Northwestern

Learning On-the-Job: Educational Infrastructure & Education Systems' Efforts to Support Professional Learning

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The Distributed Leadership Studies
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Educational Infrastructure

- Educational Infrastructure refers to structures and resources that educational systems and schools mobilize to enable (and constrain) teaching, maintain teaching quality, and lead improvement in teaching.

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- Educational Infrastructure includes:
  - the instruments and tools that are the materials of instruction (e.g., curriculum and summative and formative student assessments).
  - the formal positions, routines, procedures, and rules for guiding professional learning, maintaining quality, and enabling improvement.
  - professional norms, values, and cognitive scripts that infuse the work.

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Research Approach

- Case Study
- Sequential explanatory mixed-methods design
- Annual surveys of school & school system staff
- Theoretical/Purposeful sample of schools and school actors
- “Theoretical” or “Analytical” generalizability

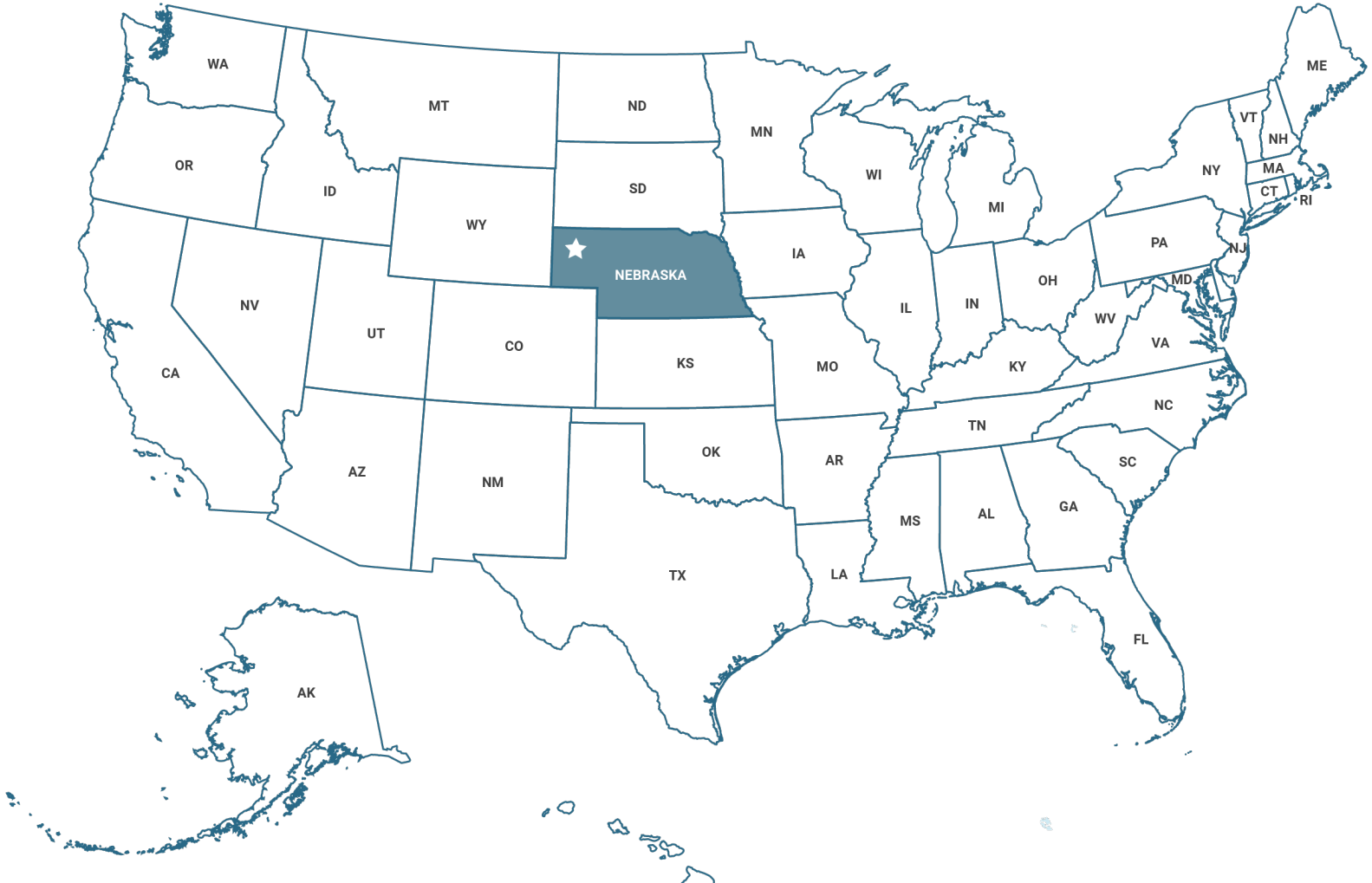
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Table 1. Elementary school demographics, Auburn Park School District, 2012.

