

Influences of Coaching Knowledge on Teacher Change

John Sutton
David Yopp

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Research Contributors



University of Idaho

Principal Investigators

Elizabeth A. 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, Brandie Good, and Arlene Mitchell (RMC Research Corp.)



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Welcome!

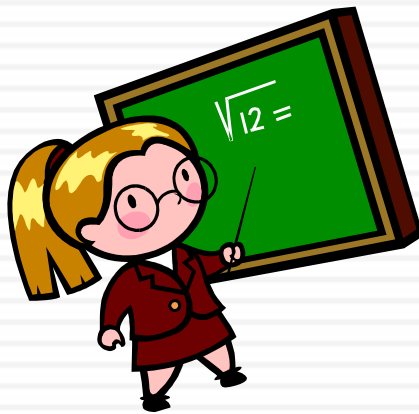
Today's Session Topics:

- EMC Research questions;
- EMC Theoretical perspective;
- EMC Research methods;
- Data collection and analysis;
- Findings; and
- Questions



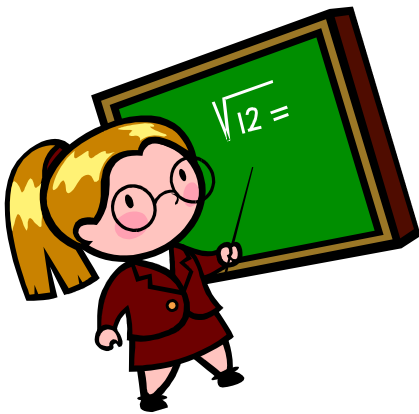


What we have learned from the EMC project



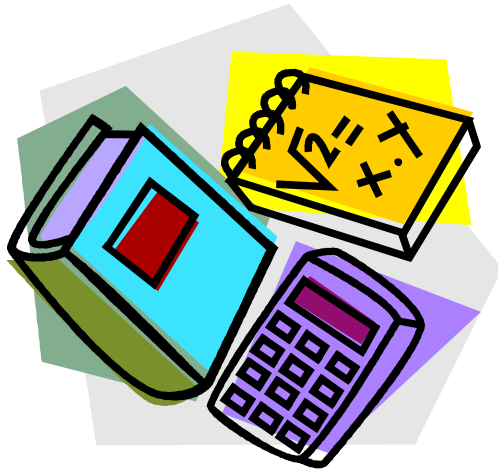
EMC RESEARCH QUESTION

- To what extent does a coach's depth of knowledge in two primary domains (coaching knowledge and mathematics content knowledge) and a coach's practice (e.g., coach intensity) influence coaching effectiveness?



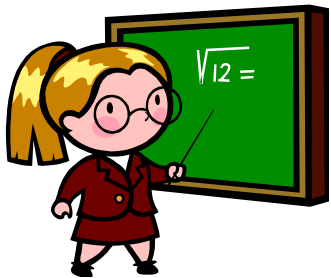
EMC THEORETICAL PERSPECTIVE

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

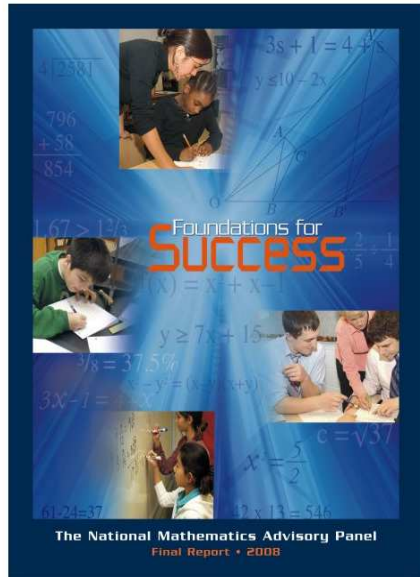


EMC THEORETICAL PERSPECTIVE

- 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 (as opposed to mentoring).



EMC THEORETICAL PERSPECTIVE



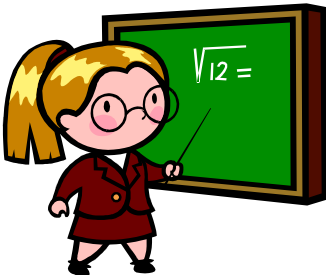
The National Mathematics Panel (2008) reports that schools across the nation are using mathematics specialists, including mathematics coaches.

What makes for effective coaching in mathematics is being researched at various sites across the United States.



EMC THEORETICAL PERSPECTIVE

- Studies are demonstrating what types and depths of knowledge effective mathematics coaches hold.
- Empirical evidence supporting coaching is just emerging.
- Implementing mathematics coaching involves cost and logistical effort for schools and districts.

