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

John Sutton
Arlene Mitchell
Clare Heidema
RMC Research Corporation

NCTM Regional Conference
Las Vegas, Nevada
October 24, 2013

Rate this presentation on the conference app.
www.nctm.org/confapp

Download available presentation handouts from the Online Planner!
www.nctm.org/planner

Join the conversation! Tweet us using the hashtag **#NCTMVegas**

Research Contributors

Principal Investigators
Beth Burroughs, Montana State University
John Sutton, RMC Research Corp.
David Yopp, University of Idaho

Contributing Researchers
Mark Greenwood, Megan Higgs, and Jennifer Luebeck (Montana State University);
Clare Heidema, Dan Jesse, and Arlene Mitchell (RMC Research Corp.).

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

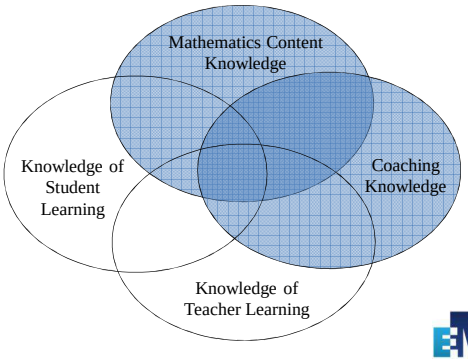
Mathematics Coach: EMC Definition

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.

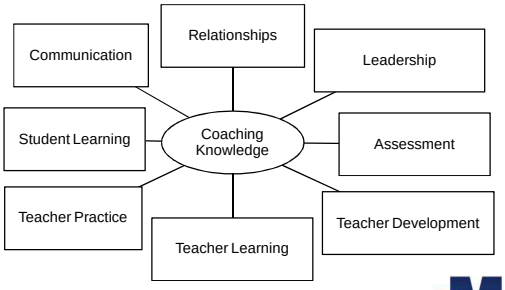
EMC Project Description

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
×9	×8	×18	×15	×12	×21	×12	×13

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

Write another pair of multiplication problems with the same product.

Computation

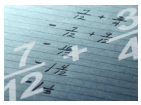
- The properties of numbers and operations on numbers create structure that underlies computational methods, including algorithms.
- Multiplicative thinking is a skill to develop with all students.
- Models can be used to solve contextual problems, decide what operation is involved, and give meaning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

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

1. How many cups of sugar do you need to make ¾ batch of cookies if a full batch takes 2½ cups of sugar?
2. How many posters can you paint with 2½ cans of paint if one poster takes ¾ can of paint?
3. How many pounds of birdseed do you need to fill a bird feeder if 2½ pounds of birdseed fills the bird feeder ¾ full?
4. What is the area, in square yards, of a rectangular garden that is 2½ yards long by ¾ yard wide?
5. How many servings of lemonade can you make if you have 2½ cups of lemonade and a serving is ¾ 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**
Themes: Teacher Learning and Teacher Development	*Themes: Teacher Practice and Student Learning*	*Themes: Communication and Assessment*	*Themes: Teacher Practice and Student Learning*	*Themes: Relationships and Leadership*

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 inter-personal 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)

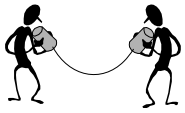
Becoming Consumers of Coaching

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

What do you believe administrators, coaches, and teachers should do to help to cultivate, promote, and sustain a culture of coaching?

Culture of Coaching

School Leaders	Mathematics Coach	Teacher
• Implement coaching as a professional development model • Set aside time for coaching within the daily schedule • Share goals and beliefs of coaching to entire school • Articulate clear expectations for coaching • Budget appropriate resources (time and personnel) to support coaching • Make mathematics coaching a priority	• Ask reflective questions of teachers • Provide feedback to teachers • Share instructional materials and resources • Maintain confidentiality with teachers about coaching sessions • Use a structured approach for coaching: o Gather information before the lesson o Observe complete lesson o Collect and document evidence from lesson o Debrief and reflect with teacher after lesson • Be flexible and dependable • Make mathematics coaching a priority	• Communicate specific instructional needs to coach • Ask for specific types of support from the coach • Listen to hear ideas being presented • Take shared responsibility for cultivating a positive and productive coaching relationship • Set aside appropriate amount of time for coaching sessions • Be open to try new instructional practices • Make mathematics coaching a priority

Culture of Coaching

- ***Commitment to Professional Growth***
- ***Open and Effective Communication***
- ***Clear Expectations***

THANK YOU!

EXAMINING MATHEMATICS COACHING

Contact Information:
Email: emc@math.montana.edu
Web: www.math.montana.edu/~emc/

Rate this presentation on the conference app.
www.nctm.org/confapp

Download available presentation handouts from the Online Planner!
www.nctm.org/planner

Join the conversation! Tweet us using the hashtag **#NCTMVegas**