School	Students enrolled	White (%)	African American (%)	Latino (%)	English learner (%)	Free/ reduced lunch (%)	Staff in network
Kingsley	564	89	2	4	–	7	32
Chamberlain	528	91	3	3	–	5	30
Ashton	484	74	5	12	7	40	31
Ashe	464	88	2	5	–	7	27
Warner	446	84	7	2	4	18	27
Abbott	441	93	1	4	–	23	24
Bryant	436	81	6	8	–	39	34
Riley	403	89	4	3	–	28	26
Northvale	395	86	4	5	–	14	22
Torres	393	76	9	8	9	44	29
Cisneros	353	88	3	4	–	16	22
Chavez	343	71	11	11	8	58	28
Stevenson	277	69	10	10	9	48	22
Easton	259	83	3	5	–	10	17

Notes. A missing value indicates that data were masked to protect student identity, as fewer than 10 students were reported in the subgroup. Schools in italics were interview sites.

Findings/Assertions

- Educational systems can design educational infrastructure to foster interactions about instruction by
  - Creating and maintaining boundary practices among different ‘Communities of Practice’ systemwide
  - Providing boundary objects to anchor and focus negotiations among participants in boundary practices
  - Preparing and mobilizing boundary spanners to support interactions among participants in boundary practices

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School District Educational Infrastructure and Change at Scale: Teacher Peer Interactions and Their Beliefs About Mathematics Instruction

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While current reform efforts press for ambitious changes to teachers' instructional practice, teachers' instructional beliefs are also consequential in such efforts as beliefs shape teachers' instructional practice and their responses to instructional reforms. This article examines the relationship between teachers' instructional ties and their beliefs about mathematics instruction in one school district working to transform its approach to elementary mathematics education. Quantitative results show that while teachers' beliefs did not predict with whom they interacted about mathematics instruction, teachers' interactions with peers about mathematics instruction were associated with changes in their beliefs over time. Qualitative analysis confirms and extends these findings, revealing how system-level changes in the district's

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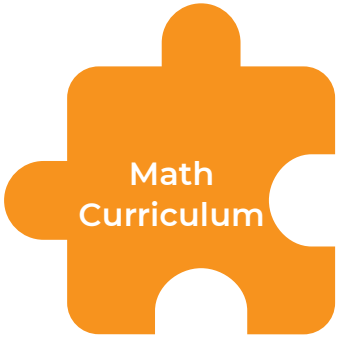
A Shift in Teachers' Beliefs

Results From Multilevel Models for Change in Teachers' Beliefs (n = 222)

		Model A	Model B	Model C
Fixed effects				
Composite model	Intercept (initial status)	−0.142 (0.076)	−0.053 (0.107)	−0.296 (0.138)
	Year (rate of change)	0.051* (0.022)	0.024 (0.031)	0.023 (0.030)
	Access to peer beliefs		0.076* (0.032)	0.081* (0.032)
	Years of experience			−0.017** (0.006)
Variance components				
Level 1	Within-person	0.371 (0.024)	0.377 (0.028)	0.377 (0.028)
Level 2	In initial status	0.554 (0.074)	0.622 (0.100)	0.588 (0.097)
	In rate of change	0.011 (0.006)	0.001 (0.008)	0.001 (0.008)
Goodness-of-fit statistics				
	Akaike Information Criterion	1,952.57	1,580.32	1,574.89
	Bayesian Information Criterion	1,976.02	1,607.03	1,606.05

Note. Standard deviations in parentheses.
*$p < .05$. **$p < .01$.

Auburn Park: A Case of Educational Infrastructure Redesign



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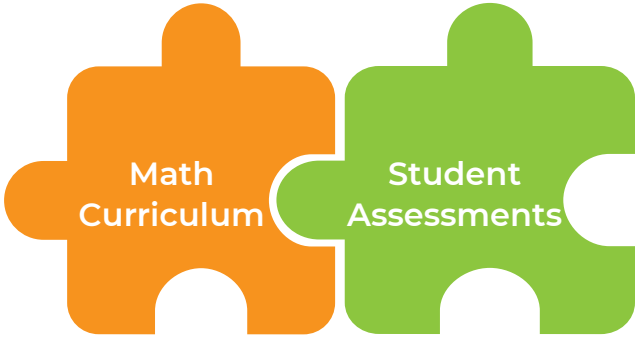

