Boosting Data Science Teaching and Learning in STEM

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About the Project

The goal of this project is to develop and test a professional learning experience that improves teachers' and students' data fluency in math and science in grades 6–9.

What is Data Fluency?

We define data fluency as the ability and confidence to actively make sense of and use data. Data fluency extends beyond possessing discrete knowledge and skills to knowing *when*, *how*, and *why* to use data to explore topics of interest and for a specific purpose. Learners develop this fluency by exploring data, getting data, asking questions or designing solutions, interpreting data, and communicating with data.

Research Questions

1. What impact does PL have on teachers' knowledge, skills, and beliefs; classroom opportunities to learn; and students' data fluency?

2. Are the PL innovations usable and feasible for the end users?

3. How do teachers' and students' classroom interactions reflect the model of learning and instruction endorsed by the PL?

Project Outcomes

Professional learning modules that engage teachers in data-rich learning and cases of classroom practice.

Through active engagement with data, participants learn to:

- Hold broad notions of what counts as data
- Understand how data are collected, produced, and used
- Use digital tools to create, modify, and interpret representations and visualizations of complex data
- Ask critical questions about data that arise from personal, contextual, and historical experiences

Research that articulates:

- The knowledge and skills teachers require to support students' data fluency,
- The common roadblocks that students face, and
- An effective model of professional learning for data fluency.

Project Timeline

2022	2023	2024	2025 and beyond
Develop Lit Review & Data Fluency Framework	Develop Professional Learning Modules	**Pilot-Test Professional Learning**	Revise and Disseminate Professional Learning Modules
			Revise and Disseminate Data Fluency Framework for Teaching & Learning

Pilot Study of Professional Learning

Summer Institute

In June 2023, teachers had the opportunity to engage in adult-level learning by collecting and exploring primary and secondary data to uncover different ways human vary.

Fall 2023 Communities of Practice

Virtual Community of Practice sessions for teachers to plan, conduct, and reflect on classroom data enactments.

Math & Science Teachers Explore Data Together
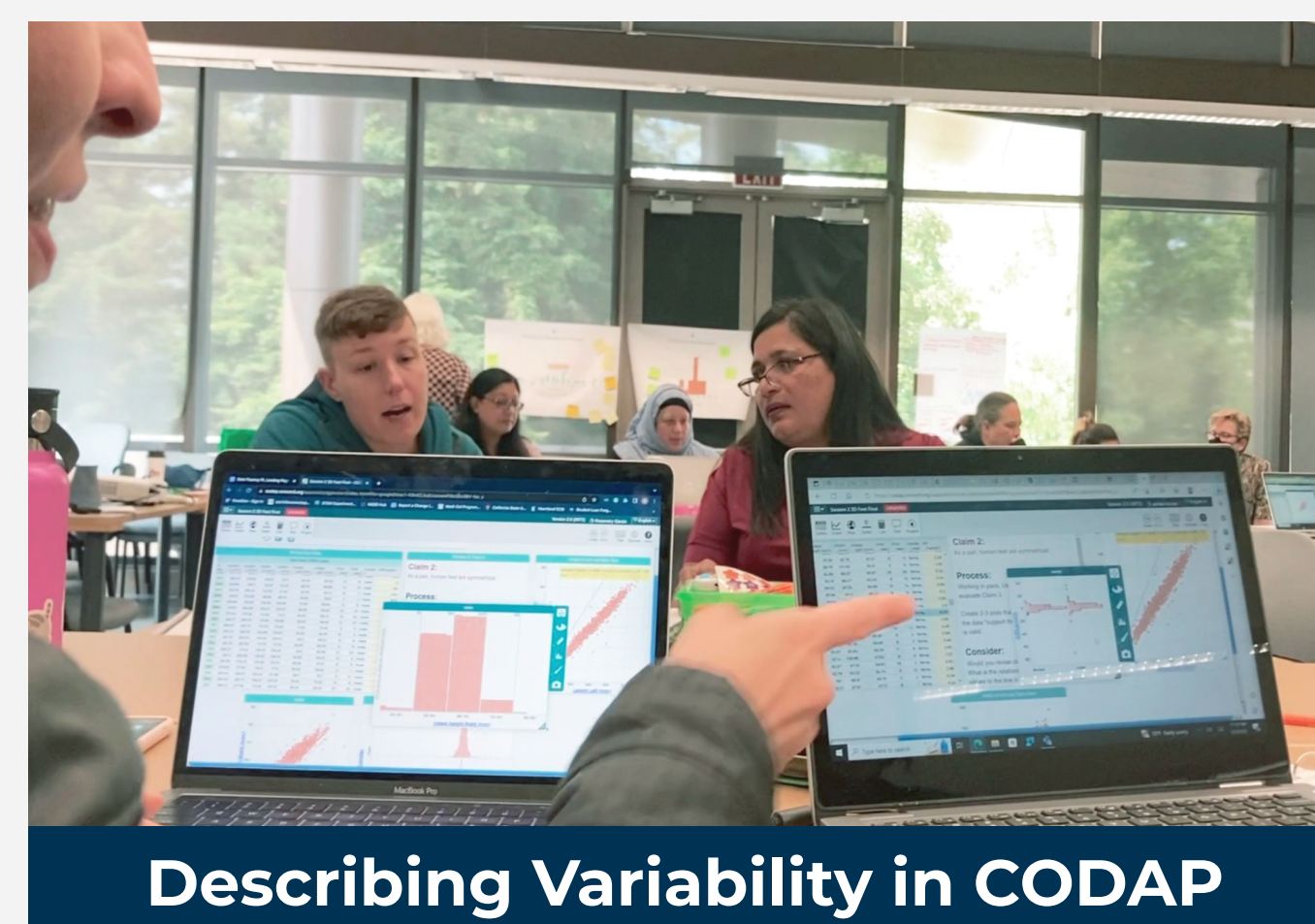
Describing Variability in CODAP

