FYI on CME, EDC, and NSF

CME Project, or the Center for Mathematics Education Project, was developed at Education Development Center, Inc. (or EDC). Led by the renowned mathematician and scholar Dr. Al Cuoco, CME Project is supported by the National Science Foundation (NSF) and informed by extensive mathematics research, decades of classroom studies, and ongoing field tests. Pearson, the largest educational publisher in the world, is the exclusive publisher of CME Project.
Somewhere between an instructional approach that is traditional and one that is progressive lies another way to teach math—CME Project ©2013. This four-year, NSF-funded, comprehensive program offers you a Common Core curriculum organized around the structure of Integrated I, Integrated II, and Integrated III. The program meets the dual goals of mathematical rigor and accessibility for all students through innovative, research-based instruction and a curriculum that is designed around problem-based, student-centered tasks. It’s math with a twist!

**Math That’s Focused**
CME Project follows a traditional course structure with a progressive, student centered approach.

**Math That’s Balanced**
CME Project blends investigation with methods, skills, and calculation.

**Math That’s Habit-Forming**
CME Project develops mathematical habits of mind and Standards for Mathematical Practices

**Math That’s Thoughtful and Rigorous**
CME Project promotes deep understanding of math concepts by focusing on connected ideas.
Most teachers choose between traditional math programs that follow an accepted course structure and progressive, student-centered approaches. The twist is that CME Project does both. This NSF-funded program takes a balanced approach to teaching mathematics and is built for the Integrated Pathway of the Common Core State Standards.
CME Project Structure

Each course is organized by chapters, with each chapter providing focused, in-depth instruction on a core mathematical topic. Each chapter includes three or four investigations that open with exploration, progress to formalization, and close with reflection.
The twist is that CME Project utilizes the best parts of each type of program and presents a uniquely balanced math program. Students begin by experimenting and previewing the math before they formalize it through traditional instructional elements.
Math That’s Habit-Forming

Problem solving is an essential part of any math curriculum. The twist is that CME Project fosters good Habits of Mind so students can solve problems that don’t always appear in textbooks. The emphasis on mathematical habits of mind, the core organizing principle of the program, is aimed at helping students develop precisely the kind of mathematical practices described in the Common Core State Standards.

<table>
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<tr>
<th>MATHEMATICAL PRACTICES</th>
<th>MATHEMATICAL HABITS OF MIND</th>
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| **MP1** Make sense of problems and persevere in solving them | • Performing thought experiments  
• Expecting math to make sense |
| **MP2** Reason abstractly and quantitatively Finding and explaining patterns | • Creating and using representations  
• Generalizing from examples  
• “Delayed evaluation” – Seeking form in calculations  
• Purposefully transforming and interpreting expressions  
• Seeking and specifying structural similarities |
| **MP3** Construct viable arguments and critique the reasoning of others | • Expecting math to make sense  
• Extending operations to preserve rules for calculating |
| **MP4** Model with mathematics Creating and using representations | • “Delayed evaluation” – Seeking form in calculations |
| **MP5** Use appropriate tools strategically Seeking and specifying structural similarities | • Purposefully transforming and interpreting expressions |
| **MP6** Attend to precision Expecting mathematics to make sense | • Seeking and expressing regularity in repeated calculations |
| **MP7** Look for and make use of structure | • “Delayed evaluation” – Seeking form in calculations  
• “Chunking” (changing variables in order to hide complexity)  
• Reasoning about and picturing calculations and operations  
• Extending operations to preserve rules for calculating  
• Purposefully transforming and interpreting expressions  
• Seeking and specifying structural similarities |
| **MP8** Look for and express regularity in repeated reasoning | • Seeking and expressing regularity in repeated calculations  
• Generalizing from examples  
• Finding and explaining patterns  
• Purposefully transforming and interpreting expressions |
Developing Habits of Mind

1.0 Habits of Mind

Mathematical habits of mind appear in every lesson and emphasize the processes and proficiencies of the Standards for Mathematical Practices.

