

PERFORMANCE MATTERS

News from the CSDE Performance Office



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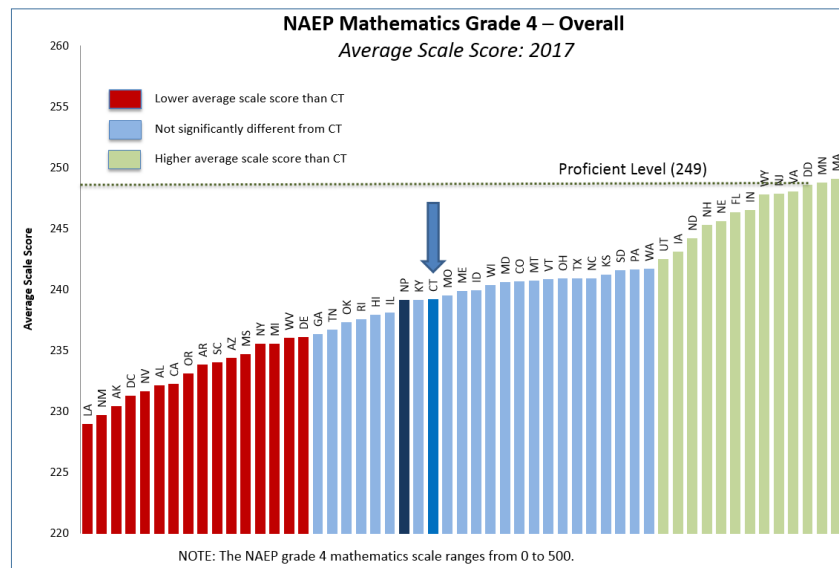
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Special Performance Matters Issue on Mathematics

Though Connecticut's Reading achievement on the 2017 National Assessment of Educational Progress (NAEP) is among the highest in the nation, its Mathematics achievement lags that of several other states around the country (see chart below).



This special issue includes resources to support the improvement of teaching and learning of mathematics. The Report of the Commissioner's Council on Mathematics (page 2) offers important recommendations for all stakeholders including the CSDE, school districts, higher education, and the community at large. The article — “*Improving Student Learning in Mathematics*” — takes a deep dive into the concepts of focus, coherence, and rapport (see below). The Commissioner's 2018 Summer Math Challenge stresses the importance of maintaining math skills during the summer (page 2).

Improving Student Learning in Mathematics

Contributing authors: John Keogh, Mathematics Consultant; Tamara Gloster, Assistant Director of Teaching and Learning at CREC; Mary P. Truxaw, Ph.D., Associate Professor of Mathematics Education at UCONN; Christina Madancy, Mathematics Curriculum Coordinator at Wallingford Public Schools; and Doreen Mantilia, Mathematics Coordinator at Madison Public Schools

When it comes to academic subjects such as mathematics, we expect all students to be working on grade-level-appropriate content. However, “experience has shown us that there hasn't been a single class taught where all students are exactly where they should be at the outset. Therefore, teachers have always had to differentiate instruction” (Drost, 2016). The same is true of math teachers throughout Connecticut: “no learner is the same, and all require different pathways” (2016). However, it has been said that if we are meeting kids where they are, then we are leaving them where they are.

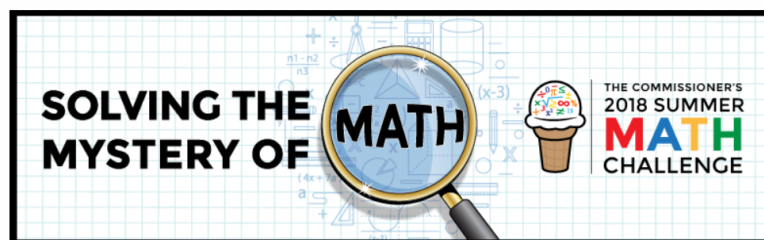
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Report of the Commissioner's Council on Mathematics

The [Report of the Commissioner's Council on Mathematics](#) from October 2016 offers recommendations that are grounded in the lessons learned regarding strong leadership, quality professional development, and dedicated time and effective collaboration within, among, and beyond school districts. They address actions all stakeholders can take, including the Connecticut State Department of Education (CSDE), each individual school district, higher education, and the community. The recommendations are:

1. Develop clear and consistent understanding of the Connecticut Core Standards – Mathematics (CCS-M) at the classroom, school, district, and state level. This understanding is defined as a deep knowledge of the content standards and an effective use of the practice standards.
2. Provide the necessary support and training to effectively implement the CCS-M with fidelity in all classrooms, schools, and districts.
3. Implement appropriate intervention and acceleration to support the needs of a diverse group of learners.
4. Engage all stakeholders in the process of putting the CCS-M into practice through effective communication that keeps teachers, parents, and community members informed and participating in the process.

