ENgagement and Achievement through Computational Thinking

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

Lesson 18

Topic and goals

In this Engagement and Achievement through Computational Thinking (ENACT) Debugging 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 use graphs within a task. 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.

This material was prepared under Contract 91990022C0011 by Regional Educational Laboratory Midwest, administered by American Institutes for Research. The content does not necessarily reflect the views or policies of IES or the U.S. Department of Education, nor does mention of trade names, commercial products, or organizations imply endorsement by the U.S. Government.

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: Debugging in math instruction: Framing, prompting, and highlighting

Timestamp	Topic	Notes
0:42–2:00	 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.
2:03–4:12	 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.
4:16–5:06	 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.
5:15–5:59	 Pedagogy	**Identifies essential content**: The teacher shares the math foci that refer to the specific math concepts or skills emphasized during the lesson. The foci/focus ensures a deep understanding of the essential math concepts.
6:09–6:41	 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
7:39–8:38	 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.
9:27–12:16	 Student Focus  Computational Thinking	**Incorporates CT strategies and student-focused practices:** The teacher provides opportunities for students to share their voice and their thinking to point out when and how students were to use CT strategies to complete the task.
12:16–14:33	 Computational Thinking  Student Focus  Pedagogy  Mathematics	**Incorporates CT strategies, pedagogy, student-focused practices, and mathematics:** The teacher supports all areas interchangeably within this section. The teacher empowers student choice by enabling multiple approaches to problems. The teacher values student thinking and voice while supporting student collaboration. The teacher uses interactive teaching/student-centered learning to actively involve students in discussions, problem solving, and sharing their thought processes. The teacher is consistently observing student work to model how to identify common misconceptions, errors, and patterns in student thinking. The teacher provides timely and specific feedback to guide students and tailors instruction to meet students' needs and enhance understanding. The teacher points out when and how students are using CT problem-solving strategies to complete their work.
14:34–15:33	 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.

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