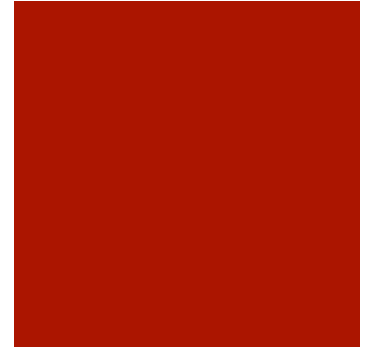




Social resources for the implementation of ambitious instructional reform

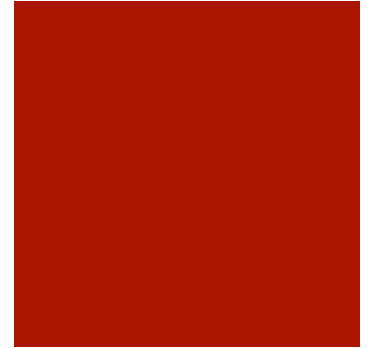
Jennifer Lin Russell
University of Pittsburgh

Scaling Up Mathematics Study



- NSF-funded longitudinal study of the implementation of **ambitious mathematics curricula** in two urban district: Region Z & Greene

Scaling Up Mathematics Study

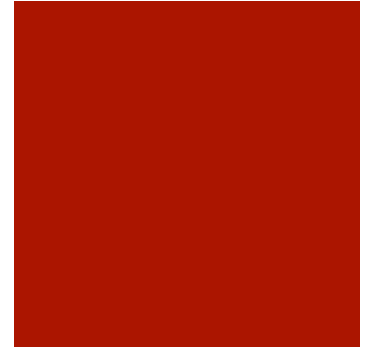


- NSF-funded longitudinal study of the implementation of **ambitious mathematics curricula** in two urban district: Region Z & Greene

Ambitious mathematics instruction =

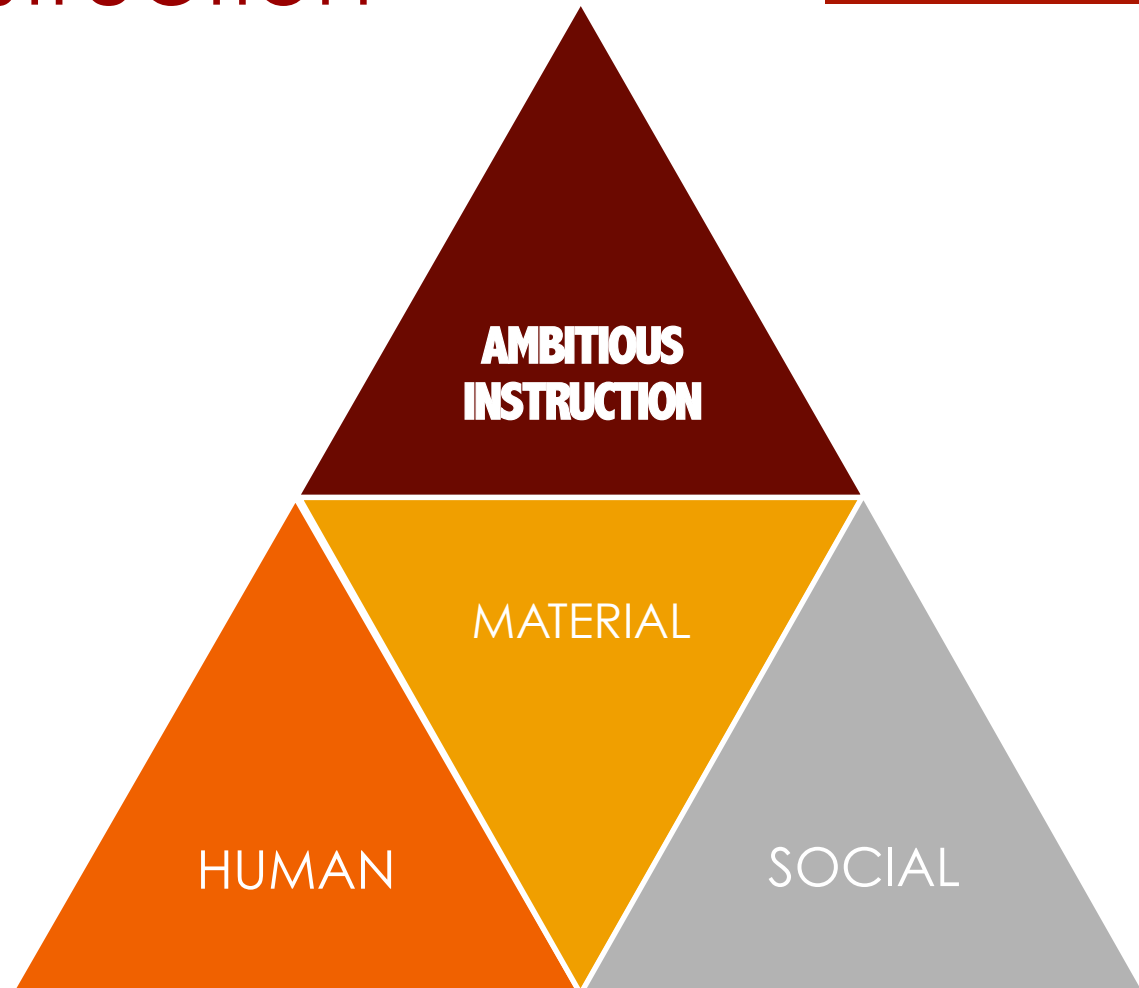
- High cognitive demand tasks
- Support for student thinking
- Intellectual authority vested in the discipline