Habits of Mind

Mathematical habits of mind are the most fundamental concepts and applications that you will take away from your mathematics course. These habits are the best tool for solving genuine, good problems, solving, and critical challenges.

You will use each of the following behaviors beyond the world of mathematics. Good habits of mind encourage and support you success in the world.

Be a problem-solver:

- Build on our patterns.
- Recognize similar processes.
- Create by subtracting.
- Look for relationships.

Be a visualizer:

- Imagine the world.
- Model the situations.
- "See" a good.
- Think proportionally.

Be a thinker:

- Reason for situations.
- Develop dynamic behavior.
- Analyze continuous behavior.
- Prove statements before we.
- Study someone else's work.

Can you think of any other mathematical habits?

Try some of the following activities:

- Any problem that you are thinking.
- Any activity for your Problem of the Week.

Math That's Habit-Forming

See What Develops

Visual reminders throughout the program emphasize good habits related to process, visualization, representation, patterns, and relationships.

(CONTINUED)
In this lesson, you will solve a one-variable equation using two basic moves for solving equations.

**Minds in Action**

**Episode 6**

Tony and Sasha solve the equation $7x + 2 = x + 16$.

Tony: To solve this problem, I'd start by drawing a number line, and... (continued)

Sasha: Don't bother with all of that, Tony. I've got a shortcut.

Tony: Show me.

Sasha: Well, whenever I solve an equation, the solution ends up being $x = \text{some number}$. So, I make the equation look like that.

Tony: How?

Sasha: First I get rid of the $x$ term on one side of the equation. To do that, I subtract $x$ from each side of the equation.

$$7x + 2 = x + 16$$
$$7x - x = x - x + 16$$

Tony: See, no $x$ term on the right. I'm almost done.

Sasha: Exactly. Then, add 8 to each side.

$$6x + 2 = 16$$
$$6x + 2 - 2 = 16 - 2$$

Tony: Now we have $6x = 14$. Finally, I divide each side by 6 to get the answer.

$$x = \frac{14}{6} = \frac{7}{3}$$

**Check Your Understanding**

1. Getting into a car involves these steps:
   - Open the car door.
   - Sit down.
   - Close the car door.
   - Buckle the seat belt.
   Describe the steps you take in getting out of a car. How are they related to the steps involved in getting into a car?

2. Find a partner. Each person thinks of a number. Take your number and follow these steps:
   - Add 6.
   - Divide by 4.
   - Multiply by 8.
   - Add 7.
   - Multiply by 10.
   Take your partner's result and find the starting number. Describe your process.

3. Write each algebraic expression as a statement of one or more operations. For each operation that is reversible, describe the operation that reverses it.
   a. $n - 13$
   b. $b^2 - 2$
   c. $3(5m - 2) + 12$
   d. $15m^2 - 36$

4. Dana says, “I take a number, multiply it by 2, add 7, and then subtract 5. My final result is 22.” What is Dana’s starting number?

5. Hideki says, “I take a number, multiply it by 12, and then subtract 9. My final result is 25.” What is Hideki’s starting number?

**Practice Makes Permanent**

Students are given daily opportunities to practice and use the habits of mind. This consistent format keeps the habits in sight and always in mind.

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“Behind the CME Project is the belief that every course or academic experience in high school should be used as an opportunity to help students develop good general habits of mind. ... Students should be Pattern Sniffers, Experimenters, Describers, Tinkerers, Inventors, Visualizers, and Conjecturers.”

— Al Cuoco

CME Project Lead Author
Math That’s Thoughtful and Rigorous

Deep understanding of math helps students see underlying themes and connections. The twist is that CME Project focuses students’ thinking on a smaller number of connected ideas. Recurring themes, contexts, and methods give students solid grounding in mathematics, so they become “power users” of math.
The basic results and methods of high school math—the Pythagorean Theorem, solving equations, graphing lines, and so on—are the products of mathematics. The actual mathematics lies in the thinking that is used to discover and develop these results.”

