



Examining Mathematics Coaching

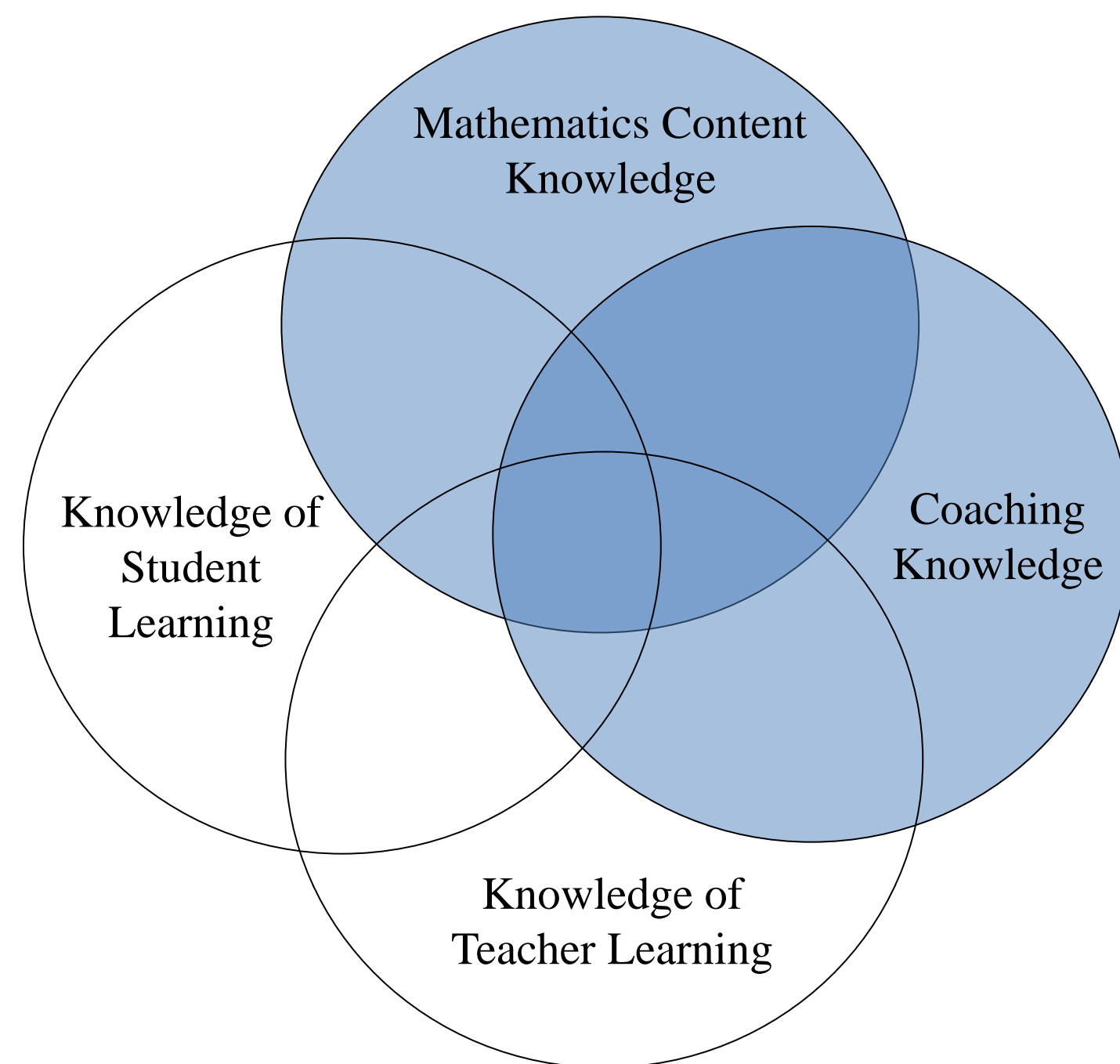
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Mathematics Instructional Coaching

There is little research supporting the effectiveness of mathematics instructional coaches. A comprehensive understanding of the effectiveness of coaching does not exist, though the components of coaching involve considerable cost and logistical effort for schools.