Scaling Up Mathematics Study



- NSF-funded longitudinal study of the implementation of **ambitious mathematics curricula** in two urban district: Region Z & Greene
- Participating schools
 - 8 elementary schools (4 per district)
 - 48 teachers
- Data (collected at 5 time points over 3 years)
 - Interviews with teachers, coaches, principals, district leaders
 - Observations of classroom instruction, meetings, professional development

Foundational capacities for ambitious instruction

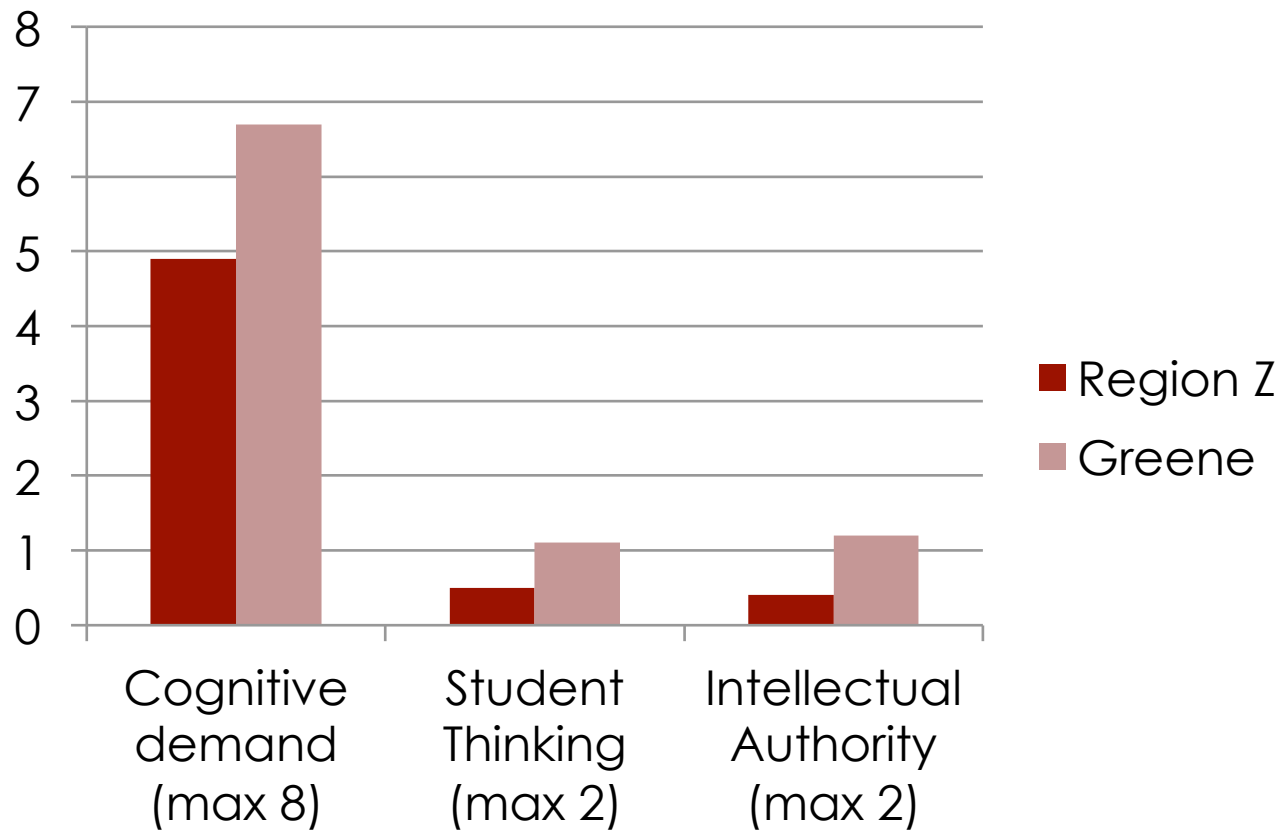


Study districts' capacity for ambitious instruction



Capacity	Greene & Region Z
Human	Large urban districts; focus on K-5 teachers; measures of representative sample of teachers' MKT showed no significant difference
Material	Selection and provision of standards-based mathematics curriculum
Social	Surface level similarities (e.g. coaching, professional learning communities) – but significant differences in quality

