

Examining Mathematics Coaching

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Research Partners



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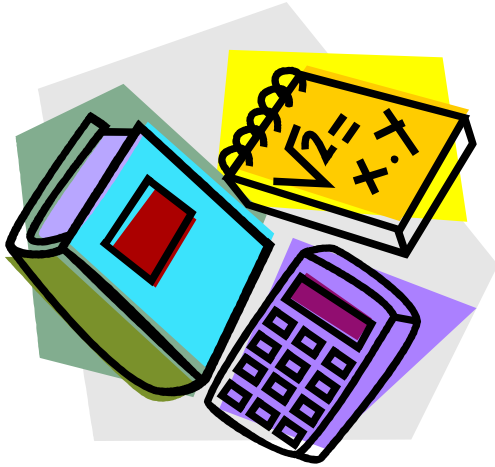


SESSION AGENDA

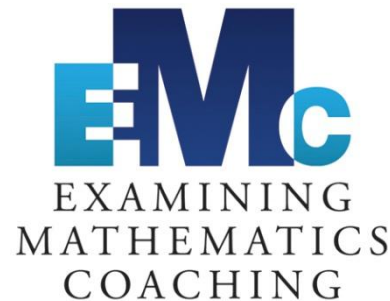
- Description of Examining Mathematics Coaching (EMC) project
- Professional Development
- Consumers of Coaching
- Valid and Reliable Instruments
- Early Findings

MATHEMATICS COACHING

Mathematics classroom coaching is gaining popularity as a school-based effort to increase teacher effectiveness and student achievement.



EXAMINING MATHEMATICS COACHING PROJECT



EMC is a five-year research and development project funded by NSF examining the effects of a coach's “knowledge for coaching” on a diverse population of K-8 teachers.



CONTRIBUTORS & OTHER PERSONNEL



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MATHEMATICS CONTENT INSTITUTE

Day 1	Number Sense	<ul style="list-style-type: none">• 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.
Day 2	Computation	<ul style="list-style-type: none">• 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.
Day 3	Fraction Concepts	<ul style="list-style-type: none">• 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.
Day 4	Operations with Fractions	<ul style="list-style-type: none">• Models for fractions and their operations reveal structure that underlies computational methods.• Various mathematical connections link ratios and fractions.
Day 5	Proportional Reasoning and Percent	<ul style="list-style-type: none">• 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 INSTITUTE

Day 1	How Teachers Learn (Setting the Stage for Standards-Based Instruction)	<ul style="list-style-type: none">• Teacher development• Teacher learning
Day 2	Teacher Practices and Student Learning: Content-Focused Coaching and How Students Learn	<ul style="list-style-type: none">• Teacher practices• Student learning
Day 3	Teacher Practices and Student Learning, Part II	<ul style="list-style-type: none">• Teacher practices• Student learning
Day 4	Professional and Interpersonal Communication for Coaches	<ul style="list-style-type: none">• Communication• Assessment
Day 5	Instructional Coaching Knowledge (“Feet on the Ground”)	<ul style="list-style-type: none">• Relationships• Leadership

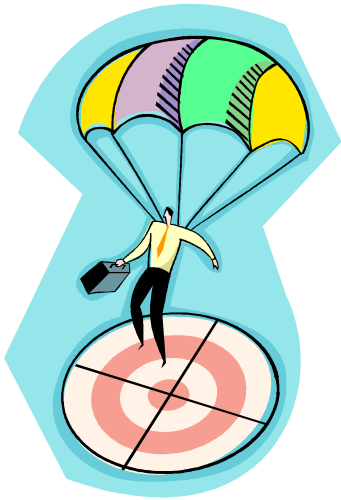
EMC COACHING MODEL

Coaching Cycle	<ul style="list-style-type: none">•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 <p>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</p>
Content Focus	Number and Operation; Ratio and Proportion
Frequency	Three teachers per coach provide data points for research. Teachers are coached at least 8 times per academic year with at least four of those times within the content focus.
Quality Assurances	<p>Coach and teacher reflection instruments, coach skill inventory, and teacher needs inventory ensure consistent implementation of coaching across schools</p> <p>Self-identified teacher needs are used in planning and goal setting, and progress toward these goals is monitored and reflected on by coaches.</p>

EFFECTIVE COACHING PRACTICE

A coach should:

- Ask reflective questions
- Provide feedback
- Share materials and resources
- Maintain confidentiality
- Use a coaching cycle:
 - Gather information before the lesson
 - Observe a complete lesson
 - Collect and document evidence
 - Debrief and reflect after the lesson



BOUNDARIES OF COACHING

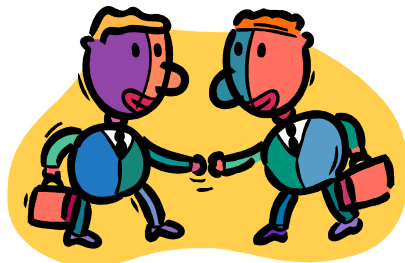
A coach generally does not:

- Evaluate teachers.
- Take over during a lesson.
- Impose specific lessons or instructional strategies.
- Tutor struggling students.
- Perform the support services of an aide.



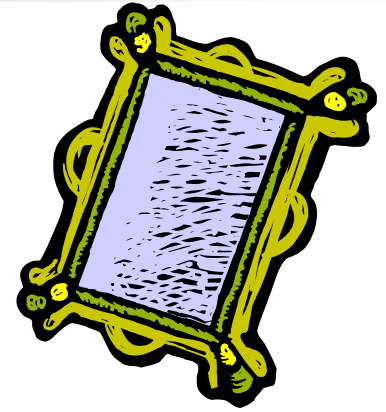
COMPLEXITY OF COACHING

- Coaching is a collaborative process that is done with teachers, not to teachers.
- Coaching is a joint effort from both the coach and the teacher(s) involved.
- Coaching support is useful only if the teacher and coach are prepared, and willing to listen, internalize, and respond accordingly.





WHAT'S MISSING FROM THE PICTURE?



- Burden of the **partnership, relationship,** and **collaboration** is on the coach only.
- Coaches are only as effective as their teachers will allow.



BECOMING CONSUMERS OF COACHING

A commitment to creating a collaborative and rewarding coaching relationship will help maximize the benefits of coaching.

- A wise consumer of coaching makes the most of this educational investment.
- Consumer of coaching addresses the teacher's role in coaching process.

BECOMING CONSUMERS OF COACHING



Discuss with a neighbor:

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

CONSUMER OF COACHING FRAMEWORK



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

FEEDBACK

- Effective coaching requires feedback.

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



REFLECTION

- Coaching is a reflective process.

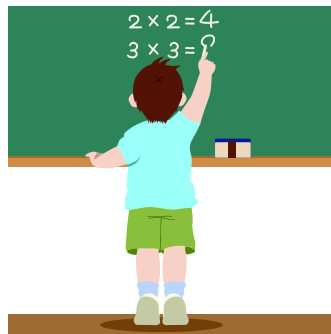
An effective consumer of coaching is open to reflection and is an active participant in the reflective process.



CLASSROOM EXPECTATIONS

- Effective coaching requires teachers to communicate their expectations for coaches as the lesson transpires.

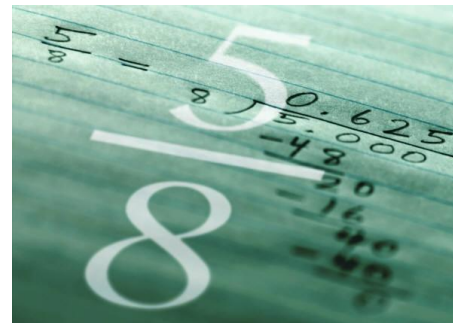
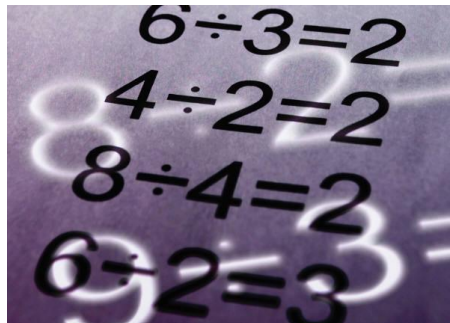
An effective consumer of coaching tells their coach what kind of classroom interaction he/she desires.



CONTENT

- Effective coaching is content-based.

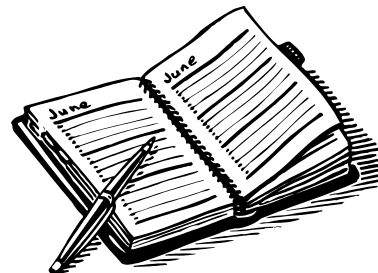
An effective consumer of coaching is willing to examine her or his own mathematics content knowledge.



