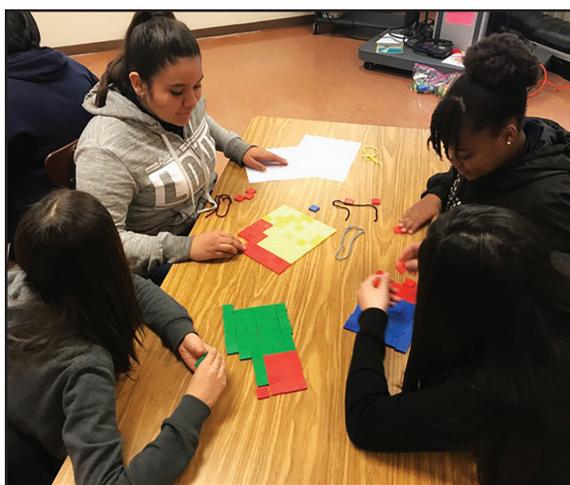# Soleado

Promising Practices from the Field

Fall 2018

Developing Reasoning and its Language in Secondary Mathematics Instruction

by Jeff Zwiers, Researcher—Stanford University

Language grows the most when it is used to share and build complex ideas—ideas such as the concepts and claims that result from high-quality mathematical reasoning. Most educators would agree that in many classrooms we need to spend more think time and talk time on mathematical reasoning. The problem is, when you get into the real weeds of lesson plans and pacing guides, the first thing to get squeezed out, more often than not, is reasoning. The purpose of this article is to emphasize the need for increasing the instructional time and energy around reasoning and its language, with a particular emphasis on student conversations as vehicles for doing this.

Student conversations support the development of reasoning in mathematics.

In my work with teachers and students, I have come to see the need for four overlapping types of reasoning, shown in Figure 1 (pg. 10): deciding what procedures to use, claims, conjectures and generalizations, critiquing the reasoning of others, and representing abstract and complex concepts and ideas. Each type is followed by related prompts that might be used by the teacher or students and sample student responses.

You will likely notice that justification is a major

component in all four types of reasoning. Why? Well, justification is really what puts the reason into reasoning. It is the logical support that strengthens and proves one's claim or idea. Justification tends to come from two sources: (1) mathematical rules and concepts, and (2) the wording or visuals of the problem or situation. Take a moment to think about all the rich language that is needed to address these dimensions. Now think about all the rich language that is developed when students work with others to justify a solution. And yes, these can overlap and intertwine in the very same response by a student. A student might start talking about procedures for solving a problem and why, and then come up with a conjecture and a representation for it.

It's exciting to consider these kinds of responses, but how do we operationalize the shift toward more and better reasoning, given the many ingrained and institutionalized ideas about mathematics learning that focus on getting the right answers as quickly and easily as possible? Shifting from finding the right answer at all costs to using problems and right and wrong answers to support reasoning is a major shift.

This shift also challenges students to use more complex and precise language to explain their reasoning-based ideas. But as

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Supporting Students' Multilingualism with Language-Focused Family Engagement

by Delis Cuéllar, Ph.D., Associate Researcher—Wisconsin Center for Education Research

Introduction

In schools serving students who speak languages other than English at home, language-focused family engagement approaches can work to support educators to recognize and affirm that students' nuclear and extended family members positively contribute to the maintenance of students' home language(s) and consequently their multilingual development (WIDA, 2016). What follows are practices that school staff can implement from a language-focused family engagement perspective on behalf of multilingual students and their families. These practices combat the pervasive deficit outlook that may inform educators' perspectives concerning families that speak languages other than English at home (Baquedano-López, Alexander, & Hernández, 2013). The following schoolwide approaches support this effort: a) staff's critical reflection of their language ideologies, b) educators' openness to learn from families about language goals for their children, and c) systemic support of families' advocacy efforts for their language aspirations.

Critical Reflection of Language Ideologies

Language ideologies are self-reinforcing beliefs, values, and attitudes about language that justify one's perspective on linguistic acquisition, socialization, and communication (Silverstein, 1979). The language experiences of students and families who speak languages other than English at home are often at the center of controversy and understood from a deficit perspective that is based on taken-for-granted language ideologies. One erroneous language ideology is the belief that even parents who do not speak English fluently should attempt to talk to their children only in English for more rapid acquisition. Educators' language ideologies can negatively affect the communication between culturally and linguistically diverse parents and their children and can have a negative impact on students' possibilities of becoming multilingual.

The following questions were created as conversation starters so that educators can share their thoughts and talk about their language-based practices with colleagues in professional learning communities (PLCs). School leaders are encouraged to facilitate these meetings or to designate teacher leaders with a strong social-justice background.

PLC Social Justice Language Ideology Questions

1. What are some taken-for-granted language expectations that may perpetuate an unfair advantage for particular children or families in our education system? Are any of these expectations present in our school or in our classrooms? If so, from a social-justice perspective, what can be done to improve this?

> Taken-for-granted language expectations that perpetuate an unfair advantage for certain families in our education system could include school-to-home communications that are written or verbally communicated only in English at a level that implies that parents are college educated or have specialized knowledge in education. The use of education jargon can make them feel inadequate and excluded. From a social-justice perspective, educators should make every effort to communicate with language-minority families using layman's terms in the language(s) that they speak best.

2. Would it be acceptable to dissuade native English-speaking parents from speaking to their children in English at home? Why is this practice a prevalent one for linguistic-minority families? How can we help this situation be more equitable?

