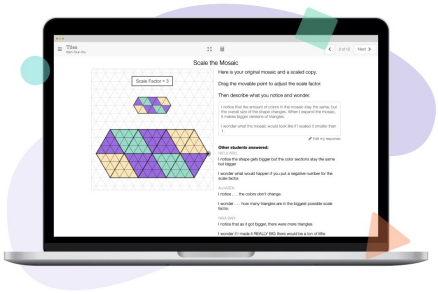
Desmos Math 6–8 Background Information

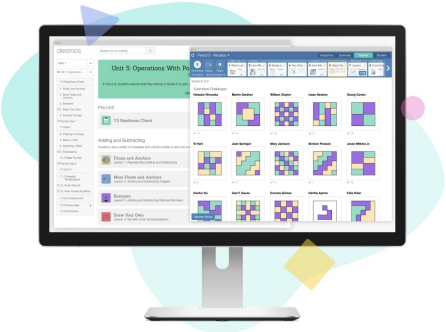
Every student is brilliant, but not every student *feels* brilliant in math class, particularly students from historically excluded communities. Research shows that students who believe they have brilliant ideas to add to the math classroom learn more.[1] Desmos Math 6–8 offers curriculum and tools designed to help teachers invite, celebrate, and develop those ideas.

When teachers teach with Desmos Math 6–8, students see themselves and their classmates as having mathematical ideas worth sharing and developing together. This is a "productive disposition—[the] habitual inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy."[2]



Based on IM 6–8 Math™ by Illustrative Mathematics and Open Up Resources, Desmos Math 6–8 is designed with student thinking at its center. We draw from researchers who have identified solving problems as the means through which students learn mathematics.[3] With our curriculum, teachers can pose accessible problems that invite a variety of approaches before helping students formalize them. In this way, students take an active role in developing their own ideas first (individually, in pairs, and in small groups) before the teacher helps them synthesize their ideas as a class.

Our curriculum blends both paper and digital lessons in order to take advantage of the strengths of each medium—the dynamic and interactive nature of technology and the flexible and creative nature of paper. The digital lessons incorporate “interpretive feedback,” which shows students the meaning of their own thinking in context[4] rather than simply evaluating it as “right” or “wrong.” Our paper lessons often include movement around the classroom and other social interactions that support students in learning from one another’s ideas.[5]



Teachers play a critical role in Desmos Math 6–8. With the support of our teacher dashboard and conversation toolkit, teachers launch tasks in ways that are clarifying and inviting. These tools let teachers anticipate ideas students may offer, monitor for those ideas, select them when they arise, and sequence them in discussion to help students make connections between their ideas and the ideas of others.[6]

In every digital activity, students can share their thinking in a variety of ways, including with text, audio recordings, and image uploads. Teachers can then view student work in real time, pace students throughout the lesson, display student work to facilitate class discussions, leave students written feedback in the teacher dashboard, and utilize a variety of other digital pedagogies.

Intentional Curriculum Design

Conceptual Understanding, Procedural Fluency, and Application

With Desmos Math 6–8, we help students create new ideas by building on their intuitions and early ideas. In order to transfer those ideas to new contexts, students need to solve problems with accuracy and flexibility. We support that procedural fluency with several resources in Desmos Math 6–8:

- Repeated challenges, where students engage in a series of challenges on the same topic.
- Challenge creators, where students challenge themselves and their classmates to solve a problem of their own creation.
- Practice sets, where students receive opportunities for distributed practice on topics throughout the year.
- Paper practice days, an entire lesson intended to consolidate procedural skills.

Students then receive opportunities to apply their fluency to new mathematical or real-world contexts, such as selecting transportation options, analyzing data from the Titanic, or determining which container holds the most popcorn.

Support for All Students

We offer teachers specific support for inviting, celebrating, and developing the ideas of students with disabilities and multilingual learners.

For students with disabilities:

- Each lesson is designed using the Universal Design for Learning (UDL) Guidelines. Here is more information on how Desmos Math 6–8 supports UDL.
- Each lesson includes strategies for accommodation and support based on the areas of cognitive functioning.
- Each lesson includes opportunities for extension and support when appropriate.
- Most digital activities are screen reader friendly.

