EL EDUCATIONAL LEADERSHIP

Making Thinking Visible

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When learners speak, write, or draw their ideas, they deepen their cognition. Project Zero's Visible Thinking approach shows how.

What are your thoughts about arthropods?

Chances are you don't have too many thoughts about this particular phylum of invertebrates. But students in Naomi Arrow's 5th grade class at Bialik College in Melbourne, Australia, came up with many initial observations when Naomi introduced a unit on the creatures, everything from "I think they're creepy" to "They are hairy and have many legs."[1] Beyond first impressions, the students generated questions on aspects of arthropods that they were puzzled about: "How do they walk upside down?" "How does the spider produce its web?" And (in an intriguing somersault of perspective taking), "Is there stuff that they stamp on, like we stamp on them?"

Naomi's students were applying a *thinking routine* called think-puzzle-explore, which has students share what they think about a topic, identify questions they puzzle about, and target directions to explore. Thinking routines help learners ponder topics that might not seem to invite intricate thinking at first glance, such as arthropods. Such routines jump-start thinking and make it visible.

Thinking routines are one element of an initiative called Visible Thinking that we, our colleagues at Project Zero, and collaborators in various schools have developed. In our research, we have explored the practicality of using thinking routines and documentation as classroom learning tools, developed a framework for pursuing cultural transformation in classrooms and schools, and devised tools for integrating the arts. This work has spanned elementary through university settings, included both public and independent schools, and involved schools in the United States, the Netherlands, Sweden, Belgium, and Australia.[2]

What Is Visible Thinking?

Six key principles anchor Visible Thinking and characterize our approach in schools.

- *Learning is a consequence of thinking*. Students' understanding of content, and even their memory for content, increases when they think through—and with—the concepts and information they are studying. Thinking through issues is not a solo endeavor, however. Team members often share and build on one another's knowledge. Notational systems, specialized vocabulary, and various technological and other tools also free up memory for more complex tasks.
- *Good thinking is not only a matter of skills, but also a matter of dispositions*. Open-mindedness, curiosity, attention to evidence, skepticism, and imaginativeness all make for good thinking (Perkins & Ritchhart, 2004; Perkins, Tishman, Ritchhart, Donis, & Andrade, 2000). Such characteristics concern not so much a person's abilities as how the person invests those abilities. Children and adults often greatly underutilize their thinking capabilities. Accordingly, besides nurturing relevant skills, education needs to promote open-mindedness over closed-mindedness, curiosity over

indifference, and so on. Several studies support this dispositional view of thinking.

- *The development of thinking is a social endeavor.* In classrooms, as in the world, there is a constant interplay between the group and the individual. We learn from those around us and our engagement with them. The sociocultural character of classrooms and schools should ensure that thoughtful learning is pervasive, not sporadic.
- *Fostering thinking requires making thinking visible.* Thinking happens mostly in our heads, invisible to others and even to ourselves. Effective thinkers make their thinking visible, meaning they externalize their thoughts through speaking, writing, drawing, or some other method. They can then direct and improve those thoughts. Visible Thinking also emphasizes documenting thinking for later reflection.
- *Classroom culture sets the tone for learning and shapes what is learned.* We have identified eight forces that shape classroom culture: (1) classroom routines and structures for learning, (2) language and conversational patterns, (3) implicit and explicit expectations, (4) time allocation, (5) modeling by teachers and others, (6) the physical environment, (7) relationships and patterns of interaction, and (8) the creation of opportunities. Depending on their form, these forces can support or undermine the rhythm of thoughtful learning (Ritchhart, 2002, 2007).
- *Schools must be cultures of thinking for teachers.* Professional learning communities—in which rich discussions of teaching, learning, and thinking become a fundamental part of teachers' experiences—provide the foundation for nurturing thinking and learning in the classroom. Administrators need to value, create, and preserve time for teachers to discuss teaching and learning, grounded in observation of student work.

First Grade Thinkers at Work …

To show these principles in action, let's look inside another classroom at Bialik College, a private preK–12 school in Melbourne, Australia. The school includes students with severe learning disabilities as well as gifted students. First grade teacher Roz Marks has been implementing visible thinking in her classroom for two years through our Cultures of Thinking project. She has found the think-puzzle-explore routine a good way to uncover students' thinking and plan her inquiry-based curriculum. When her class showed interest in the April 2006 Beaconsfield Mine collapse in Tasmania and the subsequent rescue of two miners, Roz used this routine to help define students' inquiry.