The Examining Mathematics Coaching (EMC) project is conducting research on knowledge that contributes to successful coaching in two domains: Coaching Knowledge and Mathematics Content Knowledge. The influence of these knowledge domains is examined in two ways: (1) by investigating correlations between assessments of coach and teacher knowledge and practice in each domain and (2) by investigating causal effects of targeted professional development for coaches.



A Mathematics Coach Is

an on-site professional developer who enhances teacher quality through collaboration, focusing on research-based, reform-based, and standards-based instructional strategies and mathematics content that includes the why, what, and how of teaching mathematics.

Research Design

A **non-experimental** design will answer: *To what extent does a coach's depth of content knowledge in coaching knowledge and mathematics content knowledge influence coaching effectiveness?* An **experimental** design randomly assigns coaches to one of two groups to answer: *To what extent does professional development targeting these two knowledge domains improve coaching effectiveness?* and *To what extent are the effects of the targeted professional development explained by increases in knowledge?*

	Group 1	Group 2
Year 1	• Provide orientation to EMC coaching model	
Year 2	• Provide PD on Mathematics Content Knowledge	• No PD provided
Year 3	• No PD provided	• Provide PD on Coaching Knowledge
Year 4	• Provide PD on Coaching Knowledge	• No PD provided
Year 5	• No PD provided	• Provide PD on Mathematics Content Knowledge

EMC Research Goals

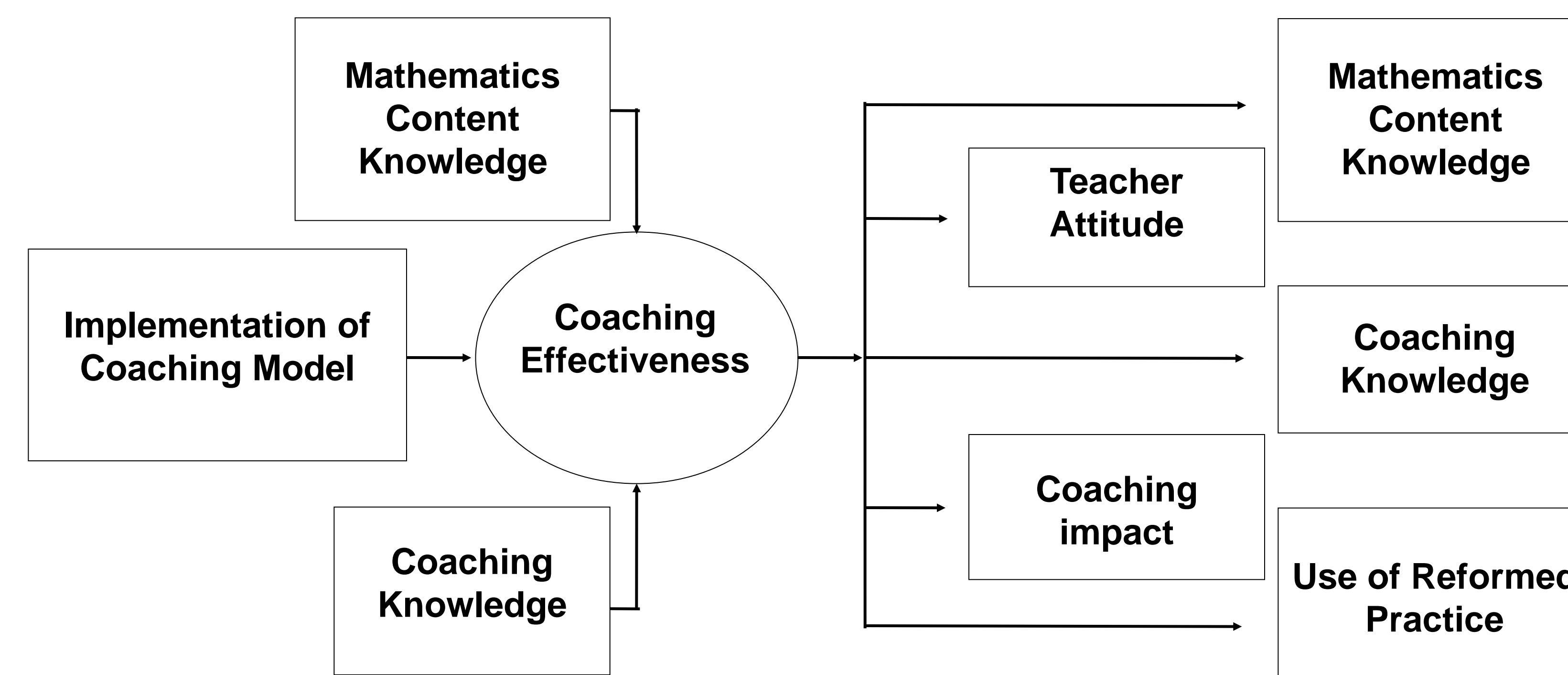
- 1). Determine the degree to which coaching knowledge contributes to coaching effectiveness;
- 2). Determine the degree to which mathematics content knowledge contributes to coaching effectiveness; and
- 3). Contribute to research on knowledge through an experimental design studying the impacts of coaching knowledge and mathematics content knowledge on teachers' knowledge, attitudes, and classroom practice.

