Graduate School of Education
Penn GSE

Teachers' Use of Mathematics Resources: A Look across Cultural Boundaries

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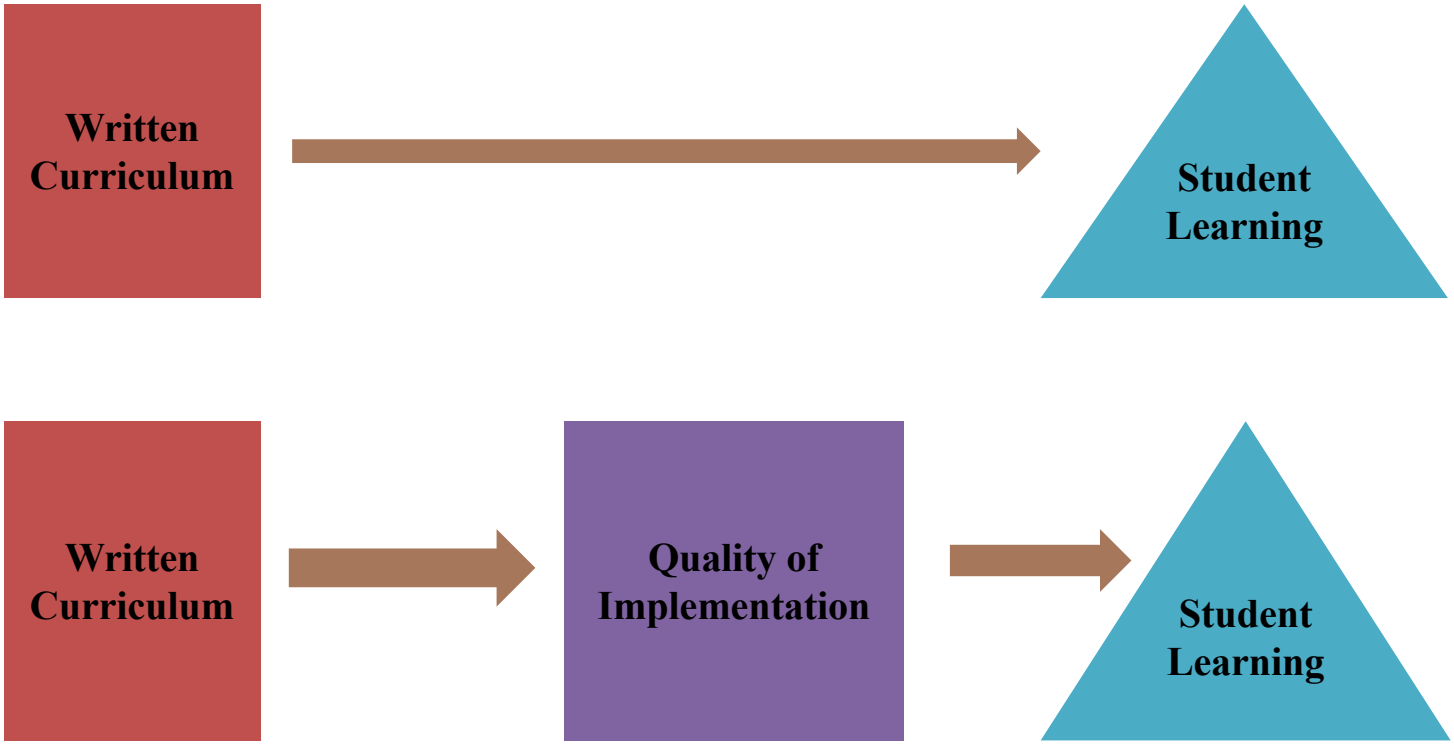
AUF Agence Universitaire de la Francophonie Europe de l'Ouest
EPIC
Sciences Société S2HEP Éducation
ReVEA Ressources vivantes pour l'enseignement et l'apprentissage
EducTice
ifé Institut Français de l'Éducation
Université de Lyon
ENS de Lyon

