Best Practices Newsletter

FEBRUARY 2018

SAVE the DATES.

Join us for the **32nd Annual HSTW Staff Development Conference**, July 11-14, 2018, in Orlando, Florida.

Come early for the **Sixth Annual College- and Career-Readiness Standards Networking Conference**, July 9-11, in Orlando.

This newsletter describes best practices presented at the 31st Annual HSTW Staff Development Conference in Nashville, Tennessee, July 2017.

Day-to-Day Teaching and Formative Assessments That Increase Students' Math Achievement

Math is not an easy subject for many students to learn; exam scores will bear that out.

But with the right instructional strategies, teachers can turn that around and help students become confident and successful math students.

Through effective questioning, productive struggle, the freedom to fail, purposeful grouping, formative assessments that expose students' knowledge and misconceptions, and through re-engagement, students can succeed.

This newsletter is rooted in the instructional strategies of the Mathematics Design Collaborative (MDC) to deepen students' understanding of math.

I Know I Taught Them This!

The title alone probably triggers a sense of déjà vu for countless teachers. I know I taught them this. Why didn't they pass the quiz? Did they forget the material? Did they not get it in the first place? These questions probably run through teachers' minds numerous times.

It certainly did for **Kimberly Livengood**, a former teacher at **Mt. Pleasant High School** in Tennessee. There, she received SREB professional development in the Mathematics Design Collaborative (MDC) instructional strategies (2011-2015) and learned about the importance of formative assessment lessons (FALs). "I watched students grow in their mathematical ability and in their confidence and understanding of math," she says.

Livengood was already a veteran teacher of 20 years in North Carolina before coming to Mt. Pleasant, but after taking part in SREB's MDC training, she said, "I wanted to apologize to the students I had taught before." She expressed regret that she was not yet equipped to teach the MDC best practices to those students.

Now Livengood is an independent consultant and MDC trainer herself, doing contract work for SREB. “I became passionate about telling other teachers about MDC.” Here are some of the strategies she shared at the HSTW Staff Development Conference in Nashville.

Successful Math Strategies

Formative assessment lessons (FALS) are designed to expose gaps and misconceptions in students’ learning. These lessons are most often implemented two-thirds of the way through a unit of instruction. With this knowledge, teachers can determine how to re-engage students until they master the standard or concept taught.

Along with FALs, there are daily formative assessment strategies. These are simple and allow the teacher to assess understanding on a minute-by-minute and day-by-day basis. One formative assessment strategy Livengood uses is called “Fist to Five.” After teaching a concept, she asks students to use their hands to show what they understand. Showing a closed fist means they have no understanding; showing an open fist means they understand the concept or procedure and are ready to move on; and showing a couple of fingers means they understand some, but need more help.

Another daily formative assessment strategy is called Ticket In/Ticket out. “Ticket In is a tool to see if students can recall facts or prove understanding of concepts that are prerequisite for the lesson you are beginning,” says Livengood. Some directions that might be listed on a Ticket In are: “Solve the following problem,” or ”Write a problem from your homework that gave you trouble,” or a teacher might ask the students to recall and write information that they will need to know for the day’s learning objective. The Ticket Out is often a fill-in-the-blank activity such as, “_____ is something that I learned today in class that I didn’t know before,” or “_____ is something we have discussed that I’m still struggling with.” The answers let the teacher know how to adjust instruction.

Re-engage students after the FALs. Once teachers have an idea of what students do and do not understand, they must develop a plan to re-engage students. “It doesn’t mean I need to teach the concept slower and louder. It means I need to approach it from a different perspective,” maintains Livengood. She says teachers will need to assess whether re-engagement needs to begin with the very basics or on higher depth-of-knowledge levels.

Eventually, **summative assessmen**t will take place. That’s when students are evaluated at the end of an instructional unit or grading period to determine the depth of learning. “Teachers don’t always need to rely on a written test; there are many summative assessment options,” notes Livengood. “Other options include assigning students a paper or written report, or a project that represents the math they’ve learned complete with a PowerPoint presentation,” indicated Livengood. These options may sound like assignments from an English class, but “Literacy is embedded throughout MDC; I don’t think people realize that,” she contends.

Student Outcomes

Livengood is passionate about MDC because she says, “It works.” In 2011, her first year teaching at Mt. Pleasant High School, 17 percent of the Algebra II students scored at the Proficient and Advanced level on the state assessment. In 2014, 80 percent of the high school’s Algebra II students scored at the Proficient and Advanced level. “Students were thinking on their own and taking more ownership of the learning,” she says. She also notes that her students grew to the point where they didn’t give up when given difficult assignments, and began to persevere and push through until they arrived at a solution they could defend.

