Five-Step Process: Step Four
by Bill Crombie and Aidan Soguero

Willard Van Orman Quine, prominent American philosopher and inspiration to Bob Moses during his years at Harvard, said mathematics was a result of the regimentation of ordinary discourse: “A progressive sharpening and regimenting of ordinary idioms: this is what led to arithmetic, symbolic logic, and set theory, and this is mathematization.” Quine believed mathematics was developed by discursive innovations that made ordinary languages into more precise and formal languages over time. Mathematicians learn to speak conceptual and symbolic languages that no one speaks as a natural language. The immediate benefit of regimentation is that it defends against the pitfalls of ambiguity and vagueness characteristic of natural languages. The ultimate benefit of regimentation is that it bridges the gap between lived experiences and individual intuitions, on the one hand, and mathematical notations and collective concepts, on the other.

Madeline Muntersbjorn is an Associate Professor at the University of Toledo where she teaches symbolic logic and philosophy of science courses. She has a deep fascination with the history of mathematics, as well as artificial languages, or languages that, rather than occurring spontaneously, are (Cont’d on page 6)
Empowered Teachers Empower Students: A Conversation with a Professional Development Specialist
by Aidan Soguero

“A newscast, on every TV that says, ‘Parents: Stop telling your kids that just because you weren’t good at math, they don’t need to be either.’”

That’s what Victoria Doctor envisions could brighten the future of equitable math education. She’s not joking. Victoria is a consultant with the Algebra Project, currently providing professional development support with teachers at Confluence Academies in St. Louis, Missouri. She also teaches at Fusion Academy Buckhead in Atlanta; an independent school where, in her one-on-one lessons, she teaches 6th through 12th graders everything from algebra to computer coding.

Victoria was first introduced to the Algebra Project and the Young People’s Project in 2015 while majoring in mathematics at Spelman College in Atlanta. She was preparing a research project in abstract algebra when a family member involved in the Project, unbeknownst to her, began to recruit her as a College Math Literacy Worker (CMLW). Victoria wasn’t sold. She was pursuing a promising academic career in research mathematics. A math literacy initiative that focused on fostering teacher professional development seemed far removed from her own educational and career goals as she herself had never expressed any interest in teaching. Nonetheless, she agreed to an initial meeting to discuss a short summer gig with the Project.

Recalling that first meeting, she remembers being introduced to Bob Moses, Bill Crombie, and Greg Budzban. Each would have a profound effect on her, the throughlines of which remain evident to this day.

Bob, the late founder and president of the Algebra Project, introduced her to a new culture of classroom teaching. “The culture was just so welcoming and you couldn’t tell who was the teacher and who were the students. I had never been interested in becoming an educator. The Algebra Project made me want to become a teacher.”

Bill, Director of Professional Development at the Algebra Project, was quick to notice her potential. He encouraged her to apply for the competitive Woodrow Wilson Teaching Fellowship. The fellowship is designed as a three-year Master’s degree program, partnering with universities to train soon-to-be teachers in STEM education.

“Bill pushed it really hard. He told me to get my master’s and train alongside other Woodrow Wilson Fellows. Their curriculum aligned really well with the Algebra Project’s.”

She was one of 63 aspiring educators to receive the fellowship in 2017, earning her Master of Arts in Teaching Secondary Mathematics from Georgia State University.

Greg, who has been active in curriculum development with the Project since 2001, now works alongside Victoria at Confluence. The pair recently facilitated a Summer Induction, after working closely with Confluence teachers the past semester. Next school year will be the first implementation year for Algebra Project classrooms in the St. Louis school.

“So, what I'm doing with Greg, I'm acting as an Experienced Teacher. Where he's in charge of the curriculum, I'm helping the teachers come up with different creative ways to implement it with the students.”

She notes the importance of the Experienced Teacher role in situations like this. For Victoria, it was her own work as a CMLW and seeing with her own eyes the impact the Algebra Project had on students that convinced her to join the team. For many teachers, when an Algebra Project PD Specialist arrives, it is their first ever brush with the unique pedagogy.

