

## Catalyzing Change and Focus in High School

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For nearly twenty years, I had a similar conversation every time I met someone new. It would go something like this:

New Friend: "What do you do for a living?"

Me: "I'm a teacher."

New Friend: "What grade?"

Me: "High School."

New Friend: "What subject?"

Me: "Math."

New Friend: "Oh my goodness, I hated math! I was fine until fractions (or variables or algebra or geometry) came along. You must be a genius. I can't imagine teaching math, and to teenagers, no less!"

Although I definitely don't consider myself a genius, I do understand that growing up enjoying and feeling successful in math class was not the norm. And truth be told, my biggest motivation to become a math teacher actually arose from the struggles I experienced taking calculus in college, when I realized for the first time that what I did well – memorize and follow someone else's computation steps to arrive at a correct answer fairly quickly -- was not all there was to mathematical success. I needed to truly understand what was going on behind all of those procedures in order to be successful in college-level math, and I wanted to create those "ah ha" experiences for my students much sooner than I had them. So, I became a math teacher.

The National Council for Teachers of Mathematics (NCTM) has known for many years that most students in the United States learn math like I did, by being told a series of procedures and with a focus on fast and accurate answer-getting at the expense of building deep levels of conceptual understanding. New standards of a decade ago were an important step in remedying this situation, but in order to realize systemic change, educators need guidance. The *Catalyzing Change: Initiating Critical Conversations* series of NCTM publications was intended to do just as the title suggests: "catalyze"

(cause or accelerate a reaction) “change” (to alter, modify, and make different) in the mathematical learning experiences of many U.S. students. With widespread disparities in math achievement among racial and socioeconomic groups, and a societal acceptance of math as “hard” and “not for everyone,” the need for catalyzing change couldn’t be greater. We can do better by our students by getting better at our work.

As a classroom teacher, I never had enough time to teach all of the expected curriculum to my high school students; our textbooks and state standards included too many topics for the 180 school days allotted for student learning. Although I knew it wasn’t effective, I often resorted to just teaching the procedures so students could get to the answers, and they and I could feel (at least temporarily) successful. When Colorado adopted the Common Core State Standards for math, the elementary and middle school teachers in my district were excited and relieved to see focus and coherence reflected in their grade level expectations, providing guidance for how to teach less content more deeply. High school teachers, however, found the new standards to be just as dense and disconnected as ever, leaving us discouraged and overwhelmed.

About eight years later, I was selected to chair the Colorado Academic Standards Review and Revision committee for mathematics. Of the thousands of public comments submitted to the committee, we found the vast majority of negative comments were related to the high school math standards. Teachers, district math coordinators, school and district administrators, and parents alike believed that there was just too much content in the high school standards, and no guidance for educators to know how to prioritize or focus instruction to ensure that all students had the math backgrounds they needed to pursue whatever post-graduation option they wanted.

Luckily for me and the committee, NCTM’s *Catalyzing Change* for high school had just been released and embedded in the four Key Recommendations (see Table 1) were the Essential Concepts: “the most critical content from [the] content domains – the deep understandings that are important for students to remember long after they have forgotten how to carry out specific techniques or apply particular formulas (NCTM, 2018).” Using these guidelines and others relevant to career- and college-readiness, we qualified the aligned high school Grade Level Expectation (Colorado Department of Education, 2020) as *Major work of high school*. This designation supports educators in creating pacing guides and scope and sequencing documents and in making instructional decisions each day around what to emphasize and what to de-emphasize with students. With time constraints a long-time enemy of educators, this simple indicator can provide some comfort that student learning is not being shortchanged or jeopardized by teachers making independent decisions that might carry unintended consequences.

Table 1  
NCTM Key Recommendations for Catalyzing Change in School Mathematics (NCTM 2018)

Broaden the Purposes of Learning Mathematics	Each and every student should learn the Essential Concepts in order to expand professional opportunities; understand and critique the world; and experience the wonder, joy, and beauty of mathematics.
Create Equitable Structures in Mathematics	High school mathematics should discontinue the practice of tracking teachers as well as the practice of tracking students into qualitatively different or dead-end course pathways.
Implement Equitable Mathematics Instruction	Classroom instruction should be consistent with research-informed and equitable teaching practices
Develop Deep Mathematical Understanding	High schools should offer continuous four-year mathematics pathways with all students studying mathematics each year, including two to three years of mathematics in a common shared pathway focusing on the Essential Concepts, to ensure the highest-quality mathematics education for all students.

Making these recommendations as part of a state-level structured process is one thing, and maybe you're wondering, "What can I do? I'm not chairing a standards review and revision committee." No matter your role in the math education space, I encourage you to do what you can with what you have, now! If you haven't already, read *Catalyzing Change*, and determine what most resonates with your job and setting. Even the smallest step toward the Key Recommendations will make a difference for students, so don't hesitate to try. When you are comfortable, you can bring others along with you, and promote *Catalyzing Change* to educators within your own system. If you can, advocate for or provide professional learning for educators aligned to these recommendations and ensure the opportunity for teachers to speak across the grade levels through structured vertical articulation.

Maybe we can shift the narrative where math teachers in the future will have this conversation instead:

New Friend: "What do you do for a living?"

Math Teacher: "I'm a math teacher."

New Friend: "Wow, you're so lucky! Math is the greatest. Your job must be very rewarding."

Until then, let's continue to get better so we can do better for our students. After all, we are lucky, and our jobs *are* very rewarding.

## References:

Colorado Department of Education (CDE). (15 April, 2021). *Colorado Academic Standards: Mathematics*. <https://www.cde.state.co.us/comath/2020cas-ma-p12>

National Council of Teachers of Mathematics (NCTM). 2018. *Catalyzing Change in High School Mathematics: Initiating Critical Conversations*. Reston, VA: NCTM.

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