Forming Human Histograms

Teaching Case

Each case presents a unique story about a real learning environment, including student work and dialogue.
These cases are written by classroom teachers for other teachers.

Cases support PCK by helping teachers:

- Have evidence-based conversations
- Explore common student thinking
- Grapple with teaching dilemmas
- Weigh the tradeoffs of instructional choices and pedagogical decisions made by other educators

Novel PCK Assessment for Data Fluency

We developed and piloted a written assessment of teachers' pedagogical content knowledge (PCK) for data fluency.
Early findings from the pretest suggest that this instrument effectively differentiates teachers along several dimensions of PCK.


What Teachers are Saying

67% of participants rated the Summer Institute as "among the best PL" they have experienced.

"[I appreciated] Learning more about data analysis for myself so I'm bringing clearer knowledge to my students. I loved the habits of mind that were shared for data analysis. The CODAP program. . . makes it easy for [students] to construct graphical visuals of the data. This PD was very rich and I learned so much."

(T005)

"I will be . . . incorporating data the first week of school. After this institute, I do not find it necessary to wait for a math or science unit to teach data in isolation." (T007)
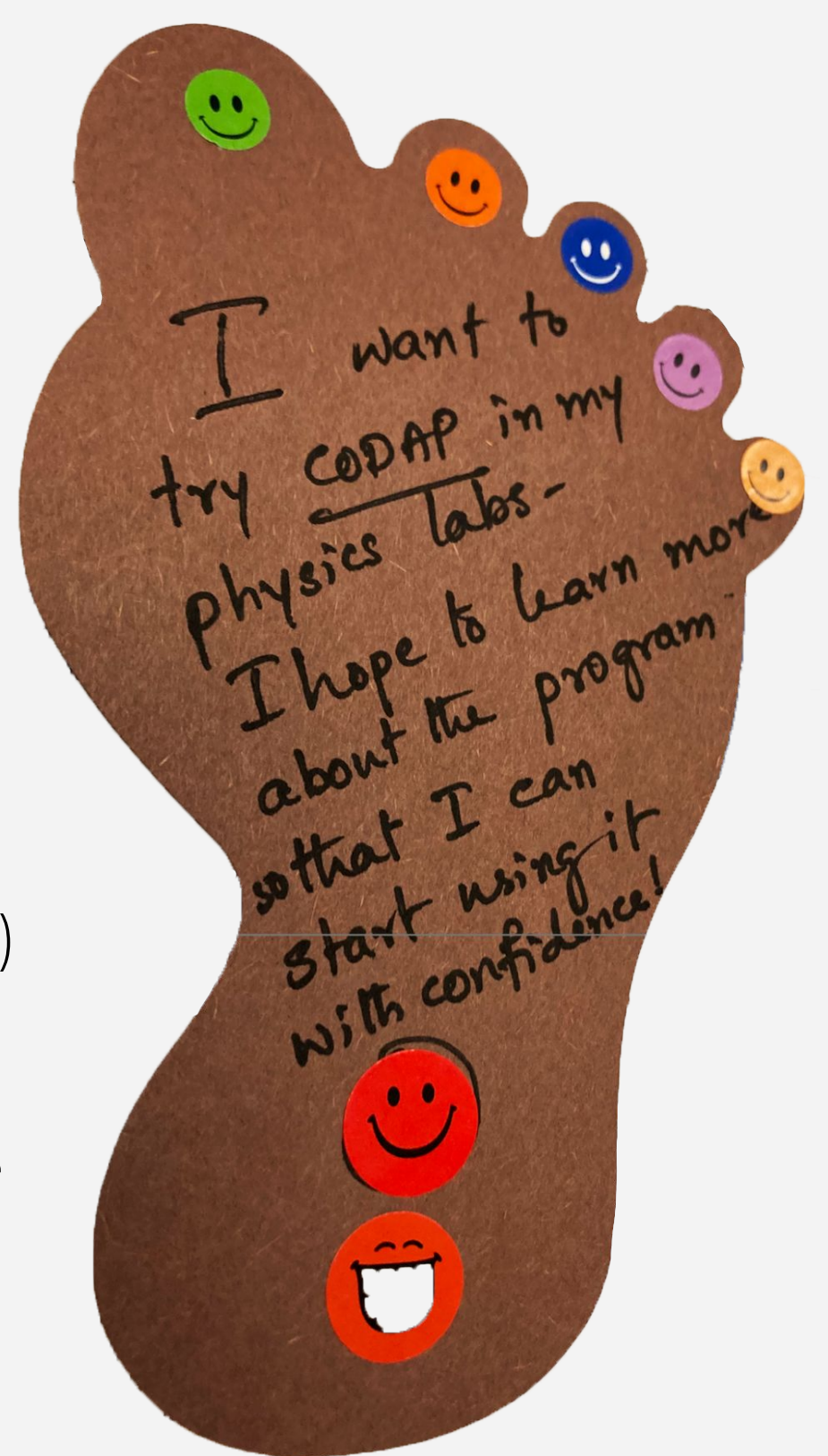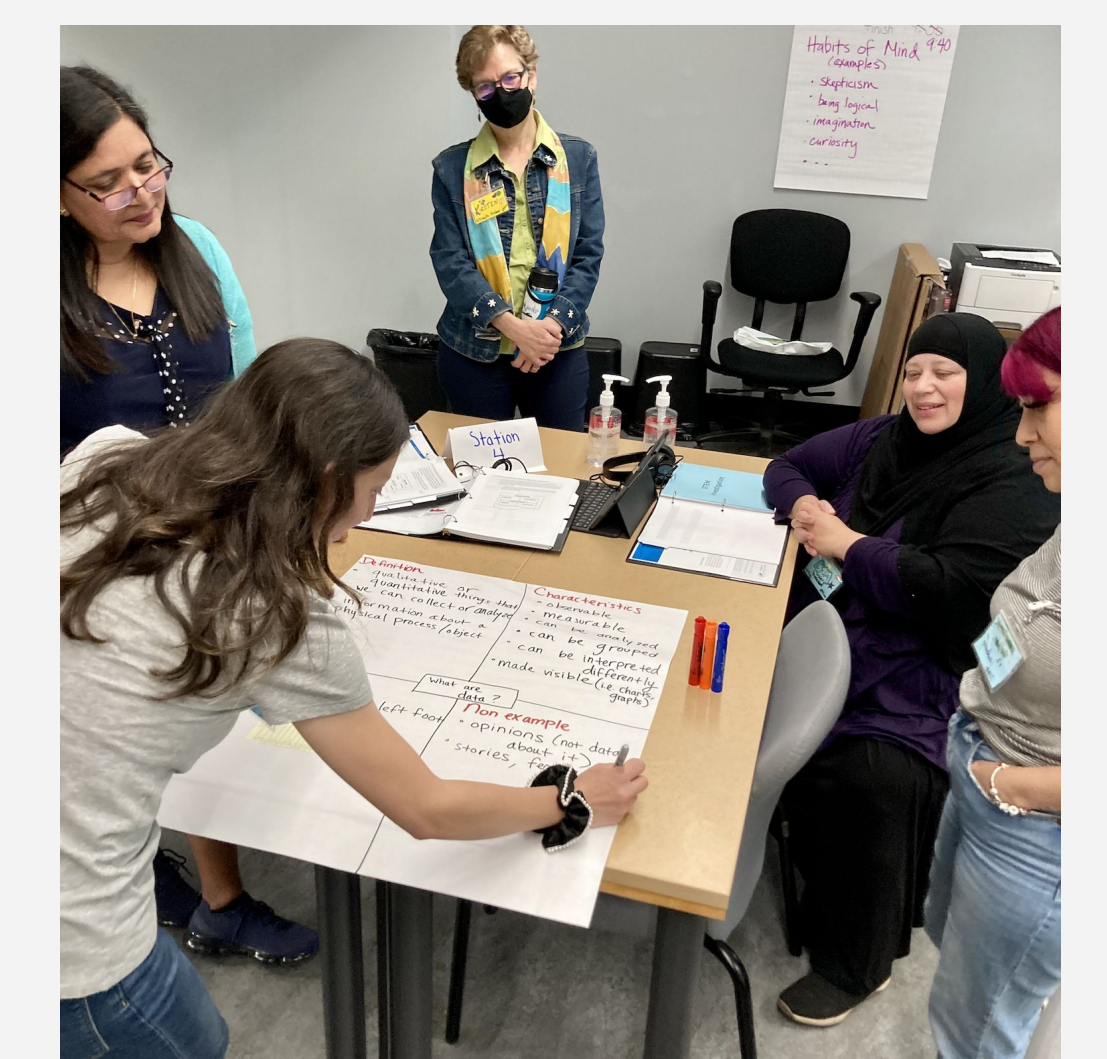

Tools for Educators

- Teaching Cases
- Entryways to Data Model and Examples
- Data Biographies & Datasets
- Data Fluency Value Statements
- Common Data Understandings for Students
- Principles of Data-Rich Instruction
- Professional Learning Framework for Data Fluency

BOOSTING Data Fluency   The Concord Consortium   WestEd.org