“They didn't get the introduction that I got, so they need heavy support on like, ‘okay, this is what we did, this is why we did it.’”
Throughout her time as a PD Specialist for the Algebra Project, Victoria recalls common obstacles when working in schools. The Algebra Project serves underserved schools that are struggling, and when teachers are used to hearing about new fads and techniques in the professional development space, it can be hard to cut through the low signal-to-noise ratio resulting from programs coming and going each year. Often with teachers, the first hurdle one can face is cultivating buy-in.

“Teachers unfamiliar with the Algebra Project are often like, ‘My kids aren’t gonna get that.’ You can face pushback, where they’re like, ‘I’ll try it, but I’ve been teaching for ten years and it’s not going to work.’”

Victoria hasn’t yet found the perfect response to alleviating this skepticism. Her current strategy is the same one that convinced her years ago: You have to see it to believe it. Teachers, hungry for new techniques to help their students despite their own reservations, bring the pedagogy into their class with an open mind and often surprise themselves with the results.

“Once they give it to their students, that’s when they really realize, ‘Oh, they do understand this.’ And they get very shocked. The kids are engaged. The kids are trying. That kid that probably wasn’t paying attention before is interested in doing the Road Coloring activity and talking about why they decided to color it that way. It opens the door for a lot more communication. And it is less teacher-centered, it’s more student-centered, so the kids kind of have no choice but to participate.”

While a healthy dose of skepticism is common, it isn’t always the case. At Confluence specifically, Victoria has noted teachers who are immediately excited to experiment with what they’ve learned during their PD session. One teacher in particular, she recalls, who, even during the months of learning curriculum wherein teachers are not required yet to use it in their classrooms, was already implementing different lesson plans and trying the pedagogy with her students. Victoria has an idea as to why that might be: “She read Radical Equations.”

Radical Equations: Civil Rights from Mississippi to the Algebra Project is a 2001 book co-authored by Bob Moses and Charles E. Cobb, Jr. which details how the Algebra Project came out of the 1960s voting rights movement in Mississippi, and explains the unique Five-Step Curricular Process Bob developed which is used both in classrooms to teach students, and in PD with teachers. It’s the same curricular process Victoria first learned as a CMLW in 2015.

Even outside of teacher professional development, Victoria finds herself using the Five-Step Process in her day-to-day life. Most notably, in her work developing unique lesson plans for her students at Fusion. She noted a recurring theme when it comes to why kids complain about not being able to learn math.

“You have science where they’re doing experiments. Even in elementary school, you’re doing experiments in science. And with English, they get to write these creative papers and they get to analyze and talk about their perspective on a reading. But with math, it’s like the teacher says this, I need to write it down. And if I don’t do it the exact same way they do it, then I’m wrong. There’s no real flexibility. So, that’s the major pattern.”

She knows that the Five-Step Process can’t be perfectly implemented in her instruction, since it relies so heavily on group activity and her lessons are one-on-one, but she creatively uplifts what she views as its two most important bulwarks, its flexibility and its emphasis on everyday language. She wants her students to use their own, natural language to discuss the classroom material and to give them latitude in choosing what helps them best understand the concepts.

Outside of working with students, the Five-Step Curricular Process has been an important professional development tool for her. Teachers themselves have different learning styles, something the five steps of the process aim to incorporate through a combination of physical experience, visual application, and dialogue. She recalls times when teachers, focused on discussing technical aspects of mathematics, inadvertently left their colleagues behind who weren’t as comfortable with the depth of the discussion. This is why, prior to Step Four: Feature Talk, the Five-Step Process utilizes People Talk, which serves as a more accessible on-ramp to technical discussions.

Even before the People Talk portion, the Five-Step Process exploits drawing as a learning tool in
Step Two: A Picture/Model.

“It can be frustrating to collaborate when one doesn’t understand the terminology their peers are using and the hints that are given to facilitate the conversation forward. The other teachers are helpful in terms of explaining their thought processes in different ways and also giving the other teacher the opportunity to turn the discussion into an abstract drawing.”

