How can coaching knowledge be measured?

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EXAMINING MATHEMATICS COACHING

Introduction

The Examining Mathematics Coaching (EMC) Project researches knowledge that contributes to successful coaching in two domains: Coaching Knowledge and Mathematics Content Knowledge.

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.

EMC Research Goals

This project is advancing understanding of coaching effectiveness and adds to the knowledge base for coaching, while it promotes teaching, training, and learning through coaching as a professional development model. New instruments have been developed, pilot-tested, validated, refined, and field-tested to provide a set of tools that can be used in multiple educational settings.

EMC Research Hypothesis

The effectiveness of a mathematics classroom coach is linked to several domains of knowledge. Coaching Knowledge and Mathematics Content Knowledge are two of these domains that contribute significantly to a coach's effectiveness as measured by positive impact on teacher practice, attitudes, and beliefs.

Products

The EMC Project has identified domains for coaching knowledge and definitions for each domain. EMC has developed two instruments for collecting data about coaching knowledge, practices, and beliefs.

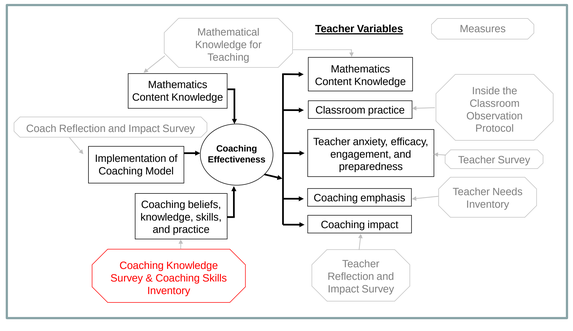
Research Methods

EMC uses (1) a non-experimental correlative study of knowledge for coaching and change in teacher practice and (2) an experimental causal cross-over design measuring the effects of increased knowledge for coaching on teacher practice. The study also will yield data about the environmental characteristics of effective coaching.

Data collection uses a variety of instruments. Analysis uses mixed-methods for qualitative data, quantitative data, and ordered categorical data.

The project is measuring coaching knowledge through a combination of factor scores on Likert items about familiarity with coaching literature; factor scores on coaches' self-reported confidence and perceived effectiveness; and character scores based on responses to scenarios.

Project Variables and Measures



Coaching Skills Inventory

To assess coaches' self-perceptions of effectiveness and confidence in working with teachers

Factor 1: **Mathematics content and mathematics-specific pedagogy**
Sample item: "How confident are you with the mathematics taught at the grade levels that you coach?"

Factor 2: **Student-centered pedagogy**
Sample item: "How effective do you feel coaching teachers on encouraging student participation?"

Factor 3: **Building coaching relationships**
Sample item: "How effective do you feel creating environments where teachers reflect openly on their instructional practices?"

Coaching Knowledge Survey

Project researchers developed eight domains of coaching knowledge using a modified Delphi process. Using the domains and existing literature on coaching, project researchers wrote items to measure knowledge of, beliefs about, and practices in mathematics coaching. After two pilots, the project has a working instrument.

Factor 1: **Working with teachers**
Sample item: "I have difficult conversations with teachers, when necessary, about mathematics misconceptions they hold."

Factor 2: **Working with principals (Teacher level)**
Sample item: "An effective mathematics coach asks the principal what she or he believes the teachers' needs are."

Factor 3: **Working with principals (School level)**
Sample item: "I provide feedback to the principal about whether or not the school is meeting its vision for mathematics instruction."

Factor 4: **Using student work**
Sample item: "I collect students' mathematics work from a teacher's classroom to guide our coaching conversations."

Factor 5: **Teacher need (Pressure)**
Sample item: (Reversal) "An effective mathematics coach coaches only on teacher-stated needs."

Characterizing Coaches

Can selected response items be used to identify coaching dispositions?
Sample item: "A coach and teacher have discussed a teaching strategy in detail. The coach feels that the teacher knows enough about the strategy to implement it, and the teacher has developed a plan to implement it. At this point, the coach should: …"

Each choice reflects a certain coaching disposition:

Coach as described in majority of the literature

a. "Develop a plan with the teacher for continued coaching support on the strategy and the possible modeling of the strategy."

- Encourages teacher reflection
- Engages teacher in mathematics teaching conversation, without critiquing teacher
- Encourages teacher self-assessment
- Encourages teacher goal-setting
- Engages in partnership (as described by Knight) with teacher
- Encourages teacher to continually improve practice
- Engages in proactive coaching

- Fails to set stage for professional, reflective coaching environment
- Fails to establish a leadership-style coaching role
- Fails to establish a partnership relationship where teacher and coach reflect together
- Fails to establish goals, implementation plans, reflection plans, and learning trajectory with teacher

Passive or light coaching

b. "Leave the teacher alone to try it out a few times so the teacher can grow comfortable with the strategy and gain ownership of it."
d. "Wait for the teacher to ask for further support to avoid appearing 'pushy.'"

- Critiques teacher
- Evaluates teacher's performance relative to coach's perception of reflective practice (as opposed to monitoring teacher's performance relative to teacher and coach's agreed-upon standards)
- Establishes oneself in a hierarchy above the teacher where coach sets standards for effective practice
- Asserts control over teacher practice
- Forces teacher actions

Coach as supervisor

c. "Check on the teacher occasionally to make sure the teacher is using the strategy."

Other items also identify the disposition
Coach as mentor, lead teacher, or evaluator

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For further information …

Or to request copies of these instruments, please contact *emc@math.montana.edu*. More information on this project can be obtained at the Web site *http://www.math.montana.edu/~emc*