Al Cuoco
CME Project Lead Author
Components

Print

Student Edition
A balance of traditional and student-centered instructional elements develop both problem-solving skills and procedural fluency. Developing students’ Habits of Mind, or ways of mathematical thinking, is a hallmark.

Teacher’s Edition
This comprehensive teaching and planning tool supports all you do. Each chapter includes mathematics background, pacing suggestions, lesson plans, error prevention, assignment guides, and more. Wrap-around teaching notes put the information right where you need it.

Implementing and Teaching Guide
This valuable professional guide helps you implement the CME Project curriculum based on research and effective practices.

Online

Assessment Resources
Lesson quizzes, chapter tests, and cumulative tests simplify preparation time and help you monitor students’ progress.

Solutions Manual
Want to check an answer? Here are worked-out solutions for all Student Edition exercises. Use this manual to prepare for class and deliver rigorous and relevant instruction.

Practice Workbook
More problem-solving and procedural practice enhance achievement.

Teaching Resources
Blackline masters support lessons. Includes answers to the Practice Workbook.
Math That’s Inspiring

Technology is a big part of everyday life. The twist is that CME Project collaborated with Texas Instruments to integrate the newest handheld and computer software, TI-Nspire™. This handheld graphing calculator lets students explore multiple representations of a math concept on a single screen.

TI-Nspire™ Technology Handbook

The Student Edition includes a Technology Handbook that explains in clear, step-by-step terms how to use TI-Nspire functions with the explorations in CME Project.

The TI-Nspire logo is a trademark of Texas Instruments.
One of the strengths of the CME Project curricula is the rich mathematical contexts in which students learn important concepts and practice important skills. The investigation on Lagrange Interpolation is a perfect example. One of the problems in this investigation requires students to demonstrate that many questions given on standardized tests are flawed in that any of the answer choices given to extend a number pattern could be correct. Completing this investigation laid the groundwork for a conceptual understanding of the factor and remainder theorems, and my students enjoyed it! Being able to outsmart the standardized test authors was an added bonus.

Kent Werst, Arlington, Virginia

The expansion tables were a great organizational tool for the students. It helped many of them ‘see’ things much more clearly than before. Real-life examples (like positioning the ladder in Chapter 4) piqued the students’ interest and answered the age old question, ‘When am I ever going to use this?’ I had one student tell me that, thanks to me, he would never fall off a ladder!

Jayne Abbas, Hookset, New Hampshire

I teach in an inclusion classroom, with both regular education and Special Education students, in an inner city public high school. I had placed the students in small groups so that I could listen to the conversations they were having about the mathematics when I heard one of my Special Education students enthusiastically explaining the pattern that he had found on a particular task. This student had not had a positive experience in mathematics class in a long while. These materials had him excited to come to math class, excited about the mathematics we were doing, and excited to share with the class. Needless to say, I was excited to teach with these materials.

James Stallworth, Cincinnati, Ohio

I learned more about algebra and mathematics concepts than ever before by using the CME materials to do my lesson studies and presentations.

Arnell Crayton, Houston, Texas
Research Behind the CME Project Approach

The Center for Mathematics Education brings together an eclectic staff of mathematicians, educators, and scientists internationally known for leadership in mathematics education.

CME Project Core Team
Anna Baccaglini-Frank, Al Cuoco, Kevin Waterman, Doreen Kilday, Nancy Antonellis D’Amato, Ryota Matsuura, Jean Benson, Bowen Kerins, Sarah Sword, and Wayne Harvey

Absent from photo: Daniel Erman, Brian Harvey, Stephen Maurer, and Audrey Ting

Current work in the field of education led to four research-based goals of CME Project.

1. To ensure that students who complete the CME Project demonstrate a high level of mathematical proficiency

2. To provide a coherent and rigorous curriculum, based on current learning research and world-class best practices, with a focus on the central themes in mathematics, for teachers who desire the traditional sequence of high school courses

3. To provide a curriculum that will help more students succeed in four years of rigorous yet accessible mathematics in high school

4. To give students the experience of working as mathematicians and scientists to highlight the profound utility of modern mathematical methods in mathematics, fields related to mathematics, and everyday life