Four Parts

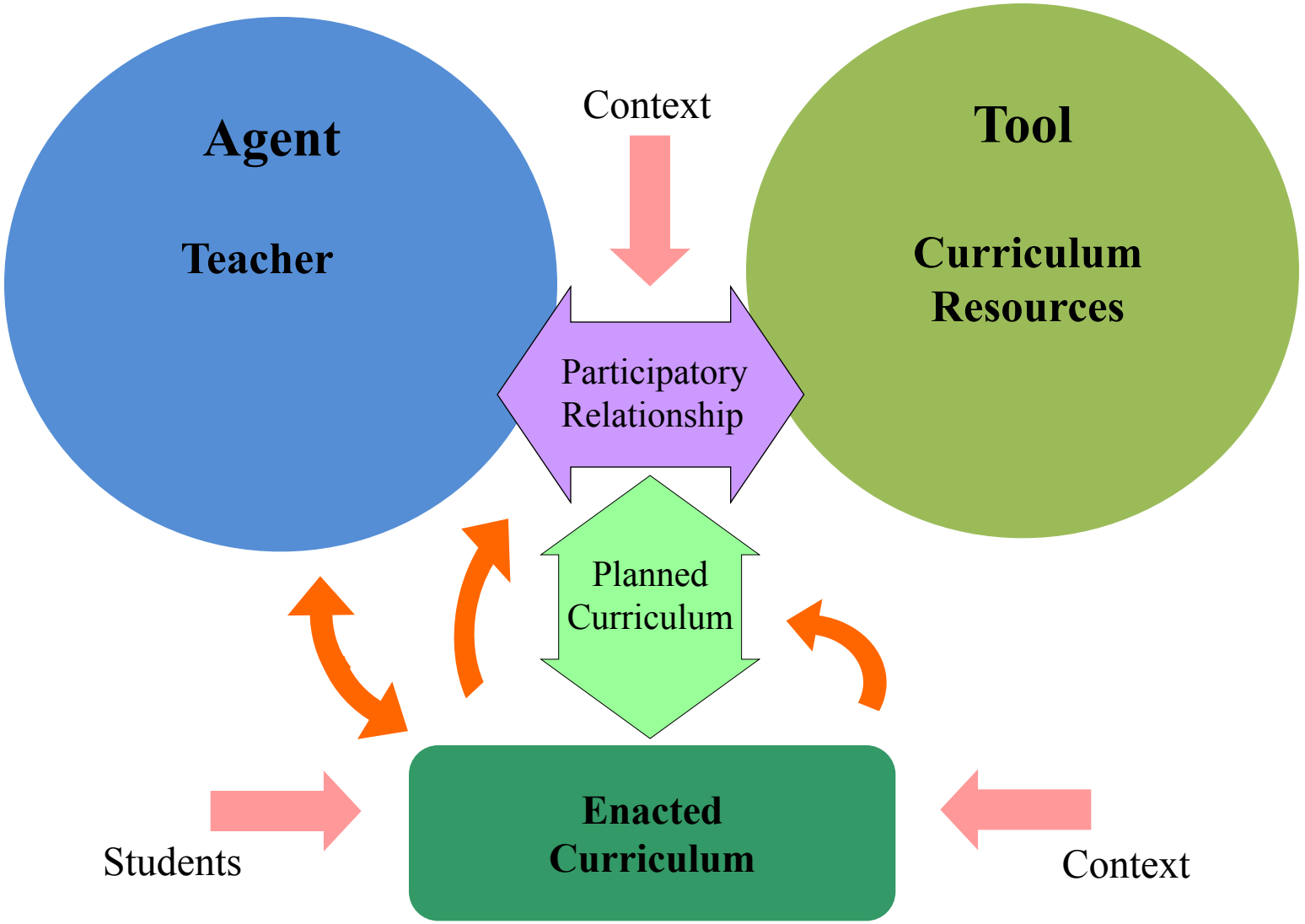
1. My documentational trajectory
2. Summary of recent work and foundational ideas
3. Math 3Cs Project: Preliminary findings
4. Final thoughts

Documentational Trajectory



We need a theory to explain what happens when teachers use curriculum materials!