Victoria’s aim during these sessions is that teachers come to have the same faith in their students that she has in them. She says she is proud of how hard she sees teachers productively struggle and hopes that it convinces them their students will be able to do the same.

“Everyone is capable of learning. You know, everyone should be able to have a chance. It’s all about equity, not equality. Being an educator, it is your responsibility to come up with a way for your student to get that information. It can’t always be traditional.”

It’s hard to imagine Victoria in a role other than teaching. Her aspiration for everyone to understand mathematics is palpable and she wears it on her sleeve proudly.

“I’m very passionate about people learning math and not writing it off as something that (only) ‘smart people’ get.”

Over eight years have passed since she met about working over the summer with the Project and she is as hopeful as ever that, given the right tools and resources, every student and every teacher can find success.

Statement from Executive Director
Ben Moynihan

Bob Moses and the students, teachers, parents, researchers, and activists that launched the Algebra Project in the 1980s and 1990s lit a pathway of shared struggle to create educational and economic opportunities for young people that the nation has been too ready to leave behind. The bedrock the Algebra Project is built upon is Bob’s vision for and with young people: that all students, particularly those in underperforming public schools in Black, Latino, and low-income communities, are given the opportunity to empower themselves and to pursue the mathematics literacy required for full participation in the civic life of the nation. On June 2nd I was voted in as Executive Director by the Project’s Board of Directors. I’m grateful for this opportunity to lead the Algebra Project as we work to realize the next phase of our mission.

I met Bob and Janet Moses, and two of their four children, Taba and Malaika, at a civil rights movement history conference at Dartmouth College in April of 1989. Having just returned from six months of study of West African Djimbé drumming at the National Conservatory in Dakar, Senegal, I recognized Bob’s name in the conference agenda – he was presenting about the Algebra Project with Jeff Howard of The Efficacy Institute – as Bob featured prominently in a book by Sally Belfrage, *Freedom Summer*, that I was reading upon my return to the States. The rich musical and cultural wealth I witnessed in Dakar inspired me to seek a greater understanding of U.S. history and my own history as an African American multiracial adoptee, as a musician, and as an educator.

After that initial meeting, Bob graciously invited me to participate in a Student Non-Violent Coordinating Committee.
25th reunion in Berkeley, CA in June of 1989. Over the next couple of years, while I gave presentations in K-12 schools on the continuities in African Diasporic music from West Africa to the U.S., I also had the opportunity to visit Bob and Janet’s family and meet the team that launched the Algebra Project with him – Bill Crombie, Cynthia Silva Parker, Jacqueline Rivers, Maisha Moses, Alan & Michelle Shaw, Phil Howard, Cesar McDowell, Alvin Poussaint, Vida Gaynor and folks that were instrumental in the early growth of the Project at the King Open Program at the MLK School on Putnam Avenue: Lynne Godfrey, Lena James, Marshall & Poppy Milner, Liberty Rashad, Les & Shirley Kimbrough, Omo Moses and his friends Khari Milner, Basonge James, Karimu Rashad, Derrick Kimbrough, and many more. Bob and the folks he organized with modeled a commitment to proactively create educational opportunities in which young people would empower themselves, and thereby change their lives, their communities, and the country. Their dedication inspired me. Their tireless devotion to students and their families, teachers, and schools envisioned a world of larger shared purpose, one in which all students are valued and given the resources for full participation in the democratic life of the nation.

In the fall of 1991, Bob asked me to join the Algebra Project team to develop an African Drums & Ratios Curriculum for 4th and 5th-grade students. By ’93, I met the people who would help grow the Project nationally, such as Dave Dennis and the Positive Innovations/Southern Initiative Algebra Project team who organized in the South. Or, Jim Burruss of McBer/HayGroup who structured our initial Training of Trainers program. And, evaluation researchers Frank Davis and Mary West were crafting groundbreaking research studies of the Project’s work, and at the same time in Baltimore, Chicago, Indianapolis, Jackson and the Mississippi Delta, Los Angeles, Marlboro County in South Carolina, Milwaukee, New Orleans, New York City, San Francisco, Oakland, and in Weldon, North Carolina sites were percolating and maturing. Since that time, the Project has worked in schools around the country, designing math education strategies with teachers, school leaders, parents, and researchers focused on what to teach, how to teach it, and how to assess it so that students are learning and enjoying math.

