



With Common Core Standards, Mathematics Coaches Need Professional Development, Too!

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NCTM Regional Conference

Las Vegas, Nevada

October 24, 2013





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Funded under NSF Award No. 0918326. Any opinions expressed herein are those of the authors and do not necessarily represent the views of the National Science Foundation.

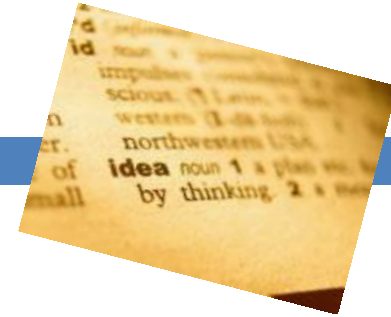
Ten Roles for Coaches

(Killion, 2009)



- Data coach
- Resource provider
- Mentor
- Curriculum specialist
- Instructional specialist
- Classroom supporter
- Learning facilitator
- School leader
- Catalyst for change
- Learner

Mathematics Coach: EMC Definition



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 include the **why, what, and how** of teaching mathematics.

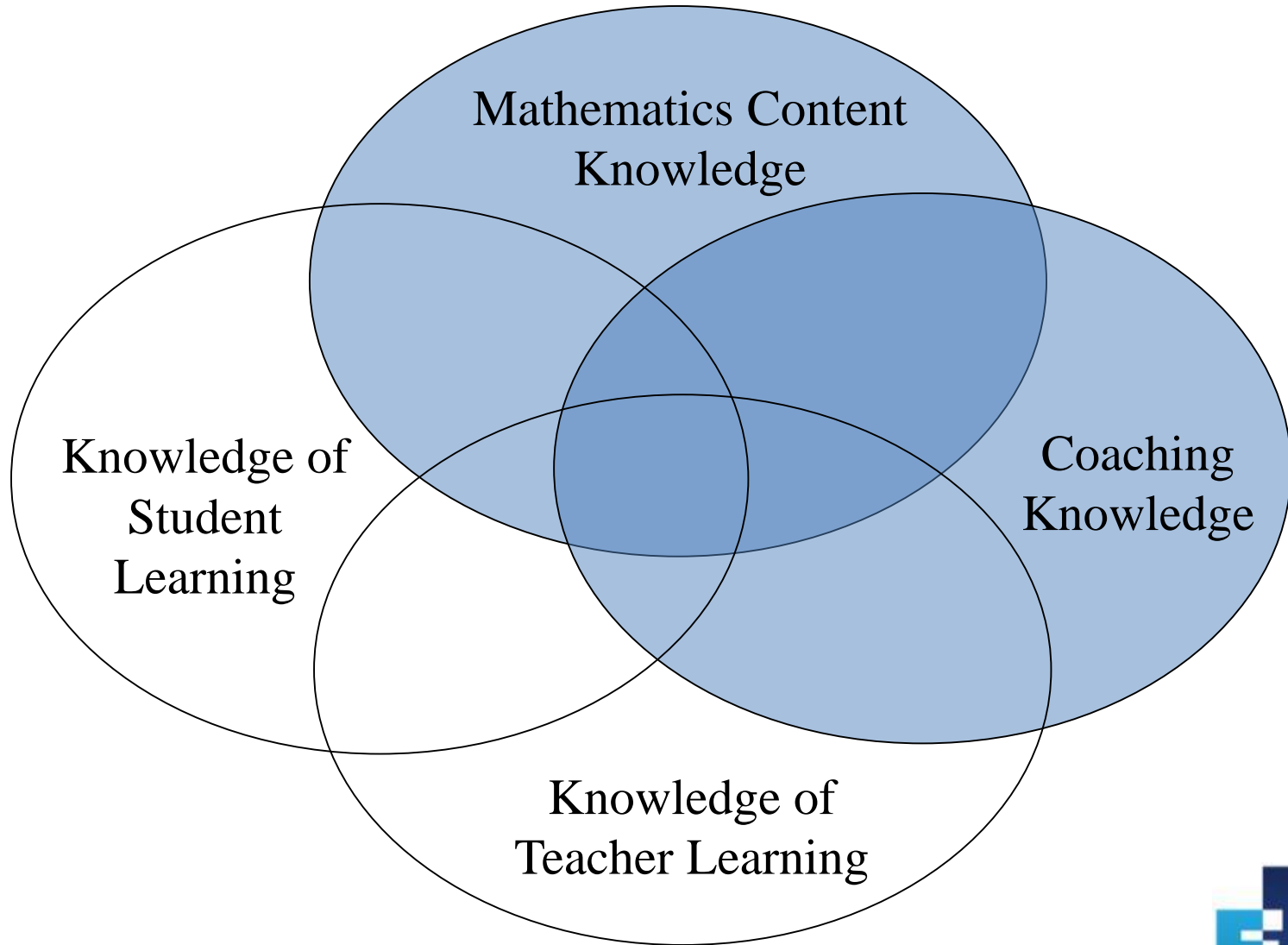


EMC Project Description

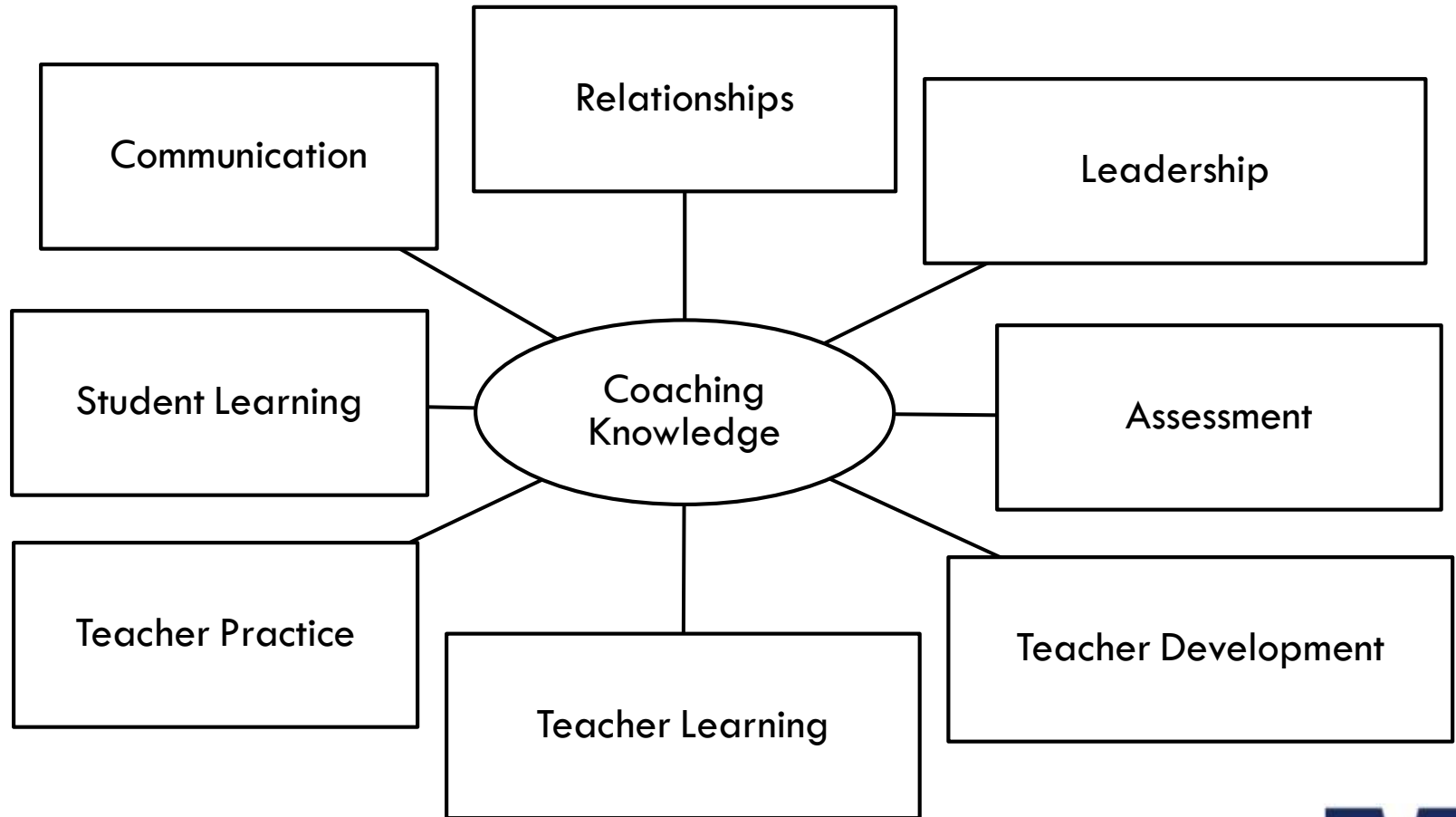
EMC is a 5-year research and development project examining the effects of a coach's *knowledge for coaching* on a diverse population of K-8 teachers.