Gathering her class, Roz asked, "What do you think you know about the Beaconsfield Mine?" To provide think time, she gave them paper to draw their ideas. Students were soon eager to share.

"I think Larry Knight [the sole fatality] was a good person," Yasmin offered. Roz recorded Yasmin's comment on chart paper and gently pushed her thinking by asking, "What makes you say that?" The 6-year-old paused before speculating, "Because maybe he offered to drive the truck and didn't mind that he wasn't protected."

Ivan added, "I think Larry Knight was scared when the rock was falling."

Roz probed, "What makes you say that?" Ivan pointed to his picture: "Because the rock was so big."

As the sharing continued, Roz followed each student's statement with "What makes you say that?" and documented responses to keep the collective thinking visible. Soon students justified their ideas without prompting. "I think one of the miners is ill," Jade offered, quickly adding, "because I heard it on the news."

Roz turned the class's attention to the mysteries of the mining disaster. "What are you puzzling over or wondering about the mine?" Hands shot up and questions flew. Some questions focused on causes of the tragedy: "How did the collapse happen?" "Why was the cage [part of the vehicle in which miners worked] so small?" "Why was Larry Knight not in the cage?" Others explored the rescue: "Why were the last three meters of rock the hardest?" Still others expressed personal puzzles: "Why wasn't I allowed to watch it on TV?"

After collecting students' "puzzles"—the questions students puzzled over—Roz discussed with the class how varied they were and asked, "How will we explore our puzzles?" Students suggested various media sources, such as newspaper and television. A few recognized the need for "the truth," not just information, and suggested visiting Tasmania or phoning the miners themselves. The class decided to keep looking at and listening to news reports. Roz and the students regularly brought articles to class, and students continued to form theories about the collapse and rescue on the basis of new evidence. Roz also made books about geology and mining available to students.

… And How Their Teacher Fostered Thinking

In this interaction, Roz fostered thinking and made it visible in multiple ways. Even before the discussion, Roz signaled interest in her students' ideas. Through observing students' conversations and play, she recognized the opportunity for rich learning related to the topic of the Beaconsfield Mine. In Roz's classroom, student thinking is noticed, respected, and encouraged, fostering a culture of pervasive learning.

Roz gave her students time to become aware of their ideas and questions, and then used the think-puzzle-explore routine to support their inquiry. Like the familiar KWL strategy—What do you **K**now? What do you **W**ant to know? What have you **L**earned? (Lyman, 1981)—think-puzzle-explore taps students' prior knowledge, but with a key difference. By asking what students "think they know" rather than what they "know," the prompt uses conditional language that suggests possibilities and openness rather than absolutes (Langer & Piper, 1987; Ritchhart & Perkins, 2000). This encourages sharing of tentative ideas. All students can engage in a conversation focused on personal thoughts rather than definitive knowledge. As the conversation in Roz's class developed, students adopted conditional language in their responses ("I think Larry Knight was scared"). Such language communicates the message that learning begins with one's own ideas and truth is built over time.

Roz used the power of language to shape thinking by weaving in the "What makes you say that?" prompt with its gentle

invitation to provide evidence. Over time, students took on this expectation for reasoned thinking. Finally, the question, What are you puzzling over? is subtly different from the traditional, What do you want to find out? and guides students toward investigating rather than stockpiling facts.

Creating a Culture of Thinking for Teachers

At Bialik, teachers like Naomi and Roz discuss their efforts to create a culture of thinking in one of seven teacher study groups. These groups use action research, classroom observations, and reading and discussion to clarify how the eight cultural forces mentioned earlier in this article shape learning in classrooms.

The study groups regularly discuss student work through the Looking at Student Thinking protocol. Using documentation of students' thinking, this protocol guides teachers through closely observing student responses, speculating about students' thinking, raising questions, and exploring implications for teaching (information on this protocol is available at www.pz.harvard.edu/vt).