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Having a Can-Do Attitude and a Growth Mindset About Math

Teachers and parents hear it all the time: "I can't do math; it's too hard. I just don't have a math brain." Students do just enough to get by — if that. But if students are to be college and career ready upon graduation, they must be able to master basic math concepts and critical thinking.

Adrienne Dumas and **Jennifer Wilson**, math teachers at **Northwest Rankin High School** in Flowood, Mississippi, have incorporated several research-based strategies into their classrooms to foster a can-do attitude and a growth mindset among students. The goal is to eliminate students' fear of math and unleash their confidence and willingness to learn.


Adrienne Dumas

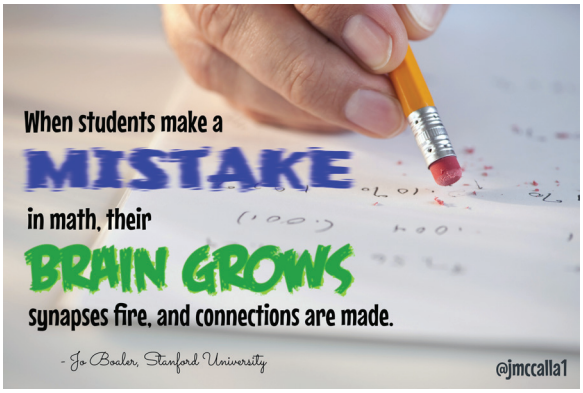
"We want to have a collaborative classroom. We want students working together and feeling safe, and unashamed to make mistakes," says Dumas. Taking a page from Carol Dweck's research on growth mindset, Dumas and Wilson are strong advocates of the belief that students can do anything they put their minds to if they put in enough time and effort.

But Dumas admits, cultivating a growth mindset is "a work in progress every day." The two teachers talk to students about their beliefs and intelligence — and stress it's something that's not fixed, but can be changed. "We glorify mistakes because we know mistakes are opportunities to learn," Dumas maintains.

Wilson agrees saying, when students first engage in new ideas and concepts, they have to be willing to make mistakes so that they can figure things out. She cites research that contends the brain grows when students make mistakes. "Making mistakes is not a shameful happening, it's actually a good happening," she insists. We actually hear students say, "My brain is growing," when they make mistakes.

Both teachers use Stanford researcher Jo Boaler's Seven Guidelines to classroom norms:

1. **Everyone can learn math to the highest levels:** Encourage students to believe in themselves. There is no such thing as a "math person." With hard work, everyone can reach the highest levels if they want to.
2. **Mistakes are valuable:** Mistakes grow your brain. It is good to struggle and make mistakes.
3. **Questions are really important:** Always ask questions; always answer questions. Ask yourself, why does that make sense? "We want a classroom full of questions," says Dumas. "Questions help us figure out how to get deeper into the task," she notes.
4. **Math is about creativity and making sense:** Math is a very creative subject that is at its core, about visualizing patterns and creating solution paths that others can see, discuss and critique.
5. **Math is about connections and communicating:** Math is a connected subject and a form of communication. Represent math in different forms, e.g., words, a picture, a graph, an equation, and link them.



6. **Depth is much more important than speed:** "It's not just about the answer; it's about the journey to the answer as well," notes Dumas.
7. **Math class is about learning not performing:** Math is a growth subject. It takes time to learn; and it is all about effort.

Success

Over the four years that Dumas and Wilson have been advocating a growth mindset, they've noticed positive changes in their students' motivation and achievement. "I've had a 100 percent passing rate for the past three years on the state test," says Dumas, who teaches Algebra I and geometry. Wilson, who teaches geometry and AP calculus, indicates, "I have students who are more willing to engage in productive struggle. They are willing to try something challenging and hard and not just be given all of the information they need to solve problems.

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Great Minds Think Alike!

Working in teams with other students has never been more important. To be successfully prepared for college and careers, today's students must master the crucial art of working collaboratively. "There are hardly any situations where we are not required to collaborate with others to find a solution to a problem or work project," says **Myra Cannon**, an independent math consultant working with SREB.

Educators are expected to model and teach students to become comfortable and productive with collaboration, says Cannon. This is true in all content areas, including math, and she adds, "We must model the vocabulary necessary for students to practice the mathematical discourse we desire from them in a collaborative setting."

Pairing Students for Success

Purposeful grouping of students in pairs is the first step to successful collaborative work. How students are grouped should be based on the purpose of the day's lesson. For example, when students are paired by the same level of mathematical reasoning based on a pre-assessment, they spend more time discussing solutions with each other.

Students must learn to work as a group, and not just in a group, she continues. For this to happen, students must be exposed to a classroom environment that is a "no judgment zone" and be with peers who are likewise encouraged to be supportive of different approaches and methods of problem solving. By seeing the many solutions to a given problem, students increase their vocabulary and eventually improve their mathematical discourse. But this won't happen overnight, and it won't happen at all if the behavior is not modeled in the classroom.

