A class of kindergarten students set out to explore the magic of the circus. What is it about the circus that sparks excitement? Is it the clowns? The acrobats? The high wire act? As this group of five-year-olds began their exploration, Rosemarie, their teacher, began her own inquiry into how to make her students' thinking visible. Students articulated their wonderings and reflected on their learning saying things like, "I used to think somersaults were hard but now they are easy." Students spoke in short, simple sentences lacking depth with their thinking.
As the project came to an end, two months later, Rosemarie asked her students, "What is the magic of the circus?" Seated in a circle, students were eager to share their thinking. Evie said, "the magic of the circus for me is the grit I developed doing headstands. The first time I did it I didn't get it but I kept on practicing and then this Friday I actually did it and because of that I am feeling happy!" "I think it is magical," Jillian began, "because our teams never gave up. Even when someone tried to give up, we would add to their bucket. We made people happy so they could be in our routine."

How did Rosemarie support these kindergarteners to articulate such deep thinking over a short period of time? Rosemarie was part of a group of six teachers at High Tech Elementary Chula Vista who used improvement science, a methodology for implementing quick iterative learning cycles, as a framework for helping students make their thinking visible.
Improvement Science as a Model for Professional Learning

Rosemarie and the group set out to understand the root causes underlying the problem: *Why is it difficult for students to articulate their thinking?* To help make the group's thinking visible, they used a **protocol** to create a **fishbone diagram**, which represented their different beliefs about why students experienced difficulty expressing their thinking. The teachers' perspective is important but doesn't offer a complete picture of the problem. There other important perspectives to consider, mainly, the students'.

Rosemarie and the team wanted to learn what students thought and how they felt when teachers asked them to share their thinking with the class. The team decided to conduct **empathy interviews** with one or two students from each of their classes, asking several short, **open-ended questions**. Through this process the group tapped into multiple perspectives about making thinking visible.

Having deepened their understanding of the problem, the group developed a plan to guide their work. In Improvement Science, this plan is called a theory of action. Drawing upon research and craft knowledge, they constructed an aim (Students will use how/why language to explain their thinking), areas of focus (such as examining structures and classroom routines to promote student thinking, and providing models of thinking), and concrete change ideas--the specific, measurable interventions they wanted to try in their classrooms, such as the introduction of sentence frames.

Once Rosemarie and the team had a plan in place (their theory of action), they used PDSA (plan-do-study-act) cycles to capture learning and guide short cycles of inquiry, action, and reflection. They gathered just enough data to help them know if their change idea was an improvement, and met every two weeks to share their learning with each other. Rosemarie decided to capture five to ten minutes of video each week during her
class reflection time so that she could track changes in student thinking over time. During one cycle of inquiry Rosemarie captured a breakthrough moment in student thinking. When discussing the data with her colleagues, she realized this short video of student thinking could be shared with her students as a model to help them better articulate their thinking. She had her next change idea! Rosemarie and the group learned that capturing just enough data about their inquiry helped the team get better at making student thinking visible, quickly.

Improvement Science brings teachers, like Rosemarie and the group, together in networked improvement communities (NICs) to share data, talk about the effectiveness of change ideas, and accelerate learning. By hearing about the successes and challenges from colleagues around this shared inquiry, Rosemarie and the team were able to access a variety of new ideas, quickly, and didn't have to "re-invent the wheel." As teachers shared their ideas and learning with each other, other teachers in the group were inspired to implement their colleague's work. Grace, a teacher from the team, shared how much she learned from Rosemarie about the importance of taking time to reflect each day with her students on how their thinking had changed, and how powerful it was to see that progression of thinking over time through the video data. Teachers are constantly innovating in their classrooms. Improvement science offers teachers a way to capture and share their learning while engaging in meaningful inquiry with colleagues.

To access improvement science tools and protocols developed by the Center for Research on Equity and Innovation at the HTH Graduate School of Education click here.
To learn more about the change ideas teachers at High Tech Elementary Chula Vista developed for making thinking visible click here.

Photos by Kristen MacConnell.