

CAREER: Designing Meaningful Learning Experiences for Statistical Literacy in Secondary Mathematics

Travis Weiland, UNC Charlotte, Department of Mathematics and Statistics



Goals, Conjectures & Questions

Project Goal: Investigating how to support secondary mathematics teachers in developing their own critical statistical literacies through data investigations of sociopolitical issues and translating that literacy into classroom practice.

Research Conjecture 1: To develop a critical statistical literacy, people need to be situated in authentic praxis of multiple communities of practice (i.e., mathematics education, statistics education, statistics, & critical pedagogy) investigating meaningful issues to their communities.

Research Conjecture 2: If explicitly supported for an extended period of time, teachers can translate learning from a professional learning community (PLC) situated at the intersection of multiple communities of practice (CoP) to their classroom practice.

Research Questions

1. How do secondary mathematics teachers develop a critical statistical literacy for doing and teaching statistics through a sustained PLC?
2. How does the design of the PLC support secondary teachers' development of a critical statistical literacy for doing and teaching statistics?
3. How does the participation of secondary mathematics teachers in a sustained PLC, facilitate the transfer of their literacy developed while situated in a PLC, into the opportunities they create for their students to learn statistics situated in their classrooms?

Setting

Participants: 17 high school mathematics teachers, 2 district mathematics curriculum specialists all with varying background experience in North Carolina.

Activities: Three weeklong summer PLC meetings (23-25) followed by school monthly meetings (23-26).

Data: Recordings of sessions (in person and zoom), surveys (LOCUS, SETS, post activity, reflection), artifacts of meetings (pictures, digital products), classroom teaching video

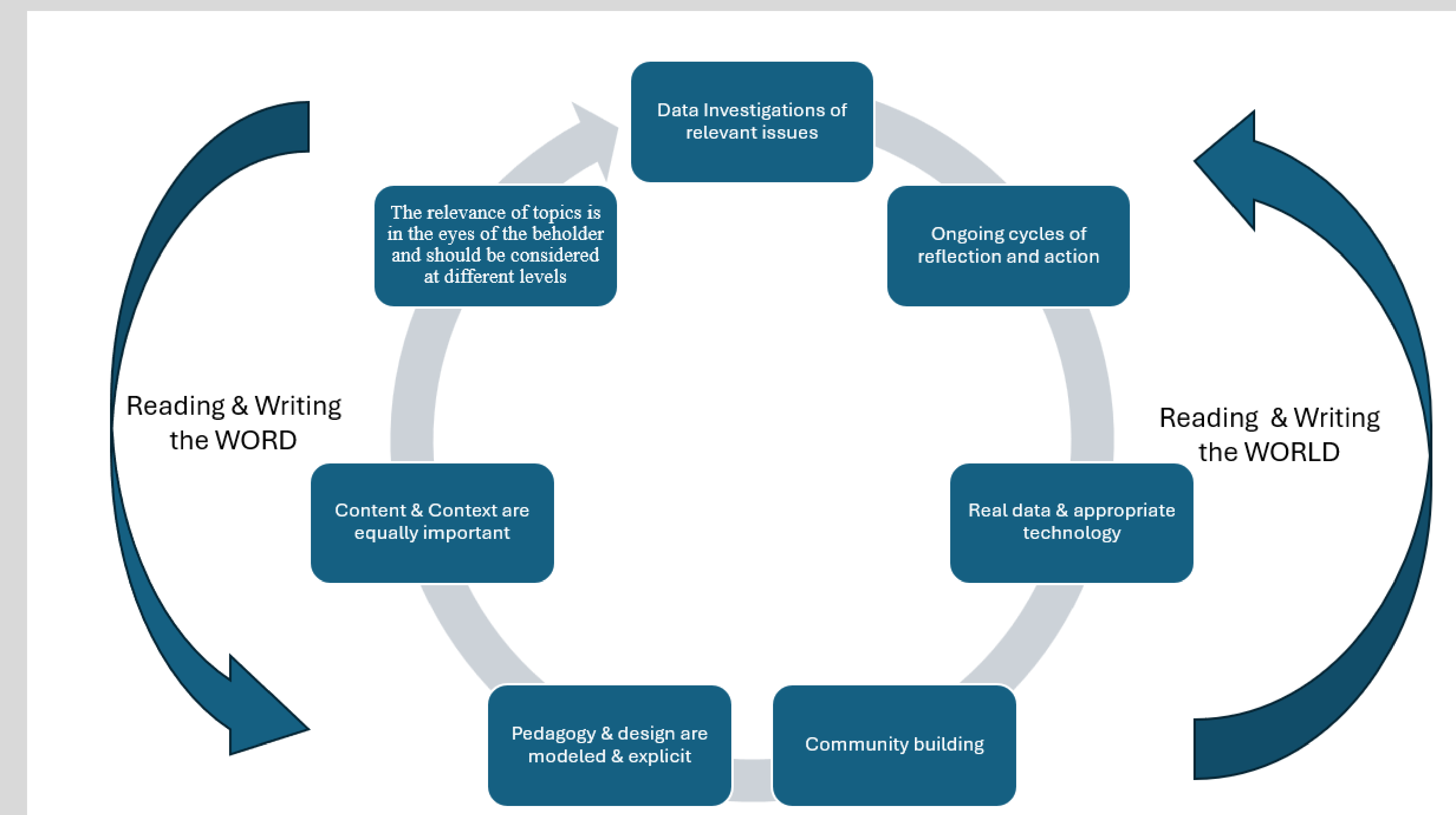
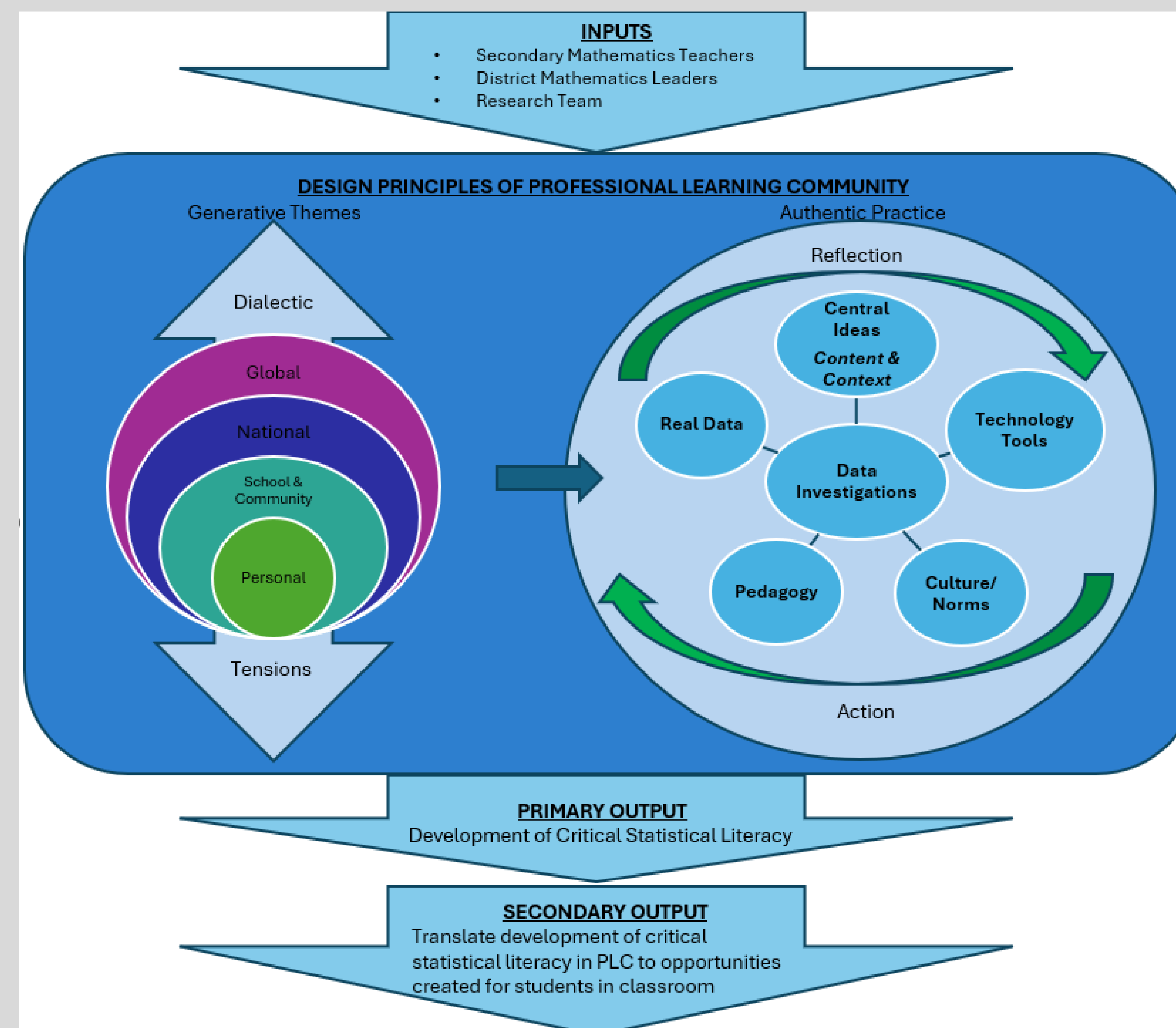


