Dennis-Yarmouth RSD

Instruction Office Newsletter

Turning “I Can’t” Into “I Can” in a High-School Chemistry Class

In this *Edutopia* article, high-school science teacher Angela Campbell says that “Chemistry seems to inspire a ‘D’ mentality. A significant number of students just want to pass the class, meet their graduation requirement, and do it with as little effort as possible… Many students will avoid working hard in a class that they see as challenging because of the risk involved. If they work hard and fail, then they’ve proven their inadequacy. But if they don’t work hard and manage to get a ‘D,’ then their pride remains intact and they haven’t lost anything. That’s the reason why, in my class, I make failing harder work than passing.”

That’s how Evelyn, a junior in her class, boosted her grade from 60 percent to 85. As the course began, Evelyn didn’t see chemistry as relevant to her present or future life, kept her head low in class, was absent one day a week, and aspired to scrape by with a D. How was this girl transformed to sitting in the front row, volunteering to solve problems, working hard, taking risks, and showing real annoyance when she didn’t get an A? Here’s Campbell’s method:

- ***Clear objectives*** – She presents students with a concise list of “I can” learning objectives up front. In a unit on dimensional analysis of the mole, here’s what it looks like:

I can identify the mole as the unit used to count particles, and use Avogadro’s number to convert between moles and particles.

I can calculate the molar mass of an element or compound.

I can perform molar conversions.

- ***Guided practice*** – Each of these objectives has do-able work activities and formative assessments

Continued on page 2

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Important Dates

March 8 and 10-

PreK-5	Parent/Teacher Conferences
6-12	Professional Development

March 13- Daylight Savings Time

March 20- SPRING begins at 12:31 am

March 25- Teacher Professional Day

Important Notice:

Central office is a **fragrance-free zone** so please be respectful and plan accordingly when you visit.

Due to one of our members at the CO being highly sensitive to any type of fragrance, we ask that staff visiting/meeting at the Administration building refrain from using any scented products. Fragrances from personal care products, air fresheners, laundry and other cleaning products have been associated with adversely affecting a person’s health. We ask that we all work together to make the environment a safe and healthy workplace for everyone. Thank you very much for your cooperation!

Continued from page 1

(homework, quizzes, or labs) that count for very little in the overall grade. "The point of these assessments is to give kids a lot of practice with the material in a low-risk environment," says Campbell, "and to provide feedback on their progress toward mastering the objectives."

- ***Checks for understanding*** – After a period of guided practice, students take a short assessment, get feedback, and review for the summative assessment, which carries the most weight in final grades. This puts the incentive on understanding the material and preparing for the type of question that the final test will contain.
- ***Summative assessments*** – The passing grade on these is 70 percent, and students who don't clear the bar get feedback on which items they didn't master, an "intervention worksheet" to get them up to speed, and are required to take the assessment again.
- ***Differentiation and incentives*** – All students can shoot for a higher percentage on summative assessments, and Campbell reports that a significant number of students who scored in the 70-89 range choose to study the intervention worksheets to retake the test. "Students who are content to score at or below 60 percent are faced with extra work that they would not have to do if they were scoring just ten points higher," she says. "The cycle helps students begin to understand that, if they can do the work required to get 70 percent, it's not much more work to get an even higher grade.

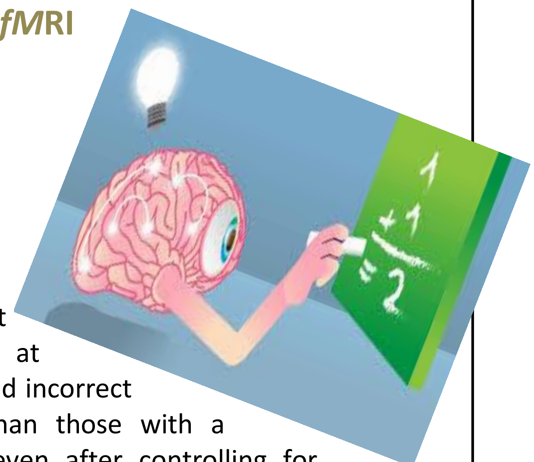
And the progress is addictive."