We must foster a classroom environment where it is okay to get an incorrect answer, says Cannon. "We learn more by analyzing a wrong answer and discussing the misconceptions than by getting a correct answer the first time," she says.

Encouraging Transformation

According to Cannon, students should experience multiple collaborative activities throughout the school year, in all units and lessons, to encourage this transformation. As with any activity, students need time to process the task at hand and what they are expected to accomplish. Providing students with "ME time before they have WE time" helps get the collaborative activity off to a successful start.

"Building better leadership and creating better problem solvers for the workplace and in our communities is the goal," says Cannon.

She strongly believes the more opportunities students have to collaborate with each other in a setting where they are monitored to stay on topic and guided by the teacher so they can productively struggle, the better product teachers will see from students over time.

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Coaching and Leading to Transform Mathematics Teaching and Learning

When **Granville County Schools (GCS)** in North Carolina sought professional development emphasizing mathematics education, its leaders wanted more than "one and done professional development." **Stan Winborne** and **Michael Myrick** were attracted to SREB's three-year approach to building local capacity through the Mathematics Design Collaboration (MDC).

The Standards for Mathematical Practice were introduced in North Carolina years ago, but they were "just a poster on the wall," says Winborne, director of high schools for Granville County Schools. Math instruction in classrooms was still "rote, procedural – more like a GPS, not the productive struggle that we know is so important for students' learning," he continues.

Stan Winborne

Michael Myrick

"I was a Spanish teacher. Michael Myrick, now assistant superintendent of curriculum and instruction, was an ELA teacher; we were not math people. But when we started going to these trainings, and we heard the Big Idea of Assessment for Learning and the Five Strategies of Assessment for Learning (see p.6), and we thought, 'Yes! If I had had this, I would have been a math person!'"

Granville is a rural district, just north of Research Triangle Park in North Carolina, with 21 schools serving nearly 8,000 students. More than half qualify for free or reduced-price meals. The district suffers from low academic achievement and low student engagement, due in large part, according to Winborne, to rote instruction and the lack of systemic framework for instruction.

Taking a Team Approach

GCS has just one math specialist for K-12. As district leaders planned to implement MDC, they soon realized that training one coach would not be sufficient. So, they devised a team leadership/trainer approach, designed to build district-level capacity for instructional leadership, demonstrate district commitment and generate buy-in for hesitant principals and teachers.

District leaders made it clear that all middle grades and high school directors and principals were expected to participate in each training session. Winborne, as director of high schools, became a local MDC trainer, participating side by side with teachers and principals in all training sessions.

The participating principals were also highly involved in classroom observations and debriefs. The local coach sent calendar invitations to everyone scheduled for each observation and debrief. Knowing that it was on their supervisors' calendars made everyone more aware of expectations and encouraged increased engagement.

Differentiating Principal Support

While the training sessions, observations and debriefs were important components for all principals, different principals had unique questions and needs. Winborne describes how the district "met principals where they were."

- One high school principal with a math background needed support with coaching strategies. During classroom observations, the district's local coach, the principal and others (director of High Schools, SREB trainer, when present) used Google documents to collaboratively record perceived wows and wonders on a specially designed form (see p.6). Use of this method allowed for "feedback on the feedback" before the actual joint debrief with the teacher. The local coach also modeled feedback emails to teachers for principals.
- A middle grades principal with an ELA background required more support around content and curriculum alignment. In addition to observing and debriefing together, the local coach modeled how to use state unpacking documents in professional learning communities with math teachers.
- In all cases, the local coach's monthly emails to principals provide specific feedback and tools for teacher development. For example, "We're currently working on questioning. In both formative assessment lessons and daily instruction, we want to hear higher-level questions. Listen for 'Why?' and 'How might…?' questions in your observations."

Pushing Mathematics Instruction Forward

Angie Salisbury, principal of GCS's **J.F. Webb High School of Health and Life Sciences**, shares three aspects of MDC that helped her push math instruction forward in her school, beyond "the same old, same old."

1) The integration of the eight mathematical practices
2) The importance of teachers planning good questions in advance of teaching to develop students' thinking processes
3) The significance of implementing formative assessment lessons (FALs) two-thirds of the way through a unit – not at the end of the unit – to identify student misconceptions and adapt instruction prior to the unit exam

WOWS & WONDERS

Teacher: _____ **School:** _____

Observer: _____ **Date:** _____ **Time:** _____

The following highlighted items were observed:

Five Strategies of Assessment for Learning	Standards for Mathematical Practice
1. Clarify and share learning intentions and criteria for success. 2. Engineering effective discussions, questions and tasks that elicit evidence of learning. 3. Provide feedback that moves learners forward. 4. Activate students as the owners of their own learning. 5. Activate students as instructional resources for one another.	1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.

