Visual Access to Mathematics (VAM): Professional Development for Teachers of English Learners

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ABSTRACT

This project is designing and studying a sustained, blended online and face-to-face course for grades 6-8 mathematics teachers and EL specialists focused on visual representations (VRs) in the context of rational number & ratio and proportion content and supports for ELs' language access & communication.

RESEARCH OVERVIEW

1. What supports allow teachers to develop mathematical knowledge for teaching & knowledge about instructional planning to support ELs?
2. What is the effect of VAM PD on that knowledge for teachers?

Year 1: PD development in consultation with critical friends group

Year 2: Formative field test of PD

Years 3-4: Cluster randomized control trial of PD

DATA COLLECTION

Participants (across phases): ~120 New England middle grades math or EL teachers, coaches, and specialists

Formative Data: PD observations; facilitator reflections; and teacher surveys, interviews, & focus groups

Pilot Study Data: MC assessments of MKT, video analysis, and open-response exercise
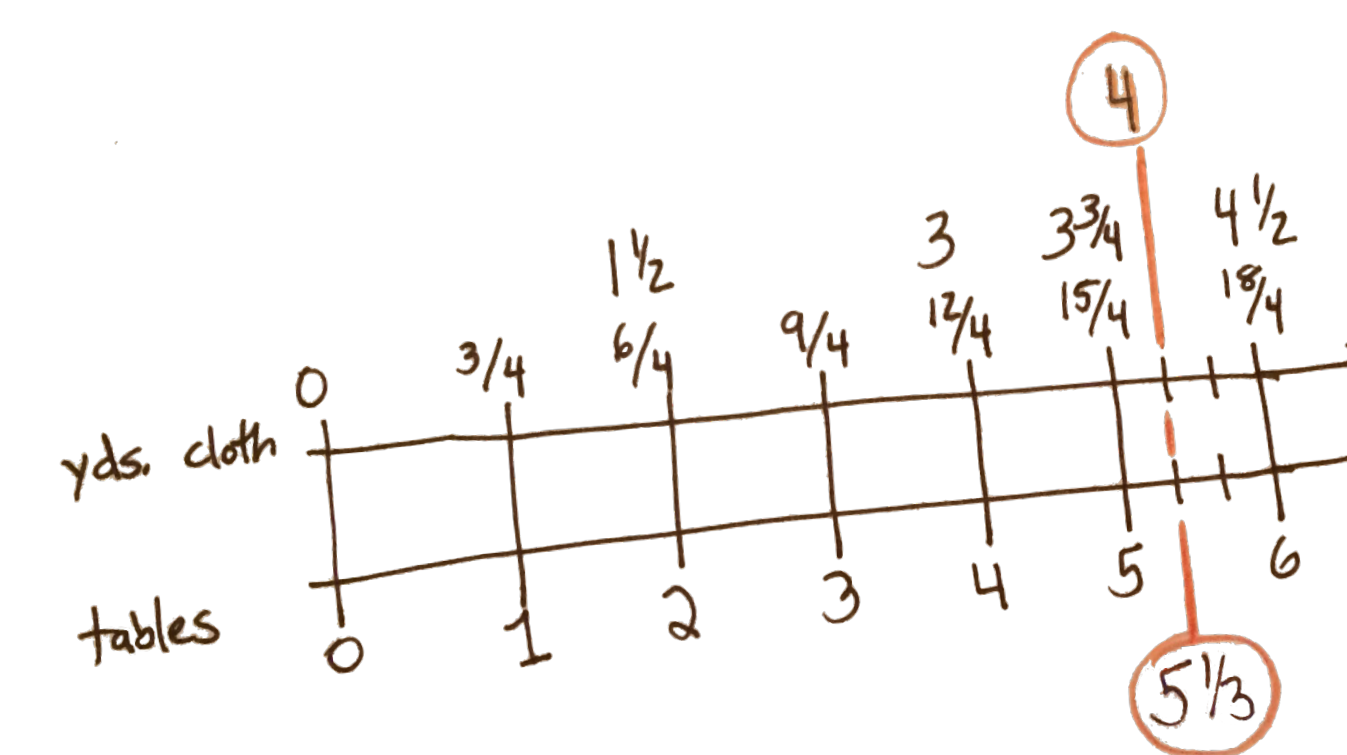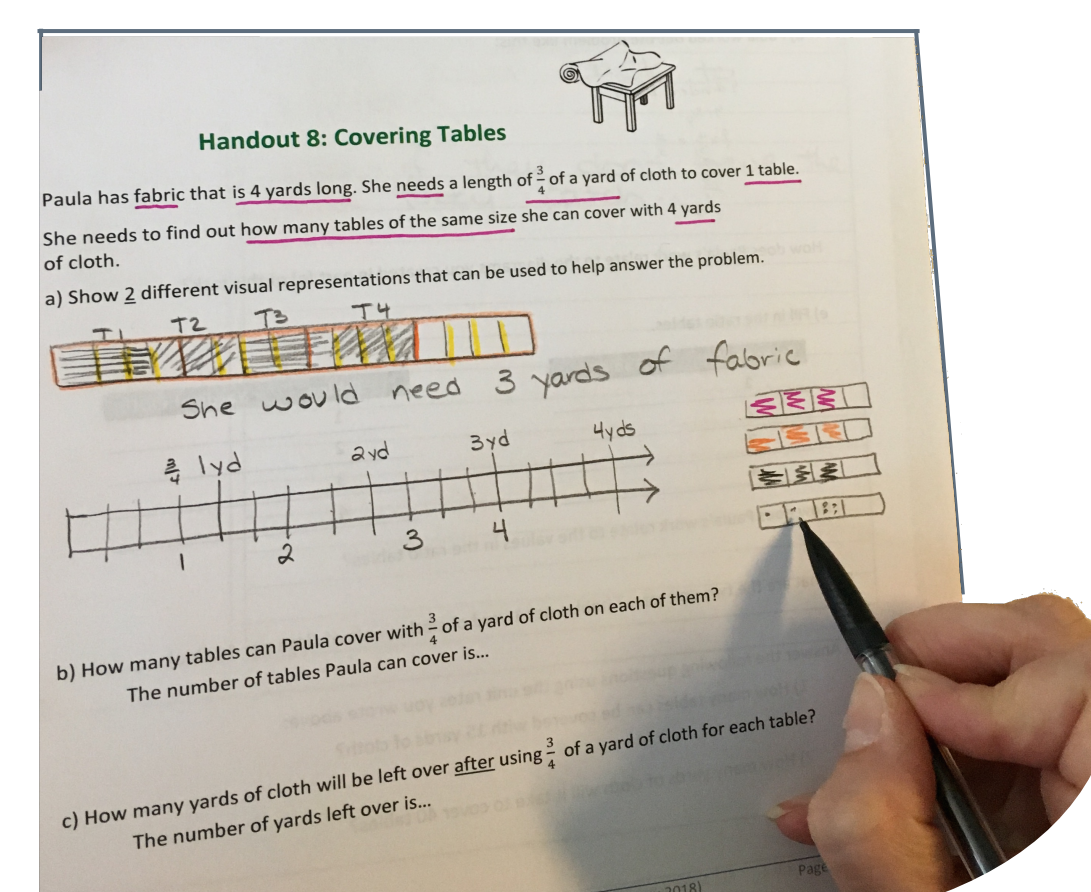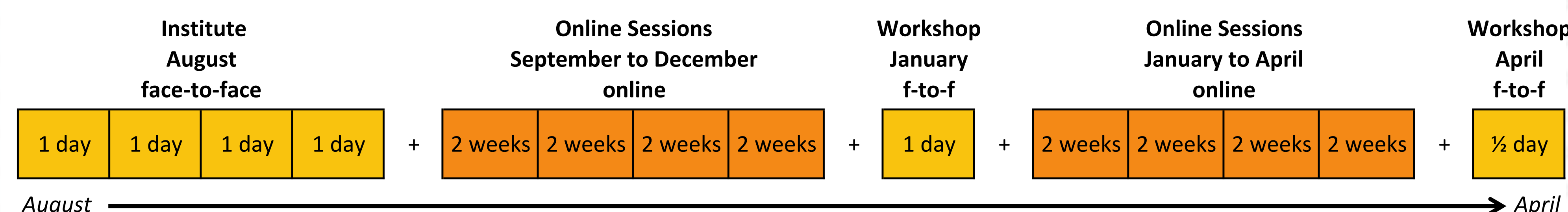
VAM PROFESSIONAL DEVELOPMENT