Implementation quality significantly higher in Greene



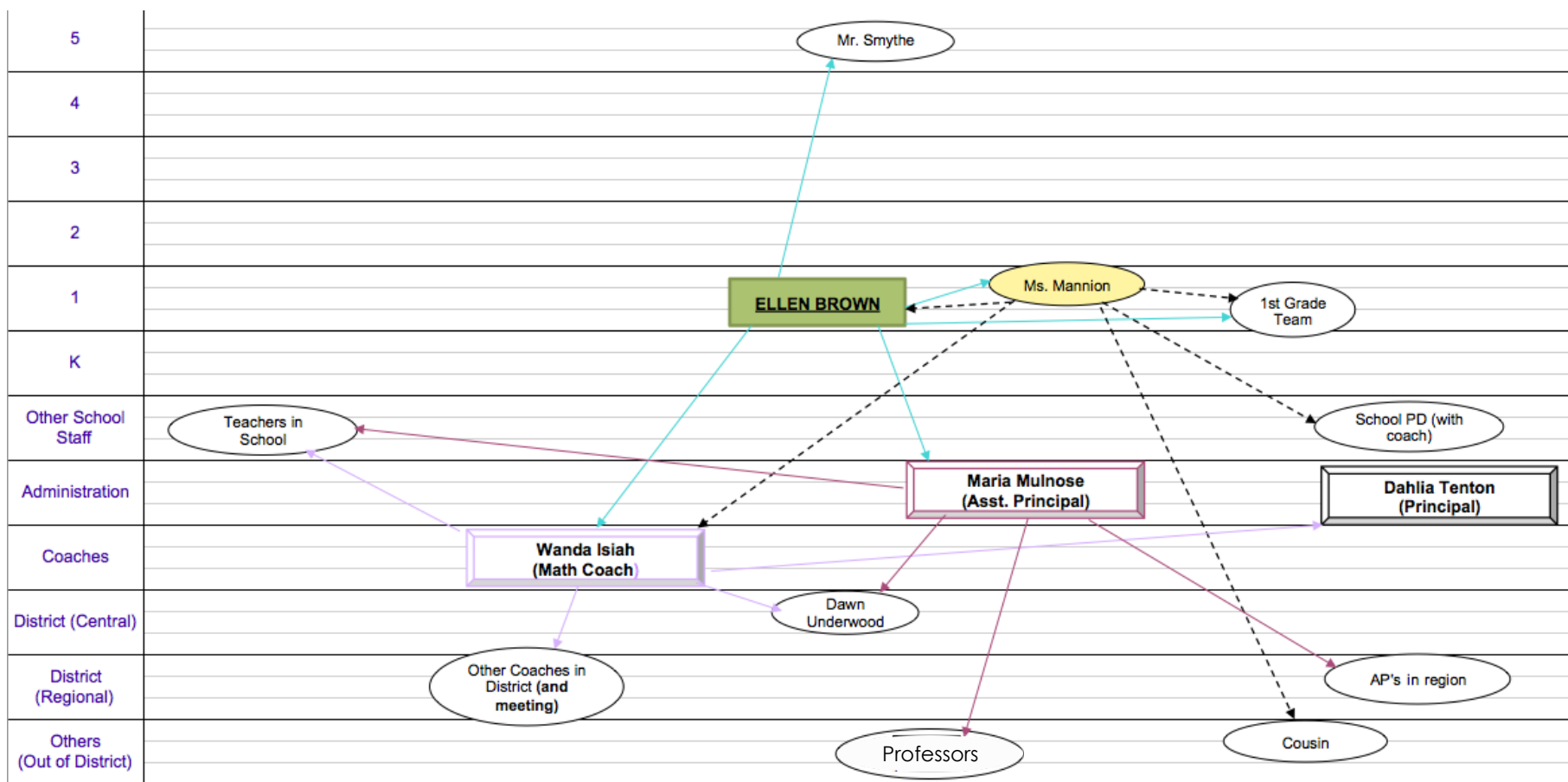
Stein & Kaufman, 2010

