and switches them. This time the larger candle floats and the smaller one sinks; an unexpected outcome for most students. Again, students are asked to write about what they observed and to develop an explanation. Students then share their reactions and discuss how the simple experiment changed where they focused their attention. As the discussion unfolds, students become aware that though both liquids appear the same, they must differ in some respect and that sinking or floating is not a matter of simple linear causality in this instance but depends on the relationship between the liquid and the object placed into it.

By continually exposing students' thinking and pushing it forward through discrepant and unexpected events, the science teachers working with the Complex Causality modules stay in touch with students' developing understanding and are able to guide it throughout the lesson. At the same time, the teachers allow students' nascent theories to be the object of continual discussion, justification, and refinement, thus putting students in charge of developing their understanding and not merely providing them with information to memorize for the test. As this lesson demonstrates, making thinking visible benefits the teacher by providing an important assessment tool. At the same time, it helps to advance students' understanding.

Making students' thinking visible serves a broader educational goal as well. When we demystify the thinking and learning process, we provide models for students of what it means to engage with ideas, to think, and to learn. In doing so, we dispel the myth that learning is just a matter of committing the information in the textbook to one's memory. School no longer is about the "quick right answer" but about the ongoing mental work of understanding new ideas and information. Vygotsky (1978), writing about the importance of the sociocultural context of learning in providing models, stated, "Children grow into the intellectual life of those around them" (p. 88). As educators, this quote provides a powerful metaphor for what it means to educate another. Taking this quote seriously, we must then ask ourselves, What kind of intellectual life are we

(Harre & Gillet, 1994). When we make the thinking that happens in classrooms visible, it becomes more concrete and real. It becomes something we can talk about and explore, push around, challenge, and learn from.

In Lisa Verkerk's fifth grade classroom at the International School of Amsterdam, featured on the DVD, she frequently names and notices students' thinking as a way of providing specific feedback on learning rather than giving generic praise, that is, comments about good work or a job well done that only tell students they have pleased the teacher more than providing substantive information about their learning. Lisa draws students' attention to the thinking they have done. Commenting to two students who have worked to build their understanding of a series of photographs that highlight the plight of refugees, Lisa tells them, "I like how you have used your prior knowledge and what you already know to really build explanations of what is going on in these photographs. You've really looked closely and used evidence to back up your reasons." This kind of feedback provides students with a clear picture of the thinking they have done and a reference point they can draw on in their future learning.

HOW CAN WE MAKE THE INVISIBLE VISIBLE?

Making thinking visible is not without challenges. As we have discussed, we first must be clear in our own minds what thinking is. This allows us to make thinking visible by naming and noticing it as it occurs. In addition, for thinking to occur students must first have something to think about and be asked to think. We as teachers must create opportunities for thinking. However, even when opportunities for thinking are present, we must still recognize that thinking is largely an internal process, something that happens "under the hood" as it were. In the remainder of this chapter, we look at ways we as teachers can make students' thinking more visible through our questioning, listening, and documentation practices.

Questioning

The issue of asking good questions has long been a focus in education, particularly as it relates to students' thinking and the creation of opportunities for learning. Open-ended questions—as opposed to closed-ended, single-answer questions—are generally advocated as a means of pushing beyond knowledge and skill and toward understanding. In addition, Bloom's taxonomy, which was discussed in Chapter One, is often suggested as a template to help teachers ask better questions. The usual advice given is to make sure questions go beyond the knowledge level and push for application, analysis, synthesis,

Good "essential questions" fall into this category of being generative as well. In her ninth grade humanities class, Kathy Hanawalt at Clover Park High School in Washington State uses a set of essential questions to focus her students on the fundamental issues of truth, perspective, and universality that lie at the heart of history and literature. Above her whiteboard on construction paper are five questions: What's the story? What's the other story? How do you know the story? Why know/tell the story? Where's the power in the story? These questions serve as the touch points for ongoing exploration of everything that happens in the class. When Kathy first began using the questions in her class, she found that her students were particularly captivated by looking at the notion of the other or hidden story to understand not only the events they were reading about but also those events around them. Even in simply sharing a recent event, she found that students were likely to ask the class, "Yeah, but what's the other story?" This question truly became essential and generative to students' learning. When reading accounts of history, current events, or political essays, the notion that there is another story and that uncovering it is necessary to truly understand people and events propelled learning and engaged students in Kathy's classroom. Using questions such as these supports students' learning of how to learn by sending messages that learning history involves uncovering the stories.

