



## Top 10 Teaching Tips for Middle School Math

By Scott Laidlaw, Ed.D.

*As a teacher for 11 years and middle school math teaching consultant, I've seen a wide array of different math programs and classes. Here are the 10 best teaching tips I've compiled over the years.*

### 1. Provide compelling content to study.

Years ago, a colleague I was working with said, "Maybe class can be fun, but I can't make class compelling. I have to teach math!"

It's an assumption worth exploring. Take Ron Berger's (author of *Ethic of Excellence*) idea to engage his students in math by studying the levels of radon in homes in the area. Not compelling enough? Radon is the second leading cause of cancer in the United States providing Berger and his students legitimate data loaded with real questions: What if his students discovered dangerous levels of radon in a particular geographic area? What would happen to real estate values in that area if they published the results? What he found is that students became highly engaged in mapping, taking averages, looking at standard deviations – students that previously didn't care about radon or the math concepts. And the result of the study? The kids saw math in a new way *and* they helped the community take action to reduce dangerous levels of radon in many homes.

So, what's the trick? The trick is that there isn't one. You can't trick students into finding something compelling if it isn't. Take some time to develop a few topics of study throughout the year that you find interesting – the Economy, the Presidential Campaigns, the Human Body, etc. Perhaps, find a way to present your results in your school or community – paper, web, or media. Keep the project small and doable.

### 2. Don't use extraneous rewards such as candy, purchase points, stickers, etc.

There is nothing more certain than seeing the culture of a math class decline over a period of years when a teacher gives students non-relevant rewards. The intent of the teacher, of course, is good. A teacher cares about his or her students and wants the very best for them. "I don't care how they learn math," one teacher said to me. "I just want them to learn it so that they are prepared." The teacher cared enough to purchase candy out of her own pocket. But the real message to students is this: the "positive reinforcement" of candy means math isn't worth doing on its own. The research is clear on the matter too, and shows us that extrinsic, non-relevant rewards hurt learning. See Alfie Kohn's *Punished by Rewards* or Daniel Pink's *Drive* for more background. Even if the effects aren't immediate, over time so called "positive reinforcements" like these mentioned above erode an otherwise high-quality math program.

### 3. Build a culture where students teach each other.

For many teachers, one student helping another is called cheating. But I have found that the better middle school math programs all encourage students to team together at certain times throughout the week. I witnessed incredible growth and engagement with peer teaching. The students felt trusted and enjoyed the project work as a break from all of their individual assignments. The activities were usually graded as complete or non-complete, and when tied to meaningful tasks, such as building a survey together and collecting original data, student comprehension tended to be greater than on individual tasks.

### 4. Give less, but more meaningful work, including homework.

The Trends in International Mathematics and Science Study labels the curriculum in the United States as “a mile wide and an inch deep.” Their review of math texts in middle school found that some were almost 700 pages long. With heavy pressure to teach to standards, you might be tempted to cover every single page. Don't. It achieves little learning. Choose the most important math concepts and teach these concepts with depth.

It's helpful to know what's driving the breadth. The National Advisory Counsel, formed from the study above, exposed that publishers are trying to meet demands of hundreds of different districts by including everything that any school might want. And while publishers have been attempting custom publishing, it is just as difficult to create a math curriculum for a small district as a large one. Thus, the challenges of book publishing lead to a single, uniformly created overarching textbook.

In the classroom, teachers and students become overwhelmed and unable to handle the scope of learning in this form. As teachers, we have to recognize that predominantly negative emotions surround math in middle school, and that anything we can do to reduce those emotions will go a long way toward gains in learning. Placing a 700 page text in front of a 7th grade student is unlikely to help, so use it sparingly and build little, home-made notebooks for daily use. The National Advisory Counsel concluded, “put first things first” and “less is more.”

### 5. Model thinking, not solutions or answers.

Rather than telling your students how to solve a problem, consider “thinking aloud.” For example, you might put a problem up on a whiteboard and start by saying, “I notice that the 4 numbers I am to sum are all in the thousands category, and that the first is near 3,000, the second near 5,000, and the third... I am confused about . . .” Model exactly what you thinking including confusion, emotions, skills, strategies and more.

When you do this, also let your students know how mathematicians think. One piece of research that is helpful to know is that mathematicians spend a long time thinking about how to set up a problem, a little bit of time doing the problem, and a long time “looking back” by asking the question, “Does this make sense?” Model that for your students, by putting a complex problem on the board and spending time not just jumping into a solution, but talking about what strategies you might use to solve the problem.