Campbell creates her own tests, quizzes, test maps, intervention worksheets, homework assignments, and labs, using state tests as a guide for rigor and content. "I do all of the grading and fill out the test maps by hand," she says. "It's time-consuming, and I have to take work home with me every single day. I do my grading while my own children do their homework." But she says her students' results make it all worthwhile.

"Making Failure Harder Work Than Passing" by Angela Campbell in *Edutopia*, September 30, 2015, http://www.edutopia.org/blog/making-failure-harder-work-angela-campbell

Does a Growth Mindset Make Students Better Math Problem-Solvers?

"Having a positive mindset in math may do more than just help students feel more confident about their skills and more willing to keep trying when they fail," reports Sarah Sparks in this article in *Education Week*. "It may prime their brains to think better." Recent neuroscientific research at Stanford University is showing how students' beliefs about math learning can produce more efficient brain activity. Lang Chen and his colleagues studied elementary students' brains with ***fMRI (functional magnetic resonance imaging)*** and found that those with a "growth" mindset about math did better at spotting correct and incorrect math problems than those with a "fixed" mindset, even after controlling for differences in IQ, age, working memory, reading level, and math anxiety. The brains of students with high positive-mindset levels had greater activity and faster, smoother connections in the areas associated with quick recall of facts and math problem-solving.



"This is very, very exciting," said Stanford professor Carol Dweck (who was not part of this research project). "My hunch is that often in the fixed mindset your mind is preoccupied with **'Is this hard?' 'Will I look smart?' 'What will happen if I don't do this?' 'I'm not good at math,'** instead of getting that brain ready to do it." It's analogous to warming up a car on a cold morning before driving off – the engine is primed to work more efficiently. The key insight from this research is that the brain isn't compartmentalized, with motivation separate from math problem-solving. "The emotion and thought structures in the brain are totally entwined, totally docked in the brain," says Mary Helen Immordino-Yang at the University of Southern California. **"If you are trying to do math and worrying about whether you are going to fail or not, rather than the process of doing math… that is not deep learning."**

Chen and Jo Boaler (also at Stanford) are hard at work on figuring out how to help students shift from a fixed to a growth mindset. “Mindset can change quite a lot across age and grade level,” says Chen, “so we really want to see how that change can relate to different brain functions and different math achievement.”
“In Math, Positive Mindset May Prime Students’ Brains” by Sarah Sparks in *Education Week*, December 9, 2015 (Vol. 35, #14, p. 6), www.edweek.org

Inquiry-Based Learning: From Teacher-Guided to Student-Driven

Begin With Guided Inquiry

Teacher-guided inquiry can build background knowledge of the topic before letting students take the reins in developing their own inquiry.

With guided inquiry:

- *Teachers start with an overall guiding question.*
- *Teachers know what they want their students to understand beforehand.*
- *Students know what the outcome of the inquiry will be.*

"Guided inquiry is like a typical science lesson," explains Anne DiCola, Ralston Elementary's instructional coach. "The teacher knows that they want kids to understand what happens when water boils. So they take them through an inquiry process; they make a hypothesis, what they think will happen. They talk about all of the materials they're using. They're going to have one or more guided questions. But the teacher knows in the end how the lab's going to end. They know what they want the students to know or do by the end of the lab."

Ralston teachers build toward student-driven inquiry throughout the course of the unit. Through teacher-guided inquiry over a series of lessons, teachers model how to develop questions, show their students that there are multiple ways to problem solve, and prepare them to lead their own inquiry by the end of the unit.

“Every child deserves a champion- an adult who will never give up on them, who understands the power of connection and insists that they become the best that they can possibly be.” - Rita Pierson

Teach Students How to Question

Explore and Model Different Types of Deeper-Level Questions

An important aspect of inquiry-based learning is teaching students how to ask deeper questions. When the teachers at Ralston had students begin creating their own inquiries, the questions were the type that could be answered with a Google search. Because they weren't coming up with deeper-level questions, the teachers had to pause and reflect on how they were modeling questioning to their students. They asked themselves, "What's an appropriate question? What kinds of questions work?"