The Participatory Perspective



Summary of Recent Work and Foundational Ideas

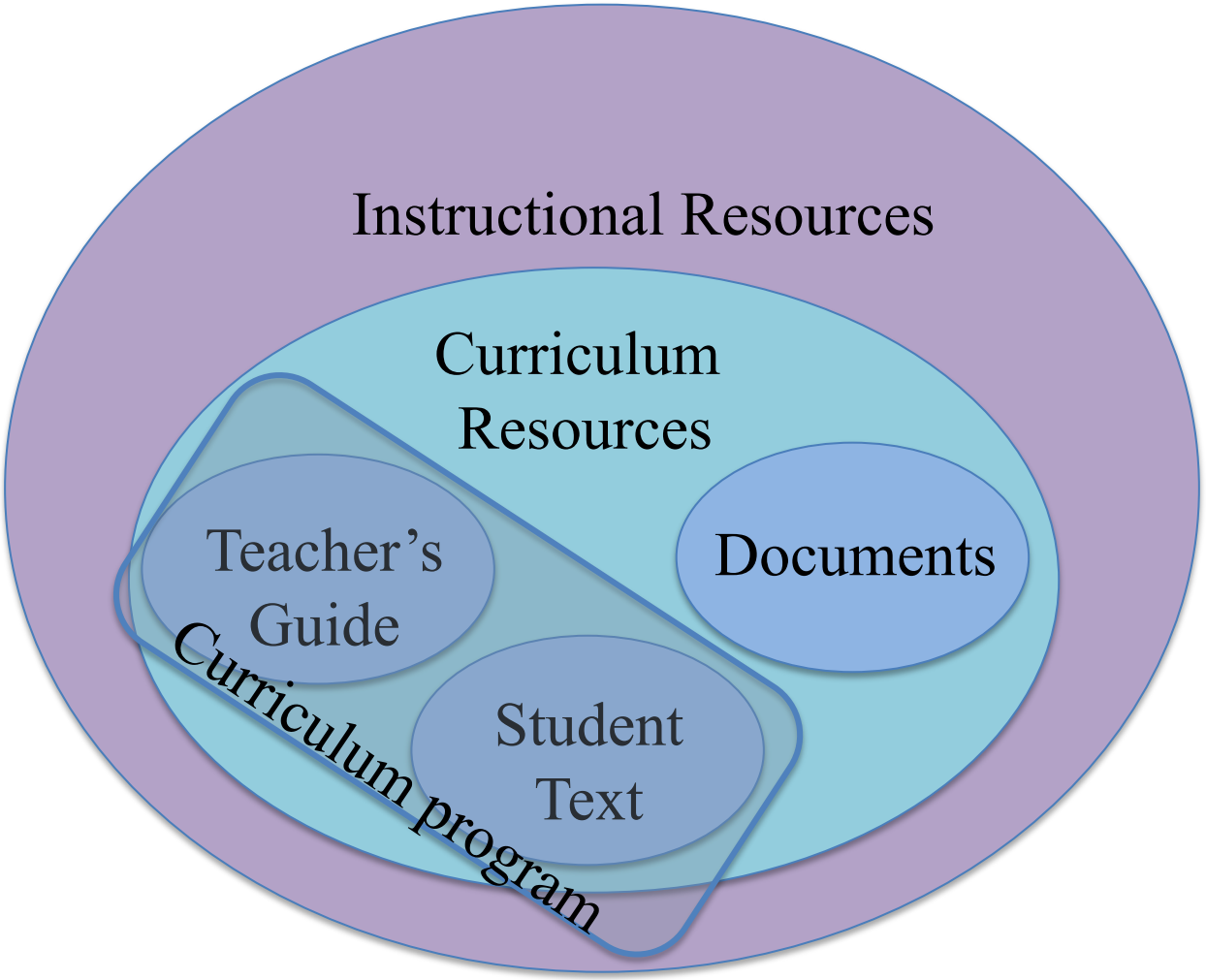
Elementary teachers

Curriculum resources

Elementary Teachers

- Teach all subjects
- Often have limited mathematics knowledge
- Tend to rely on a primary curriculum program (or textbook)
- Elementary mathematics curriculum has undergone substantial reform pressures in the last 20 years