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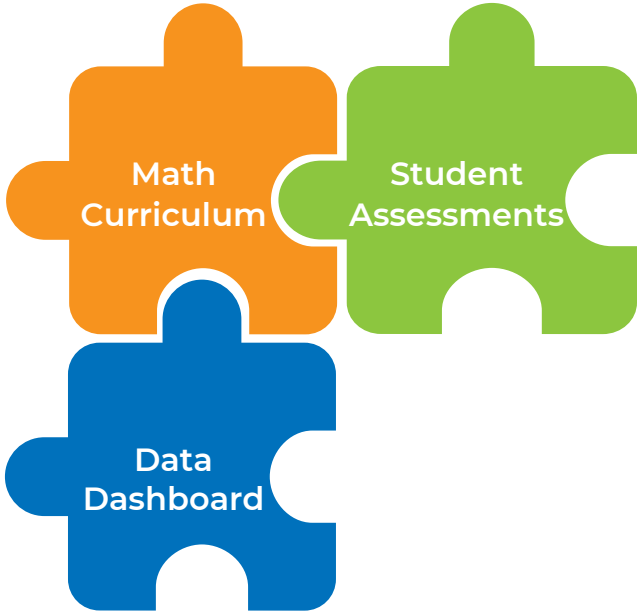

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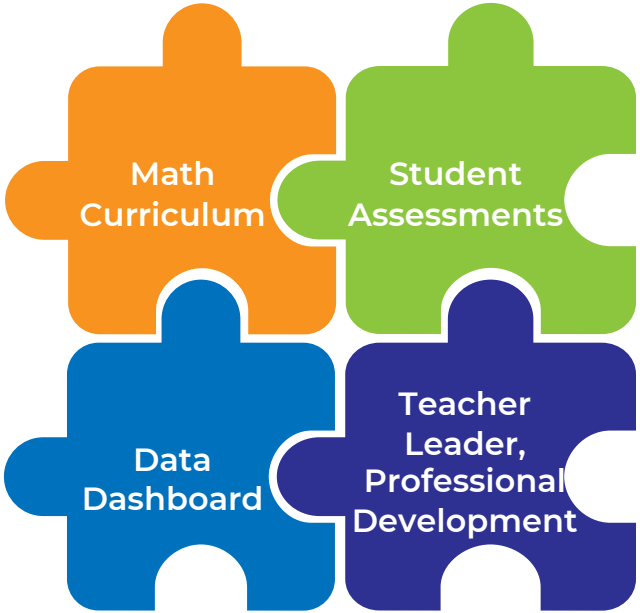

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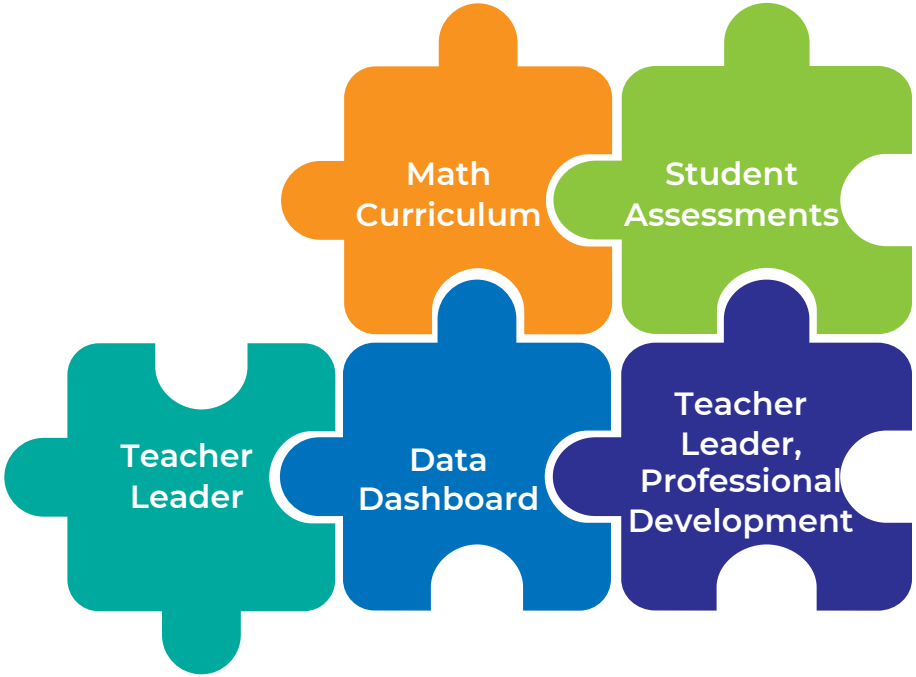