According to Principal Dawn Odean, the following two tips helped Ralston teachers:

- *Across grade levels, reflect on how you model questioning from kindergarten and up.*
- *Pose big questions that don't necessarily have a single answer -- or any answer.*

"We’re really looking at students being creative problem solvers," explains Odean. "For example, if students are reading a common text together, or posing questions about how they’re relating to the text, or how they think it might impact the world, there may not be one answer for that. As we start to pose those questions, we’re hoping that students start to pose those questions for themselves in a way that they can create an inquiry. Teachers are guiding with higher-level questions to really get students thinking and learning how to question themselves."

Example Questions

D.J. Osmack, Ralston's art teacher, integrated science and art together by having his students create their own paint. In his first art class, they followed a specific paint-making recipe. In the second class, they created a paint that fit their needs as artists. This is where the student-driven inquiry came in. What kind of paint did they want to create?

To guide his students in creating their own questions, Osmack asked:

- How can you make this paint fit your needs as an artist?
- As a scientist, how are you going to change or modify this paint so that it works?
- What is your reaction to your paint?
- Did your paint turn out the way you wanted it to?

Encouraged by these questions, his students began asking questions like:

- What kind of artwork do I want to create?
- Does my paint need to be thick, thin, consistent, or chunky to create the artistic effect that I'm looking for?
- What ingredients would I need to add to create the type of paint that I want?

"You have to form your questions the right way so you're not really taking over their creative process, but helping that creative process," clarifies Osmack, who noted how these student-generated questions encouraged them to explore and experiment on their own.

Let Your Students Drive Their Own Inquiry

Student-Driven Inquiry Led by a Question

In the guided inquiry example of boiling water, the teacher knows that she wants students to understand what happens when water boils. She creates a question that will guide students to an outcome already known to them.

The student-driven inquiry is what happens after the guided inquiry. Now that students know what happens when water boils, what questions come up for them? Their inquiry questions might be:

How much time would it take to melt a few ice cubes in boiling water?

How much time would it take to boil twice the amount of water?

"Whatever it is that they're wondering about, that's the student-driven piece," elaborates DiCola. "That may or may not be something that the teacher envisioned happening afterwards. So they're having the opportunity to say, 'This is what I'm wondering about now. Now I'm going to go through that same process. I'm going to create a guiding question. I'm going to make a hypothesis. I'm going to gather the materials that I need.' It really flips the classroom in the sense that the student is then in the driver seat. And what's really exciting is when they can pose a question that maybe the teacher doesn't know the answer to, and they're really saying, 'Yeah, let's learn this together.'"

Guide Your Students' Inquiry With a Problem

Inquiry isn't driven only by questioning, but also by introducing a problem.

"Being the second-grade math teacher," explains Lindsay Ball, "I found that giving students an opportunity to really inquire and then solve their own problems in math has been a great opportunity. I can pose a problem for them and then let them find a different way to solve that information and to share what they're thinking. We do a lot of collaborative conversations. The students are able to share what their thinking was, but then at the same time, listen to another child's thinking, and recognize there can be different ways to get to the same conclusion or the same outcome -- and [realize] that everybody thinks in a different way, and everybody's thoughts are valuable."

An Example Problem

Ball, who also teaches science, created a lesson that introduced eggs and seeds to her students and had them discover which material was which through this problem:

Two scientists have mixed up two materials. They know one is seeds and one is eggs, but they have no idea which is which. How can we help them solve that problem?

Explore Student-Driven, Problem-Led Inquiry

Ball's seeds vs. eggs problem inspired student inquiry that led their process of discovery. They came up with six stations, and their experiments came from their own inquiry. "I like doing it this way because you get to touch what you're actually doing instead of just looking at it," explains Logan, a second-grade student.

1. The Planting Station

Some kids planted the seed and the egg, pulling from their prior knowledge that a seed would likely grow and nothing would happen to the egg.