Curriculum Resources



Research on Teacher-Curriculum Interactions

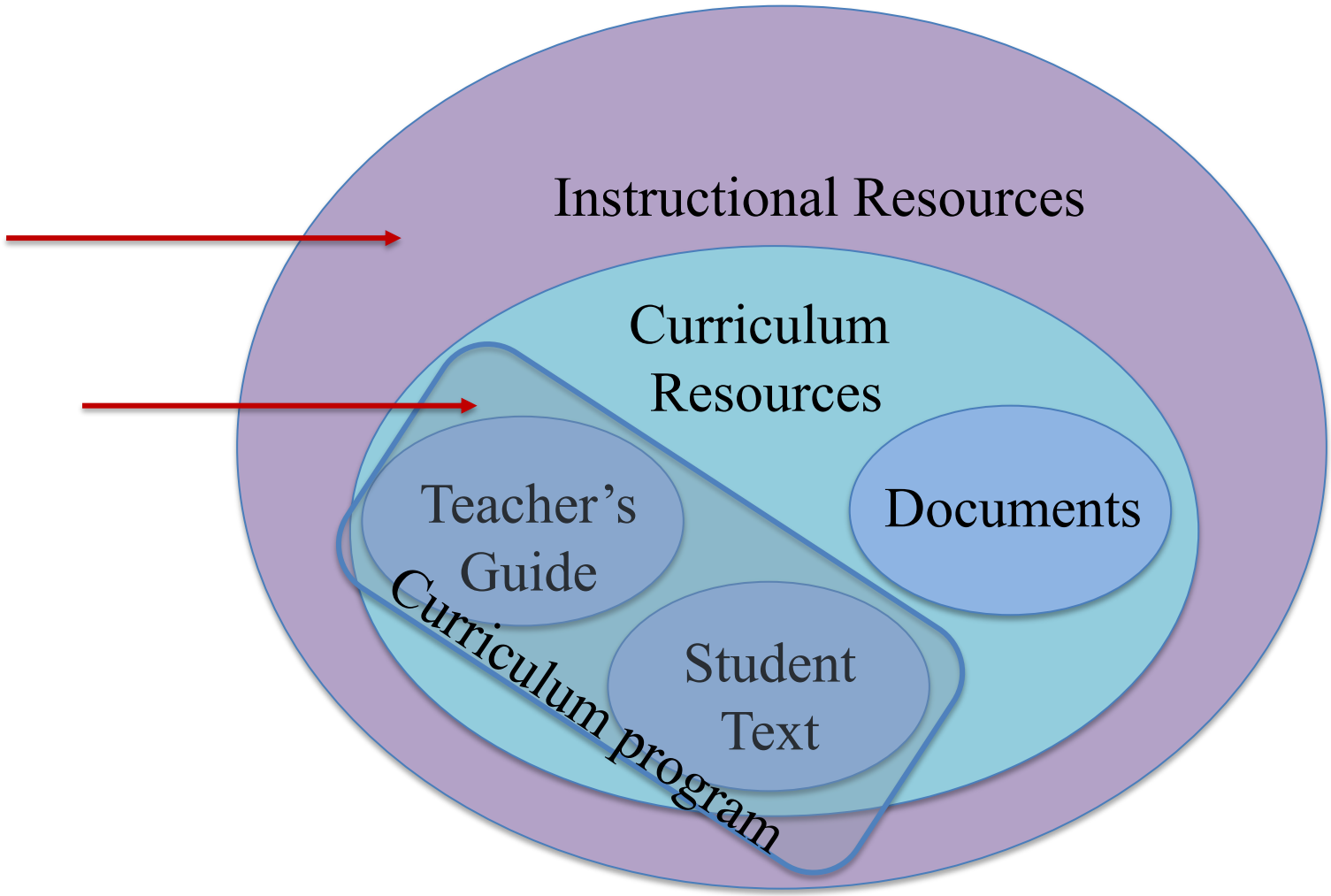
ICUBiT Study (US)

- Teacher capacity
- Knowledge of Curriculum Embedded Mathematics (Remillard & Kim, 2017, ESM)
- Analysis of teacher's guides

SwUSBe Study (Sweden, US, Belgium)

- Comparative analysis of teacher's guides (Remillard, Van Steenbrugge, & Bergqvist)

Curriculum Resources



Math 3Cs Study

Cross-Cultural Curriculum Study in Mathematics
(Funded by the Swedish Research Council)

Aim: Examine elementary teachers' documentational work with print and digital resources to design and enact instruction in Finland, Flanders (Belgium), Sweden, and the U.S.

