

Lessons in Language



Science is billed as a straightforward way of knowing. You design a test to answer a question, isolate variables, look at data gathered with authenticity, and draw conclusions that are supported with evidence. In teaching, we use a similar model to gain knowledge, with the key differences being that your experimental design is always flawed; it is impossible to truly isolate variables, and the data we gather and analyze is intensely nuanced. I've lived all of these experiences through learning about language use in my science classroom.

Learning is language

My year-long volunteer experience at El Centro del Muchacho Trabajador (The Working Boys' Center) in Quito, Ecuador helped me come to value language as a tool for human connection. Lack of shared language resulted in barriers, whereas developing my language skills in Spanish or the English skills of my 6 year-old or 60 year-old students resulted in bridges. For example, one of the classes I taught was "nivelación," which basically means "leveling." It was part of the special education program and helped students who were only just starting school get caught up to their appropriate grade level. My sole student was a nine-year-old girl named Jocelyn¹. At the beginning of the school year, she had not had any

formal education and did not know the alphabet, let alone how to read. As a result, she was incredibly shy.

Jocelyn and I worked together every morning, first on numbers, letters and sounds, later progressing to basic arithmetic, words and sentences. By the end of the year, she was flying through fluency practice in reading. As her language skills progressed, so did her social skills. Jocelyn came out of her shell and was able to express her silly, caring, and sometimes sassy personality both through writing and speaking.

When I came back to visit the following year, Jocelyn was in mainstream class with students her age, and flourishing. She was so proud to show off what she was working on in school and to introduce me to her new friends. Jocelyn's language development helped her connect to the world around her, and being part of her development helped me glimpse the transformative power of education more broadly and language more specifically.

Formalizing my inquiry

Until last year, I taught at a charter network in Denver, Colorado, where our mission was to “transform urban public education by eliminating educational inequity and preparing all students for success in college and the 21st century.” In our effort to eliminate educational inequity, we identified a problematic and persistent gap in success between multi-language learner students (MLLs) and non-MLLs. Closing this gap was set as one of our school goals.

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The work was slow at first. Even though I'd been taught to write language objectives in my teacher preparation project, it didn't prepare me to use them on a daily basis in my classroom. After some explicit instruction from Corrie, an administrator at our school with a lot of language expertise, I spent half the year just working on writing language objectives for each day's lesson. Many days, they were not rigorous enough or too vague for students to know if they'd accomplished them. But at least we were thinking about language; it had moved to the forefront of our minds in planning and instruction.

Steps in a circle are still steps

Having worked with the same teaching partner for three years made this possible. Another biology teacher at my school, Gray, and I were engaged in inquiry through our work as Knowles Fellows. Although teacher inquiry looked different for each of us, we both focused on language development and equity in our classrooms. Having already spent a few years refining content in our curriculum, Gray and I were able to pivot toward this specific area of our practice. We would not have made so many adjustments or come to value language support and practice as much if we weren't both committed to the language development of our students and willing to make mistakes along the way.

The simple move of adding a language objective slide to every day's presentation focused our attention and thinking. Sometimes we were able to find the point in the lesson where students would demonstrate a language skill that would help them master the content. For example, a content objective that asks a student to explain a process is likely going to require sequence words. An objective in

argumentation is going to require complex structure including evidence and justification. If we weren't able to come up with a language objective that students would need to engage, our lesson needed restructuring.

I was thinking about the language skills students needed to access content and demonstrate understanding, but I hadn't given students nearly enough support and practice in doing so. I was assigning vocabulary practice as homework each week, but not scheduling time in class for them to try out the new words and get feedback. I was asking my students to write and speak more frequently, but not giving a diversity of scaffolds to help all students access those tasks.

In one instance, Gray and I redesigned a writing assignment we'd done the previous year. We wanted to integrate evidence from several activities into a scientific argument for natural selection as a force of evolution. We added sentence stems and word banks, and we did a lesson with a writing workshop. When the assignments were turned in, it was clear that students had not had the opportunity to process each separate activity in writing, and thus compiling them all together was a flop. Meanwhile, the gap in test scores between MLL and non-MLL students still persisted. I had a long way to go in creating equitable access to opportunities to learn in my classroom.

The iterative nature of inquiry

In year two of this work, I was in my fourth year of teaching. I now had the capacity to dedicate even more focus to supporting these students, and more space for inquiry into my own teaching and learning in my classroom. I still wanted to increase student access to opportunities to learn, so I looked at student participation in group work and immediately found that my MLL students were participating at lower rates in both group and class discussions. Knowing that practicing language results in language development, and talking results in making connections and learning, I decided to focus on "fixing" that problem. Here is where things got messy. Supporting my MLL students in furthering their language development, scientific skills, and feelings of belonging is much more important and urgent to me than tediously identifying which activity, practice, routine, structure, or teacher move is most effective. So Gray and I tried every strategy that was recommended to us, plus some that we invented. We restructured

vocabulary instruction by preloading important vocabulary for the day's lesson and giving students practice right away in using it. One of my favorite tools became the whip-around, where you prompt students, "Which word from this definition do you think is most important in understanding the term?" There is no right answer, just a chance to reflect and share.