Across our three-decade history, we and our allies have developed new teaching materials, research collaborations, and professional development programs which have paved the way to a tangible articulation of math literacy: students gaining the ability to read, write, and reason with the symbol systems of mathematics. The Project has demonstrated that all young people CAN succeed in Algebra, take higher-level math and science courses in high school, and be prepared for college-level mathematics without remediation, whether students then choose a post-secondary education or embark in careers.

As we open the third decade of the 21st century, one of the biggest determiners of students’ post-secondary success in college or careers is how much mathematics education students receive in high school. This spring we were disheartened by the results of the 2022 National Assessment of Educational Progress report, which showed that only 8% to 11%, respectively, of Black and Latino students were proficient in mathematics by Grade 12. Unfortunately, these results have not seen significant change for far too many years, and the COVID-19 pandemic and the additional pressures it brought upon schooling have only exacerbated these challenges. Further, the June 29th U.S. Supreme Court majority ruling that race-conscious affirmative action in the admissions processes of elite state and private colleges and universities is now unconstitutional, thereby reversing more than 40 years of judicial precedent, once again makes plain that a federal guarantee of quality K-12 public school education for all children living in the country is required to level the playing field of opportunity in higher education.

In the face of these persisting and disturbing results, we remain focused on enabling teachers and school leaders to expand the number of students who have access to quality mathematics content and instruction. We have seen the needle move in school districts and have developed robust strategies for how to further increase our impact with schools. The teachers, researchers, and community leaders I speak with each week share that the most basic need in their schools is consistent access to an experiential and job-embedded approach to teacher professional learning and to increase teachers’ capacities for creating productive classroom cultures that maximize opportunities for students to excel in high-level mathematics.

In the months ahead, our small, dedicated team will continue carrying a heavy load to detail pathways for addressing these needs, including the development of technology-enhanced experiential learning tools to reach more students and teachers...
face-to-face and virtually, as well as the creation of a cadre of professional development specialists to coach teachers in the improvement of their instructional practices. Bill Crombie, who joined the Project in 1990, is the Director of Professional Development and continues to lead our teacher professional learning programs. He also is innovating a new pathway to high school Calculus through our Accessible Calculus Project. Edwige Kemegne is the Director of Finance and Accounting. She joined the Project in 2011, anchors our fiscal operations, and is centrally involved in our strategic planning for future growth. We are fortunate to have a cadre of specialists consulting with us on research and evaluation, teacher professional learning, curriculum development, and communications, including Frank E. Davis and Mary M. West, Nell B. Cobb, Marian Currell, Sara Weinberg, Greg Budzban, and Aidan Soguero. Our seven-member Board of Directors provides oversight and, with a wide range of expertise and experiences, advises our staff leadership team on our way forward: Khari Milner, Chair; LaDon Love, Vice Chair; Herbert Brown, Treasurer; Margaret A. Burnham, Clerk; Danny Glover, B.J. Walker, and Courtland Cox.

We honor the many people since the early 1980s who have been instrumental in the evolution of the Algebra Project’s mathematics literacy work and upon whose shoulders we now stand. Together with our fantastic team of staff, consultants, and our Board, we are continuing to pursue the path that our founder Bob Moses blazed. We’re collaborating with school communities, students, teachers and school leaders, researchers, activists, and allies to ensure that students in underserved K-12 public schools can make a demand on themselves, their teachers, schools, and the nation to ensure that they gain the mathematics proficiency required for college, careers, and access to full participation in 21st century society.

**FEATURED**

*(Cont’d from page 1)* developed to serve specific purposes.

“Feature talks or artificial languages are intermediaries between spontaneously spoken languages and mathematical formalism. There’s something about the process of mathematization that is artificial. But also strategic, right? There’s something about artificial languages as a class of languages in that they’re deliberately constructed rather than spontaneously occurring forms of expression.”