Broader Impact

- Advance understanding of coaching effectiveness
- Provide new instruments to measure coaching knowledge
- Inform and improve best practices for hiring and training coaches
- Study coaching in diverse settings, including districts serving Native American students

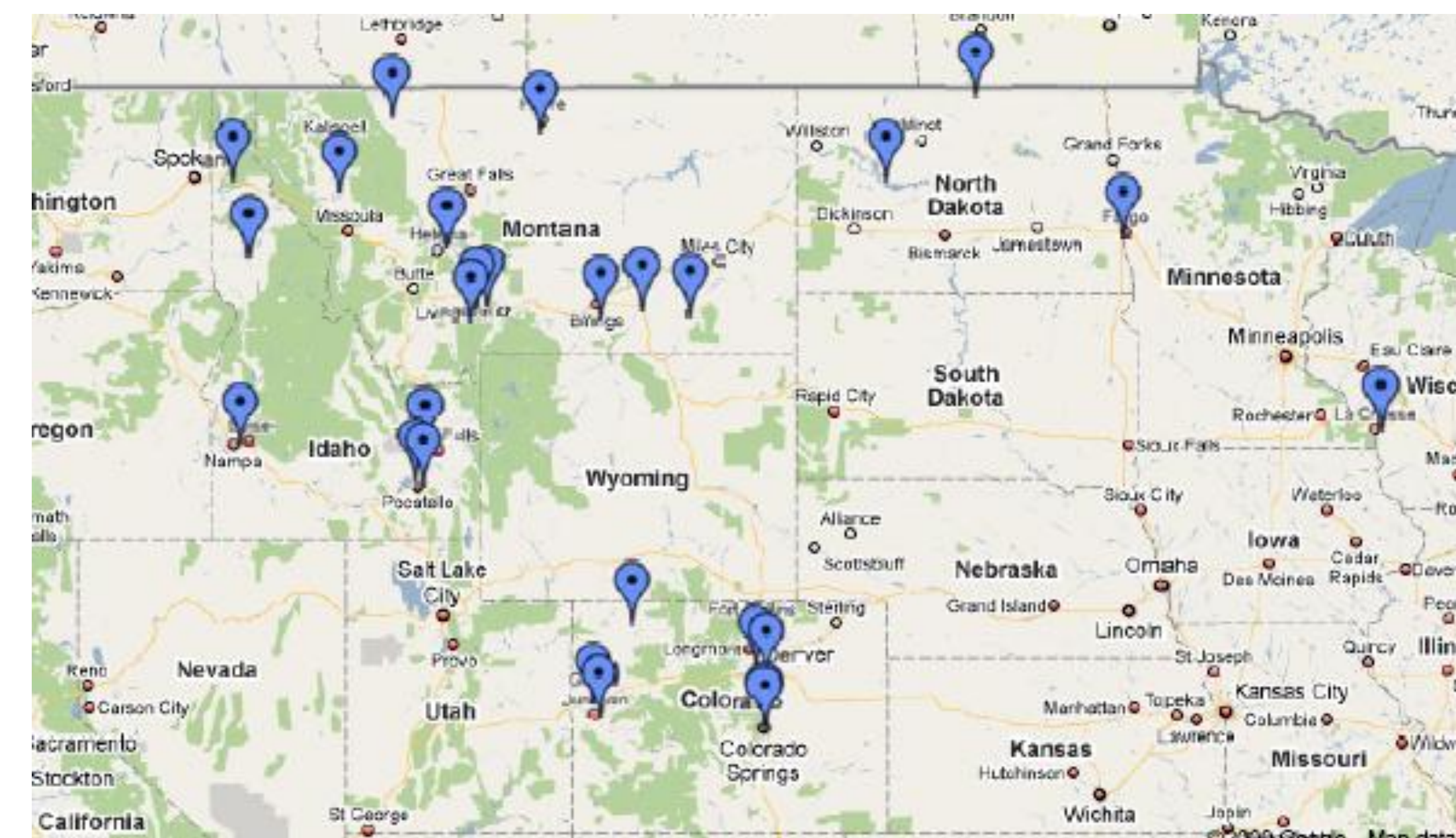
EMC Research Hypothesis

The effectiveness of a mathematics classroom coach is linked to several domains of knowledge. Coaching knowledge and mathematics content knowledge contribute significantly to a coach's effectiveness measured by the positive impact on teacher practice, attitudes, and beliefs.



Coaching Model	Before, during and after approach: <ul style="list-style-type: none"> • Pre-conference of at least 15 minutes focused on planning for upcoming lesson with emphasis on the teacher's stated goals, objectives, and needs; • Observation or model of a lesson; and • Post-conference of at least 30 minutes reflecting on planned teacher actions and serving as a transition into the next coaching cycle. Coaching sessions will focus on aspects of standards-based teaching as defined by NCTM Teaching, Process, and Content Standards, not on generic pedagogy such as classroom management.
Content Focus	Number and operation: ratio and proportion
Frequency	Three teachers per coach provide data points for research. Teachers are coached at least eight times per academic year and at least four times within the content focus.