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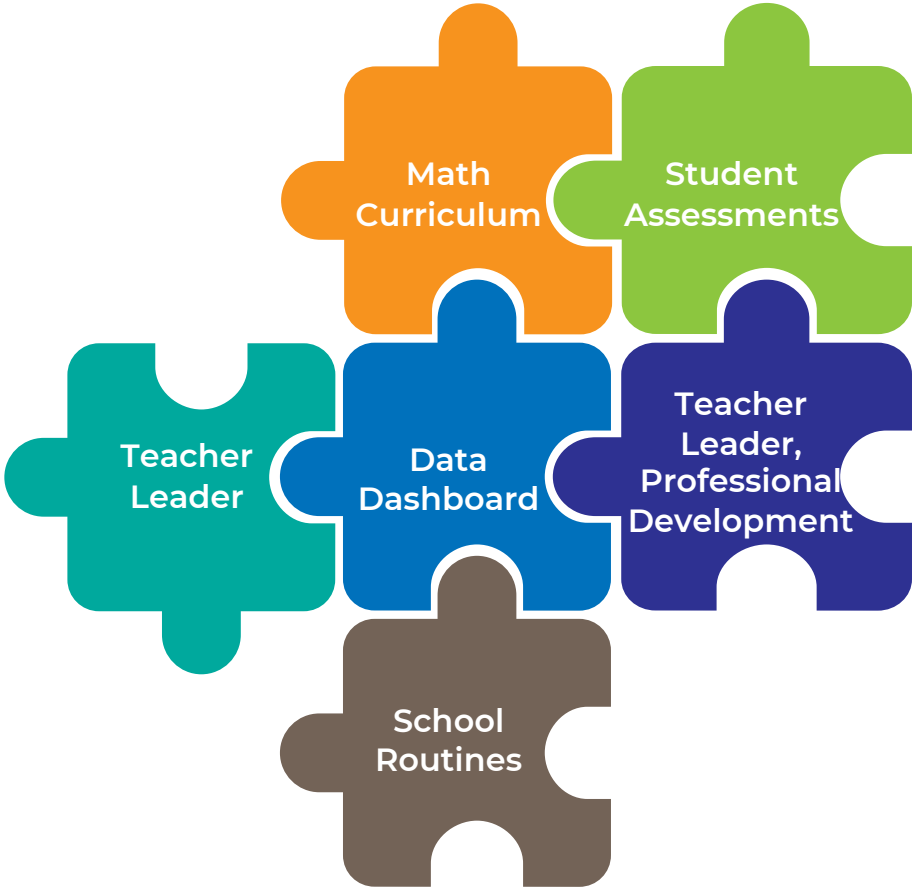