## 6. Provide feedback that is immediate, relevant to the task, non-comparative, and leads the way to next steps.

Many teachers believe that grading is a form of feedback. It isn't. Grading, when done well, can be a form of *assessment of learning*, but the distinction should be clear. Grades are not an effective tool as *assessment for learning*. Grades are the end of the road, when you assess what has been learned, but they should not be intended to inform a student where to go next.

Take, for example, three groups of students who received different kinds of "feedback" on math papers they had turned in. The first group received only narrative feedback (no score) informing them where and how they made mistakes. The second group received a grade (or score) and narrative feedback. The third group received just a grade. Not surprisingly, the students who received narrative feedback improved when re-tested. Those who had received only a grade did not have the information to improve, and performed the same when re-tested. But here is the surprising part: there was no difference between "grade-only" group and the group that received the grade and narrative feedback. Why? The students who received both a grade and narrative feedback completely ignored the written suggestions and only looked at the score. "I got a B, what did you get?"

Because we live in a world where grades and formalized assessments are so important, work with the system by differentiating *assessment for learning* from *assessment of learning*. When you're teaching, provide consistent and immediate feedback for learning. When you're grading, be aware that you are stepping out of the role of improving student learning. Follow Rick Stiggins' *Assessment for Learning*. He offers several strategies that support you through each assessment process.

## 7. Change mimeographed sheets to problems you and your students personally develop.

A pervasive aspect of our culture is to give out page after page of information. In faculty meetings, business meetings and conferences, hundreds of pages of documents are handed out. It makes us look organized and prepared. It's also a way to "cover" content. But for a middle school math student, it also makes it hard to determine what is important. Was it the fractions part? Was it the decimals section or the number line? Was it the triangle puzzle problem? Was it the cartoon? For homework, have them create story problems instead of sending home mimeographed sheets with 30 problems. Tell them to add artwork for comprehension. Give them the latitude to make them fun. Then have your students re-craft these problems and watch how their revisions parallel their understanding of the math concepts! Celebrate their work by posting them in the classroom.

## 8. Get math tutor volunteers once a week for two-months before state testing.

As a teacher or administrator, spend time during the Fall months by planning for and scheduling a single day each week during the months of February and March (right before state testing) to have volunteers come in to teach math in small groups. If developed correctly, these volunteers don't need to have any special training in math. In fact, it may be more beneficial to facilitate student learning if volunteers consider themselves bad at math so they model the learning process for the students.

Start with a simple plan. Each student has 10 skills they have chosen to work on during the whole class tutoring session and have written down their practice problems prior to the session. Together, volunteers and students work through the thought process necessary to solve the 10 questions and address each student's individual areas of weakness in preparation for the state tests.

## 9. Work with the emotions your students have for math.

Ask your students how they feel about math. Periodically check in with your students to gain a better sense of where they are. And, just let them feel how they feel. If they like math, they like it. If they are bored, empathize. If your students can't stand math, you will gain far more ground by seeing their perspective than trying to prove they are wrong. As a teacher this is hard because we are so accustomed to trying to "fix" the situation, and of course, our ego is tied to student emotion. If our students are bored, we feel like we aren't doing the right thing.

But the larger truth is that there is an ebb and flow in all of us for the topics we are learning. When the boredom, frustration and negativity do emerge, try understanding it and don't be afraid to open it up for discussion. Students want to feel heard. Consider how all of your students arrive with a preconceived idea of how they feel about math. Emotions may be attributed to stories or beliefs they hear from friends, older siblings or even parents. As teachers, we often have to break through the emotions about a subject before students are ready to learn the mental skills.

## 10. Use story to teach math.

Order a copy of Michael Shiro's, *Oral Storytelling & Teaching Mathematics*. It's a great guide for teachers to start incorporating story as a supplement to their curriculum. Write a story, a real story with characters and plot, and add the math problem set. Write about wizards that need to use angles for their sorcery or spice trading ships on the deep seas. Story engages the creative part of the brain and helps build a more meaningful relationship to what is being taught.

Teaching math through story is my passion and life work. After years of building rich, complex math story games in the classroom, I have had the opportunity (with a talented, professional team) to develop one of my students' favorites as a web-based application: *Ko's Journey*. Please check out [www.kosjourney.com](http://www.kosjourney.com) to learn more. Regardless of whether you decide to purchase *Ko's Journey* or not, I would love to hear about your success in introducing story to your math class!

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- ✓ *Facilitate playing rich, story based math games for teachers and students*
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