EXAMINING MATHEMATICS COACHING

Developing Consumers of Coaching

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Research Partners

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RMC RESEARCH

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Outline

- Examining Mathematics Coaching (EMC) Project Description
- Consumer of Coaching Framework
- Commonalities in the framework and Elementary Specialist Standards
- Teacher Needs Inventory – use and results

Examining Mathematics Coaching (EMC)

- EMC is a 5-year research and development project examining the effects of a coach's knowledge for coaching on a diverse population of K-8 teachers.

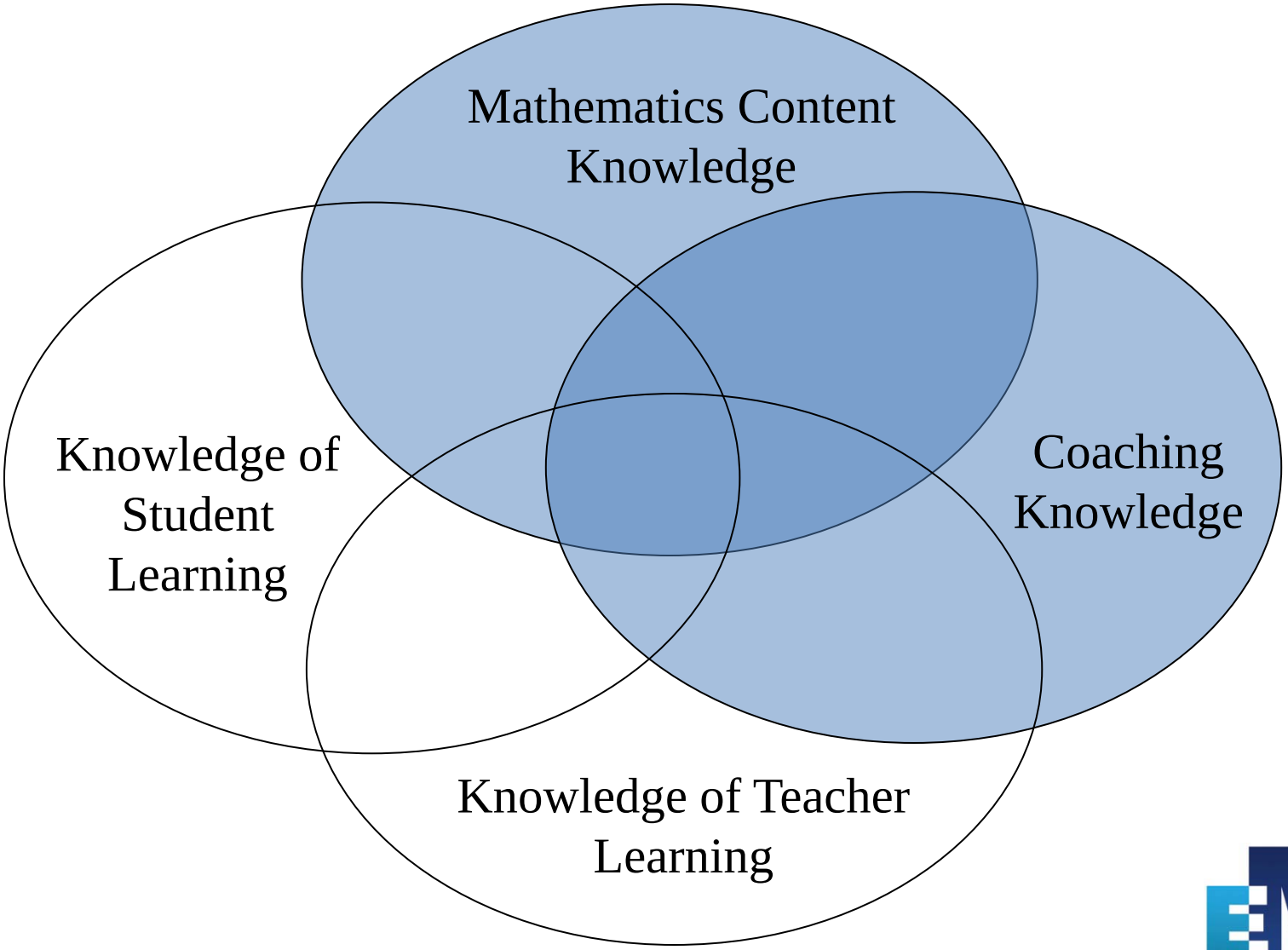
Mathematics Coaching Defined

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.

The Examining Mathematics Coaching project

- Investigates knowledge that contributes to successful coaching in two domains
  - Coaching Knowledge
  - Mathematics Content Knowledge
- The influence of these knowledge domains is examined in two ways:
  - investigating correlations between assessments of coach and teacher knowledge and practice in each domain
  - by investigating causal effects of targeted professional development for coaches

Knowledge Domains



Why Study Coaching?