In the first three steps of the Five-Step Curricular Process, the only focus is on ordinary language. The kind you, me, and everyone else across the globe speaks. The abstract formalization of mathematization is intentionally postponed for a longer period than in a traditional math classroom. However, in early stages of “people talk” what is brought to the forefront and facilitated by teachers is the interpersonal negotiation of ideas between students.

In Step One: A Shared Physical Experience, students all partake in a shared, concrete event. It can be a bus ride, a walk, a trip on the subway, or anything else with meaningful mathematical features. They are instructed to note, to whatever degree makes sense to them, the details of the event. In Step Two: A Picture/Model, students model the event in photography, drawings, or 3D. At this juncture, it is not just important that they are now making internal connections about how to connect a physical experience to a diagram, but that they do so in a way that will be understood by their peers. In Step Three: People Talk, they discuss their findings in small groups, trial-and-error whether their descriptions and models are intelligible, and work together to create a conceptual framework that can describe their experience in a way that avoids confusion.

These steps are important in cultivating ideas, giving students ownership and agency over their learning, fostering collaboration and investment in each other’s growth, and creating a space that is comfortable and culturally responsive. But it serves another purpose as well: revealing how the languages of mathematics require a shared consensus of meaning and a shared regimentation of how to use those languages.

Madeline has written and presented on Step Four: Feature Talk.

*Bill Crombie, Bob Moses, and Ben Moynihan in September 2020, at a Moses Family gathering, Cambridge, MA*
She, like Quine, believes mathematicians learn to speak specialized languages wherein Feature Talk is an on-ramp between ordinary dialog and fluency in the symbol systems of mathematics.

Not herself a math teacher, she differs from others versed in the Five-Step Curricular Process as she taught herself the material through written sources, rather than through Algebra Project Professional Development Specialists. In her exploration of the history of the philosophy of mathematics, making her way from Plato to Bob Moses, she developed a particular interest in Feature Talk.

She was a presenter at the July 2022 We the People – Math Literacy for All conference, co-hosted by the Algebra Project, where she presented on the Algebra Project as a philosophy, explicating the intellectual heritage of Bob Moses who encouraged students to approach mathematics through real-world experiences. In November 2022, she published The Algebra Project, Feature Talk, and the History of Mathematics which outlines the unique intermediary language of Feature Talk as it bridges between natural languages and symbolic representations. And this July, she is organizing a panel on Artificial Languages in the History of Science and Mathematics where she will be speaking about Feature Talk at the Congress on Logic, Methodology, and Philosophy of Science and Technology.

“It's like the philosophy of science Olympics,” she tells me, as the Division of Logic, Methodology, and Philosophy of Science and Technology organizes a conference every four years, internationally and in collaboration with hundreds of presenters.

Talking about math for an extended period can be difficult for the average person. Talking about the history and philosophy of mathematics may be even harder. For Madeline, it’s a professional passion.

In describing what mathematics is, something contemporary mathematicians still debate, she says, “There are many ways to philosophically describe mathematics and some people want to say that math is discovered, like it's somehow out there waiting for us to uncover it, and other people want to say no, mathematics is something we make up as we go along. And in my view, these two extremes – though they've battled it out, pro and con, for several centuries – are not exhaustive of the possibilities because, and this is where I think what Quine said is so interesting, there's no discontinuity between our everyday experiences and our mathematical activities. Our mathematical activities result from the refinement or regimentation of our ordinary activities.”

A formal logic classroom, she points out, has many parallels to a math classroom. “In my assignments, I always say, here's informal English, let’s put it into formal English. Then after formal English, put it into symbols, because there's a continuity there. It’s important for students to learn that the logical symbols are abbreviations of the formal English, not the ordinary English. One of the examples I use that would've made sense to Quine because it's in first-order predicate logic, his preferred language for modeling the natural sciences, is to say “all lobsters are red.” And then to put that into formal notation, you would first say something like, “for all X in our domain, if X is an L, where Lx is “x is lobster”, then X is also an R, where Rx is “x is red.” But that's so much longer than saying “all lobsters are red.” And yet the formal English can be condensed into a symbolic package very neatly: (x)(Lx ⊃ Rx).

