



Examining Mathematics Coaching (EMC)  
Defining Coaching Knowledge: The Results of a  
Modified Delphi Process

by

John T. Sutton, RMC Research Corporation  
Elizabeth Burroughs, Montana State University  
David Yopp, Montana State University

The Examining Mathematics Coaching (EMC) project has identified two major knowledge domains that are postulated as primary contributors to effectiveness for classroom mathematics coaches: Mathematical Content Knowledge and Coaching Knowledge. While the literature is quite rich in providing details and definitions surrounding what constitutes Mathematical Content Knowledge, there is very limited information related to what constitutes Coaching Knowledge. In an effort to define Coaching Knowledge at the outset of the project to inform and guide instrument development to measure Coaching Knowledge, the EMC project decided to conduct a modified Delphi study to develop an operational definition of Coaching Knowledge that capitalizes on the existing knowledge of experts in the field of mathematics coaching.

For the EMC efforts to define Coaching Knowledge, a three-phase process engaged 12 national experts and practitioners in the area of mathematics coaching (see Acknowledgments below) over an 18-day period (October 1–18, 2009) to:

- reflect on the models of coaching they are most familiar with and share their insights and ideas to provide focused areas of Coaching Knowledge, unique from teaching knowledge, that contribute to effective coaching;
- define each of the knowledge areas identified in Phase 1; and
- review each of the areas of Coaching Knowledge and the definition for that area and indicate the degree to which they agree with the definition based on four questions.

Additionally, as part of the third phase, respondents had the opportunity to provide additional comments intended to clarify, refine and enhance the definitions based on their unique perspective and expertise. The schedule and timeframe for the EMC modified Delphi process to define Coaching Knowledge is available as a download by clicking [this link](#).

Phase 3 provided respondents the opportunity to rate their level of agreement regarding the definition for Coaching Knowledge, unique from teaching knowledge, derived from responses in Phase 2, in each of seven areas: Leadership, Relationships, Assessment, Teacher Learning, Teacher Development,

Teacher Practice and Student Learning. (The full survey can be downloaded as a PDF file by clicking [this link](#).)

In addition to rating levels of agreement for the four questions, respondents also were provided the opportunity for additional comments as part of the Phase 3 validation process. Four open-ended questions addressed words, phrases or key features that respondents may have considered missing, unclear, worthy of removal, or necessary to enhance the overall definition. (The actual questions can be viewed by accessing the file using [this link](#).)

Definitions provided for Phase 3 review will inform the definitions that EMC staff will use to develop instruments to measure Coaching Knowledge in each of the seven areas, along with Communication, an area sufficiently identified as a knowledge area in Phase 1 that required no additional elaboration or agreement. The following definitions are provided as part of this summary. Additional comments provided by respondents will be considered in future reviews and possible modifications to Coaching Knowledge definitions by EMC researchers or others. (A summary of comments, organized by Coaching Knowledge definition areas, can be downloaded as a PDF file by clicking on [this link](#).)

Results of ratings for each question are conveyed as a table before each of the agreed-upon definitions. As can be seen, for all questions, across all seven Coaching Knowledge definition areas, the majority of responses were in the “Agree” or “Strongly Agree” responses.

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### Coaching Knowledge of Leadership

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	Strongly Disagree	Disagree	Agree	Strongly Agree	Neither Agree nor Disagree
This is an accurate definition for ...	0	1	2	5	2
This definition captures my thinking related to ...	0	2	4	3	1
This definition enhances my thinking related to ...	1	1	5	1	2
This definition can help inform my work.	0	1	3	3	3

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### Knowledge of Leadership

A coach knows leadership models and possesses the ability to identify, define, and communicate specific goals and objectives that relate to student success and align with the institution’s vision for mathematics. The coach uses this vision and knowledge to inform work with other school leaders, to highlight the gap between teachers’ espoused beliefs and actions, to develop trust with teachers and administrators, and to develop a deep understanding of the professional development process and impacts. A coach knows various ways to address challenges and how to communicate in ways that advocate for, negotiate with, and influence others.

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### Coaching Knowledge of Relationships

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	Strongly Disagree	Disagree	Agree	Strongly Agree	Neither Agree nor Disagree
This is an accurate definition for ...	0	0	3	7	0
This definition captures my thinking related to ...	0	0	3	7	0
This definition enhances my thinking related to ...	0	0	4	6	0
This definition can help inform my work.	0	0	5	5	0

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## 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.