- Coaching is a promising model for enhancing K-8 mathematics teachers' abilities to provide quality mathematics education.

- Coaching can be implemented at any point in a teacher's career

Why Study Coaching?

The National Mathematics Panel (2008) reports that schools across the nation are using mathematics specialists, including mathematics coaches, yet there is **limited research proving what makes coaching effective.**

EMC Research Hypothesis

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

Crossover Design

	Group 1	Group 2
Year 1 2009-10	Provide orientation to EMC coaching model.	
Year 2 2010-11	Mathematics Content Knowledge	
Year 3 2011-12		Coaching Knowledge.
Year 4 2012-13	Coaching Knowledge	
Year 5 2013-14		Mathematics Content Knowledge.

Coaching Model

Coaching Model	•**Pre-conference** of at least 15 minutes focused on planning for upcoming lesson with emphasis on teacher's stated goals, objectives, and needs •**Observation** or model of a lesson •**Post-conference** of at least 30 minutes reflecting on planned teacher actions Coaching will focus on aspects of standards-based teaching as defined by NCTM 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	Coach and teacher reflection instruments, coach skill inventory, and teacher needs inventory ensure consistent 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

Consumer of Coaching Framework

- All participants have received orientation to the coaching model and

Being a Good Consumer of Coaching

Consumers of coaching are able to

- assess their own needs;
- assess their performance;
- ask for help from others;
- provide context as needed;
- listen to and hear ideas; and
- overcome anxious feelings
- assess and communicate needs
- assist in scheduling

AMTE Elementary Specialist Standards

- I. Content Knowledge for Teaching Mathematics
- II. Pedagogical Knowledge for Teaching Mathematics
- III. Leadership Knowledge and Skills

III. AMTE: Leadership Knowledge and Skills

- Use leadership skills to improve mathematics programs at the school and district levels, e.g., develop appropriate classroom- or school-level learning environments; **build relationships with teachers, administrators** and the community; develop evidence-based interventions for high and low-achieving students; **collaborate to create a shared vision** and develop an action plan for school improvement; **partner with school-based professionals** to improve each student's achievement; mentor new and experienced teachers to better serve students.

III. AMTE: Leadership Knowledge and Skills

- Use leadership skills to improve mathematics programs at the school and district levels, e.g., develop appropriate classroom- or school-level learning environments; **build relationships with teachers, administrators** and the community; develop evidence-based interventions for high and low-achieving students; **collaborate to create a shared vision** and develop an action plan for school improvement; **partner with school-based professionals** to improve each student's achievement; mentor new and experienced teachers to better serve students.

What's missing from the picture?

- Message is to coaches, coach trainers, and administrators who hire or supervise or prepare coaches.
- Burden of the **partnership, relationship**, and **collaboration** is on the coach only.
- Address the **teacher's role** in coaching, otherwise can undermine the partnership

Feedback

- Effective coaching requires feedback.
- An effective consumer of coaching asks the coach for targeted feedback

Reflection

- Coaching is a reflective process.
- An effective consumer of coaching is open to reflection and is an active participant in the reflective process

Classroom expectations

- Effective coaching requires teachers to communicate their expectations for coaches as the lesson transpires.
- An effective consumer of coaching tells his or her coach what kind of classroom interaction he or she desires.

Content

- Effective coaching is content-based.
- An effective consumer of coaching is willing to examine her or his own content knowledge.

Structure

- Effective coaching is structured and involves at least three components: a pre-lesson conference, a lesson observation, and a post-lesson conference.
- Effective consumers of coaching help coaches schedule these.

Communicating needs

- Effective coaching requires teachers to communicate their needs.
- An effective consumer of coaching tells the coach what he or she needs.

Teacher Needs Inventory

How confident do you feel using cooperative learning?

Not at all confident — Very confident

1 2 3 4 5

I would not like to partner with coach on this topic.	Not sure if I would like to partner with coach on this topic.	I would like to partner with coach on this topic.
[ ]	[ ]	[ ]

Activity

In groups of four or five, reflect on the sample Teacher Needs Inventories provided.

These consumers of coaching have sent you a message: what is the message?

20. How confident do you feel with classroom management?

Not at All Confident				Very Confident
1	**2**	**3**	**X**	**5**

I would **not** like to partner with coach on this topic.	**Not sure** if I would like to partner with my coach on this topic	I **would** like to partner with my coach on this topic
X		

21. How confident do you feel managing a classroom where students are engaged in inquiry-based or discovery-based tasks?

Not at All Confident				Very Confident
1	**2**	**3**	**X**	**5**

I would **not** like to partner with coach on this topic.	**Not sure** if I would like to partner with my coach on this topic	I **would** like to partner with my coach on this topic
		X

Teacher 1

- Responses exhibit the expected pattern: high part a (b) then low part b (a).