For multilingual learners, we include:

- Explicit vocabulary instruction with visuals.
- Processing time prior to whole-class discussion.
- Sentence frames to support speaking opportunities.
- Instructions broken down step by step.
- Background knowledge or context explicitly addressed.

Evidence of Efficacy

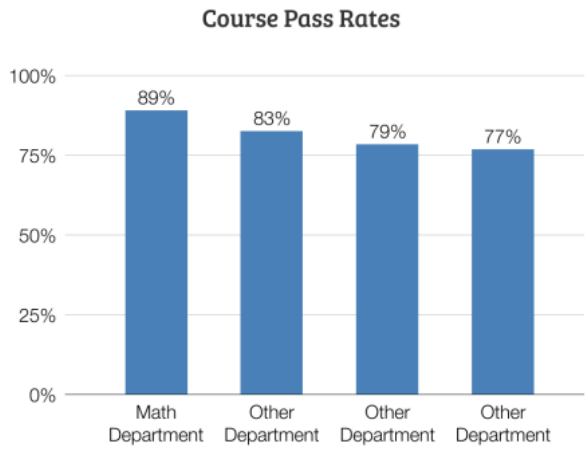
Student Achievement

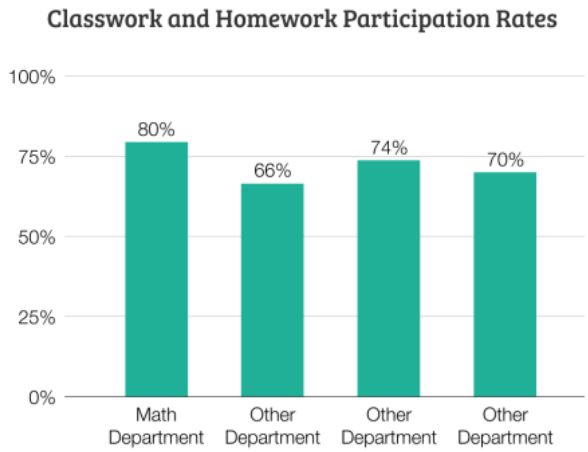
Naugatuck Public Schools Mathematics uses Desmos Math 6–8 and sees increases in student engagement and achievement.

In Naugatuck Public Schools, as in many school systems, students were struggling to engage with mathematics. Naugatuck wanted to see an increase in participation and course pass rates in mathematics, which typically trailed participation and pass rates in other academic departments. Then, in 2020, the COVID-19 pandemic forced Naugatuck's schools into a hybrid learning mode for the 2020–2021 school year.

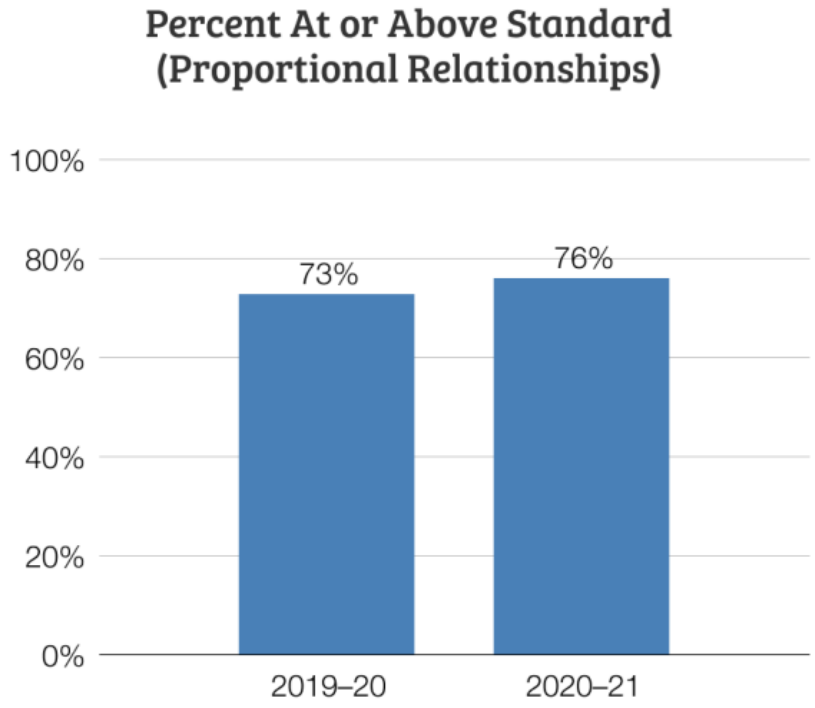
Rather than scale their goals back in response to that crisis, Naugatuck administrators, coaches, and teachers formed professional learning communities and adopted Desmos Math 6–8.

