



Using the crosscutting concepts to reflect on and refine your teaching

What Is The Issue?

[A Framework for K-12 Science Education](#) poses the idea that students are best positioned to figure out phenomena and solve problems by engaging in science and engineering practices and using the crosscutting concepts as thinking lenses. The crosscutting concepts are a broad set of useful themes that can be applied to any field, including education. By using the crosscutting concepts to approach their own problems and opportunities of practice, teachers can engage in deeper reflection and metacognition—and strengthen their ability to help students use the crosscutting concepts to explain phenomena and design solutions.

WHY IT MATTERS TO YOU

- ▶ **Teachers** should engage as scientists in their classrooms by [conducting action research](#) and reflecting using crosscutting concepts.
- ▶ **District Staff & PD Providers** should give teachers time and space to identify their own opportunities and problems of practice to focus on during professional learning (for example, PLCs and workshops).
- ▶ **School Leaders** should provide time in teachers' schedules to engage in authentic reflection and action research in service of improved practice.

Things To Consider

- [Ambitious Science Teaching](#) outlines cycles of [Plan, Do, Study, Act \(PDSA\)](#) for teachers to improve their practice. [PDSA](#) are short cycles of action-research that allow for quick adjustment based on data analysis and reflection. **The steps of PDSA encourage teachers to be “scientists” and engineers of their own classrooms.** They ask questions and make observations, suggest a change to implement based on interpreting the situation, implement the change, collect and analyze data, reflect, then act on what was learned.
- [The crosscutting concepts](#) are a set of common lenses that students use across science content to make sense of the world. Similarly, **the crosscutting concepts can serve as a form of structured reflection lenses to help teachers better understand classroom phenomena.**

Recommended Actions You Can Take

- Watch [PDSA videos](#) from Ambitious Science Teaching to observe examples of teachers focusing on a problem of practice. In these videos, teachers are implicitly using crosscutting concepts such as Patterns, Cause and Effect, and Systems Thinking to reflect and act on their classrooms. Keep in mind that there can also be [opportunities of practice](#) to identify and leverage.
- **The crosscutting concept prompts at the end of this [Plan, Do, Study, Act template](#)** from the [Institute for School Partnership at Washington University in St. Louis](#) can be used to help identify problems and opportunities of practice before action steps are planned and enacted. They can also be used during the Study portion of the PDSA cycle to provide support for teachers as they analyze data from their tests of change. This tool could be used in a wide variety of settings, including on a district, school, or classroom level.
- Review the [crosscutting concept prompts](#) from the Institute for School Partnership. Consider customizing them based on the work of your school or district—to strengthen how they fit your context.
- Use the PDSA template during PLC meetings to focus conversation and provide clear supports. The prompts can be used to analyze student work samples, lesson videos, or assessment scores, for example. This tool could also be used in a wide variety of settings, including on a district, school, or classroom level.
- As an extension, do a book study on [Ambitious Science Teaching](#). You can connect the chapter called “Organizing with Colleagues to Improve Teaching,” which outlines [driver diagrams](#) as a tool to implement instructional goals, to the effort outlined here.

REFLECTION QUESTIONS

- ↘ In your teaching, when was the last time when you weren’t sure where to go next, or when something wasn’t going as planned? What successes can you analyze to see how they might be replicated? Use the recommended process to formally explore your practice.
- ↘ How might your students, school, or district use the crosscutting concepts in ways beyond scientific thinking?

Attending to Equity

- Teachers should be supported and empowered to figure out their own solutions, rather than only accepting top-down mandates for educational change.
- Consider how systems and structures in your classroom, school, or district promote or discourage equity of student participation in authentic science and engineering learning.
- Equity-focused transformations come from deeper changes to systems. Consider true root causes and effects, as well as locus of control, when using these prompts. Dig deep and avoid deficit-based reasons we assign for student behavior and academic performance.
- These prompts can help keep PLC and professional learning conversations focused and solution-oriented, steering conversations away from deficit thinking around student capabilities.

ALSO SEE STEM TEACHING TOOLS:

- #41 [CCC Prompts](#)
- #22 [Teacher Social Networks](#)
- #24 [Teacher Communities](#)