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### Coaching Knowledge of Assessment

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	Strongly Disagree	Disagree	Agree	Strongly Agree	Neither Agree nor Disagree
This is an accurate definition for ...	0	0	5	4	1
This definition captures my thinking related to ...	0	0	5	4	1
This definition enhances my thinking related to ...	0	1	5	2	2
This definition can help inform my work.	0	1	6	2	1

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## Knowledge of Assessment

A coach knows how to diagnose teachers' needs – personal, instructional, content and management – and how data and assessment of student thinking inform instruction and work with teachers. The coach knows how to assess and use teacher content knowledge and pedagogical content knowledge to inform, grow and support teachers. A coach deeply understands formative and summative classroom assessment and knows how to set goals for assessing effectiveness of lessons. A coach also knows how to select, adapt and align curricula with assessments; knows how to use common learning trajectories; and knows when looking at student work is better than looking at numerical assessment results. The coach knows how to help teachers use assessment data to make informed decisions about instruction and student learning, and knows what teachers know about assessment, including different types, their uses, and limits.

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### Coaching Knowledge of Teacher Learning

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	Strongly Disagree	Disagree	Agree	Strongly Agree	Neither Agree nor Disagree
This is an accurate definition for ...	0	1	6	3	0
This definition captures my thinking related to ...	0	2	5	3	0
This definition enhances my thinking related to ...	0	2	5	3	0
This definition can help inform my work.	0	1	6	3	0

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## Knowledge of Teacher Learning

A coach knows about teacher motivations; the myriad ways that teachers know and understand mathematics content; and the teacher's pedagogical and pedagogical content needs, which may or may not be recognized by the teacher. A coach knows developmental continuums, potential learning trajectories, and teacher beliefs about learning. A coach knows how to develop tasks that support teacher learning through reflective practice and self-directed goal-setting, and knows when to consult and when to collaborate. A coach knows there can be a gap between a teacher's knowing a strategy and effectively using a strategy.

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### Coaching Knowledge of Teacher Development

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	Strongly Disagree	Disagree	Agree	Strongly Agree	Neither Agree nor Disagree
This is an accurate definition for ...*	0	1	5	3	0
This definition captures my thinking related to ...*	0	1	5	3	0
This definition enhances my thinking related to ...*	0	1	7	0	1
This definition can help inform my work.*	0	1	6	2	0

\*One participant did not respond to this item.

### Knowledge of Teacher Development

A coach knows various models of teacher stages of development, adult change, and the continuum of learning that teachers often experience (e.g., from beginning to experienced to expert teacher). A coach knows how to diagnose where a teacher is, recognize potential learning trajectories, and differentiate strategies to support an individual teacher's growth. A coach knows the motivations for growth and barriers to growth and recognizes the role of reflection and feedback.

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### Coaching Knowledge of Teacher Practice

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	Strongly Disagree	Disagree	Agree	Strongly Agree	Neither Agree nor Disagree
This is an accurate definition for ...	0	1	6	3	0
This definition captures my thinking related to ...	0	1	6	3	0
This definition enhances my thinking related to ...	0	1	5	2	2
This definition can help inform my work.	0	2	6	1	1

### Knowledge of Teacher Practice

A coach knows teacher beliefs about teaching practice along with a depth and breadth of knowledge of all types of practice for effective management and learning, (e.g., lesson planning, school support structures, learning environments, models of instruction, mathematical tasks, assessment, and strategies that support students based on factors such as age, gender, culture and ELLs, etc.). A coach knows when to use these and how they translate into teacher actions in classrooms for effective teaching and learning. Additionally, a coach knows research on effective teaching and learning, instructional strategies, and cognitive development on how children and adolescents learn.

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### Coaching Knowledge of Student Learning

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	Strongly Disagree	Disagree	Agree	Strongly Agree	Neither Agree nor Disagree
This is an accurate definition for ...	0	0	6	4	0
This definition captures my thinking related to ...*	0	0	4	5	0
This definition enhances my thinking related to ...*	0	0	4	4	1
This definition can help inform my work.*	0	0	4	4	1

\*One participant did not respond to this item.

### Knowledge of Student Learning

A coach knows how to create and manage mathematical learning environments that mediate factors in the K-8 spectrum including students' prior learning, age, race, gender, economic status, special needs, sociocultural events and school/district dynamics. A coach knows how to analyze student thinking and conduct mathematical error analysis, and has facility with a variety of instructional formats and

strategies (mathematical discourse, mathematical exploration, metacognition, etc.) that help students engage in challenging and meaningful mathematics problems and tasks. A coach knows how to develop and how to provide teachers with learning opportunities aimed at improving student learning by analyzing student work.

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