ENgagement and Achievement through Computational Thinking

Modeling Debugging Viewing Guide

Lesson 5

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.

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?

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.

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 **framing** a lesson on how to debug a mathematical statement after the class has agreed that the statement is incorrect. The ENACT coach models how to analyze and correct an erroneous multiplicative comparison involving grade-level fundraising goals. Although this example focuses on proportional reasoning and a common reversal error, the same debugging process can be applied to any flawed mathematical statement or solution, whether it appears in curriculum materials or is generated by students.

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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: Modeling debugging

In ENACT Lesson 5, a coach models use of *debugging,* one of ENACT's five computational thinking (CT) practices.

The goals of the video are to support you to:

- Help students understand that mistakes are a normal part of problem solving.
- Model how to use debugging to address mistakes in their work.
- Demonstrate how to use debugging in the process of solving a complex problem.

Timestamp	Topic	Notes
00:50	Student Focus	**Support student collaboration:** Normalizing mistakes and helping students recognize the correct parts of their thinking—even when an error occurs—can encourage a collaborative problem-solving environment. When students feel comfortable sharing their ideas and working through errors together, they are better able to support one another as they make sense of mathematics.
01:50	Pedagogy	**Make thinking visible:** Writing out the key information and problem-solving steps is an essential part of debugging. When students record their reasoning, it becomes much easier to locate and address errors that would be difficult to identify if their thinking remained unspoken or unseen.
03:22	Student Focus	**Value student thinking and voice:** Incorporating the reasoning students used to determine that the statement was false brings their thinking into the lesson. Highlighting and building on the ideas they share helps ensure that student voices are part of the debugging process.

Timestamp	Topic	Notes
04:08	Student Focus	**Support student choice:** Providing opportunities for students to offer different ways of adjusting or revising the statement encourages them to contribute their own ideas to the problem-solving process. Allowing multiple approaches helps students take ownership of the work and reinforces that there are several productive paths to debugging a mathematical statement.
05:33	Student Focus	**Support student collaboration:** Discussing the process of correcting mistakes as a normal part of what mathematicians do helps students feel comfortable engaging with errors during problem solving. Encouraging students to support one another as they work through mistakes reinforces collaborative problem solving and highlights that refining ideas is an expected and valuable part of mathematical thinking.

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