The provenance of authentic questions doesn't rest solely with the teacher, however. When students ask authentic questions, we know they are focused on the learning and not just the completion of assignments. Students' authentic questions are a good measure of their intellectual engagement. Middle school science teacher Paul Cripps in Wyoming says that students' questions are his best assessments of their learning. "I judge my students not by the answers they give, but by the questions they ask," he says. When observing in John Threlkeld's class Ron often heard him exclaim, "Great question!" At one point, Ron asked him, "What makes something a great question?" Without missing a beat he said, "Oh, a great question is one that gets us all thinking, including me." Through students' questions we get a glimpse into their thinking: What issues are engaging them? Where is there confusion? Where and how are they making connections? Where are they seeking clarification? Once one student has offered up his or her insights or confusion, we often see a ripple effect in the classroom that helps to produce the excitement and energy needed for learning.

Constructing Understanding. Our research team recently looked at teacher questioning in the Cultures of Thinking Project. We observed that when teachers focus on making thinking valued and visible in their classrooms, their questioning shifts away

been taught, but to focus students on how to think about the idea of "quantities" as expressed when using the parentheses in mathematics. She wants students to be able to understand that such quantities are entities unto themselves that can be operated upon. In doing so, she is also pushing her students to go beyond arithmetic explanations; that is, trying to prove something true by simply substituting in a number for n to see if it works. As useful as such test cases might be, they don't really constitute a proof, so Cathy asks her students to think like a skeptic and try to prove the equality. Anthony shows his understanding when he responds, "Okay, it's just like you are doing those two (meaning the quantity $n - 1$)—you're doing n minus one twice and you're adding it together . . . and then it's the same thing as doing two n minus two because you're still gonna subtract two."

As these two examples illustrate, constructive questions frame the intellectual endeavor in which students are to be engaged and point them toward uncovering fundamental ideas and principles that aid understanding. This may seem like a tall order to place on teachers' shoulders. However, this is precisely where the thinking routines that will be presented in Part Two of this book can be useful. The steps of each of the routines outline a set of constructive moves that students can make to facilitate their understanding and make their thinking visible. For example, in Stephanie Martin's lesson mentioned earlier, she began her lesson by adapting the See-Think-Wonder routine into Feel-Think-Wonder. Her initial question, "What did you feel when you reached into the mystery box?" directs students to making observations based on touch. Then, "What do you think about what you felt?" moves students toward interpretations and the exploration of possibilities. Finally, Stephanie asked her students, "What are you left wondering about the object in the box given that we were only able to feel it?" When you read about other routines in Part Two, keep in mind their constructive nature that you as a teacher can direct toward the specific ideas and concepts you want students to explore and understand.

Facilitating and Clarifying Thinking. "What makes you say that?" This question is often one of the most fully integrated thinking routines in the classrooms of teachers with whom we have worked. You'll see many of the teachers featured on the DVD integrating this question into their interactions with students. (You can also read more about its use in Chapter Six.) At Bialik College, where teachers have formed professional learning communities as part of the Cultures of Thinking Project, one teacher remarked, "'What makes you say that?' isn't just a teaching tool; it is a way of life." She said she learns so much more and has much deeper conversations with friends and family

the more a learner "is enabled to think aloud, the more he can take responsibility for formulating explanatory hypotheses and evaluating them" (Barnes, 1976, p. 29).