> To dissuade monolingual, native English-speaking parents from communicating with their children in English would seem preposterous. However, in the U.S., language-minority parents are often asked to speak to their children in English, a language that they may not speak fluently or speak at all. This unacceptable educational practice occurs in the name of language-minority children's future academic success. To make this situation more equitable, it is important to realize that the idea that only English is tied to academic attainment is based on an assimilationist perspective that results in subtractive practices for many minority

students. It is in the best interest of language-minority students for adults to address them in the language(s) that the adults speak best, as it is in this language that deeper conversations can occur, which positively impact students' cognitive and academic development.

3. In our teaching practices, do we privilege knowledge that students and families attained in English? How do we empower students to use all their knowledge and languages during instruction or social interactions? How can we include the language practices that students experience with their families in our curriculum?

Throughout the country, language-minority students are actively discouraged from using languages other than English at school. This unfortunate silencing practice communicates to minority children and youth that the language they share with their families is inferior to English and their home language has no place in their schooling. It also makes a wealth of knowledge related to minority students' familial linguistic and cultural identities invalid and unworthy of academic consideration. From a social-justice perspective, educators can affirm students' multiple linguistic and cultural characteristics by exploring the following topics in the curriculum: a) students' favorite language to use with nuclear and extended family members, b) students' knowledge of songs, stories, and rhymes in the home language from their cultural or national background, c) social stratification of languages in multilingual settings, d) linguistic globalization, and e) linguistic revitalization efforts.

Learning From Families About Their Language Goals and Aspirations

Research suggests that existing communication about students' language development between culturally and linguistically diverse families and school officials tends to be prescriptive and narrow in scope (Blair, Cuéllar, & Mancilla, 2017). In schools, the integration of meaningful family input about children's language development is the exception and not the rule. For instance, for many linguistically diverse families, the only way in which they have ever been invited to participate in their children's

Metas para nuestros hijos

Mi nombre es Berenice Campos, soy madre de una adolescente de 13 años y de un pequeño de 7 años. Como madre siempre me he preocupado en tomar las mejores decisiones en la educación de mis hijos y en aprovechar al máximo las oportunidades que se presentan para que el día de mañana sean adultos preparados y competentes para cualquier situación u oportunidad que se les presente. Cuando mis hijos iniciaron su etapa escolar siempre me interesé en que recibieran educación bilingüe. Por ello los inscribí en escuelas que ofrecían este tipo de educación.

Para mí es muy importante el que ellos aprendan más de un idioma porque sé que esto les dará más oportunidades y satisfacciones en sus vidas. Para mí es muy importante que ellos conserven su primer idioma porque eso les recordará siempre quiénes son y de dónde vienen, sus raíces y el orgullo de su cultura; además de que los ayudará a seguir comunicándose con sus abuelos, tíos y otros familiares.

Sé como madre que aunque yo, como primer maestro de mis hijos, haga todo lo posible por que ellos conserven su primer idioma y a su vez aprendan uno nuevo, si no trabajo en conjunto con sus maestros esto no se haría posible. Es por ello que siempre trato de estar involucrada y al tanto de cómo están enseñando a mis hijos y qué temas están tratando. Siempre me muestro ante ellos con la mejor disponibilidad para que los frutos se vean reflejados en el bilingüismo de mis hijos.

Keeping the Spark Alive: Alexandria City Public Schools' Journey to Implement OCDE Project GLAD® Districtwide

by Anna Harvin, Project GLAD® Program Specialist—Alexandria City Public Schools, VA

Alexandria City Public Schools (ACPS) is a small district in Virginia outside of Washington DC. We have a high EL population across the district and a dual language program in which I was teaching when, in 2013, a group of us went to La Cosecha.

We had heard of this conference in New Mexico and couldn't believe we were finally able to go. A preconference school visit to East San José Elementary School changed my life! There I saw teachers with interactive charts they had made and students, just like ours back in Virginia, who could actually use the vocabulary from the charts. The kids were singing and chanting grade-level content! It's not that what we saw was so different from what we were already doing, but it was so much more intentional and more visual.

Teachers plan and create materials during district-level professional days.

We had to know more

That day we were introduced to OCDE Project GLAD®. My co-teacher and I went to every Project GLAD® session at La Cosecha and came back to Virginia begging to get trained. That summer our principal and DL coordinator found enough money to send us to be Tier 1 trained, with the promise that we would open our classrooms to be models for this new approach. We knew we were going to have to come back ready to put all we had learned into practice.

That school year we invited anyone and everyone to see GLAD® in action. We were encouraged to experiment and use GLAD® strategies where we could. The more we incorporated the strategies, the more our teammates wanted us to show them. We had never seen our students so engaged. They were using the language of instruction, showing growth on tests, and demonstrating a deeper understanding of content.

In the 2 years that followed, two cohorts of teachers from our DL program were trained by DLeNM, which provides Project GLAD® trainings under the direction of the OCDE Project GLAD® National Training Center. Everybody was curious and we were huge advocates for the model. "Come in! Just give it a try!" was our rallying cry. That year, an opportunity came to revamp our summer school curriculum, so I used it as our GLAD® playground. We wrote the summer school curriculum as mini-GLAD® units and the teachers were all interested in this way of instructing. "This reminds me why I got into teaching in the first place!" one said. "Can I get trained next?" another teacher asked. We started with eager teachers who showed interest, then we began to systematically train grade-level teams as time progressed. We realized we wanted everyone in the DL program trained.