- But look at items 20 and 21.

Teacher 1

- This response is consistent with the teacher's response on item 1b.

Teacher 1

- This response is consistent with the teacher's response on item 1b.

- Teacher's responses suggests that the coaching sessions could focus on inquiry and discovery lessons.

Teacher 2

- Response pattern suggests an openness to all coaching efforts.

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- Variation in self-reported confidence levels, but consistently lower confidence with “richness” of mathematics items, e.g. 3,9, 10, 11, 12, 13, 16, & 17.

Teacher 2

- Response pattern suggests an openness to all coaching efforts.
- Variation in self-reported confidence levels, but consistently lower confidence with “richness” of mathematics items, e.g. 3,9, 10, 11, 12, 13, 16, & 17.
- Teachers responses would be a spring board for conversations, planning and reflections about the richness of the mathematics in the teacher’s classroom.

Teacher 3

- Doesn’t check any “would not like to partner” boxes.

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- However, the response pattern suggests a desire to concentrate on high quality direct instruction.

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- However, the response pattern suggests a desire to concentrate on high quality direct instruction.
- These responses can be useful in guiding the conversation about the teacher’s goals.

CONFIDENCE ITEMS

Factor 1 Mathematics Content Confidence

Item #	Item Description
9	How confident are you with the math reasoning behind the math you teach – meaning the understanding of why we teach it, how it relates to other math topics, and why it is valid?
15	How confident are you with the math you teach?
16	How confident are you with the math beyond the math that you teach, meaning the next grade level?
17	How confident do you feel planning lessons that include fraction concepts?
18	How confident do you feel planning lessons that include number sense and operations?

Factor 2 Student-Centered Classroom Culture Confidence

Item #	Item Description
4	How confident do you feel using cooperative learning?
6	How confident do you feel using strategies to increase student collaboration or dialogue among students?
7	How confident do you feel creating an environment where students listen to one another?
19	How confident do you feel encouraging student participation?
20	How confident do you feel with classroom management?
21	How confident do you feel managing a classroom where students are engaged in inquiry-based or discovery-based tasks?

Factor 3 Mathematics-specific Standards-based Pedagogy Confidence

Item #	Item Description
1	How confident do you feel incorporating investigative, inquiry-based or discovery-based math learning into your lessons?
2	How confident do you feel using instructional strategies that are likely to increase students' math conceptual understanding or problem-solving abilities?
3	How confident do you feel engaging students in math abstraction and sense-making (including symbol use, theory building, and justification and reasoning)?
10	How confident do you feel creating and teaching math applications and connections to other areas of math?
12	How confident do you feel planning lessons that include genuine math problem-solving?

DESIRE TO BE COACHED

Factor 1 Mathematics Content and Mathematics specific Pedagogy

Item #	Item Description
5b	How confident do you feel about "reading" or detecting students' level of mathematical understanding?
8b	How confident do you feel encouraging intellectual rigor, constructive criticism or challenging of ideas?
9b	How confident are you with the mathematical reasoning behind the mathematics you teach – meaning the understanding of *why* we teach it, *how* it relates to other mathematics topics, and *why* it is valid?
10b	How confident do you feel creating and teaching mathematical applications and connections to other areas of mathematics?
11b	How confident do you feel planning lessons that include mathematical conceptual understanding?
12b	How confident do you feel planning lessons that include genuine mathematical problem-solving?
13b	How confident do you feel planning lessons that include proportional reasoning?
15b	How confident are you with the mathematics that you teach?
16b	How confident are you with the mathematics beyond the mathematics that you teach, meaning the next grade level?
17b	How confident do you feel planning lessons that include fraction concepts?
18b	How confident do you feel planning lessons that include number sense and operations?

Factor 2 Student-Centered Classroom Culture*

Item #	Item Description
4b	How confident do you feel using cooperative learning?
6b	How confident do you feel using strategies to increase student collaboration or dialogue among students?
7b	How confident do you feel creating an environment where students listen to one another?
19b	How confident do you feel encouraging student participation?
20b	How confident do you feel with classroom management?
21b	How confident do you feel managing a classroom where students are engaged in inquiry-based or discovery-based tasks?

*Exactly the same as part A.

Item	Stats for Part A (Confidence) (mean) (Std Deviation)	Correlation between part A and B
2) How confident do you feel using instructional strategies that are likely to increase students' mathematical conceptual understanding or problem-solving abilities?	3.57 .826	-0.581
3) How confident do you feel engaging students in mathematical abstraction and sense-making (including symbol use, theory building, and justification and reasoning)?	3.10 .895	-0.161

Resource

Journal of Staff Development, February 2011 issue

“Becoming a wise consumer of coaching”

-Yopp, Burroughs, Sutton, Luebeck, Heidema, Mitchell

Thank You

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