Study districts' capacity for ambitious instruction

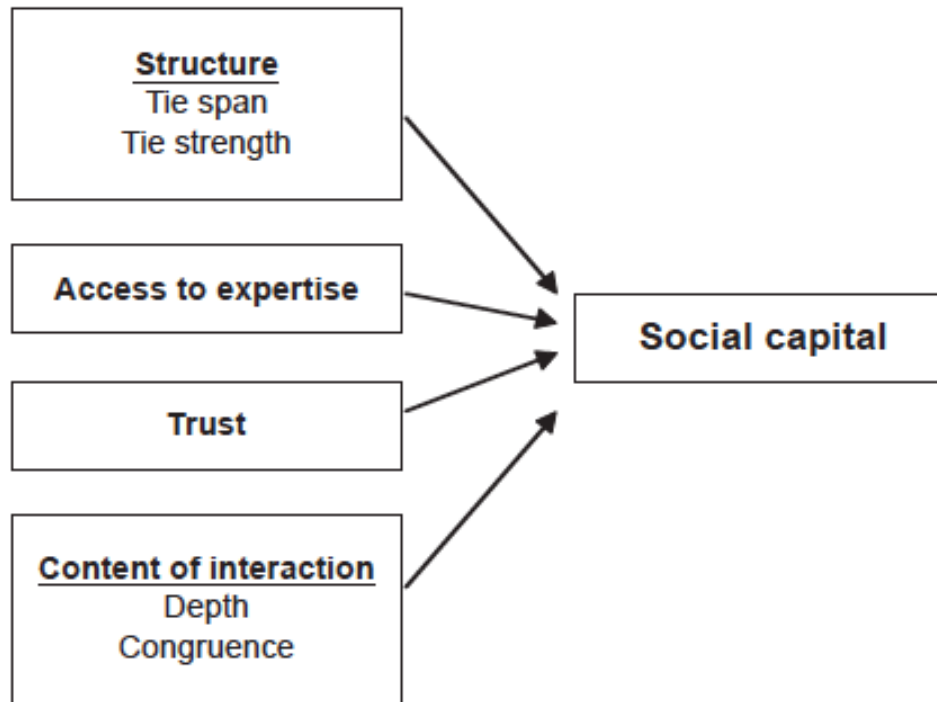
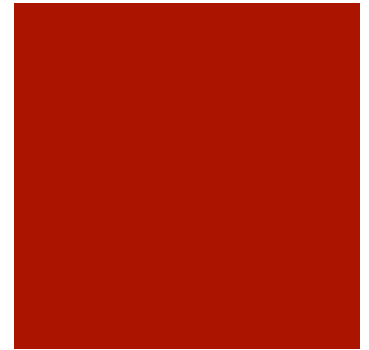