These recommendations are intended to affirm and strengthen the good work currently happening in the state while providing a structure for change to improve mathematics achievement at the school, district, and state level. The implementation of these standards is ongoing, and it is clear that collaboration among all stakeholders is necessary for success in our classrooms.



The **2018 Commissioner's Summer Math Challenge** stresses the importance of maintaining math skills during the summer. Schools compete based on student population and grade level. The program identifies the schools with the highest percentage of participating enrollment and the highest number of badges earned by participating students.

Registration instructions, district reporting forms and all other materials are available [online](#).

SAVE THE DATE: Performance Matters Forum — Tuesday, September 11, 2018

District/school leaders, data managers, data entry staff, and IT staff should plan to join the CSDE Performance Office on September 11 at the Crowne Plaza in Cromwell for an intensive and interactive one-day professional learning experience. The Performance Matters Forum will offer sessions focused on the following five topic areas:

- Data Collection
- Assessment
- EdSight
- Accountability
- Research/Evaluation



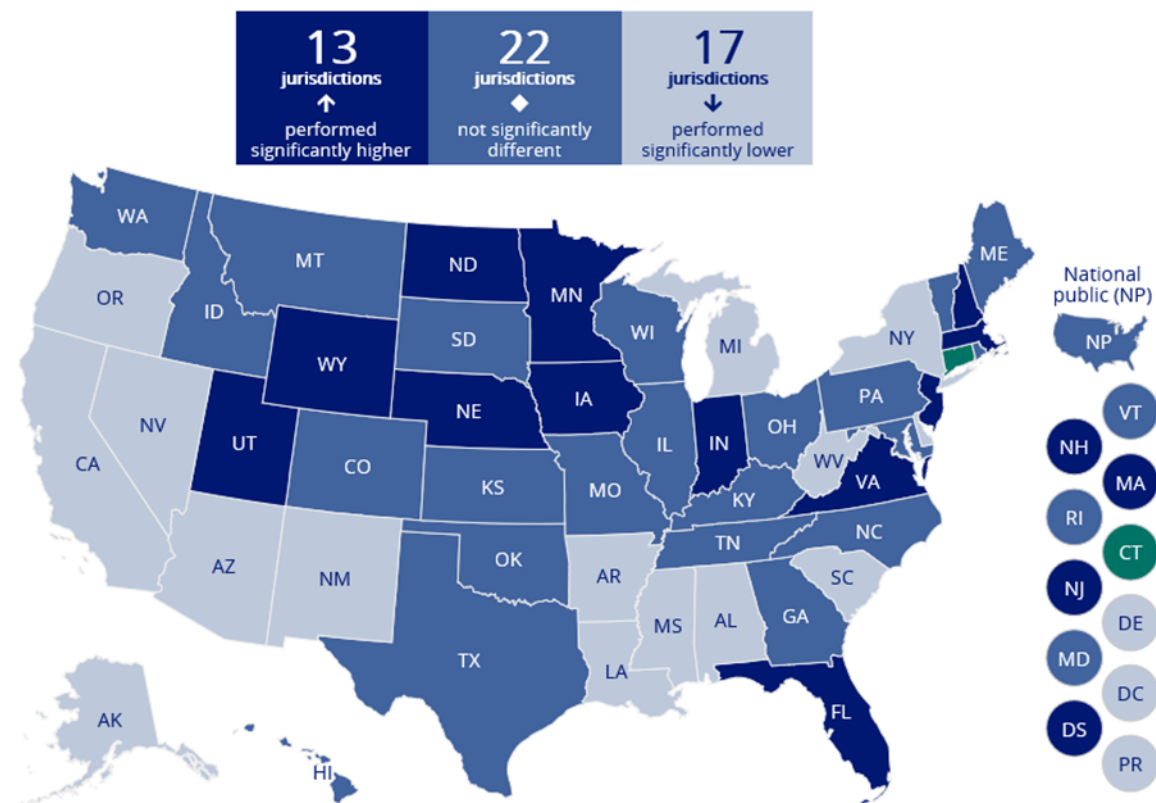
Connecticut's Overall Student Performance on NAEP Remains Steady

On April 10, the National Center for Education Statistics announced results of the 2017 National Assessment of Educational Progress (NAEP), known as the “Nation’s Report Card.” The reports show that Connecticut’s overall student performance in Grades 4 and 8 is stable in reading and mathematics when compared to results from the last administration in 2015.

Over the six-year period from 2011 to 2017, fourth graders are showing progress in reducing the achievement gap in reading. In Grade 4 reading, we see a narrowing of the gap between White and Hispanic students as well as students who are eligible for free or reduced priced meals and their non-eligible peers.

While these results provide signals that Connecticut is making headway in addressing persistent and troubling achievement disparities, there is room for improvement, especially in mathematics. When mathematics scores are reported by individual student groups, reports shows that economically disadvantaged students and Hispanic students are scoring lower than their peers nationally. Overall, many states are outperforming Connecticut students in mathematics in Grades 4 and 8.

