Defining Coaching Knowledge for K–8 Mathematics Instructional Coaching

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Introduction
The Examining Mathematics Coaching (EMC) Project researches knowledge that contributes to successful coaching in two domains: Coaching Knowledge and Mathematics Content Knowledge.

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.

EMC Research Hypothesis
The effectiveness of a mathematics classroom coach is linked to several domains of knowledge. Coaching Knowledge and Mathematics Content Knowledge are two of these domains that contribute significantly to a coach’s effectiveness as measured by positive impact on teacher practice, attitudes, and beliefs.

Project Variables and Measures

Delphi Study to Define Coaching Knowledge
- A three-phase process engaged 10 national experts and practitioners in the area of mathematics coaching.
- Throughout the process, panelists were asked to reflect on models of coaching and report areas of coaching knowledge, unique from teacher knowledge, that contribute to effective mathematics coaching.
- The EMC researchers then identified domains of knowledge using qualitative analysis techniques.
- The Delphi panel identified eight components of coaching knowledge.
- The panel collectively defined each knowledge area and expressed a level of agreement with the collective definitions.

Assessment
- A coach knows how to assess teachers' needs—personal, instructional, content, and management—and how to assess and use teacher content knowledge and pedagogical content knowledge to inform and support teachers. A coach knows how to determine what to assess, how to aggregate judgments, know assessment, including different types, their uses, and limits. A coach knows how to use data and assessment of student thinking to inform her or his work with teachers.
- A coach knows how to help the teacher learn how to set goals and assess lesson effectiveness. A coach also knows how to help the teacher learn when at student work is better than looking at numerical assessment results. The coach knows how to help teachers interpret and use assessment data to make informed decisions about instruction and student learning.

Communication
- A coach knows how to communicate professionally with others about students, curriculum, and classroom practice. A coach knows how to mediate a conversation, by passing, paraphrasing, probing, and inquiring. A coach knows how to ask reflective questions. A coach knows how to use nonverbal communication and knows how to articulate in a conversation. A coach knows how to communicate in problem-solving conversations.

Leadership
- A coach knows how to strategically identify, define, and communicate specific goals and objectives that relate to student success and teachers' professional growth, and align with the institution's vision for mathematics. The coach uses vision and knowledge to inform her or his work with other school leaders, to bridge the gap that may exist between teachers' beliefs and their ability to implement instruction that reflects those beliefs, to earn trust with teachers and administrators, and to enhance teachers' content knowledge. The coach knows whether educational structures and policies impede or promote students' equitable access to quality instruction. The coach knows how to hold teachers, administrators, and schools accountable. The coach knows the coaching process and how to implement it. The coach knows how to use feedback and guidelines and how to extend teacher cognitive processes regarding instruction—planning, doing, reflecting—and how to advocate for, work with, and influence others.

Relationships
The coach knows that the coaching relationship is grounded in content and how to use the relationship to support self-directedness in teachers. A coach knows how to communicate professionally with a variety of audiences, and knows how to establish and maintain rapport and credibility with teachers and other stakeholders based on trust, empathy, mutual understanding, and confidentiality. A coach knows about environments where positive relationships take place, including learning and safe learning environments for teachers and students, collaborative working environments, and environments where people share common goals and work toward collective reflection.

The coach knows how to work within the specific culture of the district and school. The coach knows how to use the relationship to support the teacher, and the teacher's needs. The coach knows how to use the relationship to support the teacher's growth and development, and how to use the relationship to support the teacher's growth and development. The coach knows how to use the relationship to support the teacher's growth and development. The coach knows how to use the relationship to support the teacher's growth and development.

The coach knows how to identify a teacher's needs, including needs for professional development, personal needs, and needs for support and resources. The coach knows how to help teachers recognize that there may be a discrepancy between vision and practice and how to help the teacher address that discrepancy.

Teacher Practice
- A coach knows how to identify teachers' beliefs about mathematics teaching practice and holds a depth and breadth of knowledge of all types of practice and instructional resources for effective management and mathematics learning. A coach knows how these practices and resources translate into teacher actions in mathematics classrooms for effective teaching and learning.