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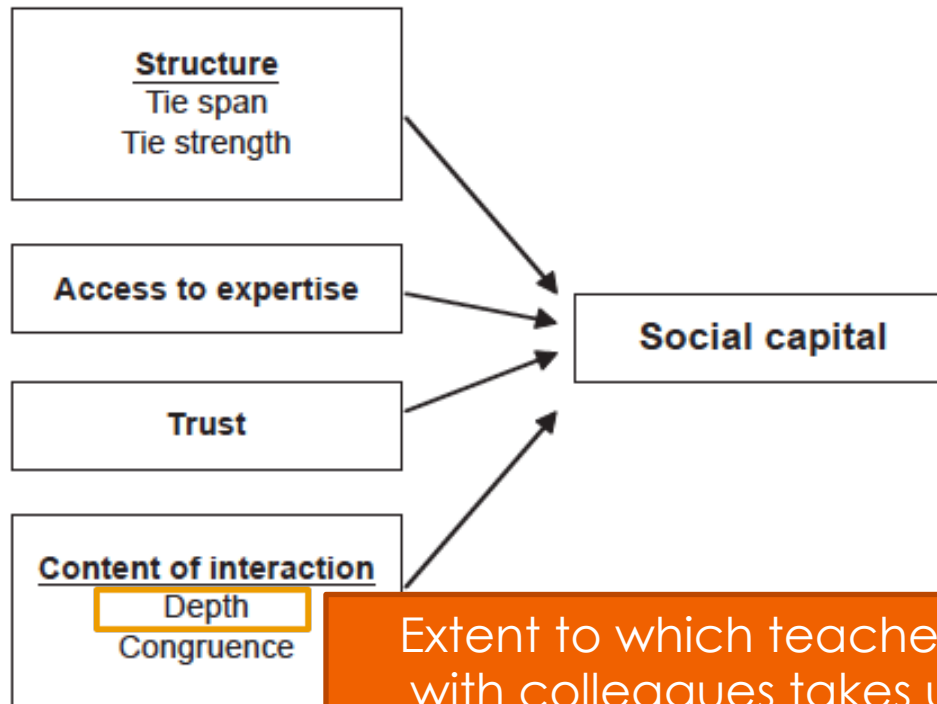
Social support for instruction: Egocentric math advice networks



Social networks as a source of social capital

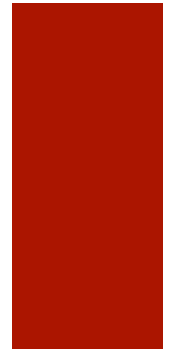


Social networks as a source of social capital



Extent to which teachers' interactions with colleagues takes up substantive issues related to teaching & learning

Depth of interaction varies by school and district

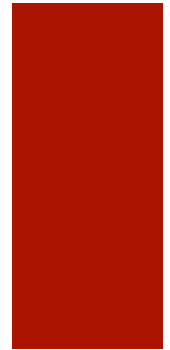


Depth of Interaction, by School

District	% (n)		
	Low	Moderate	High
Region Z			
School A	93.8 (45)	6.2 (3)	0.0 (0)
School B	82.9 (63)	17.1 (13)	0.0 (0)
School C	81.7 (85)	18.3 (19)	0.0 (0)
School D	78.2 (68)	20.7 (18)	1.1 (1)
Greene			
School E	59.3 (73)	32.5 (40)	8.1 (10)
School F	52.3 (46)	37.5 (33)	10.2 (9)
School G	58.0 (65)	33.9 (38)	8.0 (9)
School H	39.2 (47)	54.2 (65)	6.7 (8)

Note. $n = 315$ interactions in Region Z; $n = 443$ interactions in Greene.

Depth of interaction varies by school and district

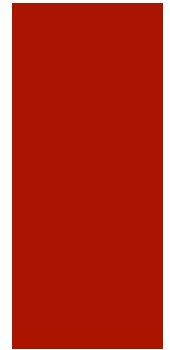


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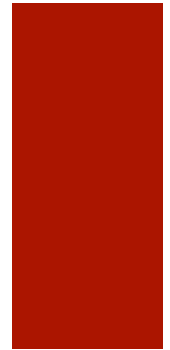