The color coded map below shows Connecticut’s Grade 4 average scale score in mathematics compared to all other states. Connecticut’s performance is not different than the national average for public schools, and 13 states outperform Connecticut. For further details about Connecticut’s performance on the NAEP 2017 assessments, please see [Connecticut NAEP 2017 Reading and Math Results](#).



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The Connecticut Core Standards for Mathematics (CCS-Math) emphasize the need for both focus and coherence in the teaching and learning of mathematics. In an article entitled, *Common Core Standards emphasize 'math that matters most'*, Jason Zimba, a lead writer of the Common Core State Standards for Mathematics and Founding Partner of Student Achievement Partners, states, "The standards are a map. They don't blaze the trail for you. But if we don't have the map, then we can't really expect to get there" (2015). Well, we have had the map for some time now; so what can you do to support students who struggle so they can participate in grade appropriate, cognitively demanding work without becoming frustrated or overwhelmed?

From a pedagogical standpoint, for mathematics teachers to help students "get" important mathematical concepts, they need to understand the progressions that lead to understanding within a given mathematical domain. One general principle is that teaching an algorithm or "short cut" too early can have a negative impact on student learning. For example, before students are taught a procedure to subtract whole numbers, they need to explore a variety of contextual situations arising from their own everyday world in which subtraction might be useful. They also need to develop and discuss strategies based on their understanding of numbers and place value and on relationships between subtraction and addition.

The National Council of Teachers of Mathematics *Principles to Action (NCTM 2014)* emphasizes that it is detrimental when "Too much focus is on learning procedures without any connection to meaning, understanding, or applications that require these procedures" (p.3). To support conceptual understanding, teachers can provide opportunities for students to represent or model problems. Mathematical modeling is not about math manipulatives. Model with mathematics (CCS-Math, SMP.4) means applying mathematics to solve a problem within context -Jason Zimba. See for yourself illustrated below by Jason Zimba (2015).

4. Model with mathematics

Mathematically proficient students can apply the mathematics they know to solve problems arising in everyday life, society, and the workplace. In early grades, this might be as simple as writing an addition equation to describe a situation. In middle grades, a student might apply proportional reasoning to plan a school event or analyze a problem in the community. By high school, a student might use geometry to solve a design problem or use a function to describe how one quantity of interest depends on another. Mathematically proficient students who can apply what they know are comfortable making assumptions and approximations to simplify a complicated situation, realizing that these may need revision later. They are able to identify important quantities in a practical situation and map their relationships using such tools as diagrams, two-way tables, graphs, flowcharts and formulas. They can analyze those relationships mathematically to draw conclusions. They routinely interpret their mathematical results in the context of the situation and reflect on whether the results make sense, possibly improving the model if it has not served its purpose.

This provides an example of why the Standards deliberately placed mastery of the standard algorithm for subtraction in grade four while having them perform subtraction in grades K-3 - not because students cannot master the algorithm sooner, but because they need a variety of experiences in context to lead to a deeper understanding of subtraction before learning a specific subtraction algorithm. "Specifically, learners should have experiences that enable them to connect with new learning with prior knowledge and informal reasoning and, in the process, address preconceptions and misconceptions" (p. 9).

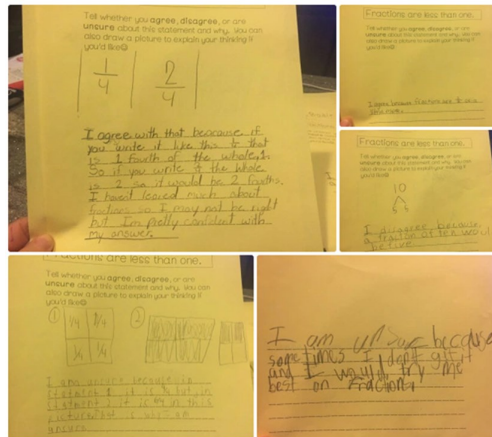
Because these [learning progressions](#) are vital to long term learning, perhaps no teacher practice is more important than the use of a formative assessment process to determine whether the student has a true understanding of the concepts being learned (probably best measured by asking the student to justify her/his reasoning in a developmentally appropriate way based on the student's mathematical maturity) and to identify any underlying misconceptions that inhibit the student's ability to grasp those concepts, thus enabling the teacher to make the instructional adjustments necessary for student mastery.

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To see this in action, here is an excerpt taken from [MathMinds](#) Blog on Assessments by Kristin Gray, a content developer and facilitator of professional services at Illustrative Mathematics. The task involved asking students if they agreed, disagreed or were unsure about the statement, “Fractions are less than one.”