Figure Above: Design principles for the project.

Figure Left: Theory of change for project drawing from situated cognition and Paulo Freire's approach to literacy.

Reading the Word and World

Theory: We developed a two-dimensional framework for reading the word and world with data drawing from past literature through multiple iterations of the project.

Practice: We created a toolkit for teachers to use to develop reading data viz activities.

Findings: Analysis is still ongoing, but we have the following initial findings to report:

- What questions are asked help shape how people read data
- Teachers find "slow reveal" instructional routine useful for teaching
- What data viz is used is important in terms of how teachers read it. We now view data viz as similar to the picture cards Freire used in community circles to develop people's literacy.
- Supporting transfer into the classroom requires long term engagement

Writing the Word and World

Theory: We have been using the data investigative process framework (Lee et al., 2022) to frame writing the word and then adding critical components to it. Areas of need we have found are:

- framing problems that are relevant to students,
- processing and considering data that is publicly available and measures sociopolitical phenomenon (often in problematic ways)
- communicating and taking action for just futures.

Practice: We have developed a research brief on how to find issues relevant to students for framing problems as well as for finding datasets. To support data processing and consideration we have also create research to practice briefs. We are currently working to develop supports for communicating.

Findings: We have some initial anecdotes here:

- It is challenging for teachers to determine issues relevant to their students and data
- Creating data investigations is challenging for teachers and requires varied knowledge and practices

Resources

We are working on getting our resources live. You can find the most polished drafts for review using the QR code

Our resources include:

- Teaching Toolkits
- Research to Practice Briefs
- Course Planning Chart
- Instructional Briefs



Acknowledgement

This material is based upon work supported by the National Science Foundation under DRK-12 Grant #2143816. Any opinions, findings, and conclusions or recommendation expressed in this material are those of the author and do not necessarily reflect the view of the National Science Foundation.