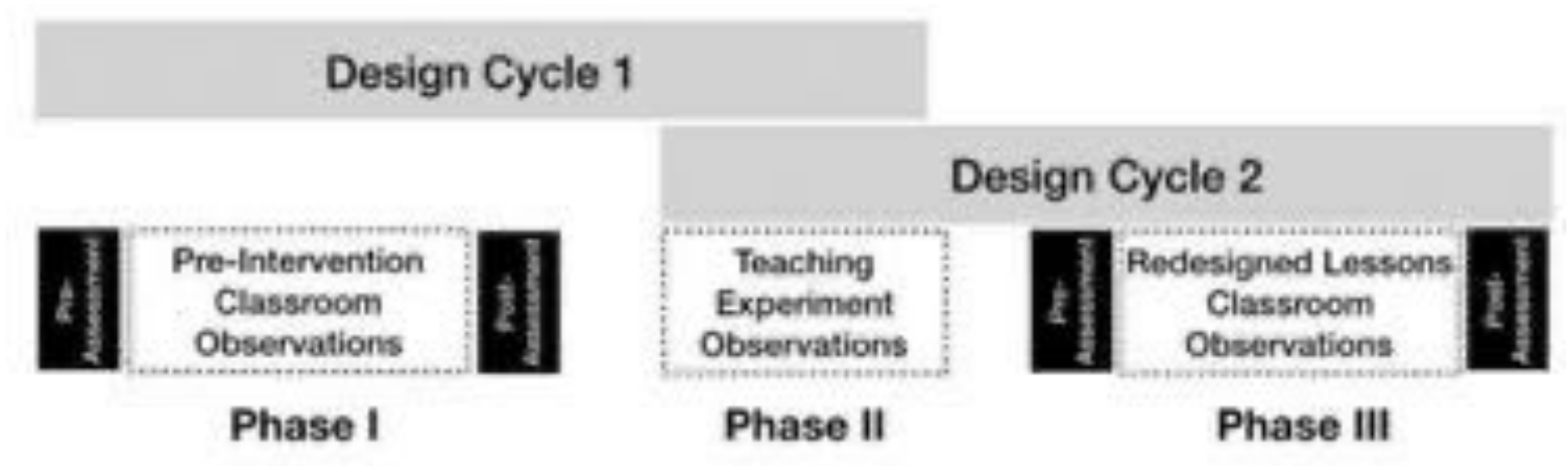


Two Design Cycles

- Design-based research (Cobb et al., 2003)



Design Framework

Academic Literacy in Mathematics for emergent bilingual students
(Moschkovich, 2015; Moschkovich & Zahner, 2018)