Eventually, students begin to see how conditional statements about one-place functions do the work that categorical statements did when we were conversing in ordinary language.”

This type of universal conditional statement is common in everyday language as well as abstract mathematics. Both, ‘For all students, if you study diligently, you will get good grades’ and ‘For all real numbers X and Y, if X is positive and Y is negative, then the product of X and Y is negative’ are both examples of universal conditionals.
Madeline believes this is an example of ordinary language made extraordinary: “We domesticate the wild relations around us by being more precise in our use of ordinary language. I sometimes think of Feature Talk as ordinary language being put to extraordinary uses, or ordinary language subject to additional constraints, rules, conventions, and stipulations.”

Madeline has her own go-to example of people talk versus feature talk, “In ordinary language, you take a word like large, it's very vague. How large is large? Depends on what we're counting, right? Even a small number can be large depending on what we're counting. If we find that 1% of all people have some dreaded disease, that's too many people, that's a large number. Whereas if we discover something like 1% of learning permit holders need to re-take their driving exam, that's a small number.

“It's the same number. It's 1% in both cases, but whether it's large or small depends on what we're counting. And so that is part of what the regimentation is supposed to do. It's supposed to be more precise about terms like large, that are inherently vague or have fuzzy borders.”

The importance of the Feature Talk step is not only in the benefits of regimentation but also by regimenting intuitive language, it helps make the regimentation more accessible. In being explicit about what ordinary activity or understanding is being encoded in subsequent abbreviations, the abbreviations become a tool instead of a riddle.

Madeline explains how students often already come to the table with a certain implicit understanding of science and math concepts. “One of the more famous equations, $f = ma$ or force equals mass times acceleration, is the symbolization of something people already kind of know. If you say to very young people, would you rather be hit with a pillow or a brick? Would you rather it fall from a short height or a tall height? Their answers reflect people’s intuitive understandings of force; even though it’s a technical and scientific concept, people have an implicit awareness of how much relative oomph there is in one kind of collision versus another.”

Feature Talk can serve as the bridge between the implicit understanding of how the world works shared by young people, and the regimentation of symbolic representation and procedural computation developed to describe and explore it. But this artificial language defined by its precision can become tediously lengthy. One must make sure they use precise words but also capture all the salient mathematical features of the event in such a way that there is no room left for ambiguity or vagueness. This often leads to sentences with multiple subjects and myriad predicates. And so, in order to retain that necessary precision but shorten the expression length, symbolic abbreviations are implemented.

“Symbolism is mostly a process of abbreviation, but one that we're led to as a consequence of being more precise. Because when you try to be more precise, you end up being more prolix, but in order to fit big ideas into small spaces, we use symbols to pack those ideas into shorter expressions.”

The symbolic representation we're used to seeing on the first day of Algebra I classes is the last step in the Five-Step Curricular Process for a reason.

“You can teach mathematics in a top-down, axiomatic way: Here are the abstract axioms, let's see what follows. It's just that when you adopt that pedagogy, you're going to appeal to a smaller subset of the student population than if you had a pedagogy that starts from concrete experience and works its way towards the abstract notations. And I think that's important because what it suggests is that there's not only one unique right way to teach and learn mathematics, but there are more or less effective strategies that bring more people along with the process.”

Showing students the end product of an ordinary event spoken about in ordinary language, made more precise by discussing its features, and then abbreviating those features in symbols, often does not make sense unless they too follow that same trajectory. Even students who are gifted at manipulating and memorizing the computational formulas of mathematics frequently don’t understand the concepts involved.

Madeline recalls walking across campus one day when she overheard students returning from Calculus discussing delta $x$ as the limit goes to zero. One of the friends was insisting on how important the limit was, how his friends needed to know about it, but also how they didn’t need to understand it in order to do the homework.