Those strategies were just the beginning. Gray and I added more games to class to make vocabulary fun, like QuizletLive and HeadsUp. We added language scaffolds to almost every writing prompt, ranging from fill in the blanks to sentence stems to just bolding keywords. We asked for structured output for turn and talks. Sometimes there was a keyword students should use or an academic phrase that would help narrow their thinking. We started giving MLL students different short answer prompts on assessments that had appropriate scaffolds. These prompts might have pictures or be broken into several smaller questions. I was also still trying to get MLL students to participate more in group work, so I included more roles and sentence stems in tasks.

From school goal to student-focused

Gray and I tried to tackle language use from so many angles that some days I felt I'd tied myself in knots. The other confounding factor is that, fortunately, my students are not test subjects in an experiment; they are humans with goals and emotions and challenges.

Last year, I developed a close relationship with a student named Marina, who only shared two times with the whole class, but with whom I spoke at length every day (in Spanish). Over the course of the year, both her science and writing skills soared. She earned the biology course growth award for Trimester 2, and her final grade was 20% higher than her trimester 1 score. At the end of the school year, she was sharing in English when students turned and talked with partners, consistently producing quality writing, and learning independently. No student took as detailed notes as Marina did.

Marina was clearly seeing success and felt like a powerful learner. I spent 20 minutes interviewing her on her experience with language development both in and out of my class, but at the time, I still could not pinpoint what had been most helpful for her. Was it just that her language had progressed at a normal rate? Did she just like me as a teacher? Was she working particularly hard at her

language skills? At the time, I wondered if the things we'd tried in class had really been helpful.

A pivotal moment for Marina took place during this year's Climate Change Summit in class. To prepare for the summit, students worked in groups to read and analyze a variety of articles. Then, during the summit, each student assumed the role of a particular stakeholder and was responsible for conveying their perspective. Marina was a representative of the Center for Disease Control (CDC).

Throughout the year, Marina pleaded with me, with both her eyes and her words, to not call on her in front of the whole class. I knew that speaking in front of that many people brought her anxiety, as her speaking skills were not as strong as her reading, writing, and listening. The other times I'd gotten Marina to share in front of the whole class, she had only put together very short simple responses. I knew she needed more practice speaking than in any other area of language.

However, before the summit, Marina wrote down her prompts and beautifully crafted responses, complete with references. Instead of asking another group member to present for her, as she often did, she confidently and competently presented her claim that increased disease is going to be an effect of climate change, and the world summit should make commitments to mitigate it. It was a quiet victory, but I know it affected both her academic and social confidence. She was beaming afterward. It was probably my proudest moment as a teacher last year.

This was different from my experience with another MLL student named Andres, who had struggled throughout his educational experience. He was not doing well academically at the beginning of the year, so we asked his family for a meeting. In that conversation, his parents shared that he often needed a little extra help moving through tasks, and he explained that because he struggled to build relationships with teachers he often didn't ask for the help he needs. They also shared that Andres had had intervention meetings every year at our school and nothing seemed to "click," both for him and for his teachers.

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I worked on getting Andres to open up; we even shared some games of Super Smash Bros on his Nintendo Switch. But language development was not his only challenge. He also needed help with soft skills: “What does productive studying look like?”, “How do you keep track of assignments?”, “Why is consistency important in school?”, and “How can you build confidence in your skills and in talking with teachers?”

Andres failed my class (and most of his other classes) the first two trimesters of the year. As a result, Andres was put on an academic contract he designed which, if met, would allow him to pass for the year. Teachers agreed to check in with him during every single class and intentionally celebrate each one of his successes. As of this writing, Andreas has passed our most recent test with an 85% (his highest so far) and told us he’s feeling confident and engaged.

Sharing what I’ve learned

Language development looks different for each student because it is couched in their own identities. Are they a student that always speaks a different language at home? Sometimes? What else is affecting their opportunities to learn?

At this point in my inquiry, I do not have many evidence-based conclusions to share, other than the fact that when I think about and plan for language development my students’ opportunities to learn increase. On the last biology final, the gap between MLLs and non-MLLs decreased from about 10% the previous year to only 1%. Although these results are not from a large sample size, and probably not statistically significant, they were certainly significant for those individual students.

What I do know with certainty is that no student is going to learn in my class unless I have a relationship with them. Jocelyn would not have learned to read if

she didn't trust me. Marina would not have shared with the whole class if she didn't know how much I believe in her. Andres would not have changed his outcomes in the classroom if he didn't know how much we cared about him. All students have challenges that they bring with them into my classroom, and students who are learning multiple languages usually have previous experiences that make it even more difficult. I will continue to collect data and try to refine my instruction, but forming relationships will always be the heart of my teaching.

A few months ago, Corrie asked Gray and me to run a professional development session for our staff around language practice and supports in our classrooms. We were both a little hesitant because we feel like novices in this work; all we did, we thought, was implement the resources she had given us. But by sharing why we feel language development is important to teaching content and describing how we made it work in our science classes, our colleagues were able to see the potential benefits of making small adjustments to their plans.

Although some days I feel like an imposter confronted by an insurmountable challenge, overall I feel like we are learning how to use language as a tool for making connections, developing content knowledge, and building relationships.

¹ Student names are pseudonyms to protect privacy.

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