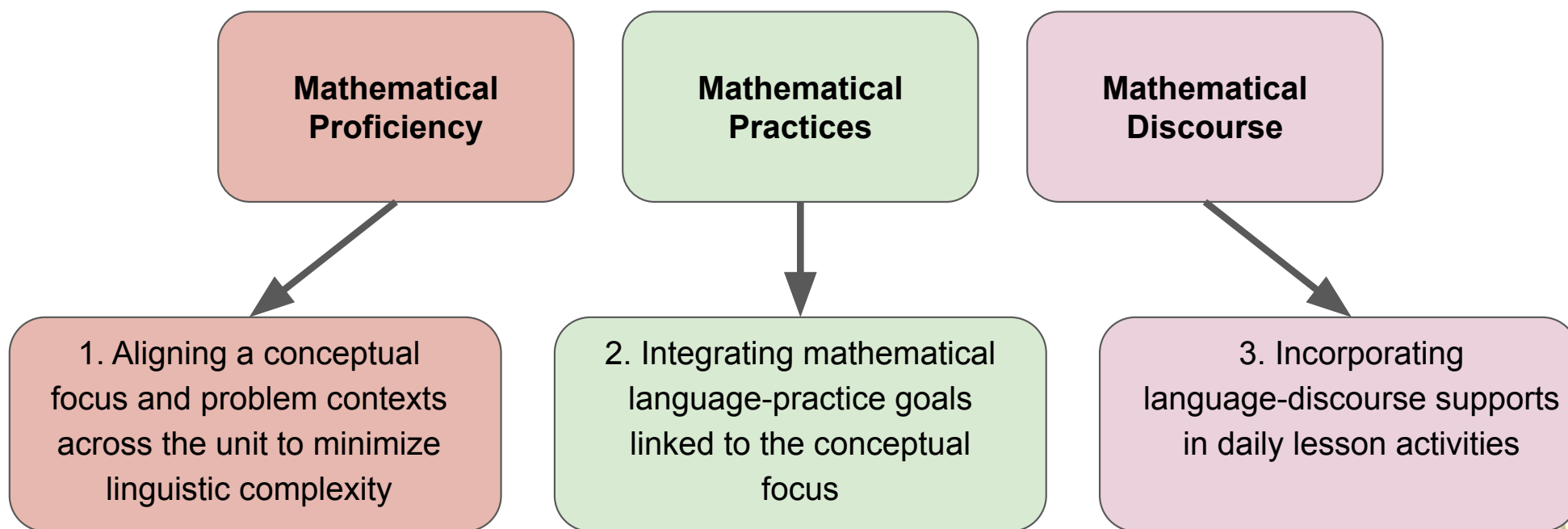
Mathematical
Proficiency

Mathematical
Practices

Mathematical
Discourse

Design Principles

Dimensions of ALM Framework → Project-Specific Design Principles



Example: Introducing Linear Rate of Change

This collage represents the initial learning materials. It includes a worksheet titled '3C All About Steps' with various diagrams and text. Below it are four small images: a house, a wind turbine, a lighthouse, and a photograph of an open textbook showing a graph of a linear function.



This collage represents the refined learning materials. It features three main components:

- Measuring Fastness:** A worksheet with sections for 'Mathematical Goals', 'Mathematical Language Goals', and 'Maths to Investigate Computer Games'. It includes a table with icons for different skills like 'M1.1 Measure and compare' and 'M2.1 Compare and classify'.
- Mathematical Language Routines:** A vertical list of routines with icons and brief descriptions:
 - Stronger & Clearer:** M2.1.1. A student opportunity to practice in words and write how they think about a problem.
 - Collect & Display:** M2.1.2. A student opportunity to collect and display data in a table.
 - Critique, Correct, & Clarify:** M2.1.3. A student opportunity to critique and clarify a student's work.
 - Information Gap:** M2.1.4. A student opportunity to ask and answer questions to solve a problem.
 - Co-Crafted Questions:** M2.1.5. A student opportunity to ask and answer questions to solve a problem.
- Make Emma Go Reeeeeally Fast!:** A worksheet with a graph showing distance over time. The graph has a point labeled (34.4, 100) and another point (0, 0). The text asks: 'Here is a simple graph showing a different walk. How can you edit the graph to make Emma go really fast? Experiment with the mouse. Then write your response below.' There is a text input field and a 'Check with Class' button.

