ENgagement and Achievement through Computational Thinking

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

Lesson 16

Topic and goals

In this Engagement and Achievement through Computational Thinking (ENACT) Abstraction 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 nets and conversions to find surface area 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.

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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: Abstraction

Timestamp	Topic	Notes
0:38–2:23	 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.
2:25–4:37	 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. **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.
4:40–6:18	 Pedagogy	**Clarifies problem components:** The teacher is supporting the layout for students to organize the problem into its essential components as well as laying out how to identify key elements, vocabulary, variables, and relationships.
6:42–10:57	 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
11:00–15:29	 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 allowing multiple representations and approaches. The teacher values student thinking and voice while promoting collaboration and community. 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.
17:26–19:31	 Computational Thinking	**Concludes the lesson around CT:** The teacher employs framing, prompting, and highlighting around the lesson's CT strategy to close the lesson and address the specific task.
19:34–20:02	 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.