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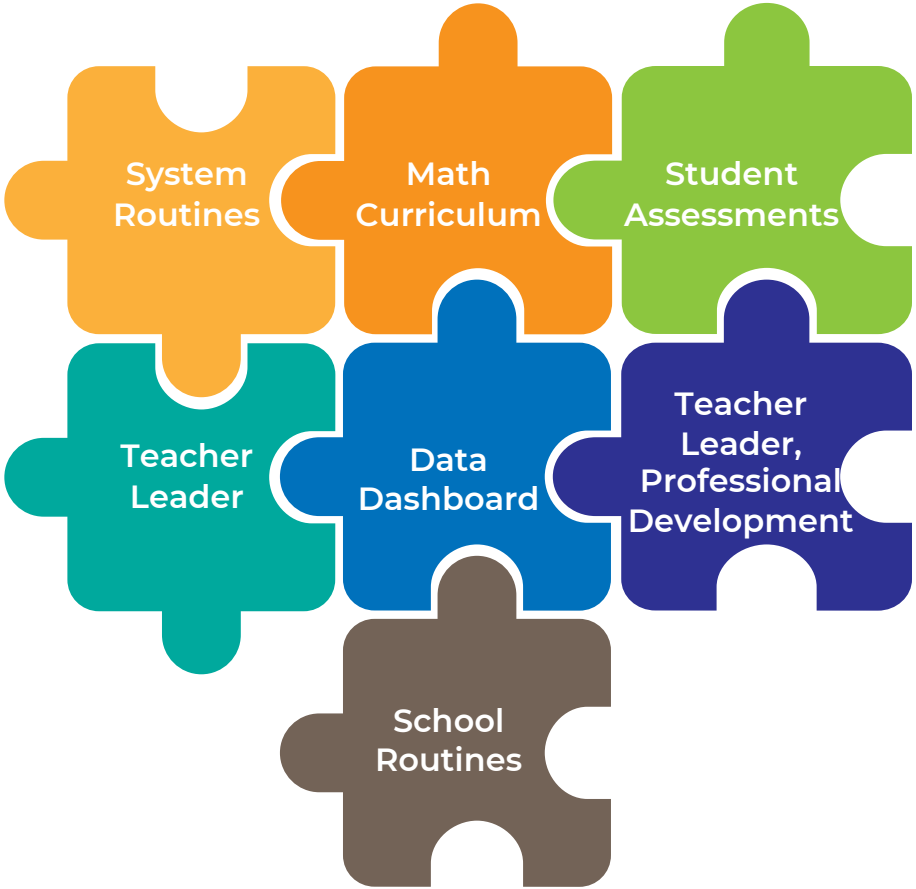
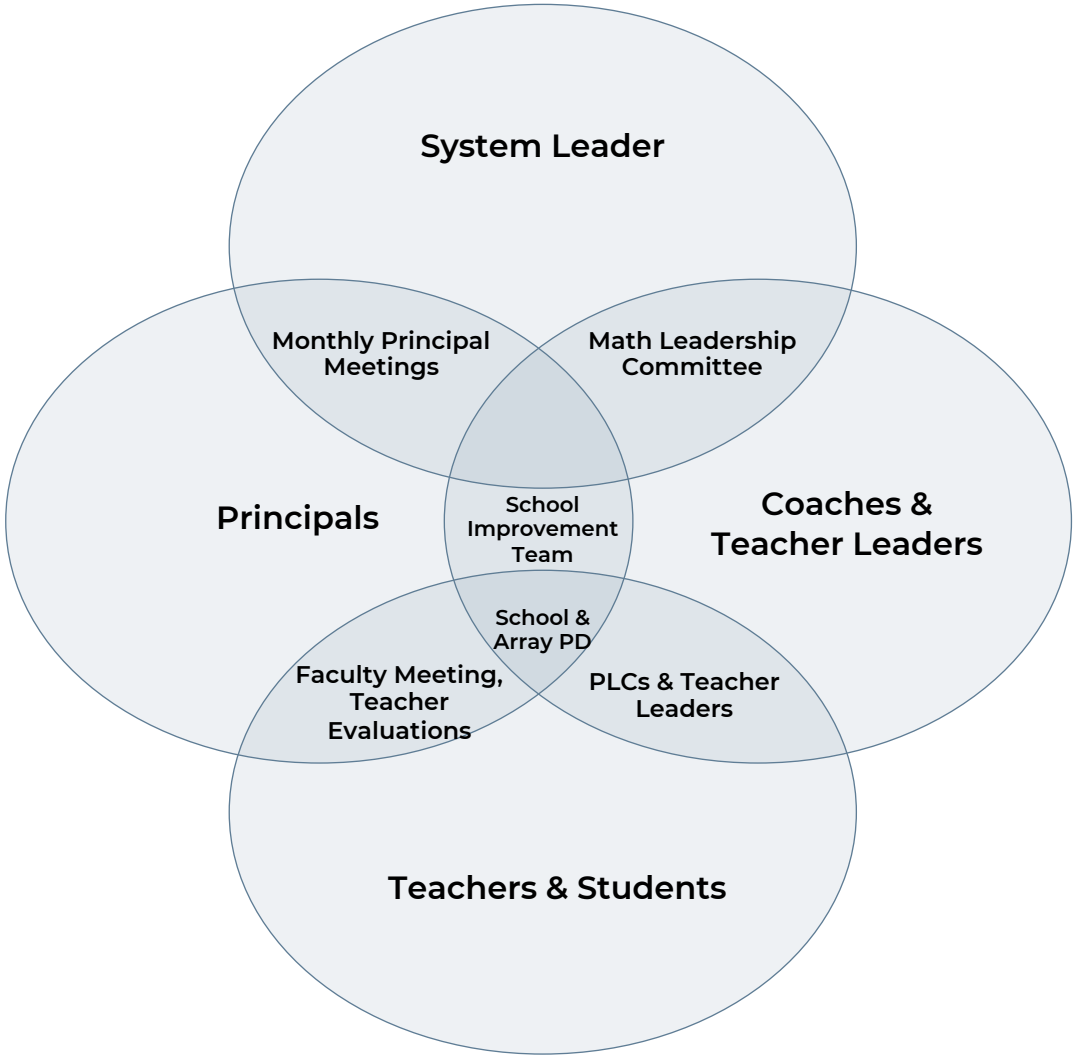
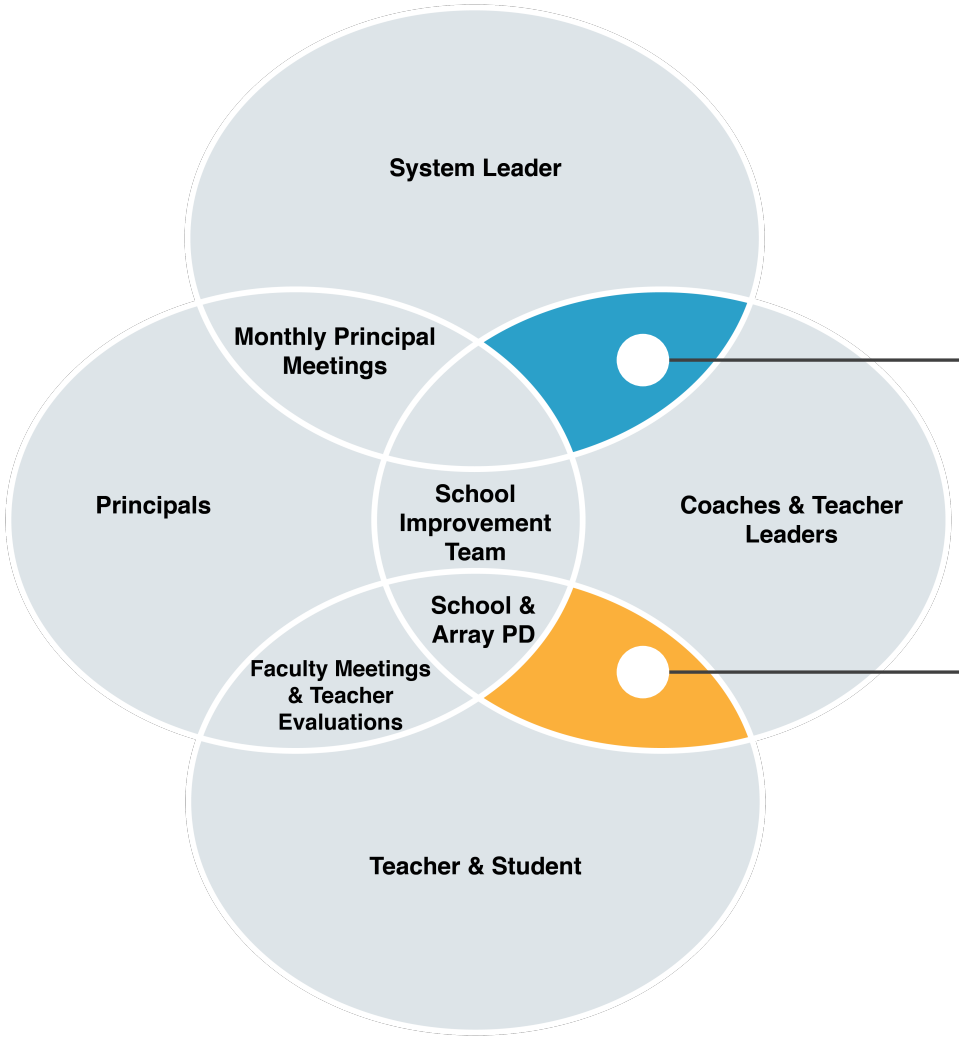



