Supporting Educators in Improving Practice Through Instructional Materials

Can curriculum and instructional materials be developed to not only support students in building knowledge and skills, but also support educators in honing their practice? Educative curriculum materials help teachers acquire new content and pedagogical knowledge, typically through embedded notes, annotations, and models of practice. The presence of educative features in a curriculum has been shown to improve teachers’ instructional planning and curriculum implementation as well as student learning.

For example, teachers using highly educative mathematics curriculum materials are more likely to identify the big ideas in a curricular program while planning collaboratively and are more likely to maintain cognitive demand and elicit student thinking during a lesson (Stein and Kaufman 2010). Research also suggests that teachers who use educative curriculum materials show increases in pedagogical content knowledge and use a greater number of strategies to support student learning (Schuchardt et al. 2017).

In 2005, researchers Elizabeth A. Davis and Joseph S. Kracjik offered five design principles to help guide the development of educative curriculum materials, stating that educative resources should do the following:

- Support teachers’ learning of subject matter.
- Help teachers anticipate what learners might say or do in response to activities.
- Help teachers consider how to relate units throughout the year.
- Make curriculum developers’ pedagogical judgments visible.
- Promote a teacher’s capacity to make pedagogical adaptations for learners.

All Great Minds® curricula were intentionally and uniquely designed to contain educative elements because we believe in empowering teachers to not only deliver a high-quality curriculum, but also to effectively adapt it to meet the unique needs of the students in their classroom. Unlike a scripted curriculum where content is provided to educators with little to no guidance or rationale, our educative curricula help teachers improve their practice while enabling all students to achieve greatness.

Defining Educative Curriculum Materials

In 1996, Ball and Cohen introduced the concept of educative curriculum materials in their seminal paper, which suggested that curriculum resources themselves had the potential to support not only students’ learning but teachers’ learning as well. This idea differentiated educative curriculum materials from those that mainly focus on instruction without developing teachers’ own content and pedagogical knowledge.
As a teacher, I have learned so much more about how to teach math in this one year [using Eureka Math]—it’s just unbelievable. I was always told ‘Here’s the formula. Use it, and don’t ask why. Just do it’... But now I’m understanding the why, and it’s helping me to be a better teacher because I understand what I’m teaching. Instead of saying ‘I know it works, but I can’t tell you why it works or where it came from,’ now I actually understand it.”

—Teacher, Calcasieu Parish Public Schools

The Why. Each module also includes a Why section that highlights and explains elements of the mathematics in the module to give teachers insight into decisions made during the writing of the module and the reasoning that concepts are taught in a particular way.

“I love the why. There was one time I was questioning why we didn’t teach something differently and then I read the why of it, and it helped me understand the reason behind the lesson. Most of the time I agree with the why, or it helps me understand why we set the lessons up the way we do.”

—Tonya Hill, Grade 3 Teacher Paragould School District, AR

Seven Educative Features Embedded in Eureka Math™

The Eureka Math® Teach book—the Teacher Edition for each module in the curriculum—is the core resource that teachers use to plan for and deliver instruction. Crafted by our team of teacher-writers, the Teach book includes seven educative features that support teachers own learning and help them achieve flexible, high-quality math instruction for all students.

1 Module Overviews. The Teach book for a module begins with the Overview, a topic-by-topic summary that shows the development of learning throughout the module. It also provides connections to the work done before and after the module, helping teachers understand the module’s underlying structure, flow of the content, and coherence of the different parts of the curriculum.

“Before This Module

Grade 5 Module 1
The Why: Multiplicative Comparisons

Before This Module

Grade 3 Module 2
The Why: Multiplicative Comparisons

After This Module

Grade 5 Module 2
The Why: Multiplicative Comparisons

After This Module

Grade 3 Module 3
The Why: Multiplicative Comparisons

The Overview describes, topic by topic, the story of learning in the module.

2 The Why. Each module also includes a Why section that highlights and explains elements of the mathematics in the module to give teachers insight into decisions made during the writing of the module and the reasoning that concepts are taught in a particular way.