Knowledge Domains



Coaching Knowledge



Professional Development

Two one-week professional development courses:

- **Knowledge of mathematics content**, specifically in the area of number and operation, with a focus on ratio and proportion.
- **Coaching knowledge**, addressing eight themes identified by coaching experts.

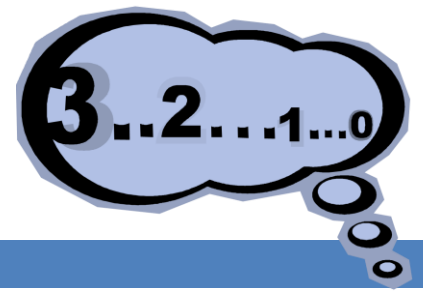


Mathematics Content

Mathematics Content Topics

Monday	Tuesday	Wednesday	Thursday	Friday
Focus on Mathematical Practice and Number Sense	Computation	Fraction Concepts	Fraction Operations and Ratios	Proportional Reasoning and Percent

Mathematical Practice and Number Sense



- Standards for Mathematical Practice describe ways teachers and learners engage with mathematics content.
- It is important to select appropriate representations of numbers or numerical problems based on context
- Factorization, divisibility, and divisibility rules are based on mathematical structure.

Number Sense Activity (Example)

Here are several pairs of multiplication calculations.

What pattern do you notice when you find the products?

24	27	35	42	56	32	156	144
<u>×9</u>	<u>×8</u>	<u>×18</u>	<u>×15</u>	<u>×12</u>	<u>×21</u>	<u>×12</u>	<u>×13</u>

Explain why, in each case, the products are the same.

Write another pair of multiplication problems with the same product.

Computation



- The properties of numbers and operations on numbers create structure that underlies computational methods, including algorithms.
- Multiplicative thinking is a skill to develop with all students.
- Models can be used to solve contextual problems, decide what operation is involved, and give meaning to number sentences.

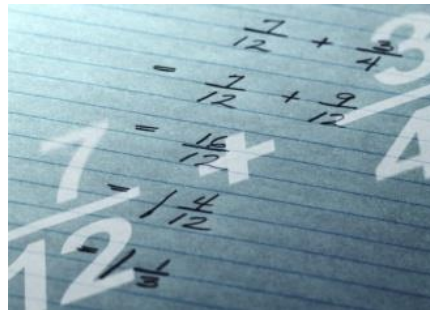
Fraction Concepts

- Unitizing is the basis for fraction understanding.
- There are various models for representing fractions and these complement each other and enrich the meaning of fractions.



Fraction Operations and Ratios

- Models for fractions and their operations reveal structure that underlies computational methods.
- Various mathematical connections link ratios and fractions.





Multiplication or Division



Which of the following problems are solved by:

$$2\frac{1}{2} \times \frac{3}{4} \quad \text{OR} \quad 2\frac{1}{2} \div \frac{3}{4}?$$

1. How many cups of sugar do you need to make $\frac{3}{4}$ batch of cookies if a full batch takes $2\frac{1}{2}$ cups of sugar?
2. How many posters can you paint with $2\frac{1}{2}$ cans of paint if one poster takes $\frac{3}{4}$ can of paint?
3. How many pounds of birdseed do you need to fill a bird feeder if $2\frac{1}{2}$ pounds of birdseed fills the bird feeder $\frac{3}{4}$ full?
4. What is the area, in square yards, of a rectangular garden that is $2\frac{1}{2}$ yards long by $\frac{3}{4}$ yard wide?
5. How many servings of lemonade can you make if you have $2\frac{1}{2}$ cups of lemonade and a serving is $\frac{3}{4}$ cup?

