

Resources

Interested in learning more? Here are selected resources. For a complete list, scan here: →



Implementing Rich Math Tasks

BOOKS

- NCTM's *Taking Action Series*
- *5 Practices for Orchestrating Productive Mathematics Discussions*
- *Classroom-Ready Rich Math Tasks Series*

WEBSITES

- Bridging for Math Strength
mathstrength.org/about/rich-tasks
- Virginia Department of Education:
Rich Mathematical Tasks
doe.virginia.gov/teaching-learning-assessment/k-12-standards-instruction/mathematics/instructional-resources/rich-mathematical-task

Building Fact Fluency

BOOKS

- *The Figuring Out Fluency in Mathematics Teaching and Learning Series*
- *The Number Talks Series*
- *Building Powerful Numeracy for Middle & High School Students*

WEBSITES

- Math Fact Fluency
kcm.nku.edu/mathfactfluency
- NCTM Position Statement on Procedural Fluency
nctm.org/Standards-and-Positions/Position-Statements/Procedural-Fluency-in-Mathematics

Math for the common good.



cehd.gmu.edu/centers/mec



Mathematics Education Center

Leading innovative efforts to engage communities in mathematics teaching and learning


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3. National Council of Teachers of Mathematics. (1989). Curriculum and evaluation standards for school mathematics. NCTM.
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12. National Research Council. (2001). Adding it up: Helping children learn mathematics. The National Academies Press.
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16. Davenport, L. R., Henry, C. S., Clements, D., H., & Sarama, J. (2019). No more fact frenzy. Heinemann.
17. Kling, G. & Bay-Williams, J. M. (2021). Eight unproductive practices in developing fact fluency. *Mathematics Teacher: Learning and Teaching PK-12*, 114(11), 830-838.
18. Ramirez, G., Shaw, S. T., & Maloney, E. A. (2018). Math anxiety: Past research, promising interventions, and a new interpretation framework? *Educational Psychologist*, 53(3), 145-164.




Mathematics Education Center

Implementing Research-Informed Evidence-Based Mathematics TEACHING

Leading innovative efforts to engage communities in mathematics teaching and learning



Placing
research-
informed,
evidence-based
practices in
the hands of
educators
and the
communities
they serve



Inside this brochure, you'll find a wealth of research-backed insights and valuable resources dedicated to promoting rich math tasks and fact fluency.

International assessment data shows that students who develop a deep understanding of mathematics outperform their peers who rely on memorization and rote procedures.¹ To think deeply about mathematics concepts, students must have the opportunity to work on interesting and novel problems that emphasize authentic application.² Processes for solving rich problems are central to nationally respected standards^{3,4} and frameworks,² and ensure students have the experiences necessary to learn and do mathematics.⁵

The information illuminated on each page draws on recommendations by leading organizations, such as the National Council of Teachers of Mathematics (NCTM), that not only promote high expectations and excellence for all students but also define the mathematics content and thinking skills students need to pursue a full range of college and career opportunities.

What is a rich math task?

“A rich task or problem can be presented in words or expressed using only numbers. It can be a game or a puzzle. It is a task to which there is no immediate known solution-path on the part of the learner. A rich task presents a high level of cognitive demand and requires students to think abstractly in order to make connections to and among mathematical concepts. As students work to reach a solution, new mathematics concepts unfold, and deeper understanding occurs.”^{6 (p. 3)}

How long does it take to implement?

Depending on the task identified, rich task implementation could take ten minutes, one instructional block, or multiple days.

What does the research say about implementing rich math tasks?

Student achievement increases when students investigate math ideas in context, use various computational strategies, and collaborate around dynamic and interesting tasks.⁷

Rigorous math learning experiences, such as implementing rich math tasks, contain content that challenges students and **promotes strategic and flexible thinking**.⁸

Regular opportunities to build deep understanding through tasks with high cognitive demand **increases student math performance**.⁹

The ability to complete rich math tasks **supports transfer of math concepts and skills** to new contexts and problems.²

What is math fact fluency?

“Knowing basic number combinations - the single digit addition and multiplication pairs and their counterparts for subtraction and division - is essential. Equally essential is computational fluency - having and using efficient and accurate methods for computing... Regardless of the particular method used, students should be able to explain their method, understand that many methods exist, and see the usefulness of methods that are efficient, accurate, and general.”^{10 (p. 32)}

How do students develop fact fluency?

While mastery and automaticity are outcomes of practice, fluency with math facts moves beyond memorization and attends to efficiency, flexibility, and accuracy.^{11,12} Understanding the role and meaning of arithmetic operations in number systems is key to developing fact fluency.^{13,14}

What does the research say about developing fact fluency?

Student learning is greatest in classrooms where math facts are taught using number relationships and reasoning strategies.¹⁵

Using number relationships, benchmarks, and reasoning strategies **supports students' emerging conceptual understanding and flexibility**.¹⁶

Timed tests do not allow teachers to assess fluency as they do not attend to efficiency, flexibility and the individual needs of the learner.^{17,18}

