

# Reaction to conference: Gazing from the outside

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# Merci mille fois!

- Thanks for a wonderful conference
- Fantastic hosts
- Perfect location
- Great conversations

# My perspective

Much of my work has focused on

- teachers' interactions with and learning from curriculum resources
- emerging trends related to digital curricula.

Choppin, J. (2011). The impact of professional noticing on teachers' adaptations of challenging tasks. *Mathematical Thinking and Learning*, 13(3), 175-197. doi:10.1080/10986065.2010.495049

Choppin, J. (2011). Learned adaptations: Teachers' understanding and use of curriculum resources. *Journal of Mathematics Teacher Education*, 14, 331-353. doi:10.1007/s10857-011-9170-3

Choppin, J., & Borys, Z. (2017). Trends in the design, development, and use of digital curriculum materials. *ZDM Mathematics Education*, 17(6). doi:10.1007/s11858-017-0860-x

Pepin, B., Choppin, J., Ruthven, K., & Sinclair, N. (2017). Foundations for change: Digital curriculum resources in mathematics education. *ZDM Mathematics Education*, 49(5), 645-661.

# Contribution of DA to Research on Teachers' Interactions with Curriculum Resources

- Problematizes relationship between teachers and curriculum resources
- Provides nuance to the notion of resources and resource use
- Explores teacher learning from engaging in curriculum design
- Considers teachers as agents in their own learning
- Connects design and use, especially in the era of the use of digital curriculum resources

# Powerful aspects of DA

- Holistic theory
  - wide-ranging design practices of teachers and students,
  - role of instructional contexts,
  - role of collective work,
  - affordances of tools, and so on.
- Robust connections to other theories
  - Sociocultural theories
    - Vygotsky
    - Wertsch (mediated action),
    - Engestrom (activity theory)
  - Cognitive ergonomics
  - Documentational engineering

# Tensions in the Theory

- Stability versus change
  - Theory assumes both stability and change (Invariance versus movement)
  - Fixed ways of doing things and new ways of doing things
  - Structure versus agency
  - In the US, with respect to conventional curricula, there are small variations in use, but overall very similar patterns of instruction over time

# Tensions in the Theory

- Terminology
  - **Need for precision:** important to have terminology that has a common understanding among its adherents
  - **Need for emergence of terminology from empirical work,** which argues against premature precision
  - **Using plain and detailed language might help, but has its own limitations,** including limiting the phenomena to which the theory applies and being too narrow
  - **Articulating a theory that builds on successive layers of terminology** – developed by a small group of people – **makes it difficult for outsiders to understand the theory** if they don't understand foundational terms (theory becomes too cryptic for outsiders)

# Tensions in the Theory

- Psychological constructs versus sociocultural constructs
  - E.g., operational invariance vs. communities of practice
  - View human activity and learning in very different ways
- Comprehensiveness versus application to specific contexts and phenomena
  - Theories that are overly comprehensive tend to be difficult to apply to specific phenomena
  - Theory is used to label rather than explain phenomena

# Theory building mirrors Vygotsky's explanation of how we learn

## Theory

Scientific

Abstract language introduced

Abstracted and instantiated concept

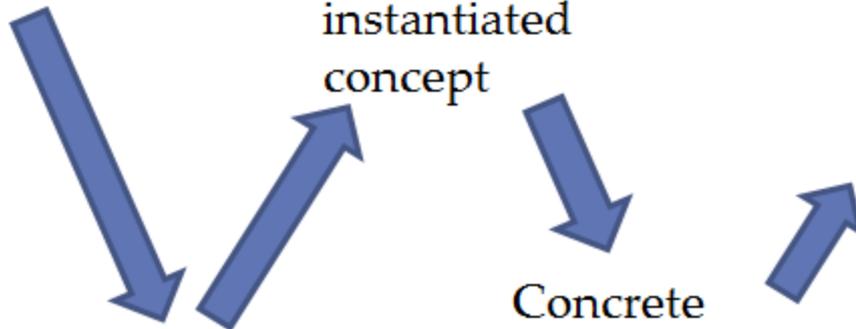
Robust understanding of concept, with abstraction and generalization but grounded in spontaneous experiences

Spontaneous

Concrete and unsystematic exploration of concept

Concrete encounters in the world – non-systematic exploration

## Empirical work



# Theory building mirrors Vygotsky's explanation of how we learn

- Similarly, theory that has meaning with respect to actual phenomena should develop as an iterative process:
  - Theory informs understanding of empirical phenomena
  - Empirical phenomena provide meaning to the theory
- Argues for continued focus on empirical results to inform theory

# Example of how empirical work may challenge the theory

- Assumptions in DA regarding teacher development from curriculum use are optimistic
- Teachers learning from engaging in curriculum design is highly variable, and is constrained by the intensified work contexts experienced by many teachers
  - How do conditions impact what teachers learn?
  - What is the role of teacher characteristics and dispositions?

# Example of how empirical work may challenge the theory

- DA involves a holistic and long-term view of teachers' practices and their professional learning.
  - These practices and long-term learning **require specific and stable curriculum contexts** in order to fully understand how they function
  - **This stability is difficult to achieve** for many reasons, including the fact that teachers' contexts often change over the long term, for personal, political, and institutional reasons
  - **This is never truer than in the digital era**, where there is rapid proliferation and evolution of curriculum resources

# Ongoing methodological work

While there are

- **New data generation tools**
  - Reflective investigation
  - Resource system schemata
- **Analytic methods need equal development** to allow for empirical work to inform theory formation

# Consequences and impact of theory

To increase **predictive power of theory**,

**Connect:**

**Descriptions** of documentation, usage schemes, resource systems, and so forth

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**Outcomes** such as the kinds of opportunities for students to learn mathematics