

## Improvement Science as a Means to Amplify Teacher Voice

Receiving a Knowles Science Teaching Foundation Teaching Fellowship in 2008 was the biggest gift of my career. Back in 2008, I had no idea what an influence KSTF would have on my teaching practice and my views on education. As a Fellow, I was lucky to have a cohort of like-minded colleagues. We were all new to teaching and had similar struggles: How do I manage a classroom? Why don't my students understand the difference between acceleration and velocity? How do I assign points to this lab report? How do I make my the science in my classroom more authentic? The longer I taught, the more I realized that many teachers did not have a group of peers who would engage in these pressing conversations about teacher practice. I also started to realize that the advice I found from curriculum and education research didn't always match my own experiences in the classroom. I knew that there was something special about the way teachers shared best practices, but also that very few of us have the time and means to tackle the most challenging issues in our classroom. Enter, KSTF's Project ASCENT.

As a Senior Fellow, I attended the **Carnegie Foundation for the Advancement of Teaching's** workshop on **Improvement Science** as a KSTF **Project ASCENT** planning committee member in June 2014. The tenets of improvement science immediately spoke to me—rapid cycles of teacher inquiry, collaborative learning communities, and empowerment of teachers to make decisions. When KSTF's Project ASCENT centered its mission on improving student success in STEM courses, I started to see connections forming between the teacher communities like KSTF that had the knowledge and experience and the data-collection structures that allowed us to amplify these voices to the extent curriculum and education researchers were.

In 2014, my most pressing classroom struggle was helping my students learn to read and write in an Advanced Placement (AP) Chemistry class. I would hear things like "Well, I know how to answer *that*. Why do they have to make it so hard to understand?" After reviewing each exam question, a new voice would ring out, "well why didn't they say it the way *you* just said it, Ms. Haines?" I knew I needed to change my practice, but I couldn't find the answers for my students in my context. Improvement science gave me a bite-sized formula for beginning to understand what literacy instruction could look like in my classroom and how that goal fit into the bigger picture of educational reform. Carnegie's mantra for

creating change and analyzing data was “Plan-Do-Study-Act,” or PDSA. Each PDSA cycle constituted a miniature teacher inquiry that took place at a rapid pace, in my case weekly, to help me test change ideas and measure progress towards my ultimate goal of improving my students’ reading and writing skills.

After our summer workshop, I committed to having my students read 300 words and answer questions based on the text two times per week.

When I returned to my classroom that fall, I was completely unsure how my students would take to reading a textbook silently for 10 minutes when they entered class. Framing this work to my students as my own learning process was essential. My vulnerability in making the learning process transparent to my class helped lower the barrier for my students to take risks and focus on growth, not scores. In our pilot year, 2014–2015, the Project ASCENT planning committee—made up of teachers and former teachers—served as my collaborative network, helping me to chart my students’ progress and come up with change ideas I could implement in response to their needs. Over the course of the next 10 weeks, my collaborators helped me iteratively scaffold the process of writing claims, evidence, and reasoning (CER). My students responded to my small but regular changes in the task by excitedly sharing their work under the document camera for public critique, discussing ideas with one another, and continuing to engage with increasingly difficult readings.

Because of the rapid cycles of data collection and testing, my students quickly worked their way from identifying the components of great CER arguments, to improving sample CER arguments, to constructing one to two parts of a CER argument, to finally independently writing a complete CER, including a quote from the reading as evidence. Each week, two members of the network would score student work according to a rubric. During a Google Hangout, the team and I would look for variation in the students’ responses to figure out what my top performers were doing that the week’s bottom performers needed to learn from. While I was empowered to be the expert on my students and my course content, the team was invaluable in helping me see patterns in student learning and generate ideas for scaffolds and instruction methods I never would have done on my own, let alone within a four-month span. They also helped me think objectively about students’ work. I sometimes found myself scoring students based on what I *thought* individual students could do, and my team helped me assess understanding strictly according to what they *did* do.

Ultimately, Google Hangouts with my Project ASCENT team became one of my favorite parts of the week. They empowered me as a teacher by giving me an opportunity to share the most exciting moments in my classroom: the moments when both my students and I were in the midst of authentic learning experiences that required vulnerability. In these moments, my students were thinking critically about chemistry while developing communication skills, and I was thinking critically about their independence as learners and how my own teaching skills supported that process. In helping my students find their voices as chemists, I found my own voice as a teacher who could enact change in my classroom in response to my students' needs. At the end of the year, this cohort's AP scores were significantly higher than past cohorts, but in my opinion, the more important gains came from my students' increased confidence and ability to confidently interpret novel, wordy, cross-unit problems and articulate evidence-based arguments.

When Project ASCENT launched in the summer of 2015, all six teams were made up of teachers and a few former teachers who collaborate on work that, like mine, starts in the classroom with a problem of practice generated by teachers and focuses on the success of the students in that classroom. Now that we are in the second year of our work, there is a firm belief among Project ASCENT members that it is our goal to explore and support what teachers can accomplish when they work together—not just within schools, but across schools in a nationwide network.

In 2015–2016, my team helped me continue the work of teaching literacy in my AP Chemistry course. I started with an entirely new group of students, but felt more confident in my skills as a reading teacher. My team once again helped me plan for the year with our regular examination of student work using PDSA cycles. I also had the added benefit of five other teams in the Project ASCENT network, some of whom were tackling literacy in science classrooms. I made connections with a reading specialist, an English Language Learner (ELL) biology teacher, an AP Biology teacher, an AP Physics teacher, math teachers, an improvement science coach, and other science department chairs, all of whom had experiences that resonated with my own and added to my teaching practice. Together, we shared ideas that improved our practice and realized that we were executing the kinds of education reforms policy makers and researchers tout. We were watching students grow in ways we knew were meaningful and together, quantified those

changes. As we continue our work together in this school year, I look forward to seeing the how the research we do in our teams spreads and how the idea of a teacher network can be a leading voice for change in education.

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*Each week, beginning on September 12, members of the KSTF community will be **writing about one of the characteristic actions of teachers acting as primary agents of educational improvement**. This week, we're writing about teachers acting as primary agents of educational improvement when they work collaboratively with other teachers to initiate, own, and critically evaluate improvement efforts that benefit their own students and have the potential to ultimately benefit all students.*