2. The Dissecting Station

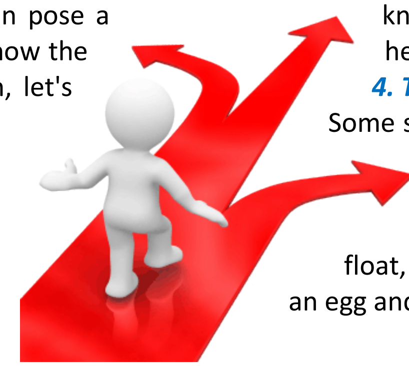
Other students broke the egg and seed open, thinking that they might find a yolk or animal inside of the egg.

3. The Heating Station

Others put their egg and seed under a heating lamp, knowing that a mother chicken will sit on her eggs to make them hatch.

4. The Water Station

Some students put their eggs in water, knowing that fish eggs hatch when in water. Other students thought about density. If one of the materials were to sink or float, it might help them determine which was an egg and which was a seed.



5. The Weighing Station

Others thought that eggs would be heavier than seeds and weighed both materials.

6. The Size Station

Some kids thought that the egg would be bigger than the seed, and they looked at both under a microscope to compare sizes. They also measured them with a measuring tape.

"We found that the students really are able to take a bigger and a deeper passion in what they're learning because it's really what they care about versus what they think their teacher cares about," emphasizes Ball.

"We really don't have a limit," adds Kendall, a fourth-grade student. "We get to learn how to do this stuff with our own ideas."

"Guide Your Students' Inquiry With a Problem"
http://www.edutopia.org/practice/inquiry-based-learning-teacher-guided-student-driven
Edutopia, December 15, 2015

A Sea of Change in School Discipline Policies

"The idea that a zero-tolerance philosophy based on punishment and exclusion could create effective learning climates has proven to be illusory," say Russell Skiba (Indiana University) and Daniel Losen (University of California/Los Angeles) in this article in *American Educator*. Recent research has overwhelmingly discredited the "get tough" approach to school discipline: it isn't effective in reducing individual misbehavior or improving school safety; frequently-suspended students are more likely to engage in antisocial behavior and get involved with the juvenile justice system; and there are often negative academic consequences for disciplined students, including lower grades and increased incidence of dropping out. In addition, the logical-sounding and politically popular zero tolerance policies have produced the most negative social and academic outcomes for students from historically disadvantaged groups. The widespread investment in security – video cameras, metal detectors, officers – has not improved most students' sense of safety in school.

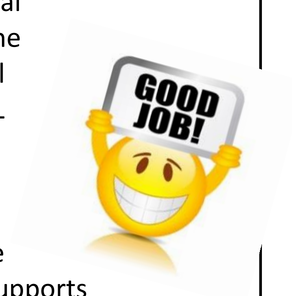
Here are the troubling statistics on the percentage of U.S. secondary students who received at least one out-of-school suspension during the 2011-12 school year (the national average was 10.1%):

- *African-American – 23.2%*
- *Students with disabilities – 18.1%*
- *American Indian/Alaska Native – 11.9%*
- *English language learners – 11%*
- *Latino – 10.8%*
- *Hawaiian/Pacific Islander – 7.3%*
- *White – 6.7%*
- *Asian – 2.5%*

Studies have revealed racial bias in suspensions and other disciplinary consequences, with African-American students more likely to receive harsher consequences for the same offenses than their white peers. Recent research also shows that lesbian, gay, bisexual, and transgender students are at increased risk of expulsion, experiencing a hostile school climate, and being stopped by the police and arrested.

The unintended consequences of harsh discipline policies have registered with many policymakers, educators, and parents and new approaches are being implemented in many parts of the U.S. There are four types of promising alternative strategies, some of which are being implemented simultaneously:

- ***Relationship building*** – Interventions that foster positive teacher-student interactions have been shown to reduce the use of suspensions and expulsions, especially for black students. Restorative practices that build relationships and repair harm after conflicts have also shown positive results (a 47 percent drop in suspension rates in the Denver Public Schools), as has the MyTeachingPartner professional development program.
- ***Social-emotional learning*** – These programs aim to build students' skills in recognizing and managing their emotions, appreciating others' perspectives, establishing positive goals, making responsible decisions, and handling interpersonal situations effectively. When the Cleveland Metropolitan School District implemented an SEL program, it recorded a 50 percent drop in negative behavioral incidents.