For example, Roz's group spent 90 minutes exploring and analyzing her class's conversation about the Beaconsfield Mine. Her colleagues noticed that student responses signaled great empathy and curiosity and marked emerging mathematical and scientific ideas about types of rock, weights, distances, and cause-and-effect relationships. They noted that students presented evidence for all their statements, sometimes without prompting, and showed rich awareness of informational resources.

As the discussion expanded, questions emerged about the power of starting with student interests, the role of the media in presenting information, and adults' role in censoring that information. Issues arose about what opportunities students should have to delve deeply into ideas, explore their own thinking, and pursue research. Teachers suggested that Roz might extend the exploration into geology, Australia's natural resources, and the process of mining—or connect it to a discussion of survival skills and how events affect communities. Roz not only could see her students' thinking more clearly, but also could better situate their learning within the school's collective efforts.

The Effects of Making Thinking Visible

We have seen positive changes in school culture and student learning in Bialik and other schools implementing the Visible Thinking approach. Classroom activities become more learning oriented rather than work oriented (Marshall, 1988). Students who previously believed they lacked a voice or that their ideas weren't valued, including students with learning disabilities, participate more actively and confidently (Ritchhart, Palmer, Church, & Tishman, 2006); and students' awareness of thinking strategies dramatically increases at all grade levels (Ritchhart, Hadar, & Turner, 2008). Teachers at Bialik have told us that making thinking visible enables them to more accurately assess students' understanding.

Data from schools using the approach reflect improved student learning. High school students at Bialik reported that thinking routines helped them structure their thinking before they began writing essays for their state graduation exams, which boosted their confidence and increased the time they spent writing. At Long Lake Elementary in Traverse City, Michigan, where our colleagues have been implementing Visible Thinking ideas since 2004, student scores have significantly increased on state and district tests in reading, writing, and social studies. Efforts are underway to expand the program throughout the Traverse City district.

The long-standing goals of the Visible Thinking approach—deepening learning in the content areas and fostering thinking skills and dispositions—are vital in schools today. In our experience, this approach creates a chemistry that can be truly transformative for learners and teachers.

Thinking Routines: Tools for Making Thinking Visible

Project Zero researchers developed more than 30 thinking routines in collaboration with K–12 teachers. Below are a few popular routines used by teachers. See www.pz.harvard.edu/vt/ for more information, including actual classroom examples, on these routines and many others.

Headlines

This routine uses newspaper headlines to capture the essence of an event, idea, concept, or topic. It works especially well at the end of a class discussion in which students have explored a topic and gathered new information and opinions. Ask students,

- If you were to write a headline for this topic or issue right now that captured the most important aspect to remember, what would that headline be?
  If you ask the first question at the beginning of the discussion, follow up with these questions:
- How would your headline change after today's discussion? How does it differ from what you would have said yesterday?

Connect-Extend-Challenge

This routine helps students make connections. Ask students these three questions:

- How are the ideas and information presented connected to what you know and have studied?
- What new ideas extended or pushed your thinking in new directions?

- What is still challenging or confusing for you? What questions, wonderings, or puzzles do you have?

See-Think-Wonder

This routine helps stimulate curiosity and sets the stage for inquiry. Ask students to make observations about an object, image, or event, answering these three questions:

- What do you see?
- What do you think about that?
- What does it make you wonder?

Compass Points

This routine helps students explore various facets of a proposition or idea (such as a school dress code) before taking a stand on it. Ask students these four questions, recording their responses as the directions of a compass to provide a visual anchor.

- E = Excited. What excites you about this idea or proposition?
- W = Worrisome. What do you find worrisome about this idea?
- N = Need to Know. What else do you need to know or find out about it? What additional information would help you?
- S = Stance, Steps, or Suggestions for Moving Forward. What is your current stance on the idea or proposition? What steps might you take to increase your understanding of the issue?

Source: Activities are adapted from Project Zero's Visible Thinking Web site (www.pz.harvard.edu/vt) created by David Perkins, Ron Ritchhart, Patricia Palmer, and Shari Tishman. © 2007 by the president and fellows of Harvard College on behalf of Project Zero at the Harvard Graduate School of Education. Used with permission.

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Endnotes

[1] *For the purist, most arthropods have many legs, but only a few are hairy.*

[2] *For more information on Project Zero's practice and research, visit www.pz.harvard.edu/vt or www.pz.harvard.edu/tc.*

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