By the end of the second year, teacher interest was high, students' scores were showing improvement, and when there was an opening for a coaching role, I became the Language Acquisition Specialist focusing on OCDE Project GLAD® strategies for the DL program. As a part of this new role, my training partner and I wrote a 3-year plan for rolling out Project GLAD® in our district. We were hopeful and optimistic.

We presented our plan to our dual language coordinator, the office of English language learners, and our principals. At the same time, more and more people were asking when they were going to be trained. The plan was in place. Now, as we look back on those goals, we realize that we hit every one—even expanding our scope beyond the DL program.

In my role as a coach focused on OCDE Project GLAD®, I have worked hard to get into teachers' classrooms and model. If you can show them how to use a strategy with their own kids, on their own turf,

it immediately makes the strategy feel doable. And doable is what we were after.

Our Keys to Success

Create a spark year. When starting out, select a few enthusiastic, capable teachers to get trained and try out GLAD® strategies in their classroom. Support them, show them off, give them what they need to be successful. Get school administrators trained so they can be on board. Have small whole-staff professional development opportunities so others can find out what the buzz is about.

Promote a risk-taking atmosphere. Teachers have to be trusted to make good educational decisions for their learners and to take risks. If they try a strategy and it doesn't go as planned, they can refine and get better. If they are reprimanded for not doing it perfectly the first time, they won't try again. I knew we were getting it right when I had a veteran teacher ask me to come in and observe her trying something new to see how she could improve next time.

Have programmatic goals. Write them down. Getting 3 years at a time on paper allows you to not only think about the immediate timeline items, but long-term planning for budgeting as well. Have principals and school leaders help create this plan. The 1-day Leadership Ensemble provides principals and other school and district leaders information on OCDE Project GLAD® and what it looks like in action. (Visit *http://www.ocde.us/NTCProjectGLAD/Pages/default.aspx* for more information.) Knowledgeable leadership is important to reach program goals.

Provide the resources so teachers can be successful. Teachers need markers, tape, chart paper, sentence strips, and pocket charts. They also need access to a laminator and a color printer. That's it. No investment in expensive technology, subscriptions, or textbooks.

Offer whole-staff professional development opportunities (even when the whole school hasn't been trained). Many of the Project GLAD® strategies can be chunked into a nice 30-45 minute PD session: engaging strategies to begin a unit, foster student engagement, manage classroom behavior, and/or support student discourse—and (my all-time favorite) the Sentence-Building strand. These are all small tastes of Project GLAD® that everyone can

access, and they provide a great review for those already trained. These minisessions help bridge the divide between the trained and the not trained so that people don't feel left out.

After the GLAD® demo, focus on the doable. I have found that if teachers try a strategy and feel successful, they will try another. Many of our teachers walked out of the 4-day demo with a GLAD® hangover. How can I actually do all of THAT in my classroom? We have helped teachers set the expectations to return to the classroom and try something out. The expectation is NOT that teachers will go back and recreate the demo.

Set up a place to share resources. ACPS uses a Google Drive folder to collect and share strategies and lessons by grade level. While we encourage our teachers to use the existing units for ideas and chants, we often have to make our own materials. Three years into creating our GLAD® folder, we have our own Chant bank, grade-level folders with Picture File Cards, Observation Charts, scanned images of Input Charts, and Expert Texts. Now, when teachers get trained they have access to these resources and can build on what has been started.

Advocate! Have an elevator speech ready on the benefits of Project GLAD® so that when opportunities arise you can quickly and clearly explain what GLAD® is and why it works. When decision makers are talking about providing access, closing the achievement gap, incorporating language arts into the content areas, speak up!

Take opportunities when they are given. Is the district asking for help writing curriculum during the summer? "GLAD ® up" the curriculum! New summer school opportunity? Incorporate GLAD strategies! You are asked to model for another teacher? Model a GLAD® lesson. Someone is leaving and they are redefining a new position? How about someone to support teachers in implementation of GLAD® strategies so teachers can be successful?

Lessons learned

Of course after some reflection, there have been many things we could have done differently or would have changed. Here are a few:

Building Number Sense Through Number Talks—AIM4S³ Style

by Delia Yunnuen McLaughlin, Kevin Donoher, and Kim Smith—
Bookcliff Middle School, Mesa County Valley School District, Grand Junction, CO

What are Number Talks?

Number Talks are classroom conversations built around purposefully crafted computation problems that students solve mentally. The teacher presents the problems and encourages students to solve them accurately, efficiently, and flexibly. A typical classroom Number Talk takes between 5 to 15 minutes. Using Number Talks in the classroom is a transformative instructional routine that supports students and teachers in building number sense, mental math, and computation strategies. It is a collaborative forum for student mathematicians to invent and clarify strategies. Mathematicians of all ages have the opportunity to justify, validate, and generalize their personal strategies. With number sense and fluency as the foci, students will " ... develop a strong sense of the meaning of quantities and operations while gaining proficiency with mathematical practices" (Parker & Humphries, 2015, p.1).

Students use a silent signal to indicate they have one or more solutions.

Why Number Talks?

In the foreword of *Number Talks Matter* (Parker & Humphries, 2015), Jo Boaler writes, "When students fail algebra, it is not because algebra is a really hard subject; it is because they do not have a foundation of number sense." Dr. Keith Devlin, mathematics professor at Stanford University, claims the most important mathematical concept in 21st century K-12 education is number sense (2017). Marilyn Burns, renowned math educator, describes students with strong number sense as "[They] can think and reason flexibly with numbers, use numbers to solve problems, spot unreasonable answers, understand how numbers can be taken apart and put together in different ways, see connections among operations, figure mentally, and make reasonable estimates" (2015, p. 51). It is crucial that students have the opportunity to build number sense from a very young age, and Number Talks are a powerful instructional routine to support mathematicians of all ages.