Earlier in their fraction unit, the third grade teachers used the talking point to hear how her students were talking about fractions. (This work is actually from another teacher’s class, but you get the idea;)



A teacher who did this activity reflected, “From this activity, I learned my students had only ever been exposed to a fraction as a part of a whole (and wanted to strictly refer to fractions in terms of pizza). This impacted my instruction by being sure to have the discussion that fractions can represent parts of a whole, but we can also represent whole numbers with fractions.”

To me, these reflections are what assessment should be...the teachers learn about student thinking, the students think about their own thinking, and what we learn helps us plan future lessons with our students’ understandings in mind!

So how do we address unfinished learning and support students in developing understanding and mastery of content?

Chrissy Allison, Director of Math Professional Learning at Achievement Network (ANET), and Astrid Fossum, the Mathematics Assessment Specialist for Student Achievement Partners (SAP) developed a “[Do’s and Don’ts Chart](#)” for catching kids up (Fossum, 2017). The chart identifies some missteps districts, schools, and teachers make when working with students who have gaps in their math knowledge. In the table are recommendations to consider to avoid these missteps.

Common Misstep	Recommendation
Blindly adhering to a pacing guide/calendar	Use formative data to gauge students understanding and inform pacing
Halting instruction for a broad review	Provide just-in-time support within each unit or during intervention
Trying to address every gap a student has	Prioritize most essential prerequisite skills and understanding for upcoming content
Trying to build from the ground up or going back too far in the learning progression	Trace the learning progression, diagnose, and go back just enough to provide access to grade-level material
Re-teaching students using previously failed methods and strategies	Provide a new experience for students to re-engage, where appropriate
Disconnecting intervention from content students are learning in math class	Connect learning experiences in intervention and universal instruction
Choosing content for intervention based solely on students’ weakest areas	Focus on Major Work clusters from current or previous grades as it relates to upcoming content
Teaching all standards in intervention in a step-by-step, procedural way	Consider the aspect of Rigor called for in the standards when designing and choosing tasks, activities, or learning experiences
Over-reliance on computer programs in intervention	Facilitate rich learning experiences for students to complete unfinished learning from previous or current grade

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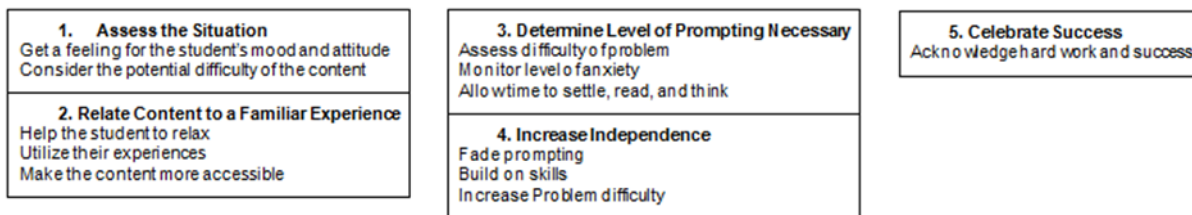
Although there are other practices that can be listed here, rapport with students is essential. Stephen Brookfield in his book, *The Skillful Teacher* (2006), said, “Trust between teachers and students is the affective glue that binds educational relationships together. Not trusting teachers has several consequences for students. They are unwilling to submit themselves to the perilous uncertainties of new learning. They avoid risk. They keep their most deeply felt concerns private. They view with cynical reserve the exhortations and instructions of teachers” (p. 163).

So what does rapport look like in the classroom? A guiding tenet is realizing that mathematics pedagogy is not free from sociocultural influences. Students who are products of various socio-economic and cultural backgrounds learn mathematics through different contexts, and it is because of these varied experiences that student mathematics performances fluctuate between low and high levels of disparity (Stigler & Hiebert, 1999).

In an interview with students who participated in a study that examined how students felt regarding teacher relationships in mathematics, students said:

- They were motivated to entertain the idea of math when opportunities for creativity were allowed.
- Teachers incorporated incentives and consequences related to math, to spark interest and motivation such as offering free time.
- Working with partners which allow them to try different approaches to math and motivate them to finish.
- Teachers challenged them based on levels and to increase their current knowledge based on their previous knowledge. (American Psychological Association, 1997).

Additionally, [NCTM](#) provides five steps for easing tension (in mathematics) and promoting success used for students with learning disabilities; however, all students can benefit from practice! (Hord, Marita, Walsh, Tomaro, & Gordon, 2016, p. 614).



In conclusion, understand the learning progression of the CT Core Standards for Mathematics. Provide multiple experiences for students so that they can connect to new learning. Remember that it is very likely students will have some unfinished learning. Therefore, use the Do’s and Don’ts Chart to determine a plan and avoid missteps. And above all, know that trust is the glue that binds relationships and therefore impacts achievement. Be sure to build rapport with students and ease the tension to help students be successful.

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