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The Why

Why does the place value module begin with a topic on multiplicative comparisons?

Beginning with multiplicative comparison enables students to build on their prior knowledge of multiplication from grade 3 and provides a foundation upon which students can explore the relationships between numbers and place value units. This placement also activates grade 3 knowledge of multiplication and division facts within 100 and provides students with opportunities to continue building fluency with the facts in preparation for multiplication and division in modules 2 and 3.

Students are familiar with additive comparison—relating numbers in terms of how many more or how many less. Multiplicative comparison—relating numbers as times as many—is a new way to compare numbers. Students use multiplicative comparison throughout the year to relate measurement units, whole numbers, and fractions. This important relationship between factors, where one factor tells how much larger the product is compared to the other factor, is foundational to ratios and proportioned relationships in later grades. Taking time to develop this understanding across the grade 4 modules sets students up for success with interpreting multiplication as scaling in grade 5 and applying or finding a scale factor in scale drawings, dilations, and similar figures.
**Topic- and Lesson-Level Supports.** Within a module, small groups of related lessons are organized into topics. Each topic begins with a detailed **Topic Overview** that is a summary of the learning in that topic and typically includes information about how the content connects to previous or upcoming content. A **Progression of Lessons** chart shows a list of the lessons in the topic along with sample, student-friendly statements of each lesson’s major learning.

### Progression of Lessons

**Lesson 13**

Count on from an addend in add to with result unknown situations.

```
4
```

I don’t have to show or count the first part. If I know 4 frogs are in the pond, I can just count on: Four, 5, 6, 7, 8, 9.

**Lesson 14**

Count on to find the total of an addition expression.

```
5 6 7 8 9
```

I imagine holding 5 in my hand. Then I track on my fingers to count on 4 more: Five, 6, 7, 8, 9.

**Lesson 15**

Use the commutative property to count on from the larger addend.

```
1 2 3 4 5 6 7 8 9 10
```

1 + 6 and 6 + 1 have the same total. I can add in any order. It is helpful, or more efficient, to start with the larger part.

Finally, each lesson begins with a two-page **Lesson Overview** to help teachers prepare to teach that lesson, which includes the following:

- **The Lesson at a Glance**, which provides a snapshot of the lesson’s learning outcomes, tools, representations, and terminology.
- **Key Questions** to help focus teachers’ instruction and classroom discourse.
- **The Exit Ticket**, which is a formative assessment given at the end of the lesson.
- **Achievement Descriptors (AD)** that are standards-aligned and detail what students should know and be able to do based on instruction. Each AD also has its own set of proficiency indicators that are more detailed and help teachers evaluate what they see in the classroom and in students’ written work.

<table>
<thead>
<tr>
<th>AD Code: Grade.Module.AD#</th>
<th>AD Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.Mod1.AD2</td>
<td>Count On to Add</td>
</tr>
</tbody>
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- **Partially Proficient**
  - Consistently counts all rather than counting on to add. Significant time may be needed to count or find the total, and answer may be incorrect. Students may:
    - draw or count all objects one at a time starting at 1.
    - count all rather than count on from embedded parts or known facts.

- **Proficient**
  - Counts on to add efficiently and accurately through organized counting of objects, drawings, equations, use of the commutative property, or embedded parts. Proficiently uses methods to show organized counting to add. Students may:
    - count the total by using known groups to count on from (e.g., 5 + n, doubles).

- **Highly Proficient**
  - Flexibly manipulates units to add, no matter how the problem is posed. May recognize smaller groups within a set and know the total of the whole set without counting how many in the groups (conceptual subitizing).

“Eureka Math is an educative curriculum that teaches teachers how to do math…Last year we were going so fast. This year we were into customization and prep. We used to hear, ‘Math is not my subject.’ We’re not hearing that anymore. Instead, they’re taking the lessons and making them their own.”