AIM4S³

Teachers and students at Bookcliff Middle School started implementing Number Talks 3 years ago. Staff designed a pre- and post-test based on the Marilyn Burns *Math Reasoning Inventory* oral and written components (offered free online at Math Solutions). The impact of implementation has been significant— in year 2 of implementation, 69% of Bookcliff mathematicians showed growth on a post-test. This year's (year 3) results show 73% of students growing, with our dual immersion math classes coming in at 90%.

We attribute this growth in part to our work with Achievement Inspired Mathematics for Scaffolding Student Success (AIM4S³). After attending an AIM4S³ Level I Training in New Mexico, teachers started incorporating elements of the Key Instructional Principles from the AIM4S³ Framework into the Number Talks routine, especially in the dual language classrooms. Teachers enhanced the instructional routine by introducing additional silent hand signals. They were more intentional with sentence stems and questioning (Talk Moves) to elevate the level of conversation. They also utilized planning tools to deepen understanding of strategies and misconceptions, introduced protocols to increase student output and engagement, and considered new ideas for the Compendium/anchor chart.

Focus and Motivation/Student Output

Middle school students frequently share their distaste for "cold-calling" or "hands-down" to elicit their responses. Teachers are now utilizing the strategy Numbered Heads from Spencer Kagan to increase student engagement and output without randomly calling on students. In groups of four, students each decide on their number, 1 to 4. Once students have time to think individually, each group member shares answers and strategies to ensure every group member is confident to present to the class. Next, a group is chosen, and a number is randomly selected.

The student with that number will share their answer and strategy. If that student is stuck, he or she is encouraged to ask for help from the group. This protocol has increased participation and engagement.

A vital component of Number Talks is the use of "silent signals" that students use to indicate they are ready with an answer, the number of strategies they have to solve the mental math problem, and whether they agree or disagree with other students' explanations. The hand signals allow processing time for all students, increase participation, encourage active listening, and provide formative assessment data for teachers without interrupting the flow of other students' thinking. These are adapted from the work of Ruth Parker (2015) and Sherry Parish (2010). The teacher introduces the "silent signal" the first time she facilitates a Number Talk with a group and will review as necessary. It is critical that students understand the rationale behind the signals, and that the teacher explains why blurting out an answer or raising hands can easily distract the thinking of other students in the room. Students do not all think at the same speed and some students may have a tendency to stop thinking if they notice that someone else has already arrived at a solution. Since some students will arrive at an answer more quickly than others, they are encouraged to put up another finger for each additional strategy they derive during the wait time. Students now use the sliding "Y" sign signal for "I agree with you". This allows the teacher to scan the room for students who are sharing the same thinking or strategy. Students are also encouraged to put their hand over their heart if they are stuck or if they feel like they are overwhelmed with the problem. This motivates students to engage and try instead of sitting idly, thus providing them with an opportunity for productive struggle. Students can at least dig far enough into the problem to realize that they do not have a mental strategy for solving it.

Classroom Culture

The "Student Participation Norms" publicly acknowledge that we value and honor the thinking of everyone. This includes errors and mistakes. Teachers strive to build a culture around the validity and value of mistakes. Jo Boaler (2014) offers a variety of resources that explain brain research and the benefits of mistakes. Positive classroom environment is an important component of the success of Number Talks.

Student participation norms are a cornerstone of the Number Talk routine. Each time the teacher introduces Number Talks to a new group or class, she displays a poster that starts with the same seven items. These seven norms are adaptations from Jo Boaler's online class "How to Learn Math" (*https://lagunita.stanford.edu/courses/Education/EDUC115-S/Spring2014/about*). Teachers and students may contribute to these at any time. The teacher should revisit these norms each time she facilitates a Number Talk. Posting the norms can lead to some great conversations and teachable moments when the need arises. Adherence to norms enables all participants (students and teachers) to develop a positive classroom community that challenges and supports learners.

Teacher Mechanics and Delivery

When facilitating a Number Talk, moment-to-moment decision-making happens all the time. It is imperative that teachers prepare for Number Talks with a well-planned sequence, know multiple strategies, and anticipate misconceptions. The picture below shows a tool that we use to plan our Number Talks. The planning tool includes space to plan the problem or sequence, anticipated strategies and methods of recording, academic language, questions to students, Talk Moves, a conclusion or wrap-up, and a place to forecast misconceptions or errors. This allows for quick thinking with a variety of student responses and issues that may and probably will arise. Understanding common misconceptions helps teachers respectfully address errors in a way that propels learning forward for all students instead of pointing fingers at a mistake.

Planning Tool

Maximizing our Work: Teacher Collaboration in the Ninth-Grade Academy

by Scott Brown, English 9 Special Education Teacher—
Rio Grande HS, Albuquerque Public Schools, NM

As high school teachers, we often talk about the difficulty of motivating students, equipping them with the tools needed to engage with complex text, and utilizing academic language in the classroom. We want our students to be prepared to compete in a global economy that requires clear written and spoken communication. 2017 PARCC scores for Rio Grande High School, indicate the student body lacks proficiency in the areas of grade-level vocabulary usage in reading comprehension relative to the scores of students in other districts and states. Ninth-grade students at the school scored significantly lower than students across the district in reading vocabulary, with 21% proficient as opposed to 30% across the district, 33% in the state, and 41% cross-state average. In reading vocabulary, 56% of students did not meet or partially met expectations, as compared to 45% of students in the district. Such outcomes can negatively affect students' ability to enter into careers where the expected language is academic English. Furthermore, many students at Rio Grande speak a home language other than English, so they are acquiring both basic English communication skills and academic language.

