ENgagement and Achievement through Computational Thinking

Structuring Opportunities for Decomposition Viewing Guide

Lesson 7

Topic and goals

In this Engagement and Achievement through Computational Thinking (ENACT) Decomposition 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 **prompting/structuring** a lesson on how decomposition can support students in approaching a complex problem. In the first part, the ENACT coach models how to draw on students' initial observations to identify a manageable subpart of the task—one they can solve using prior knowledge or familiar strategies. The coach then shows how to encourage students to continue decomposing the problem as they work. In the second part, the coach models how to give students time to reflect on the decomposition strategies they used and how those strategies supported their progress. These reflections will be most effective if students share their approaches in a group discussion before reflecting individually.

The complex problem featured in the video involves placing a large set of fractions on a number line. The strategies demonstrated will be most successful if students have some experience comparing fractions and explaining their reasoning. Although the video focuses on fractional number-line work, the same ideas about decomposition can be applied to any complex problem, with some advance planning to anticipate how students' observations might lead to identifying subproblems and developing strategies for those subproblems.

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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: Structuring opportunities for decomposition

In ENACT Lesson 7, a coach models how to provide structured opportunities for students to use *decomposition* by foreshadowing decomposition opportunities early in the lesson and supporting student reflection at the end of the lesson.

The goals of the video are to support you to:

- Leverage student observations to identify subparts of problems.
- Provide opportunities for students to reflect on the ways they decomposed the problem.

Timestamp	Topic	Notes
00:46	 Pedagogy	**Support engagement through structured discussion:** Giving students time to talk with a partner or in small groups before sharing with the whole class helps ensure that all students can participate. This structure allows them to draw on their prior knowledge and organize their thinking, which supports their ability to make connections as they encounter new ideas.
02:21	 Pedagogy	**Support precision in student communication:** Elaborating on students' observations when their ideas are not yet precise helps them express their thinking more clearly. This process also creates opportunities for students to identify and correct misunderstandings as they refine their explanations.
02:46	 Student Focus	**Value student thinking and voice:** Affirming students' observations by incorporating them into the discussion helps bring their ideas into the work. As you create a list of what students notice—like the example shown in the video—be sure to include and acknowledge all contributions. The list in the video is only one example; students may notice many other features that are equally valuable for supporting their reasoning.

Timestamp	Topic	Notes
05:20	 Mathematics	**Support understanding of negative number relationships:** Some students may think that −1 1/3 is greater than −1 because they compare the fractional parts rather than the values on the number line. Using the number line helps students see that negative numbers with greater magnitude (or absolute value) are actually *less* than negative numbers with smaller magnitude. **Use familiar contexts to reinforce magnitude:** Relating negative values to everyday contexts—such as temperature or owing money—can support students' reasoning. For example, students often recognize that −10 degrees is colder than −5 degrees, or that owing 10 dollars places someone farther from breaking even than owing 5 dollars. These experiences connect to the mathematical idea that −10 is farther from zero than −5 and therefore appears farther left on the number line.
07:09	 Student Focus	**Connect to student experiences:** To help students build their understanding of decomposition, you can invite them to share times when they have broken a task or problem into smaller parts in other classes or outside of school. Students might describe writing an essay in sections (introduction, body, conclusion), investigating a science question one variable at a time, or completing chores step by step. Using their own examples helps reinforce how decomposition can make complex problems more manageable.
07:32	 Mathematics	**Support reasoning about fractional relationships:** Encouraging students to notice what is unique or different about various fractions helps them choose reasoning strategies that fit each situation, rather than relying on a single rule or automatically finding common denominators for every comparison.
07:47	 Student Focus	**Support student choice:** Encouraging students to identify their own starting points allows them to choose approaches that make sense to them. Providing this flexibility helps students take ownership of their problem-solving process and engage with the task in ways that build confidence and independence.
09:52	 Student Focus	**Support student choice:** Decomposition gives students the flexibility to begin with a part of the problem that feels accessible to them. This approach reinforces that there are multiple valid ways to enter and work through a task, allowing students to choose pathways that make sense for their own thinking.

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