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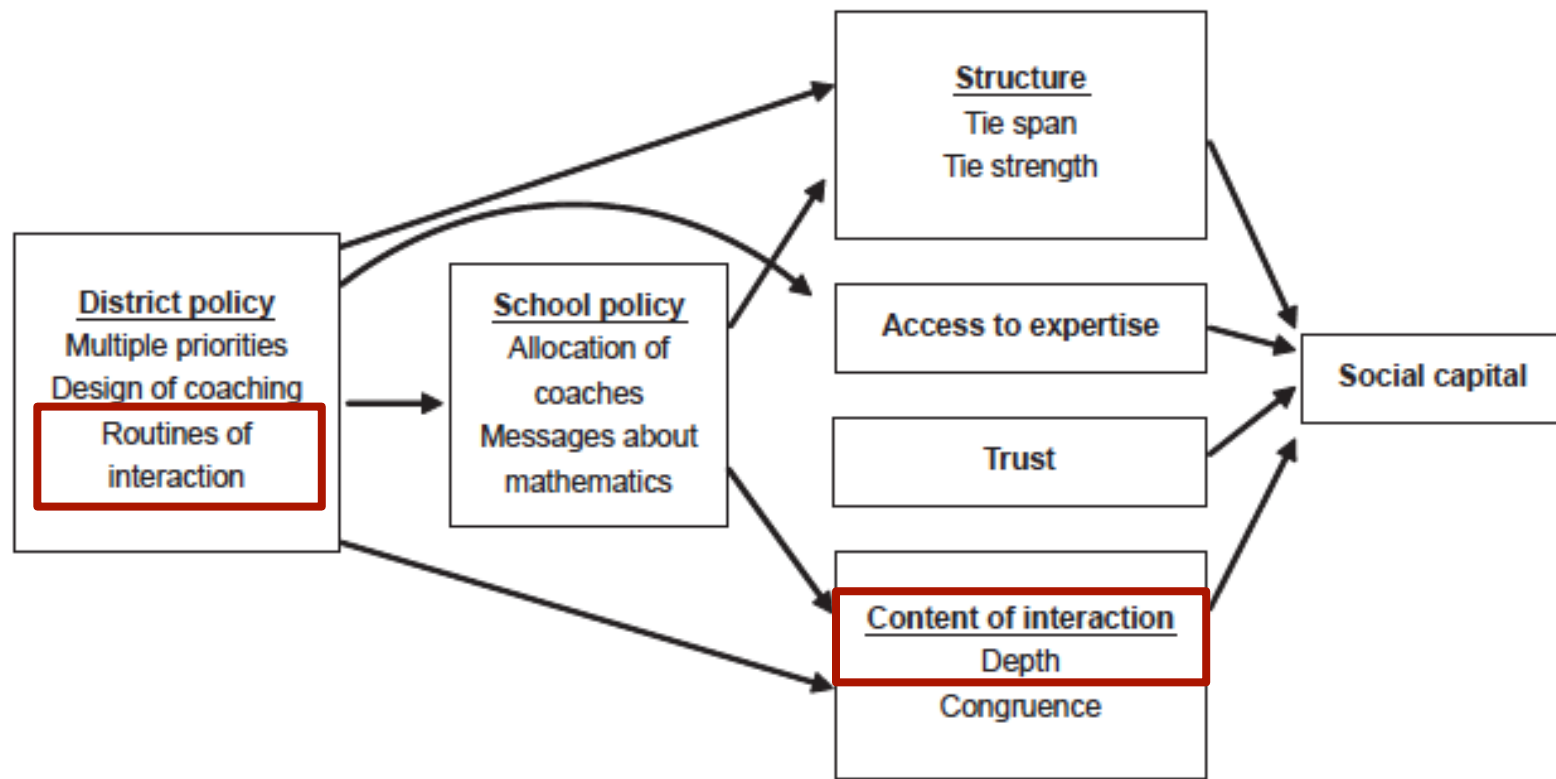


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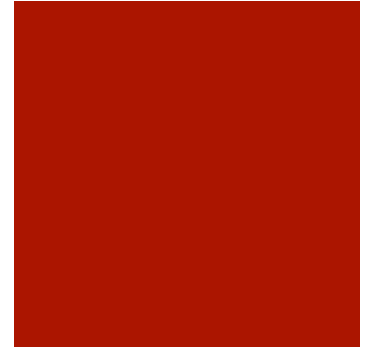
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District policy influences teachers' social networks



Coburn & Russell, 2008

Supporting sustainability of ambitious instruction



- In year 3 of the study, Greene largely withdrew supports for implementation of *Investigations*
 - Reduced allocation of coaching resources & math PD
 - Reduced grade level team time focused on math
 - Reduced the amount of time for math instruction in elementary schools from 90 to 60 minutes
- Despite a shift in district reform priorities
 - 7 teachers sustained high quality instruction
 - 5 were not able to sustain high quality enactment