I am currently an English 9 Special Education teacher at Rio Grande High School and the leader of one of the ninth-grade professional learning communities (PLC). The ninth-grade academy teacher-collaboration time is cross teamed, meaning we meet with teachers of all content areas. The advantage to this grouping is that our collaboration time can be spent not only discussing individual student concerns and interventions, but also on planning for the use of instructional techniques as a teacher team.

At the beginning of the 2016-2017 school year, Rio Grande High School was selected by Dual Language Education of New Mexico to participate in their *Building Community Partnership to Support Dual Language Learners* Kellogg grant. During the second year of the grant, the ninth-grade PLC had the opportunity to work directly with DLeNM through Contextualized Learning for Access, Validation, Equity and Success—CLAVES™, with Adrian Sandoval and Victoria Tafoya as our facilitators. CLAVES™ serves as a framework that provides the entire school community with the professional learning needed to create an environment of differentiated, inclusive, and validating instruction that serves culturally and linguistically diverse (CLD) students, with specific emphasis on English learners (ELs). (See *Soleado*—Fall and Winter 2017 issues, *soleado. dlenm.org* for more information.)

Our CLAVES™ training included learning and reflecting on strategies and activities designed to support CLD students, as well as establishing commitments to use mutually agreed upon strategies with our students across all content areas. Additionally, Adrian provided support and worked directly with members of our collaboration team on lesson planning and ways to incorporate the Eight Pathways of Contextualized Learning.

As leader of one of the ninth-grade PLCs, it is my job to create the agendas and facilitate our meetings. One of our first tasks was to review our students' assessment data described earlier. As we saw it, we needed to close the gap in student achievement in the area of academic language. That became the focus of our problem of practice. We wanted to build confidence in the communication and collaboration skills of our students to prepare them for challenging college and career experiences. We hoped our focus would have the effect of increasing student achievement on standardized tests. The CLAVES™ framework became a great complement to the teaching team's focus for the year.
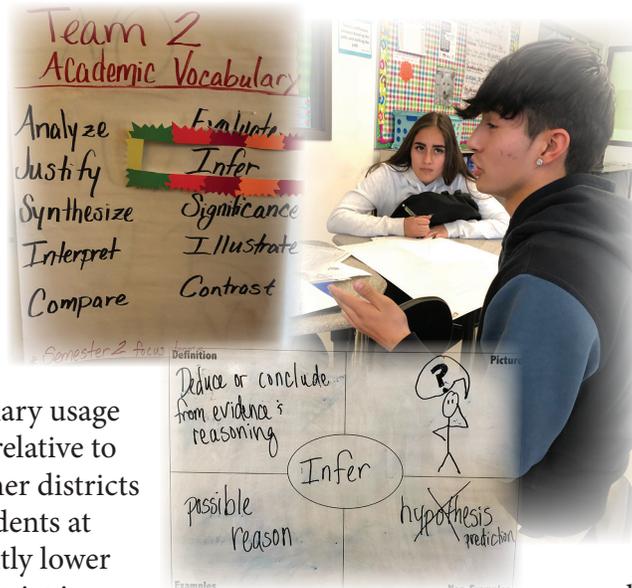
We began our discussions by asking why academic language is so important. We learned that academic language is important because students who master it are more likely to be successful in academic and professional settings. Students who do *not* learn academic language struggle academically and are at a higher risk of dropping out of school (Scarcella, 2017). With graduation rates at 66% in 2016, Rio Grande HS must make every effort to engage students in learning and demonstrating academic language and thinking (Getting Better, 2017).

By November, our team was fully engaged in the VISITAS™ process—visiting classrooms, gathering data, and talking about what we observed. (For more information on VISITAS™, see *Soleado*—Winter 2016.) Our collaboration group decided on academic language as a "look for" in our class visits; it met our initial focus, and aligned with many of the CLAVES™ Pathways. Our discussions paved the way for concrete next steps toward our goal of improving our students' access to and use of academic language. The ninth-grade team made the following commitments.

⊙ Participate in a book study of Walsh and Sattes' book, *Questioning for Classroom Discussion* (ASCD, 2015).

⊙ Conduct formal conversations with students about the goal of student academic language use, explicitly explaining what it is and how we can support one another in learning and practicing it.

⊙ Include many opportunities for students to use academic language in speaking.

⊙ Use sentence stems as scaffolds to support students' language use.

⊙ Intentionally plan and use interactive strategies, focusing on the Turn and Talk protocol.

⊙ Begin lesson study, using DLeNM as a resource.

To include the voices of our students, and to begin our conversations regarding the importance of academic language, our ninth-grade PLC decided to collect data on key cognitive vocabulary and language functions. Student self-assessment surveys were created to assess their perceived and actual knowledge of 10 grade-level vocabulary words. The 10 words with the percentage of students correctly identifying the definition in a multiple choice assessment are as follows: compare–73%, analyze–72%, contrast–66%, evaluate–59%,

significance–51%, justify–47%, interpret–42%, infer–38%, illustrate–37%, synthesize–34%.