System Leader
Monthly Principal Meetings
Math Leadership Committee
Principals
School Improvement Team
Coaches & Teacher Leaders
School & Array PD
Faculty Meeting, Teacher Evaluations
PLCs & Teacher Leaders
Teachers & Students

Math Leadership Committee as Boundary Practice

> We're given a lot of training in the committee **that we're expected to bring back** to the buildings, and so **we hear about a lot of things** . . . I think that **deepens the understanding** and kind of the light bulb goes on of, "These are things I need to be doing.
>
> — Jodie, Special Education Teacher



Math Leadership Committee

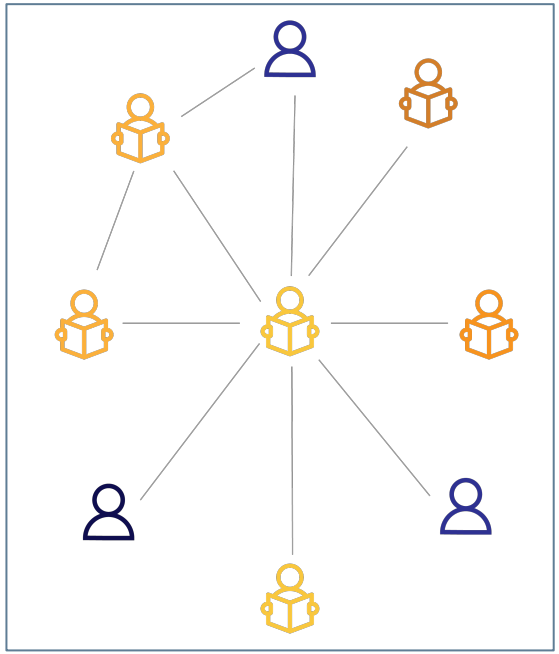
PLCs & Teacher Leader

Boundary Practices and Boundary Spanners

> **Our [grade] team** plans, and we get to collaborate together . . . **our math coach** . . . when we're planning together if we have a question, she's always there to help . . . she knows a lot . . . "
>
> — Rachel, Kindergarten