STRUCTURE

- Effective coaching is structured and involves at least three components: a pre-lesson conference, a lesson observation, and a post-lesson conference.

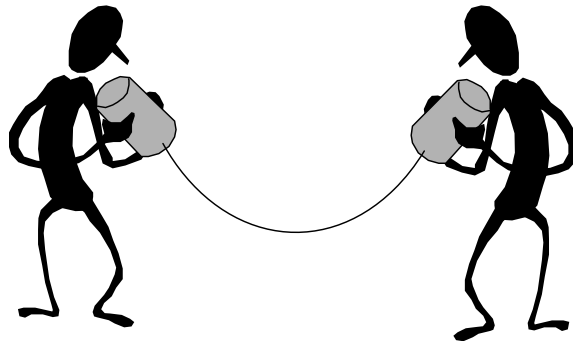
Effective consumers of coaching help coaches schedule the 3-part cycle.



COMMUNICATING NEEDS

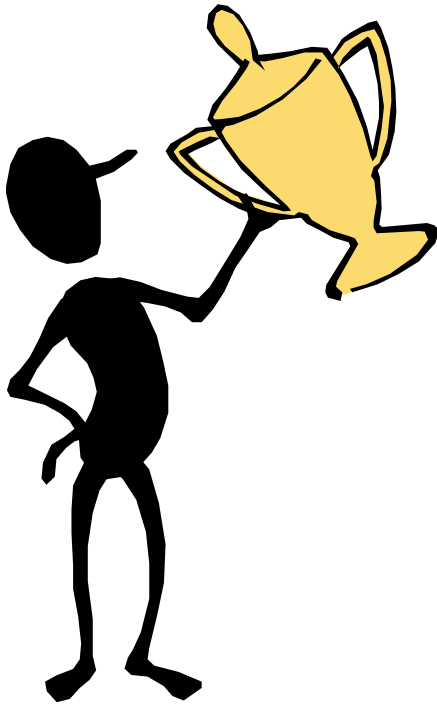
- Effective coaching requires teachers to communicate their needs.

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



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;
- overcome anxious feelings;
- assess and communicate needs;
- assist in scheduling.



VALID AND RELIABLE INSTRUMENTS



The Examining Mathematics Coaching (EMC) 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)

DOMAINS AND INSTRUMENTS

Domain	Instrument
Mathematics Teacher Efficacy (MTE) Teacher attitudes and beliefs	Teacher Survey (TS)
Coaching knowledge	Coaching Knowledge Survey (CKS)
Coach perceptions of coaching effectiveness and impact of that coaching	Coach Reflection and Impact Survey (CRIS)
Teacher perceptions of coaching effectiveness and impact of that coaching	Teacher Reflection and Impact Survey (TRIS)
Coaching skills	Coaching Skills Inventory (CSI)
Teacher reported needs for coaching mathematic	Teacher Needs Inventory (TNI)
Reform- and standards-based teaching practices	Inside the Classroom-Classroom Observation Protocol (ITC-COP)

EMC

COACHING SKILLS INVENTORY

...is intended to measure
a coach's perspective
on his/her own
level of effectiveness or confidence
with various coaching responsibilities.





EMC

COACHING SKILLS INVENTORY

Areas explored include:

- Coach/Teacher relationships
- Coaching skills
- Mathematics content
- Mathematics-specific pedagogy
- General pedagogy
- Background & practices as an educator

EMC COACHING SKILLS INVENTORY

I. Coach/Teacher Relationships

	Not at All Effective				Very Effective
	1	2	3	4	5
1. How effective do you feel observing lessons and giving teachers feedback?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. How effective do you feel creating environments where teachers reflect openly on their instructional practices?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. How effective do you feel helping teachers set goals and objectives aimed at improving their instruction?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. How effective do you feel creating an environment of open discussion and constructive criticism with teachers?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

EMC

TEACHER NEEDS INVENTORY

...is designed to help the teacher take ownership of the coaching process.

The responses are used by the coach as a tool to help focus the coaching and increase effectiveness.