Armed with this data, the team agreed to try several of the strategies shared with them as part of the CLAVES™ training. Towards the end of the school year, the teachers developed a follow-up survey asking the students if they felt the strategies used during the school year supported a better understanding of the vocabulary. Here are some of the students' responses:

⊙ I feel like I can better understand the vocabulary terms because we went over them in most of our [content] classes multiple times.

⊙ The best academic vocabulary instruction ... was conversations and analyzing the vocab words.

We also asked students what their favorite activities were. Here are a few of the responses:

⊙ My favorite was *speed dating* because [we were able to] interact with each student as they go down the line.

⊙ My favorite group activity was the *consensus frame* because it was fun and the topics were more real-life relatable. I also liked how we could [express] our own opinions and what we thought about the topic.

Many of the student comments were positive, and it became apparent that students liked coming to the class because they were able to share their thoughts with classmates. This kind of collaborative environment takes real work and support in the classroom, but as a PLC we were able to witness an increase in productive academic language use. Our goal was to create a classroom experience where students are encouraged to use higher-level language in speaking and writing.

Teachers in our PLC now have open conversations about the importance of using academic language and better understand their role in reinforcing academic vocabulary with the students. The VISITAS™ protocol allowed each teacher to visit other teachers' classrooms. The look fors focused teachers' conversation and generated excitement about analyzing our own practices. Not only did students benefit from the intentional focus of the

Type of Reasoning	Sample prompts	Possible student responses
Deciding on what procedures to use when solving a problem, with justification. Depending on the problem, students must use their reasoning to decide if they need to add, subtract, multiply, take the derivative, etc., as they solve a problem. And they need to have a mathematically logical reason, or justification, for it. "Because we did this yesterday," or "because adding is easier than division," are not strong justifications.	What is your plan (next step) for solving this problem? Why?	"I think we should make it x because in the problem it changes." "I decided to start by dividing the trapezoid into triangles because I think it's made up of triangles with no leftover area."
Claims, conjectures, and generalizations, with justification. Conjecture tends to mean coming up with a tentative and logical idea about how things work in math, which includes using patterns and explaining how they might be used. Justification of these things means supporting an idea with math principles, patterns, and the information given in a problem. It also means outlining conditions under which the claim is true.	In looking at this tile pattern, can you come up with a claim for how math works?	"I think when you multiply two fractions, the answer will always be smaller because ..." "You can never divide by zero because..."
Critiquing the reasoning of others, with justification, (and critiquing one's own reasoning) in order to sharpen and revise thinking for all. This often includes arguments for or against ideas in math, such as why you choose a certain method for solving a problem. Students need to justify their critiques with logical ideas and specific language. They can't just say, "I liked it," or "It wasn't clear."	After reading (or listening) to this person's reasoning, what is right, wrong, or unclear? Why?	"I don't think you can say it's "always true" based on trying it with just those numbers. It could be another number you didn't try. I think you need to notice in the problem where it says, *except*."
Represent abstract and complex concepts and ideas, with justification. This includes the use of representations such as symbols, graphs, diagrams—and why you are using them. Representations are often used to show relationships that are impossible to communicate with just words in sentences.	How would you clearly show others your thinking for solving this problem? Come up with at least two different representations.	"I put them into a graph in order to show how the answer is where the two lines cross. " "I drew the pencils in different groups to help me times them up".

Figure 1. Types of reasoning

you well know, language can vary a lot, even out of the mouth of the same student on different days. For this reason, it is very difficult to isolate the exact words and sentences that you want students to produce and understand. You can do this with modeling and sentence frames, but the much bigger and more important practice is creating engaging activities and tasks that challenge students to use reasoning and its language with one another to accomplish them—even if you can't frame up all the language used. We don't want to put the cart of language before the horse of understanding.

Using Student Conversations to Foster Reasoning and its Language

Even though we must improve the reasoning in activities that highlight all modes of language (e.g., listening, speaking, reading, writing), here I will focus on conversations. In the space remaining, we will begin to answer the question, "How can we shape and support student conversations so that they build

reasoning skills and the language needed for them?" Here are several suggestions:

1. Foster a "building up ideas" mindset.
Students can and often do have the basic "I talk with a partner to get the answer" mindset. In addition, we must strive to cultivate a "conversations help us to build up big mathematical ideas" mindset. This includes dispositions such as:

* I work with my partner to understand and think more deeply about this topic.
* I work with, not against, my partner even if we disagree at times.
* I am open to having my ideas change.

2. Have students clarify and justify often.
To build up ideas, the two main skills of clarifying and justifying are needed. Clarifying can include defining terms, paraphrasing, synthesizing, and asking questions. Justifying, as we saw already,

includes referring to mathematical principles and/or the information given in a problem or set of problems. Anchor charts with phrases and questions that are typical of these language functions can be made available to students, revisited, and referred to often during the course of any lesson.

3. Model and scaffold conversation skills.
We can't just put two students together, tell them to solve a problem and share their reasoning, and expect powerful reasoning-filled conversations. We need to model how to have productive conversations. You can do this with sample transcripts that you analyze, or live modeling with you and a student or two students. Then you can debrief the conversation, highlighting phrases and responses that deepen the thinking and further the conversation, as well as behaviors that allow for respectful and fruitful collaboration.

4. Improve conversation purposes and prompts.
Here are four types of prompts that your students' conversations might emphasize. Two or more of these foci often overlap in one conversation.