- How they access and have access to various resources
- How they use them
- Influencing factors
- Variation within and across cultural context

Designing Cross-Cultural Analysis

- Few studies of teachers' curriculum-resource work in cross-cultural contexts
- Teaching is a cultural activity

  (Pepin, Gueudet, & Trouche, 2013)
- Cultural scripts

  (Stigler & Hiebert, 1999)
- Cross cultural studies help us identify cultural scripts

  (Andrews, 2007; Pepin & Haggarty, 2001)
- Danger of search for equivalencies (Pepin, 2005)

  Alternatives – 1) focusing on anomalous cases;
  2) embed analysis in cultural context.

Cross-Cultural Team

Hendrik Van Steenbrugge	 
Tuula Koljonen	 
Kirsti Hemmi	 
Heidi Krzywacki	 
Janine Remillard	
Rowan Machalow	

Phase One Design

Focus: Understanding use of print and digital resources for commonly used programs

- Identified 2 curriculum programs per region
  - Print with digital components
- 2 interviews of 5 teachers using each program (n=40)
- Background/context
- Resource use: what, how, why
- Perspectives and beliefs

Programs

Country/Region	Program	Description
 Finland	Otava's Tuhattaituri	Mainstream, highly used
	Edukustannus	New, represents new approach
 Belgium	Kompas	Mainstream, highly used
	Nieuwe Pluspunt	Represents newer approach
 Sweden	Matte Direkt	Mainstream, highly used
	Favorit matematik	Adapted from Finland, new pedagogical approach
 U.S.A	Everyday Mathematics	Established, NCTM aligned, highly used
	Eureka Math	New, CCSS-M aligned, open access, highly used

Analysis

(Emergent Process)

1. Developed common coding categories
2. Within culture coding of interview transcripts in native language→ descriptive cases of use (incl. images, supporting quotations)
3. Team discussion → collectively identified what needs to be described, surface taken-for-granted features, additional approaches
4. Identify analytical themes (within or across cultural contexts) → record in table

Questions Focusing Current Analysis

1. How do elementary teachers in different regions describe the purposes and uses of digital resources in their documentational work?
2. To what extent do these uses provide opportunities for transformation of teaching and learning through the integration of digital resources?

(Pepin, Choppin, Ruthven, Sinclair, 2017. ZDM)

Two Preliminary Findings

1. Teachers use digital resources to respond to policy or other new instructional initiatives
2. Impact on teachers' professional work practices

Responding to Broad Initiatives

Sweden 

- Nation-wide PD initiative (Matematiklyftet/Boost in Mathematics)
- Aims to shift instructional routines: PDE Model (Individual work on task, then pairs, then whole class)
- Teachers report finding appropriate tasks online and classroom technology to facilitate process.

I post some of the results that we received during the lesson on the document camera and then we discuss these solutions by asking, for instance: How has this person thought? . . . I photograph some of the results every time. They [the students] love this. They all want to contribute with their solutions and to be posted on the board.

Responding to Broad Initiatives

When I get to a point where I'm really struggling with visuals, I do go to Zearn [videos] and I'm like, 'Wow, that's a really good ...' I love the way they have their visuals laid out… and how you can add... the way they make it interactive. [Or] I'll just Google it... there's this one other website, LearnZillion... I always find videos.

United States

- CCSS-M emphasize visual models, including bar models and number lines.
- These are used in many new curriculum programs, but unfamiliar to teachers.
- Teachers report finding videos (from primary resource and elsewhere) to educate selves and introduce students to the models.

Impact on Professional Practices

- Increased collaboration/sharing with colleagues
- Monitor student progress
- Communicate with parents more frequently
- Engage in online PD

Ruthven: Online resources not only shift the nature of teachers' *work,* but increase the *workloads* of teachers.

Concluding Thoughts

1. The documentational approach has broad, cross-cultural possibilities as an analytical framework, even though what it looks like within particular contexts varies substantially
2. It is particularly well suited to characterizing teachers' work in the current internet era
3. Teachers' work is being transformed beyond the lens the documentational approach offers

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Thank you!

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