Supporting sustainability of ambitious instruction

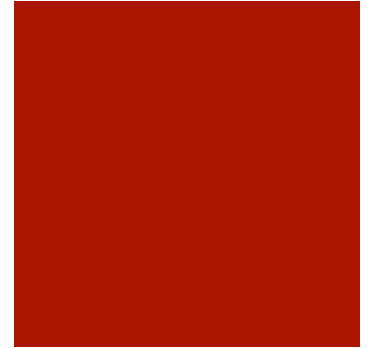


- In year 3 of the study, one of the study districts largely withdrew supports for implementation of *Investigations*
 - Reduced allocation of coaching resources & math PD
 - Reduced grade level team time focused on math
 - Reduced available time for math instruction in elementary schools from 90 to 60 minutes

SUSTAINABILITY

- Despite a shift in district reform priorities
 - 7 teachers sustained high quality instruction
 - 5 were not able to sustain high quality enactment

Study methods



- What aspects of teachers' social networks are consequential for sustained reform-related instruction?
- Longitudinal analysis of teachers' egocentric advice networks in the Greene district (N=12)
- Employed Qualitative Comparative Analysis to detect relationships between complex sets of network variables and instructional outcomes

Math advice network characteristics associated with sustainability



	Year 1			Year 2			Year 3
	Depth	Expertise	Strong ties	Depth	Expertise	Strong Ties	High Quality Instruction

Math advice network characteristics associated with sustainability



	Year 1			Year 2			Year 3
	Depth	Expertise	Strong ties	Depth	Expertise	Strong Ties	High Quality Instruction
1				X	X	X	Y

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1				X	X	X	Y
2	X	X	X				Y

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	Depth	Expertise	Strong ties	Depth	Expertise	Strong Ties	High Quality Instruction
1				X	X	X	Y
2	X	X	X				Y
3		X	X	X			Y

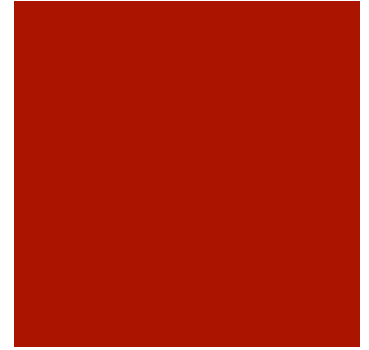
Math advice network and reform sustainability



	Year 1			Year 2			Year 3
	Depth	Expertise	Strong ties	Depth	Expertise	Strong Ties	High Quality Instruction
1				X	X	X	Y
2	X	X	X				Y
3		X	X	X			Y

Support from teachers' math advice networks in years 1 and 2 enabled them to achieve the **understanding of the curriculum and its pedagogical approach** that enabled them to continue to enact it flexibly under different conditions

Implications for STEM reform



- The quality of teachers' social networks is associated with their capacity to sustain reform-oriented mathematics instruction
- District and school level leaders can influence the quality of teachers social networks, in turn supporting reform sustainability
- Engineering social supports should attend to the structure and content of teachers professional interactions

States as STEM Learning Environments



- Design a state-wide, empirically based indicator system built from data gathered through in-depth study of teaching and learning in a sample of 4th through 8th grade mathematics classrooms
- Focus on a set of constructs and measures:
 - Known to predict student learning on high-level mathematics assessments: **high-cognitive-demand instruction**
 - Associated with teachers' capacity to enact ambitious instruction: **social supports for instruction (e.g. coaching & peer interaction)**
- The objective is to distill the measurement of these constructs to a core set of survey indicators that are:
 - Predictive of student outcomes,
 - Can be administered efficiently at scale, and
 - Are consequential for state policy makers' decision making

References

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- Coburn, C. E., Russell, J. L., Kaufman, J., & Stein, M. K. (2012). Supporting sustainability: Teachers' advice networks and ambitious instructional reform. *American Journal of Education*, 119(1), 137-182.
- Stein, M.K., & Kaufman, J. (2010). Selecting and supporting the use of mathematics curriculum at scale. *American Educational Research Journal*, 47(3), 663-693