—Julia Alvarez, Director of Mathematics, IDEA Public School
### Margin Notes

- **Teacher notes** communicate information that helps with implementing the lesson. Teacher notes may enhance mathematical understanding, explain pedagogical choices, give background information, or help teachers identify common misconceptions.

- **Differentiation suggestions** provide targeted ways to help meet the needs of specific learners based on teachers’ observations or other assessments. There are two types of suggestions: support and challenge. Teachers can use these to support students in the moment or to advance learning for students who are ready for more of a challenge.

- **Language support** provides ideas to help students with receiving (reading and listening) and producing (speaking and writing) English in mathematical contexts. Suggestions may include ways to promote student-to-student discourse, define new and familiar content-specific terminology or academic language, or clarify multiple-meaning words.

- **Universal Design for Learning (UDL) suggestions** offer strategies and scaffolds that address learner variance. These suggestions promote flexibility with engagement, representation, and action and expression—the three UDL principles described by CAST. These strategies and scaffolds are additional suggestions to complement the curriculum’s overall alignment with UDL Guidelines.

### Lesson-Level Sample Solutions

Sample Solutions are examples of answers to problems students will engage with during a lesson. Although specific solution paths are provided, teachers are also encouraged to accept accurate responses, reasonable explanations, and equivalent answers for student work even if they differ from the sample.

### Fluency

**Happy Counting by Tens within 3D**

Students visualize a number line while counting aloud to build fluency counting within 3D.

Involve students in participating in Happy Counting. Let’s start by tens. The first number you see is 10. Ready?

Write down 10. Complete the tens up to 20. Signal students to show their whiteboards. Provide immediate and specific feedback. If students need to revise, briefly return to validate their corrections.

- **Whiteboard Exchange: Take Out 5**
  - Students use a number bond to decompose a number into 5 and another addend to prepare to make ten when one addend is 5.
  - After each prompt for a written response, give students time to work. When most students are ready, signal for them to show their whiteboards. Provide immediate and specific feedback. If students need to revise, briefly return to validate their corrections.

### Sample Solutions

Expect to see varied solution paths. Accept accurate responses, reasonable explanations, and equivalent answers for all student work.
Lead the class in skip-counting to find the total number of arms the students have.

Invite students to turn and talk about how each group of 10 equals 2 ones.

Let’s also round 94 to the nearest 10.

We estimated in two different ways. First, we estimated visually because we weren’t sure. We used benchmark numbers for the different ways we estimated. How did we use benchmark numbers for the different ways we estimated?

The equal groups are the rows in the array. Do I still have the same number of equal groups? Yes, because the array did not change. We just put the five-sticks together to remove the extra ones.

Write the unit form, $4 \times 3 = 12$. What does the $3 \times 5$ mean in the expression $30 + 20$? How many threes did we add to make $9 + 9$?

You put the equal groups into rows. How many equal groups of 3 do we have? 20

How many twos do we have? 10

What is the product in the multiplication equation $3 \times 5$?

Consider summarizing the two ways to estimate with the following statement.

Ask the following questions to promote MP2:

• How could you explain your plan in your last sentence frame?

• Is your plan working? Is there something else you could try?

• How did we use benchmark numbers for the different ways we estimated?

Facilitate a brief discussion to draw out the distinction between these two types of high-quality instructional materials.

Media (Images)

Eureka Math® Professional Learning is available in many forms, including professional development sessions, coaching, implementation services, and a variety of digital resources. Providing teachers with ongoing, curriculum-based professional learning is key to unlocking the potential of high-quality instructional materials.

“\textit{I’ve learned a lot through using the curriculum and studying it. Eureka Math is very focused on presenting the mathematics very clearly. I think a lot of teachers don’t have a strong understanding of how kids learn math, of how an algorithm works, or what you’re doing when you’re regrouping with addition and subtraction. The new math standards expect students to have a stronger conceptual understanding of math, and I think it’s important that teachers have that too.”}”

—Jordan Meyer, Math Intervention Teacher DC Public Schools
Works Cited