Proportional Reasoning and Percent



- Multiplicative reasoning is a fundamental component of proportional reasoning.
- Proportional situations can be represented by a variety of models, and certain models promote sense-making in solving proportions.

Coaching Knowledge PD



Week-long Theme

- Teaching coaches to recognize standards-based mathematics
- Standards-based mathematics develops mathematical processes, mathematical practices, and mathematical strands of proficiency.



Coaching Knowledge Topics

Monday	Tuesday	Wednesday	Thursday	Friday
Teacher Learning	Student Learning & Teacher Practices I	Communication for Coaching	Teacher Practices & Student Learning II	Logistics of Coaching
<i>Themes: Teacher Learning and Teacher Development</i>	<i>Themes: Teacher Practice and Student Learning</i>	<i>Themes: Communication and Assessment</i>	<i>Themes: Teacher Practice and Student Learning</i>	<i>Themes: Relationships and Leadership</i>

Teacher Learning & Teacher Development



Teacher Learning

- Engaging teachers in the coaching process
- How teachers in general acquire knowledge of content, pedagogy, and pedagogical content
- How individual teachers best acquire knowledge
- The discrepancy between “vision and practice”

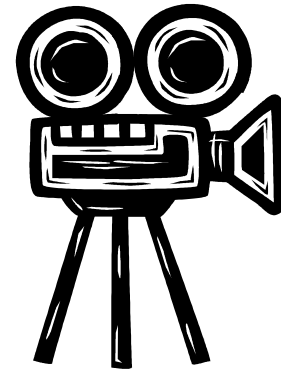
Teacher Development

- Teacher development in content, pedagogy, beliefs, and management
- How to support individual teachers’ development
- Teachers’ motivations and barriers for learning

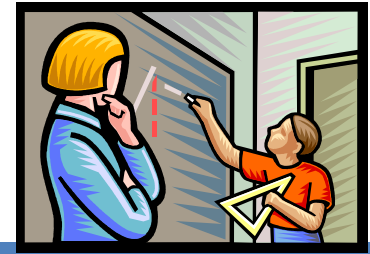
Example Activity: Teacher Development

Use this video clip to decide what you could discuss with the teacher in a conference, based on what you notice the most. Be prepared to give a rationale.

- ▣ Mathematics content?
- ▣ Communication?
- ▣ General pedagogy?
- ▣ Something else?



Student Learning & Teacher Practice



Student Learning

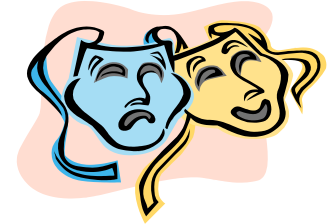
- A coach knows how to support teachers in applying mathematical processes (discourse, exploration, engagement) to classroom.
- A coach has knowledge to help teachers manage the learning environment and improve student learning.

Teacher Practice

- A coach knows how to discern teacher beliefs.
- A coach has a depth and breadth of knowledge of teaching research and teaching actions.

SCENARIO:

STUDENT ENGAGEMENT



Roles

- Participant **A** is **Coach**.
- Participant **B** is **Teacher**.
- Participant **C** is **Observer**.

Process

- Individual prep (quiet time):
5 minutes
- Role play: 5 minutes
- Debrief: 15 minutes
 - 1st: Observer
 - 2nd: Teacher
 - 3rd: Coach
- Large group discussion:
5–10 minutes

Assessment & Communication



Assessment

- Assess teacher needs and use that assessment to set goals for coaching
- Assess student thinking and use that to set goals for coaching
- Help teachers know how to use assessment in their classrooms

Communication

- Communicate professionally about students, curriculum, and classroom practice
- Mediate a conversation, by pausing, paraphrasing, probing, inquiring, and asking reflective questions
- Use nonverbal communication and listen actively
- Communicate in problem-resolving conversations

Example Activity: Communication

- Take a moment to review the pre-conference viewing guide.
- As the video plays, take notes on your observation guide and transcripts.
- Use the transcripts to make notes of specific examples of coaching moves.