EMC

TEACHER NEEDS INVENTORY

Areas explored include:

- Teaching conceptual/inquiry-based lessons
- Classroom environment
- Conceptual understanding of mathematics
- Mathematics content knowledge
- Classroom management

EMC TEACHER NEEDS INVENTORY

IV. MATHEMATICS CONTENT KNOWLEDGE

	Not at all Confident					Regarding this topic, ...		
	1	2	3	4	5	<i>I would not like to partner with my coach.</i>	<i>I'm not sure I would like to partner with my coach.</i>	<i>I would like to partner with my coach.</i>
15. How confident are you with the mathematics you teach?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. How confident are you with the mathematics beyond the mathematics that you teach, meaning the next grade level?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. How confident do you feel planning lessons that include fraction concepts?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. How confident do you feel planning lessons that include number sense and operations?	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

EMC 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.
[]	[]	[]

EMC COACH & TEACHER REFLECTIONS

... are tools for monitoring and logging coaching interactions.

- Quantity, quality, and duration of coaching sessions
- Coaches and teachers' perceptions of coaching's impact on instruction



EMC COACH & TEACHER REFLECTIONS

Areas explored include:

- Interactions with the coach / teacher
- Frequency of various activities:
 - pre-lesson conference,
 - observation,
 - post-lesson conference,
 - modeling a lesson, etc.



EMC COACH & TEACHER REFLECTIONS

Areas also explored:

- Mathematics content
- Mathematical concept and inquiry
- Classroom environment/culture
- Reflection and planning
- Impact on teacher practice



EMC COACH REFLECTION & IMPACT

Mathematics Content

	Not at All				To a Great Extent
	1	2	3	4	5
a. The teacher and I discussed significant and worthwhile mathematical content.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
b. The teacher and I discussed mathematical content at the grade level(s) she/he teaches.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
c. The teacher and I discussed ways to increase the level of cognitive demand of the mathematical content being taught.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
d. The teacher and I discussed mathematical content beyond the grade level(s) she/he teaches.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

EMC TEACHER REFLECTION & IMPACT

Reflection and Planning

	Not at All				To a Great Extent
	1	2	3	4	5
o. My coach and I set goals and objectives aimed at implementing ideas and addressing issues we discussed.	0	0	0	0	0
p. My coach and I were reflective about my students' learning.	0	0	0	0	0
q. My coach and I were reflective about my teaching practices.	0	0	0	0	0

CHALLENGES

- Staffing changes within schools and districts
- Schedule observations for teachers
- Coaches wanting PD before scheduled institute
- Online Professional Development/Support
- Student Achievement Data
- Research Team Leadership



FINDINGS



- PD provided uniformly superior offering of content and process enhancement for the coaches.
- Students of teachers who worked with coaches participating in the EMC Project increased their test scores slightly more than students of other teachers who did not work with coaches.
- Type A Intraclass Correlations showed observers were within one rating of each other, which is an accepted IRR analysis process.

FINDINGS

- Middle school coaches have lower CKS scores than elementary coaches.
- Middle school teacher ratings were significantly higher than elementary teacher ratings on the Confidence for Teaching Mathematics scale.
- Elementary coaches had significantly higher levels of content knowledge than the elementary teachers and middle school coaches had significantly higher levels of content knowledge than the middle school teachers.



FINDINGS

- Teachers with high levels of efficacy for teaching mathematics:
 - have taken a higher number of mathematics courses for their bachelor's degree;
 - are more engaged in activities related to mathematics teaching and learning;
 - score higher on levels of mathematics content knowledge;
 - have lower levels of anxiety for teaching mathematics; and
 - feel more prepared to teach mathematics.



FINDINGS

- Mathematical content knowledge professional development had a positive impact on the coach participants
 - Statistically significant change for elementary coaches
 - Non-statistically significant change for middle school coaches

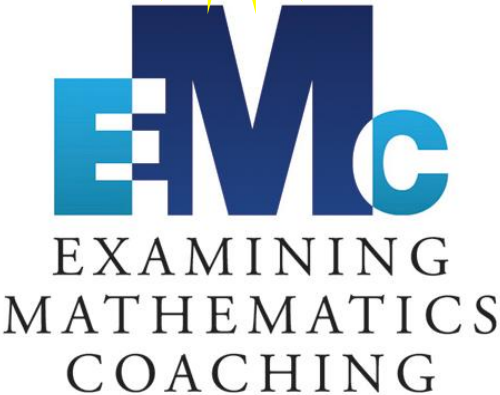


EXAMINING MATHEMATICS COACHING

- Questions ???
 - Insights ...
 - Ideas ...
- Comments ...



THANK YOU



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COACHING

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