“I remember thinking, oh, I wish I could stop and interview him because he's trying to get at something really important about the relationship between concepts and computation.
It is possible to learn to follow algorithms or enact procedures without having a full grasp of the concepts that underpin the procedures.

“But when you learn math that way, as arbitrary abstract rules without conceptual understanding, it doesn’t stick. And that’s one reason why somebody can graduate from high school with the scores on the test they need to get into college. But then by the time they get to college, which might be months or years later, computational rules without conceptual understanding hasn’t stuck with them.”

The purpose of the Feature Talk step then is that by retaining the continuity between People Talk and Symbolic Representation, the conceptual understanding sticks with students.

For Madeline, "Feature Talk is more precise and rigid. It's very wordy. And this then makes it more natural for students to embrace abbreviations. Like, do I have to use this entire sentence? And so I think that, especially in formal logic, what I notice is that students can’t grasp the symbolism because they’re looking for a direct match-up from ordinary language to the symbolism. And there’s not a direct match-up because the symbolism is not an abbreviation of ordinary language expressions. There's this intermediary language. You have to learn to speak the intermediary language before the abbreviated symbols make any kind of sense. So for me, where a lot of logic textbooks will say, 'Here's the symbols, put it in natural English,' I say, here's some natural English. We must put the natural language into an artificial language before it can be put into symbols."

In this way, the Five-Step Process emulates the way these symbols and formulas came into existence and does not just give students the end results with instructions to memorize them.

Madeline goes on, “By starting with a shared experience and then moving from Picture or Model to People Talk, to Feature Talk to Symbolic Representation, by the time you get to symbolism, you can do the computations and have the conceptual understanding that’ll make those algorithms and procedures stick around, right? Because they will become a part of your overall understanding of the everyday experiences of things like functions, relations, properties, individuals, and variables.”

These foundational aspects of Feature Talk, which are meant to be built upon and later subjected to greater regimentation via symbolic representation, are only the beginning. They open up an intuitive pathway to an exponentially greater level of complexity.

Returning to the red lobsters, “The lobster example is a fun one to use for logic class because, first of all, most American lobsters are brown and only turn red when cooked. Second, there are blue lobsters. They're rare. They're an exception to the rule. The rule does not universally hold. So then we can introduce the existential quantifier and say there exists at least one X such that X is a lobster and X is blue. And then you get to show them the rare blue lobster and everybody’s like, whoa, wow, I had no idea. Because most people have no idea. But then you can get at this idea of contradictory statements, only one of them can be true: Either it's true that all lobsters are red, or it's true that there's a lobster that's not red, but not both. And similarly, if all As are Bs, if that's true, then it's not true that there is an A that's not a B. And if it's true that there's an A that's not a B, then it's false that all As are Bs.

“It looks like a simple example on the surface, but it's not because the question for all natural kinds is, are we carving nature at the joint? Or is it just a fiction that things can be carved up in this way? In terms of color perception, we know certain wavelengths correspond to what we call red, but there are also different languages for different color words that divide the visible spectrum in different ways. But the advantage of wavelengths, of course, is that they allow people from different cultures to talk about the same phenomena, independent of their natural language, which might not share the same color names.”

This gets to the heart of the Feature Talk step. Despite cultural differences, differences in perception, and different languages, Feature Talk leads to a shared modality in which people can communicate ideas scientifically, across cultural divides, and which serves a great communicative purpose.
Gus Newport, Former Algebra Project Board Member, Passes Away  
(1935 - 2023)

Gus Newport, an Algebra Project Board Member from 2005 - 2006 passed away Saturday, June 17th. A lifetime activist, Gus had a long and impressive organizing history. Algebra Project Board and staff members spent time sharing stories of him during their June Board Meeting. You can read about his life in his obituary.

Summer Induction Held at Confluence Academy

Confluence Academy in St. Louis, Missouri recently wrapped up their first Summer Induction. After month of working with Algebra Project Professional Development Specialists, Summer Induction is an important benchmark where teachers and students meet to work on the curriculum. Next year, Algebra Project curriculum and pedagogy will be implemented in classrooms at the Missouri school.
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