ENgagement and Achievement through Computational Thinking

Algorithms in Math Instruction: Framing, Prompting, and Highlighting Viewing Guide

Lesson 17

Topic and goals

In this Engagement and Achievement through Computational Thinking (ENACT) Algorithms Lesson video, a teacher models how to integrate computational thinking (CT) strategies into your classroom. Framing, prompting, and highlighting are designed to empower students to take ownership of CT strategies.

The goals of the video are to support you in:

- **framing** a lesson or task that provides students with an opportunity to apply one or more CT strategies.
- **prompting** students (either verbally or using resources) as they work on a problem by applying CT strategies.
- **highlighting** examples of when and how students used CT strategies to complete their work.

Questions to consider when planning:

- What are some strategies my students could use to solve the problems in this lesson?
- How might a CT strategy already be part of or add to what they are already doing?
- How might I recognize when my students are using CT strategies?
- How might I identify when it would be helpful to prompt a student to use CT strategies?

As teachers become comfortable with framing, prompting, and highlighting, students will feel more empowered to take ownership of the CT strategies and integrate them into how they solve math problems.

Context

The examples in this video demonstrate using a table to find missing values and develop an algorithm for quantities of two ingredients. However**, these concepts can be applied to any word problem or situation** in which students translate a context into a mathematical representation and devise strategies for solving equations.

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Video notes: As you view the video, icons (below) will appear, indicating content related to CT strategies, student-focused practices, pedagogy, and/or mathematics. When an icon appears, you may want to pause the video to read the associated notes in exhibit 1.

Computational Thinking

When this icon appears, the focus will be on CT strategies that are being modeled through framing, prompting, and/or highlighting. The focus is on the strategy.

Student Focus

When this icon appears, the focus will be on student-focused practices that are being used: connecting to student experiences, supporting student choice by enabling multiple approaches to problems, valuing student thinking and voice, supporting student collaboration.

Pedagogy

When this icon appears, the focus will be on the teaching techniques that use interactive teaching and student learning, and/or assessing formatively.

Mathematics

When this icon appears, the focus will be on specific math concepts that are needed for solving the problem and connecting them to previous learning, and/or observing student work.

Exhibit 1. Notes for ENACT video: Algorithms in math instruction: Framing, prompting, and highlighting

Timestamp	Topic	Notes
0:40–1:32	 Student Focus	**Connects to student experiences:** The teacher provides opportunities for students to make connections between the problems they are solving and a different context or content that the students might be more familiar with.
1:38–1:43	 Computational Thinking	**Frames the lesson around computational thinking (CT):** The teacher sets up the lesson or problem/task in a way that provides students with an opportunity to engage in CT.
1:53–2:59	 Pedagogy	**Identifies essential content**: The teacher shares the math foci that refers to the specific math concepts or skills emphasized during the lesson. The foci/focus ensures a deep understanding of the essential math concepts.
3:34–4:03	 Computational Thinking	**Frames the lesson around CT:** The teacher sets up the lesson or problem/task in a way that provides students with an opportunity to engage in CT. **Prompts students to use CT:** The teacher encourages students as they work on a problem (verbally or through resources) to use an approach that incorporates CT.
4:06–5:23	 Mathematics	**Articulates mathematics concepts needed for solving and connects these concepts to previous learning experiences:** The task is an example of how, when CT strategies are introduced, the CT strategies may require math concepts that students have already encountered through the spiral approach. By building on previous material, students gain a deeper understanding of principles and can apply their knowledge effectively in real-world situations.

Timestamp	Topic	Notes
5:29–6:54	 Pedagogy	**Models and communicates to support learning:** The teacher models math concepts, structures, and relationships. The teacher communicates by expressing math ideas, reasoning, and solutions clearly and effectively.
7:31–8:00	 Student Focus	**Promotes student collaboration:** The teacher provides opportunities for students to work together and build from one another's knowledge and experiences, and to share their work with the class. **Values student thinking and voice:** The teacher provides opportunities for students to share their work and voice their thinking and incorporates these into the teaching of the lesson.
8:05–8:36	 Mathematics	**Observes student work:** The teacher models how to identify common misconceptions, errors, and patterns in student thinking. Then, based on observations, the teacher provides timely and specific feedback to guide students and tailors instruction to meet students' needs and enhance understanding.
9:14–9:52	 Student Focus	**Supports student choice enabling multiple approaches to problems:** The teacher provides opportunities for students to share how problems within a lesson can be represented or solved in multiple ways.
10:03–10:29	 Mathematics	**Bridges mathematical practice to CT strategies:** The students connect their math knowledge to computational thinking prompts; they bridge theory and practice, enhancing problem-solving skills. The teacher plays a crucial role in facilitating this connection.
10:33–11:30	 Pedagogy	**Uses interactive teaching/student-centered learning:** In this method, teachers actively involve students in discussions, problem solving, and sharing their thought processes. This fosters a collaborative and engaging classroom environment.
11:32–12:02	 Computational Thinking	**Highlights when students use CT and prompts CT use:** Teacher points out when and how students were using CT problem-solving strategies to complete their work and prompts them to share how they incorporated CT strategies.
12:16–13:50	 Mathematics	**Observes student work:** The teacher models how to identify common misconceptions, errors, and patterns in student thinking. Then, based on observations, the teacher provides timely and specific feedback to guide students and tailors instruction to meet students' needs and enhance understanding.

Timestamp	Topic	Notes
13:50–15:05	 Pedagogy	**Assesses formatively:** The teacher gauges student understanding through quick visual feedback. The teacher's approach helps to inform instructional decisions and adapt teaching strategies based on students' comprehension levels. **Note:** Students were not "hearing" the questions, so teacher paused the formative assessment to ensure it was a meaningful closure. **Note:** The teacher clarifies when students were using a CT strategy versus when they needed to understand math concepts.

This viewing guide is part of a series of training resources related to REL Midwest's ENACT partnership.