

CHAPTER 12: Mathematicians Work Together and Alone

The main focus of this chapter is to teach students to work in different ways, depending on their mathematical needs. Historically, we've focused on formats—individual work, partner work, group work—rather than the nature of the interactions or mathematical need. I hope I provided you with some compelling alternatives.

Discussion Questions**Pages 311–313**

Discuss or write about this excerpt:

If a major part of doing mathematics involves interacting with other mathematicians, then a major part of teaching students mathematics must be to teach students how, why, and whether to interact with one another mathematically. Students need to learn how to ask for what they need from each other and to be what they need for each other. In other words, we need to teach students how to be good colleagues, in math and in life.

Page 314

I argued that we seek out collaborators when we genuinely need them. If we can solve a problem on our own, working in a group is more of a hindrance than a help. Discuss this assertion with your colleagues. What do you think? As you talk, it's fair game to draw on your experiences as a student as well as a teacher. Are you thinking about making any changes to your practice in light of this argument?

Page 314

Do your students think they have to be right in order to talk? Do you? What can you do to welcome partially formed thinking?

Page 320

Discuss or write about the paragraph at the top of the page, about socialization into the collaborative culture of mathematics. What do you make of it?

Pages 320–321

A key component of Fullilove and Treisman's "intervention" with underperforming students was to use "unusually difficult" problems. How does this approach compare to your school's current approach to intervention or remediation? If this question sparks deep thinking or changes to program, I'd absolutely love to hear about it at tjzager.com (Chapter 12). Their articles are linked on the website as well.

Pages 327–330

A common theme in this section is that exposing students to other ideas is not enough. Students need time and opportunities to try out strategies they pick up through cross-pollination. Reflect in writing or conversation about this assertion. Are there opportunities for cross-pollination that you're not converting? What changes might you make?

Pages 330–332

Talk about this idea of "credit" in the math classroom and mathematics. Have you seen students take offense if they're not given credit? How might you teach students to give credit graciously? I've linked a lovely Teaching Channel video of Laretha Todd talking about how her students give credit at the companion website. It's worth a look in this conversation.

Page 334

Discuss the way Shawn structured this class so students talked with people with whom they agreed and disagreed. How might you be inspired by this move?



CHAPTER 12: Mathematicians Work Together and Alone (continued)

Pages 339–345 From an equity point of view, many people make assumptions about Jen's (and Heidi's) students, including that they're not capable of engaging in cognitively demanding mathematics. One of my goals for this book was to provide honest examples of students of color engaging in conceptual, rich, mathematical explorations. I wanted to share substantial evidence that would challenge our implicit biases (my own included). This is a good place to pause and discuss this idea. What have you noticed about the capabilities and brilliance of young black and Latino/a mathematicians throughout this text?

Pages 345–347 Reflect on or discuss Jen's use of individual student critiques. What sort of teaching has to precede this assignment so it will be successful?

Pages 347–349 Look at this table together. What kind of teaching would it take for students to send and hear these messages? Reflect in writing or discuss with your colleagues. How can you make these cues explicit?

Activities**Page 317** **Planning for Collaboration**

Discuss the way Jen addresses collaboration at different points in the lesson. Take a look at the next lesson you're planning to teach. Where might be appropriate places to focus on the ways students are working together? How might you open those conversations? What will you look for?

Page 336 **Make Math Debatable**

Get together with your colleagues and tomorrow's lesson plans. Can you convert some of the questions into debatable questions? Practice together.

Page 339 ***Austin's Butterfly***

Watch this short film and discuss it with your colleagues. You might also consider showing it to your students. How does everyone react?

Pages 339–345 **Transcript Analysis**

Spend quite a bit of time reading this vignette from Jen's class. Make sure to analyze the mathematics in the student work and the transcripts. When you're ready, discuss this vignette with your colleagues. What do you think about the level of discourse and analysis from Jen's students? What is Jen doing to create the conditions for this caliber of conversation and critique?



CHAPTER 12: Mathematicians Work Together and Alone (continued)**Calls to Action****Pages 321–323 Vertical, Nonpermanent Surfaces (VNPS)**

Take a look through the blogs about VNPS gathered at the companion website, and then figure out a way to get your students standing up and working on an erasable surface. Tell your colleagues and me about how you hacked your space challenges and what you noticed at tjzager.com (Chapter 12).

Pages 323–324 Visibly Random Grouping (VRG)

Liljedahl said that teachers saw a significant difference in the way their students worked with one another after three weeks of visibly random grouping. If you're ready for a little action research, can you commit to using VRG for three or four weeks and tracking your results? What do you notice? Share with your colleagues and me at tjzager.com (Chapter 12).

Pages 327–330 Cross-Pollination

Choose one of the suggested activities in this section and try it out with your class a few times. Share what you've learned with your colleagues in person and online at tjzager.com (Chapter 12).

Pages 335–338 Sparking Debate

Choose one of the activities or ideas from the description of Chris Luzniak's teaching and related resources. (There's quite a bit on the companion website and at tjzager.com, including videos of Chris in action.) Try it out with your colleagues and classes. Come back together and discuss. Share your thinking at tjzager.com.

Additional Resources

At stenhouse.com/becomingmathteacher and at tjzager.com, you'll find a collection of supplemental resources that may come in handy for further thinking and discussion. I keep the links fresh, so the contents will change, but you will certainly find:

- Several classroom videos and articles related to the content of this chapter
- A large collection of blog posts, especially around vertical, nonpermanent surfaces
- Chris Luzniak's videos