Math Coach as Boundary Spanner

2009 — 10



Kindergarten
1st Grade
2nd Grade
3rd Grade
3rd Grade*
4th Grade
5th Grade
6th Grade
Coach
LITFACIL
SPED
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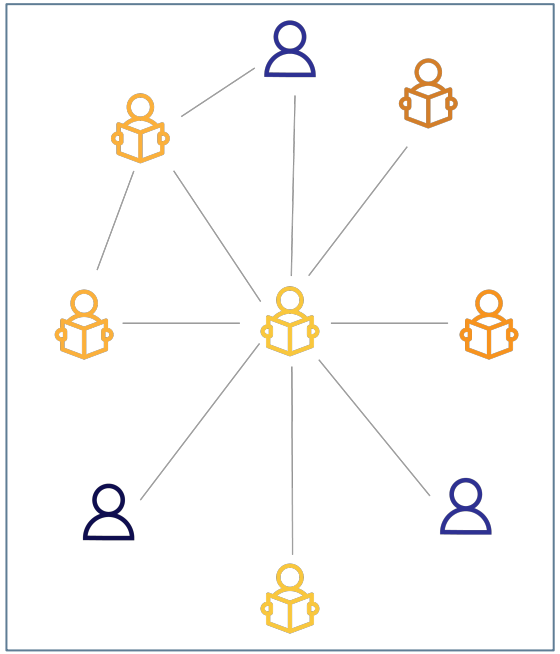
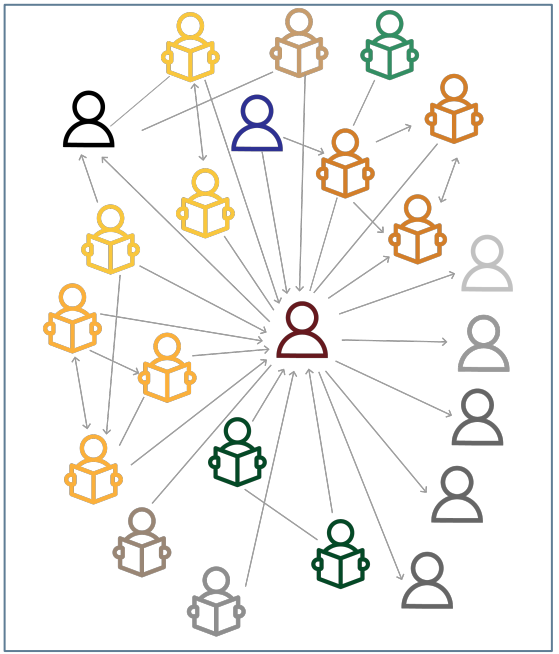
INSTRFACIL**
DIRESEARCH**
System Leader
MATHFACIL*
DIRELEMCURR**