WOWS:

WONDER:

Additional comments:

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Designing Learning Targets and Meeting Them

It is difficult for students to reach a destination unless we share with them where they are going and how they will get there. Daily learning targets help foster student ownership and self-regulation. They guide students in achieving long-term goals.

Learning targets address the question, 'Where am I going?' from the student's point of view. They are not the same as standards, chapter titles or activities. Standards represent a full school year of growth. Unit goals or objectives may represent what a student should know by the end of a semester, but learning targets indicate what a student should know at the end of each lesson within a unit, says **Debbie Robertson**, an SREB mathematics consultant.

As teachers plan lessons, setting learning targets helps them provide a focus for instructional decisions, selection of tasks, etc., but the activities should not become the targets. As Shirley Clarke demonstrated in *Formative Assessment in Action: Weaving the Elements Together*, learning targets should be written without context.

Focusing on Learning, Not Activities

For example, when students are told they will be "conducting a survey and using that data to make a graph," most think they are learning about surveys. When restated as "determine which graphical representation works best for different types of data," students understand that they are learning about different graphical representations of data, even though the survey activity might be used as a mechanism for that learning to take place. Learning targets should clearly identify the learning that will take place, not the activity that students will be participating in.

Learning targets and success criteria allow teachers to formatively assess students daily. With each assignment, teachers should ask themselves, 'What do I want my students to know or understand?' Lesson-sized objectives help teachers and students monitor their progress in learning, and the accompanying success criteria provide teachers opportunities for checks for understanding.

Success criteria are based on the learning target and represent observable, tangible proof of student progress toward the target. Success criteria provide benchmarks that teachers can identify in student work to formatively assess student understanding. Success criteria answer the student question, "How am I doing?" on my way to the learning target. Feedback should always move students toward the learning target.

For example, if the learning target is, "Understand that equivalency of fractions, decimals and percentages allows them to be used interchangeably and maintain equivalency of a given relationship," success criteria may include "convert between fractions and decimals precisely." This success criteria, along with others that provide observable steps toward the target, could be used as a checkpoint by which teachers and students can monitor their progress.

According to Robert Marzano in his 1998 report, *A Theory-Based Meta-Analysis of Research on Instruction*, in an analysis of 53 research studies, students who were given clearly defined learning goals in advance of what they were learning, scored, on average, 34 percentile points higher on tests than students in control groups.

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You Don't Know What You Don't Know…

It is not uncommon to hear teachers say they don't understand why students' grades were so low on a given assessment. After all, they taught the material, and it seemed like the students got it. According to **Cathey Ritter**, SREB math trainer, it is important to find ways to engineer effective discussions and tasks that provide evidence of student learning and math mastery. "You want to become an investigator. It is imperative that you find out what your students know," she insists.

What are some common errors that math teachers make? Some teachers ask too many questions, answer their own questions, question only the brightest or most likable students, and ask the same kind of questions most of the time. Many teachers also fail to give students appropriate think time, pay attention to student answers, or build on answers that students give.

It is also important to collect the right sort of evidence that will reveal each student's progress toward the lesson goals. **Donna Farmer**, an independent math consultant working with SREB, says, "We want to biopsy the situation before we have to do an autopsy."

Mathematics Design Collaborative

Strategies used in the Mathematics Design Collaborative (MDC) engage students in a productive struggle as they learn key concepts and use formative assessments to determine what students know and don't know.

MDC provides teachers with instructional tools and strategies that help them implement state college-and career-readiness standards. At the same time, this gives teachers the flexibility to use their own textbooks and other resources to design engaging assignments that help students reach higher achievement levels. MDC builds students' fluency of procedural skills and deepens their mathematical reasoning and understanding.

MDC has at its heart the Five Strategies of Assessment for Learning posed by Dylan Wiliam (See p.6).

According to Wiliam, "Well-planned questions can prompt students to think and provide teachers with information to adjust instruction. Teachers need to use effective questioning techniques that keep all students engaged and gauge the understanding of the whole class instead of just selected students."

So what kind of tasks will elicit the right kind of evidence of students' learning? Teachers should plan and manage the teaching/learning level for the desired thinking level. The tasks should be relevant to life and work, and students should be required to apply knowledge to analyze and solve problems for predictable and unpredictable situations.

"If you challenge the students and raise the bar, they will at least reach," notes Ritter. Teachers must strive to develop effective classroom instructional strategies that will allow for the measurement of success.

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For more information about the school improvement models offered by SREB, contact: Gene Bottoms, senior vice president, at gene.bottoms@sreb.org or call (404) 875-9211.