Goal:

Increase teachers' knowledge and abilities to use VRs, plan lessons to support ELs, and analyze student work, all in the context of ratio & proportion (R&P) content.

CREATE +USE VRs / PLAN for ELs / EXPLORE R-P / ANALYZE St. Work
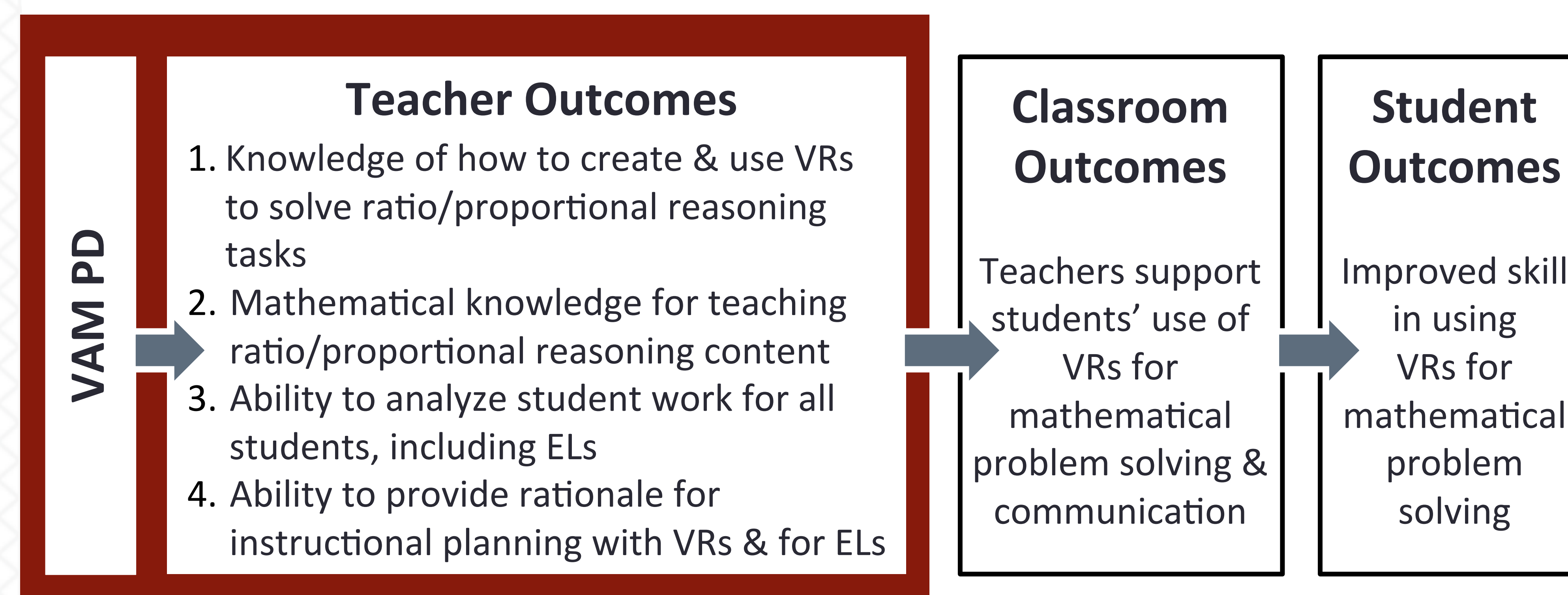
Key PD Activities:

- Solve and discuss mathematics tasks using VRs
- Plan lessons to integrate supports for language access & communication
- Analyze student, including screencast recordings from EL students
- Explore applets that make connections between VRs and R&P content
- Reflect in online notebooks & participate in group videoconferences

Course structure:

Institute August face-to-face				Online Sessions September to December online				Workshop January f-to-f	Online Sessions January to April online				Workshop April f-to-f
1 day	1 day	1 day	1 day	2 weeks	2 weeks	2 weeks	2 weeks	1 day	2 weeks	2 weeks	2 weeks	2 weeks	½ day

August → *April*

THEORY OF CHANGE

VAM PD

Teacher Outcomes
1. Knowledge of how to create & use VRs to solve ratio/proportional reasoning tasks
2. Mathematical knowledge for teaching ratio/proportional reasoning content
3. Ability to analyze student work for all students, including ELs
4. Ability to provide rationale for instructional planning with VRs & for ELs

Classroom Outcomes

Teachers support students' use of VRs for mathematical problem solving & communication

Student Outcomes

Improved skill in using VRs for mathematical problem solving

PARTICIPANT REFLECTIONS

*"I had always used and thought of VRs as presentation tools to show final work. After taking this course, I have emphasized the use of **VRs as thinking tools** to make sense of word problems."*

*"Throughout this course, my own use of VRs when solving problems has led to a **deeper understanding of how to teach** the key ideas involving fractions, ratios, and proportional relationships to my students."*

*"The most important take away so far for me is that by allowing students to 'show' what they know you gain insight into their mathematical thinking. **Students may be able to show more than you think they know**. […] [VRs] allow students a way into the problem that they may not have had"*

*"My knowledge of language strategies to support ELs has increased. I am **more comfortable identifying effective modifications** to support students' language access and production. […] Some supports we have used have been Three Reads, Questioning, Sentence Frames, and Think, Pair, Share."*

BLENDED PD FINDINGS

Blended PD is a powerful vehicle for rigorous and interactive professional learning. Blended PD components that emerged as important in VAM's design:

- Customizable online platform
- Asynchronous structures that provide flexibility but offer guidelines, accountability, & supports
- Building relationships early in course and through synchronous sessions
- Goals, activities, & instructions that are quick to navigate online