Listening

Ron Ritchhart recalls a pivotal episode from when he was a mathematics coach. Rather than being a one-off, it was an episode that seemed to repeat itself over and over again at the various schools where he was working: "I would teach a mathematics lesson in one teacher's classroom with other teachers from the same grade level observing. After we had debriefed the lesson, the observing teachers were encouraged to teach the lesson and share their experience with the group in our next session together. Invariably, at these follow-up sessions a teacher would remark, 'I wrote down all the questions you asked, and I was very careful to ask the same questions, but my students didn't respond the same way as when you did it.' This happened enough times among the teachers with whom I was working that I decided to investigate what was happening."

What he observed was that indeed the teachers were doing their best to ask the same key questions—questions that were generally constructive in nature—he had asked at pivotal points in the lesson. However, students often gave short answers or seemed to be guessing rather than thinking mathematically. This wasn't a problem with the students, however, as Ron had rotated his demonstration teaching among all the classes. He also noticed that when students didn't respond the way the teachers had expected, the teachers were often stumped about how to respond and tended to just move the lesson forward. Ron concluded, "It is one thing to ask good questions, but one also has to *listen for the answers.*" The teachers, in part because they were taking risks and trying new ways of teaching mathematics with which they were unfamiliar, were so focused on what they were going to do or say next that they often failed to listen to students. This had two effects on the class: first, it inadvertently sent a signal that the teacher was not as interested in hearing the students' thoughts as in hearing a specific answer. As a result, the students played "Guess what is in the teacher's head" rather than stating their true ideas and understanding. Second, by not listening, the teachers had trouble being responsive to students through appropriate follow-up (facilitative) questions. Good questions, that is, questions that drive learning, don't come from some prescribed list or set of guidelines; they arise in response to students' contributions. If we don't listen to those thoughts, we rob ourselves of the information we need to be able to ask good questions. If we don't first "catch" students' meaning, we will be hard pressed to "toss" back a question that pushes them to elaborate or clarify their thinking.

students' thinking, it might be easy to confuse documentation with merely recording what the class has done, a sort of archive of activity through the collection of various forms of documents. However, to be useful to both teachers and students, documentation must extend beyond this. At its heart, the documentation process, which has its origin in the Reggio Emilia preschools but has since moved to include all grade levels through the work of the Making Learning Visible project at Harvard, is focused on the learning process itself by trying to capture the events, questions, conversations, and acts that provoke and advance learning over time.

Our Project Zero colleagues, Mara Kerchevsky, Terri Turner, Ben Mardell, and Steve Seidel, have been investigating how documentation supports students' learning from early childhood through secondary school. They define *documentation* "as the practice of observing, recording, interpreting, and sharing, through a variety of media, the processes and products of teaching and learning in order to deepen learning" (Given, Kuh, LeeKeenan, Mardell, Redditt, & Twombly, 2010, p. 38). Embedded in this definition is the idea that documentation must serve to advance learning, not merely capture it. As such, documentation includes not only what is collected but also the discussions and reflections on those artifacts. In this way, documentation both connects to the act of listening and extends it. To capture and record students' thinking, teachers must be vigilant observers and listeners. When teachers capture students' ideas, they are signaling that those ideas and thoughts have value and are worthy of continued exploration and examination.

In Stephanie Martin's first grade class, as students share what they felt inside the mystery box, she records their individual contributions on sticky notes and places them on chart paper. This allows students to see that their ideas have value and exist as contributions to the class's discussion. The documentation of the class's observations about what was felt then becomes a foundation that Stephanie and the class can connect to as they move on to discuss what they think and wonder about those observations. The documentation demonstrates Stephanie's listening and provides the basis for the ongoing class conversation about the object in the mystery box. In Brigid Barron's (2003) study of successful groups, she found similar examples of documentation happening among students themselves. Documentation of the ongoing problem-solving process allowed all group members to access the thinking of the group and feel a sense of ownership of it. The documentation also allowed the group to monitor progress and make contributions and ask questions at appropriate points in the process that would advance the understanding of the group. In contrast, unsuccessful groups were often