Pre- and Post- Redesign Video Illustrations

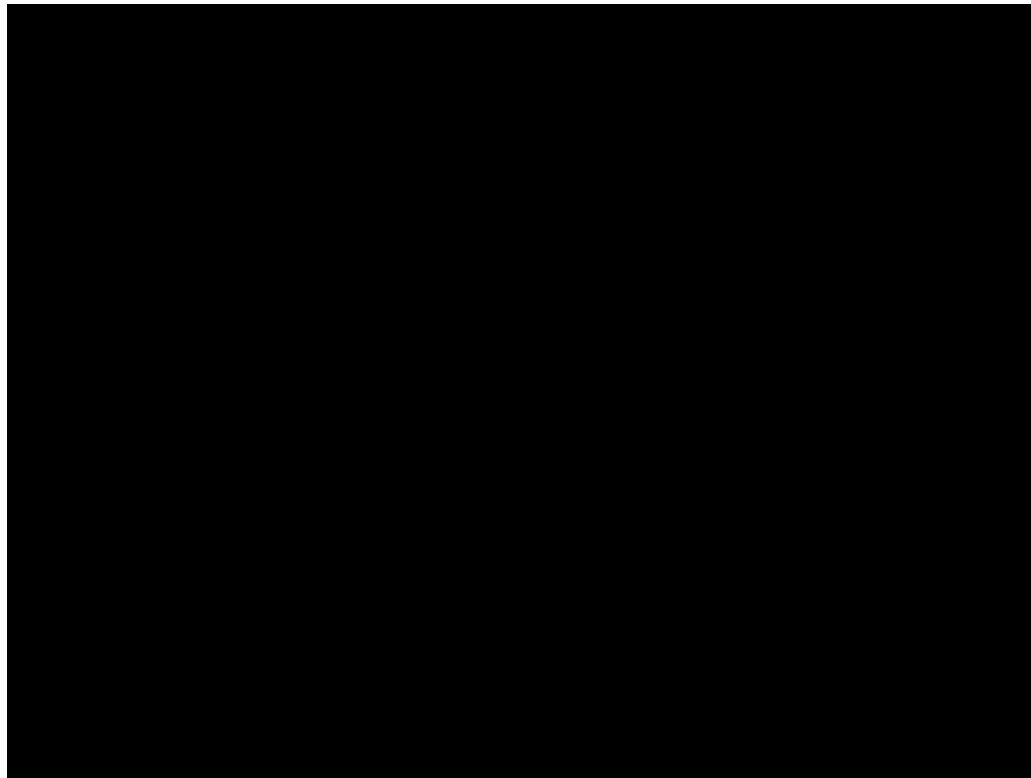
Video Example: Pre-Intervention

Mr. S. Introduces slope as speed / average rate of change in distance-time graph



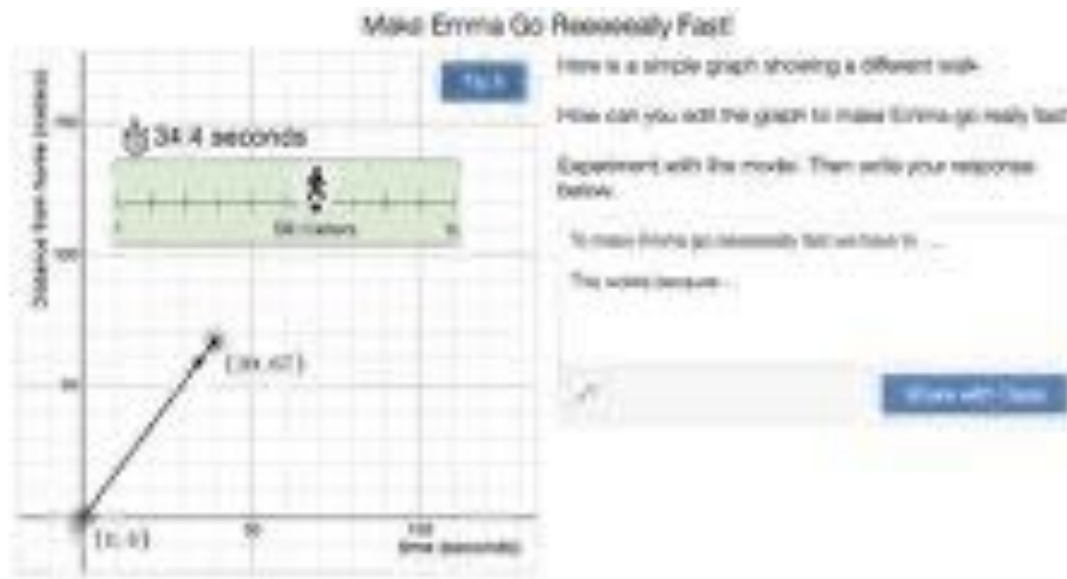
What was Emma's average speed on the way to the park?

Video Example: Pre-Intervention



Video Example: Redesign

How can you edit the graph to make Emma go fast?



Video Example: Redesign



What did you notice & wonder?

I noticed...

I wonder...