• Collaborating—Solving a problem through collaboration is the most common purpose for a conversation. It is important for students to learn how to effectively and respectfully talk with each other to solve problems in math—and in other disciplines, for that matter. The sharing, critiquing, and justifying of ideas during conversations can accelerate students' mathematical language development.

> A sample prompt could be, "Collaborate with your partner to come up with at least two methods for solving this problem and be able to describe how the two methods relate to one another."

• Arguing and critiquing—Have students collaborate to make choices and justify them by using mathematical principles and/or the information in the problem(s).

> Here's a sample prompt for an argument-based conversation: "Work with your partner to decide whether the following statement is sometimes, always, or never true: $x2 > x$. You must cobuild a strong argument for your choice, supporting it with mathematical rules and principles, as well as strategic examples. Argue why it is what you chose and why it can't be the other two. Use examples to justify your ideas."

• Clarifying concepts and big ideas—These conversations focus on how math works, and students use problems as examples to show their understandings, rather than as ends in and of themselves. These conversations can be foundational for many students.

> For example, you might have two students work together to come up with a presentation for other students on the topic of completing the square for quadratic equations. Students try to clearly explain, using problems and drawings, the idea of completing the square, why it's done, when, and how.

• Collaborating to create new math problems— Many students want to add their creativity and interests to learning, which means they tend to put more energy and investment into the process. When they work with another student to create a problem, they need to negotiate both language and math at the same time. To create problems, students must apply the math they have learned to real-world settings, "reverse engineering" the problems, and thereby building a better understanding of how different kinds of problems work.

> For example, if we tell you right now to create a problem that requires using algebra, you immediately need to think of and describe a setting that uses variables and equations. Here's a sample prompt: Work with your partner to create a word problem that requires that your classmates solve it using two linear equations. Both of you contribute ideas and then decide which would make for the most interesting problem for your peers to solve. Make sure to set up what is happening and use consistent units.

Conclusion
Developing reasoning in math lessons can provide rich opportunities to develop complex uses of language. But we must set up learning activities that support and challenge students to communicate their reasoning. Fortunately, conversations between students foster this communication and the practice that students need in building mathematical concepts, ideas, and arguments with others.

language education is by stating, "Yes" to the question, "Does your child speak a language other than English at home?"

Research shows that linguistically and culturally diverse families have long-term language plans and aspirations for their children's language education and that they practice a variety of activities in their homes and communities to support them (King & Fogle, 2013). What follows are excerpts of the responses from two immigrant mothers (one from Germany and one from Mexico) when asked, "What are the language and cultural goals you have for your child?"

Mother 1

I want her to be bilingual and bicultural. I want her to speak, read, and write both English and German fluently and to appreciate art, poetry, and music in both languages. I want her to know that she is both German and American. I want her to be proud of both countries.

Mother 2

It is my responsibility, and I think the responsibility of all Mexican parents living here (meaning in the U.S.) to assure themselves that their children learn Spanish. It's the language of our family.

Research findings like these show that families who speak languages other than English at home could be engaged in their children's language education at school in much more meaningful ways. School leaders are encouraged to build systems where educators have asset-based, open-ended conversations with linguistically diverse families to learn about their language goals and aspirations for their children.

Supporting Families' Advocacy Efforts for Their Language Goals

Recognizing the language goals and aspirations of families is of high importance; however, it is not enough. Research shows that families that speak languages other than English at home might need support in advocating for their children's multilingual development. The following are schoolwide practices that, if implemented, can help

families advocate for their language goals:

- Communicate meaningfully about the language goals of the program in your school (e.g., dual language, home language maintenance, ESL).

- Have empowering conversations about the similarities and differences in your school's language-learning goals and parents' own (e.g., ESL program at school vs. multilingual goals at home).

- Create welcoming spaces where families can meet others with common language and cultural goals. Together they can take part in decision-making committees and more effectively implement and advocate for their goals and aspirations.

Conclusion

Language-focused family engagement methods can help combat the deficit outlook that forms the basis for biased perspectives and language ideologies regarding families that speak languages other than English at home. When implemented, these approaches allow educators to learn from families and create a space where school officials advocate together with families for children's multilingualism.

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No one is held accountable until they are trained. This becomes an issue when you are training your whole school and some teachers haven't yet been trained. It's unfair for anyone to be evaluated or held accountable for using strategies if they haven't been through the 6-day training.

It's hard to be the only one trained on your team. We have moved to training at least three teachers per team (two grade-level teachers and an EL teacher or support teacher). If you are the lone voice of GLAD® on a grade-level team, tensions can rise.

Model, model, model, but then let go. If all you do is model without a plan for the teacher to take over, they might continue to ask you to model and never take ownership of the strategies. Set up systems so that they understand what to do after you leave.

Focus the follow up. If you want continued success with implementation, you must provide follow up. After different attempts, this is what worked for us:

1. Google survey the whole staff with miniworkshop choices (strategies to start a unit, the Expository Strand, writing from a Comparative Input chart …)

2. For district-level professional days, give teachers planning time. Offer refreshers on certain strategies in the back of the room, but let teachers plan and create materials with like-content teachers.

3. For individual teachers, use an observation form for what you DO see, not what you don't.

4. Offer multiple ways to support: modeling, coteaching, coaching from the back of the room and offering suggestions on a white board, or teacher-selected focused observations.