Math Coach as Boundary Spanner

2009 — 10



2010 — 11



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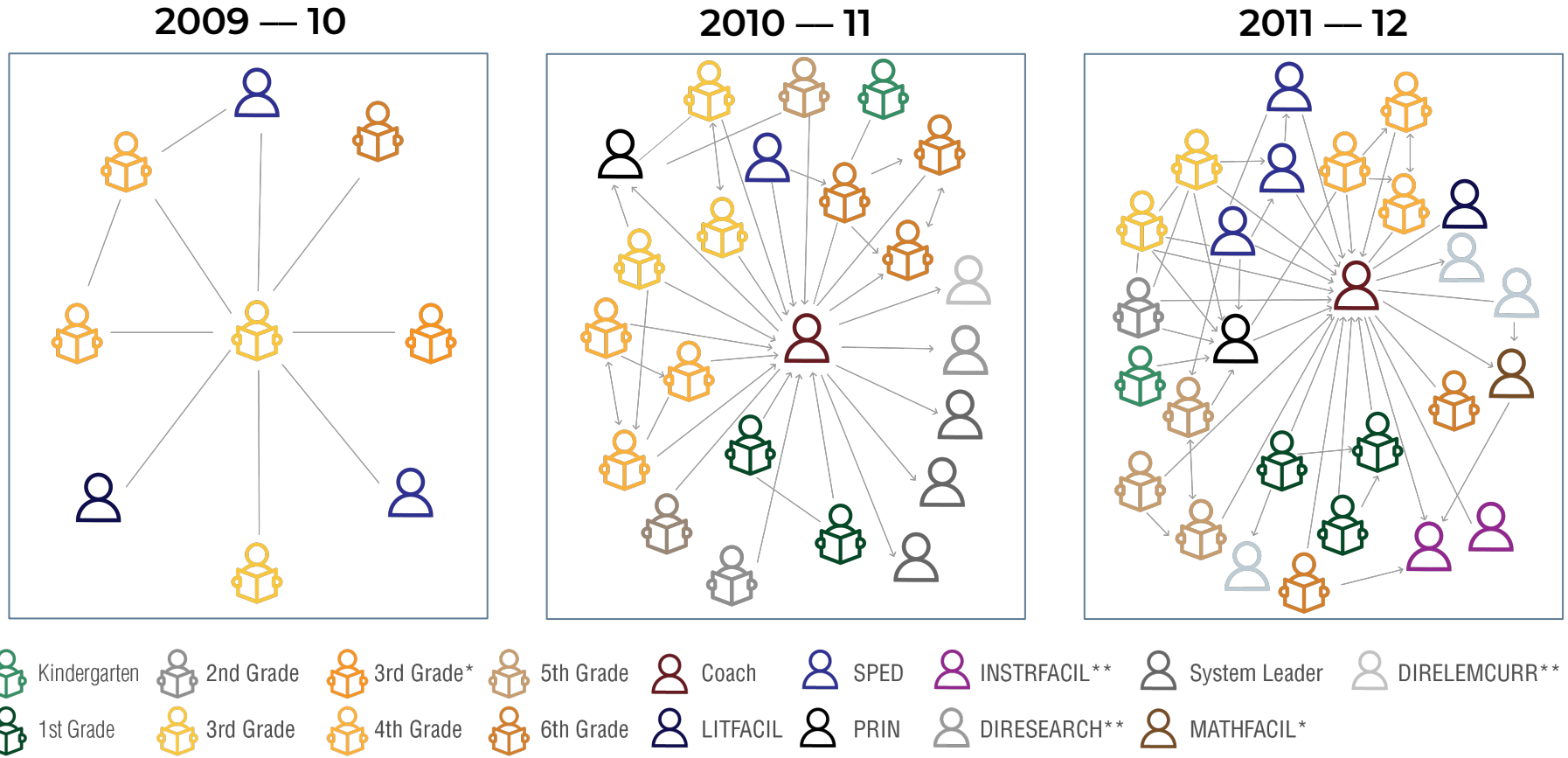

Curriculum as Boundary Object

It's just **so different** [new math curriculum], … 'Golly, tell me again, **what's the purpose of this** classroom activity?' . . . Some of **them don't really kind of make sense to me.**

— Andrea, 3rd Grade

Students Assessment Responses: As Boundary Object

> They're helping me think through, **"Is this an appropriate response for a fifth grader?"** Sometimes I think it's not, but she'll point out, "But they did this and this" and I'll have not thought about that . . . helping me analyze student responses and just show understanding.
>
> —— Carmen, 5th Grade

Infrastructure Redesign Promoted Advice and Information Seeking in Mathematics

	2019 — 2010	2010 — 11	2011 — 12
Participants in School System Routines for Math (6)	1.60	2.80	2.67
Teacher Leaders (9)	4.33	**6.00***	6.00
Math Coaches (3)	6.33	**16.33****	18.00
Classroom Teachers (256)	1.54	1.60	1.36

Infrastructure Redesign Promoted Brokering in Mathematics

	2019 — 2010	2010 — 11	2011 — 12
Participants in School System Routines for Math (6)	5.00	**75.80***	48.86
Teacher Leaders (9)	32.44	**144.33***	115.42
Math Coaches (3)	38.67	**248.67****	222.97
Classroom Teachers (256)	10.85	**24.81***	11.90

Leadership: Supporting Educational Infrastructure in Use

> **Over the years it's changed** as we first moved into the [PLC] process. **I was a lot more involved as far as setting up what they would talk about, leading the discussions**. . . And the teams, their capacity to work as purposeful teams has really grown over time so **they develop their own agendas** . . . it's left up to them. **They have ownership.**
>
> —— Georgia, principal

In Conclusion

- Instructional Improvement takes a System
- Educational System building involves building educational infrastructures that
  - Create and maintain **boundary practices** among different ‘Communities of Practice’ in an education system
  - Provide **boundary objects** that anchor interactions among participants in boundary practices
  - Develop and mobilize **boundary spanners** to support interactions among participants in boundary practices

Educational Infrastructure and on-the-job Professional Learning: Seeing Leadership as Systemwide Practice

Attention to how different components **interact** in practice to enable learning about teaching

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Attention to **multiple levels simultaneously** — classroom, grade/department, school, and system

Attention to regulative, normative & cultural-cognitive dimensions

Thank you !


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