Relationships & Leadership



Relationships

- The purpose of the relationship is to support teaching and content
- Communicate in a way that establishes trust, rapport, and credibility
- Establish positive interpersonal environments
- Foster relationships that respect various cultural influences (socio-cultural, school/district, and authority-autonomy)

Leadership

- Be strategic about setting goals and objectives for teachers and students
- Use, evaluate, and influence the school's vision
- Evaluate the utility of educational policies
- How to address challenges
- The coaching process

Example Activity:

Coaching Heavy or Coaching Light?

- Read pages 21-26: Coaching Heavy or Coaching Light (Killion, 2009)
- Identify the one or two ideas that can help you as you think about your own role in the coming years.
- Walk and talk with a partner. Return at the specified time.

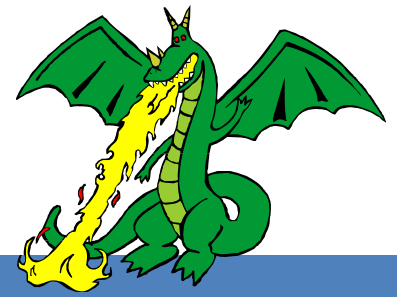


Coaching Heavy or Coaching Light

- “The difference is in the coach’s perspective, beliefs, role decisions, and goals, rather than in what coaches do.”
- Coaching light: driven by coaches’ desire to be valued and appreciated (they aren’t necessarily needed)
- Coaching heavy: “high-stakes interactions between teachers and coaches.” Coaching heavy maximizes the potential for reform.



Using research: myths and folklore



- ▣ What is meant by “intelligence”?
- ▣ At your table, use **Go Around One** to share your ideas about intelligence.

What does research say?



- Many students believe that intelligence is fixed, that each person has a certain amount and that's that. This is a *fixed mindset*.
- Other students believe that intelligence is something that can be cultivated through effort and education. This is a *growth mindset*.

(Dwyck, 2008)

Meeting the needs of all learners



Promoting a growth mindset among teachers and students meets:

- ▣ NCTM Equity Principle
- ▣ *Productive Disposition* strand of Mathematical Proficiency
- ▣ CCSS mathematical practice of “*persistence in problem solving*”

Tools to Support Coaching

The Examining Mathematics Coaching project has developed and refined tools to help coaches and teachers in the coaching process.

- ▣ Coaching Skills Inventory
- ▣ Teacher Needs Inventory
- ▣ Reflections (Coach and Teacher)



Becoming Consumers of Coaching

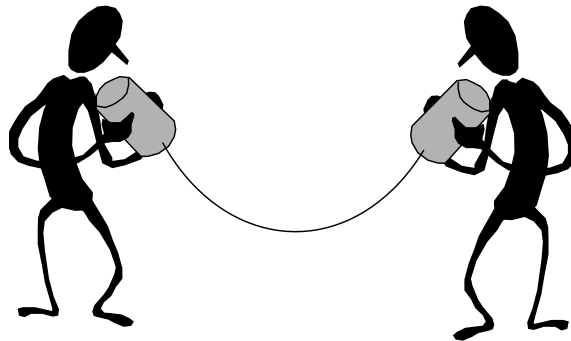
***What might be the expectations
from teachers
who are being coached
in order
to make coaching
effective and collaborative?***



COMMUNICATING NEEDS

- Effective coaching requires teachers to communicate their needs.

An effective consumer of coaching tells the coach what he/she needs.



CONSUMER OF COACHING FRAMEWORK

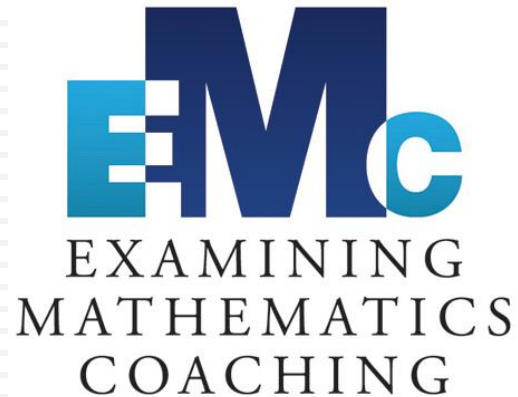
How to be a Wise Consumer of Coaching (Journal of Staff Development, February 2011)



- Feedback
- Reflection
- Classroom expectations
- Content
- Structure
- Communicating needs

Culture of Coaching

THANK YOU!



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