Along with DLeNM, ACPS trained 100 teachers last year and now have over 220 teachers trained in five schools. We are planning four more trainings next year, incorporating a new school, and starting a cohort of trainers-in-training. This year I will support district-wide implementation of Project GLAD®. We are on our way to providing access to language and content for thousands of our most vulnerable students.

The Orange County Department of Education (OCDE) holds full license to Project GLAD®. DLeNM provides Project GLAD® trainings under the direction of the OCDE Project GLAD® National Training Center.

PLC, but my colleagues reacted positively to our work together. Here are some of their comments:

⊙ I loved the focus on academic vocabulary. I liked that we had a word of the week and all focused on the same word and how it was used in the different content areas. I enjoyed VISITAS™, seeing how others utilize academic language and seeing the students in other environments.

⊙ Breaking down the VISITAS™ afterwards was helpful in seeing what we do as a whole and what we need to work on.

⊙ I have been in many collaboration groups over the years … and this year has been very productive. The VISITAS™ experience was a good learning opportunity. The protocol for debriefing after the visits was educational and made teachers (including me) think about our strategies and how to improve, whether we were new or veteran teachers.

As one of the PLC leaders, I was proud of the ninth-grade team's focus on academic language and maintaining a collaborative team that contributed to the overall functioning of the school.

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In the fall of 2008, DLeNM published the first issue of Soleado under the direction of Materials Development Coordinator, Dee McMann. In the 10 years that have followed, Dee's considerable work ethic, vision, and expertise have made Soleado a leading publication in our field, featuring articles from practicioners, experts, and researchers from across the country. Dee was also the driving force in the creation of DLeNM's online clearinghouse, FUENTE365 and lead editor for the books and monographs published by Fuente Press. Her contribution to our organization and our field are without parallel.

This past summer, Dee officially entrusted Soleado to Ruth Kriteman, mentoring, guiding, and encouraging her to maintain the quality everyone has come to expect. Ruth and the DLeNM team are enormously grateful for Dee's inspiring example. Happy retirement, Dee! ¡Te queremos mucho!

Sheltering and Scaffolding

With Number Talks, teachers push for student-centered conversations. It is rewarding when teachers can observe students share, explain, and defend their thinking, and ask about the thinking of others without prompts from an adult facilitator. Teachers activate students' prior knowledge at the beginning of Number Talks and highlight links between previous problems and strategies.

Dual language teachers understand the importance of sentence stems and Talk Moves in the development of academic language for all students, but especially for second language learners. Teachers post sentence stems for Number Talks in both English and Spanish in dual language classrooms. The sentence stems used during Number Talks include, "Me gustaría defender ___ porque ___" (I would like to defend ___ because ____) and "La estrategia que usé para conseguir mi respuesta es ____" (The strategy that I used to get my answer is ___) In addition to sentence stems, the dual language teacher started implementing the use of question stems after the AIM4S[3] training. Question stems model proper questioning, help students get the academic conversation started, and keep them engaged during group talk. Question stems used during Number Talks include, "¿Cuál estrategia usaste para resolver este problema?" (What strategy did you use to solve the problem?) and "¿Me podrías explicar tu razonamiento?" (Could you explain your reasoning to me?).

Anchor Charts: Capturing Students' Strategies

The Number Talks strategy uses focused anchor charts to summarize student strategies. The charts are recorded in a single session or compiled after a series of Number Talks with several classes. The latter typically works well for middle school teachers with several sections of a math class. Anchor charts provide a variety of strategies to solve a problem and illuminate misconceptions. Teachers use the "my favorite no" strategy (a response that is incorrect but well-reasoned) to celebrate misconceptions and highlight the importance of taking risks and learning from mistakes. Anchor charts are posted in the room as long as they are relevant, and give students resources that they can rely on when they embrace the challenge of learning math. Students also collect strategies in their math folder or journal.

Conclusion

The work students do with number sense and fluency translates to all facets of their mathematics education. Building number sense is critical to future mathematical success. Students have the ability and the right to access a deep understanding and realize their strengths with flexibility, fluency, and accuracy with numbers. Number Talks is a powerful instructional routine to empower students and teachers of all ages. Bookcliff Middle School teachers are driven and inspired to continue this work not only because of the results we've seen in the data, but also the confidence and positive attitude students are showing in their math classes. We hope you are inspired to introduce this instructional routine to your students.

Anchor Chart

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▣ **Association of Latino Administrators and Superintendents (ALAS)—2018 ALAS Summit "Equity: United We Stand":** October 10-13, 2018, in San Diego, CA. Please visit *www.alasedu.org* for more information.

▣ **Texas Association for Bilingual Education (TABE) Annual conference 2018—Estamos Unidos: Strengthened By Our Differences:** October 10-13, 2018, in Dallas, TX. For more information, please visit the TABE website at *www.tabe.org*.

▣ **WIDA 2018 Annual Conference— Schools and Communities Empowering one another:** October 23-26, 2018, in Detroit, MI. For more information and to register, visit WIDA's website, *www.wida.us*.

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▣ **Keres Children's Learning Center (KCLC), Native Language Symposium: A Cross-Generational Model of Indigenous Education—Equity in Indigenous Education:** November 14-15, 2018, at The Lodge of Santa Fe, Santa Fe, New Mexico. For questions or more information, please contact *tracordero@gmail.com* or *trisha@kclcmontessori.org*.

▣ **American Council on the Teaching of Foreign Languages (ACTFL))—Where Language Educators Meet:** November 16-18, 2018, in New Orleans, LA. Visit *https://www.actfl.org/convention-expo* for more information.