In a system-wide survey that winter, the Naugatuck district administration found that mathematics participation and course pass rates had increased over previous years and even exceeded rates in every other department.





Then, Naugatuck administered a benchmark assessment on proportional reasoning to their seventh-grade students. At a time when school systems nationwide were preparing for lower scores on most academic measures, Naugatuck met and exceeded their previous year's results.



Teacher Surveys

As we developed Desmos Math 6–8, we surveyed teachers about their experience with their previous curriculum and later about their experience with Desmos Math 6–8.

We saw large increases in the percentage of teachers agreeing that Desmos Math 6–8 was engaging and educative and that they were well supported in its use.

% Teachers Agreeing With Statement	Desmos Math 6–8	Previous Curriculum	Difference
My students find my curriculum engaging.	97%	34%	63%
My curriculum makes teaching enjoyable.	93%	41%	52%
My curriculum makes me a better math teacher.	88%	43%	45%
My curriculum helps my students learn math.	96%	53%	43%

Implementation Support

Teacher Support

Orientations

Orientation webinars are available throughout the school year to all Desmos Math 6–8 educators at no additional cost. These webinars are specifically designed for teachers, main contacts, and administrators, and are differentiated for new users or experienced users. An asynchronous orientation option is also available.

Desmos Coaches

Each school or district that uses Desmos Math 6–8 is assigned a Desmos Coach who provides ongoing support throughout the school year. Coaches act as thought partners for the main contacts at each school or district who are overseeing implementation, helping to contextualize usage reports and data points and respond to questions or challenges throughout the year.

Ongoing Professional Learning

- Webinars that highlight best practices for both the technology and pedagogy in Desmos Math 6–8 are held throughout the year.
- Teachers regularly receive lesson preview emails that provide them with a sneak peek at their next lesson along with helpful facilitation tips and suggested practices to help them develop their students' brilliance.
- Monthly newsletters are sent to all Desmos Math 6–8 teachers to highlight new features and implementation tips from coaches and other teachers.

Supplemental Services

Additional professional development on a variety of topics is available for purchase.

[1] Uttal, D. H. (1997). Beliefs about genetic influences on mathematics achievement: A cross-cultural comparison. *Genetica, 99*(2–3), 165–172. https://doi.org/10.1007/bf02259520

[2] National Research Council. (2001). Adding It Up: Helping Children Learn Mathematics. Washington, DC: National Academy Press. doi.org/10.17226/9822

[3] Hiebert, J., Carpenter, T. P., Fennema, E., Fuson, K., Human, P., Murray, H., Olivier, A., & Wearne, D. (1996). Problem solving as a basis for reform in curriculum and instruction: The case of mathematics. *Educational Researcher, 25*(4), 12–21. https://doi.org/10.3102/0013189x025004012

[4] Okita, S. Y., & Schwartz, D. L. (2013). Learning by teaching human pupils and teachable agents: The importance of recursive feedback. *Journal of the Learning Sciences, 22*(3), 375–412. https://doi.org/10.1080/10508406.2013.807263

[5] Chase, C., Chin, D.B., Oppezzo, M., Schwartz, D.L. (2009). Teachable agents and the protégé effect: Increasing the effort towards learning. *Journal of Science Education and Technology 18*, 334–352. https://doi.org/10.1007/s10956-009-9180-4.

[6] Smith, M.S., & Stein, M.K. (2018). *5 practices for orchestrating productive mathematics discussions* (2nd ed.). SAGE Publications.