- ***Structural interventions*** – Positive Behavioral Interventions and Supports (PBIS) is a widely-used program that focuses on staff training to prevent discipline problems. It's had some success, although Skiba and Losen note that it needs to be supplemented with additional components to bring about the best outcomes for African-American students. For PBIS to be effective there needs to be staff buy-in, administrative support, and the time and money to implement it consistently schoolwide. Other structural interventions include improving school climate, rewriting codes of conduct, and being systematic in responding to threats of violence.

• ***Classroom content and climate*** – Another study addressing racial disparities in discipline had several specific recommendations: teachers communicating high expectations and fairness for all students; creating a bias-free and respectful environment; ensuring academic rigor; and engaging in culturally relevant and responsive teaching.

These approaches all depend on professional development, administrative support, collaboration with community agencies, well-formulated alternative strategies, increased presence of mental health and instructional support personnel in schools, working with parents to promote less-punitive approaches at home, and ongoing collection and analysis of disaggregated discipline data.

"From Reaction to Prevention: Turning the Page on School Discipline" by Russell Skiba and Daniel Losen in *American Educator*, Winter 2015-16 (Vol. 39, #4, p. 4-11, 44), http://www.aft.org/sites/default/files/ae_winter2015skiba_losen.pdf

Coaches Corner

Betsy Pontius – K-3 Instructional Math Coach

Using Models in the Math Classroom

Children construct math concepts little by little, over time. Manipulative materials, pictorial representations, words, and numbers help students actively reflect on their new ideas (MP1). Talking through an idea, listening for the viewpoints of others, arguing for a viewpoint are all mentally active ways of testing an emerging idea (MP3 and MP6). It is difficult for students (of all ages) to talk about and test out abstract relationships using words alone (MP7 and MP8). Models and mathematical tools can help students test their ideas (MP4). These models can be thought of as "Thinker tools". Models give learners something to think about, explore with, talk about, and reason with (MP2).

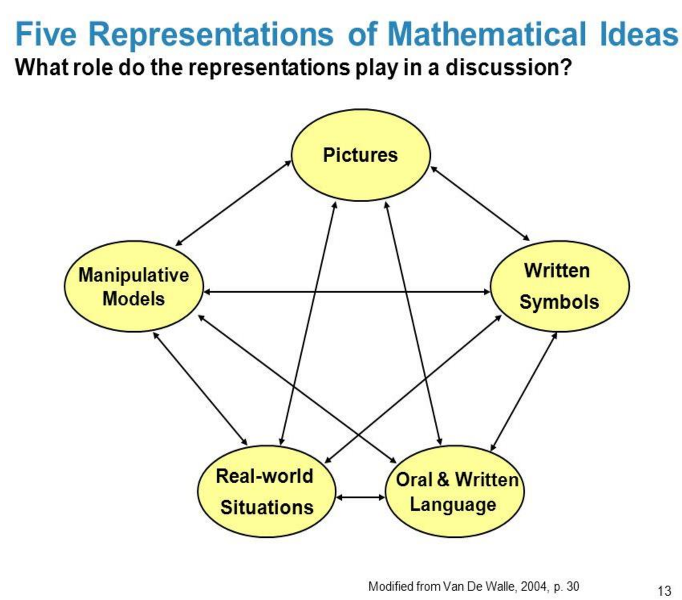
The most widespread error that teachers make with manipulative materials (and other representations) is to structure lessons in such a manner that students are being directed in exactly how to use a model. However, we can't just give students a set of Cuisenaire Rods, fraction circles, a number bond or tape diagram and expect them to develop the mathematical ideas that these materials potentially represent. It can help to follow this process as we introduce new models, or a new use of a familiar model (MP5).

Show how the model can represent the idea for which they are intended

Allow students to select freely from available models to use in solving problems

Encourage the use of a model when you believe it would be helpful to a student having difficulty

Researchers Leah, Post, and Behr (1987) found that students who have difficulty translating a concept from one representation to another are the same students who have difficulty solving problems and understanding computations. They suggest experiences in which students describe the relationships between and among the five representations (see figure 1.5). As students do this, there is a better chance that concepts will be formed correctly and integrated into a rich web of mathematical ideas.



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