Quality Assurances	<ul style="list-style-type: none"> • Coach and teacher reflection instruments, a coach skill inventory, and a teacher needs inventory ensure consistent quality of implementation of coaching across schools. • Self-identified teacher needs are used in planning and goal setting, and progress toward these goals is monitored and reflected on by coaches.

60 coach participants from Montana, Colorado, Idaho, North Dakota, and Wisconsin



Delphi Study to Define Coaching Knowledge

- Three phase process engaged 10 national experts and practitioners in the area of mathematics.
- The Delphi panel identified 8 components of coaching knowledge.
- Experts collectively defined each knowledge area and expressed their level of agreement with the collective definitions.



Knowledge of Relationships: Highest Level of Agreement among Delphi Panelists

Knowledge of Relationships

A coach knows how to communicate professionally with a variety of audiences, and knows how to establish and maintain rapport and credibility with teachers based on trust, empathy, mutual understanding and confidentiality. A coach knows about environments where positive relationships take place, including challenging and safe learning environments for teachers and students, collaborative working environments, and environments where people share common beliefs and goals with honest reflection. The coach knows how autonomy, issues of authority, and sociocultural aspects of class, race and gender for students and teachers influence relationships. A coach knows a range of concepts, theories and frameworks (e.g., adult development, educational belief systems, cognitive styles, etc.) and how those relate to teachers, teachers' views of teaching and learning, and students.