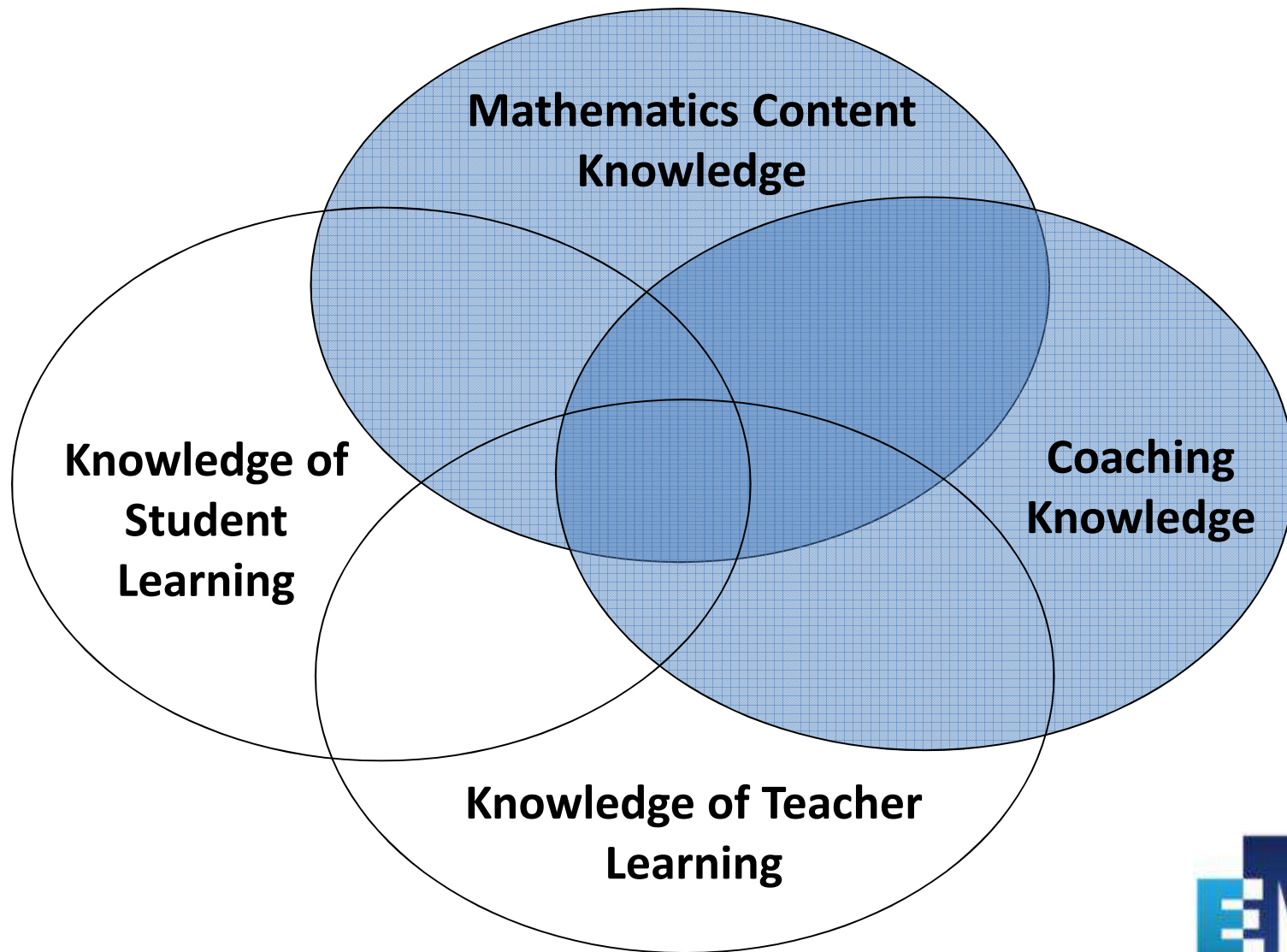


EMC THEORETICAL PERSPECTIVE

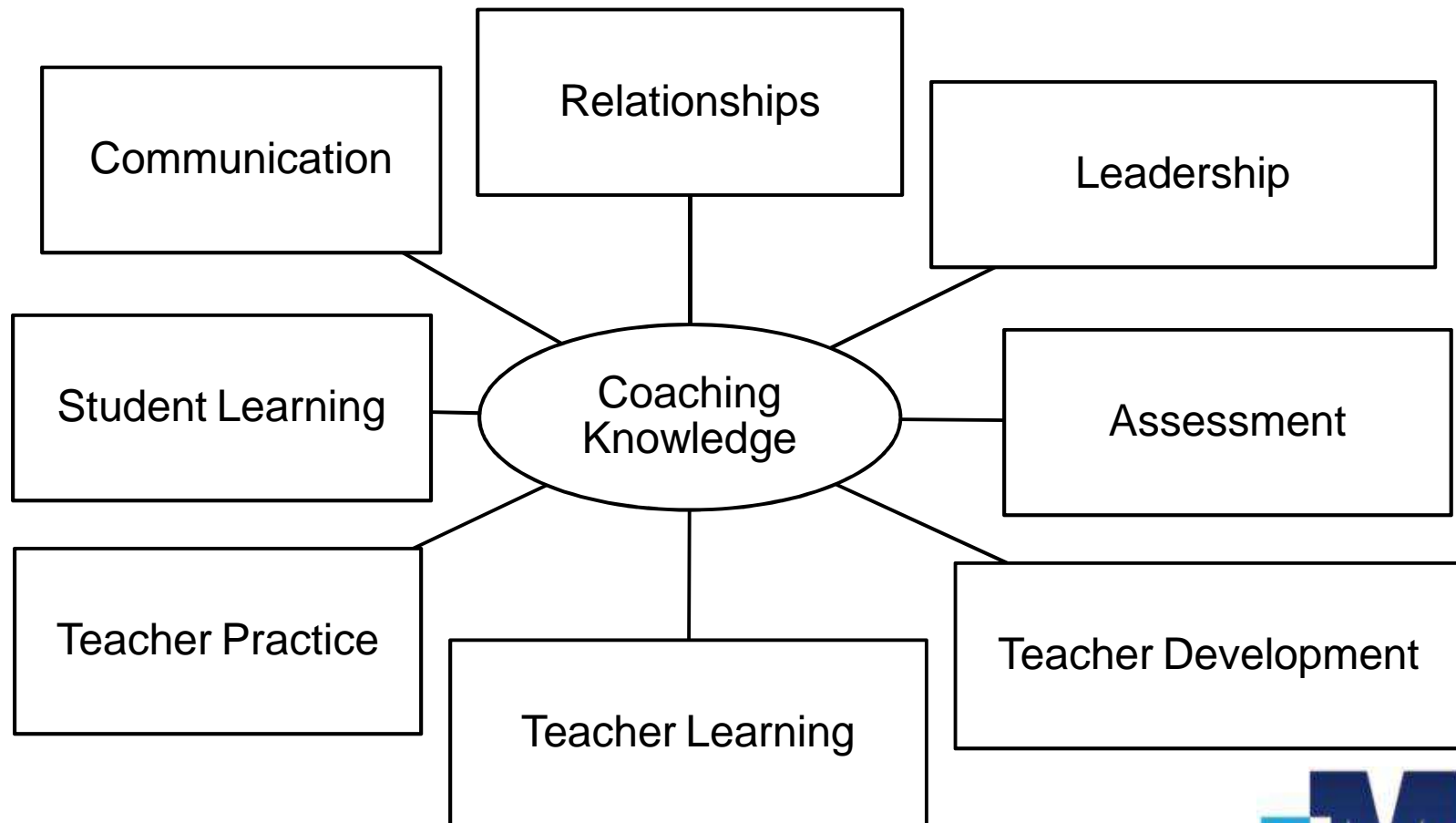
A mathematics coach is an **on-site professional developer** who enhances teacher quality through **collaboration** focusing on **research-based, reform-based, and standards-based instructional strategies and mathematics content** that includes the **why, what, and how** of teaching mathematics.



EMC THEORETICAL PERSPECTIVE: RESEARCH KNOWLEDGE DOMAINS



EMC THEORETICAL PERSPECTIVE: COACHING KNOWLEDGE DOMAINS



EMC RESEARCH METHODS: DATA COLLECTION



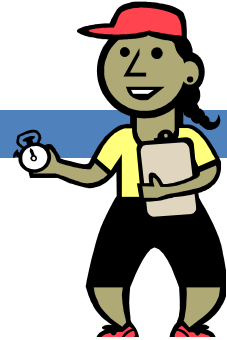
- The data set as analyzed included:
 - ▣ 56 school-based coaches
 - ▣ 142 coached teachers
 - ▣ 25 districts across eight states
- EMC collects data on coach and teacher knowledge and practices for five consecutive years.

EMC RESEARCH METHODS: DATA COLLECTION



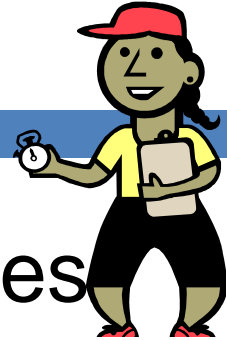
- This presentation reports on the analysis of the first four years of data.
- Because some participants dropped out and others joined later, some data are considered missing at random.

EMC RESEARCH METHODS: MEASURES



- ❑ Coaching Skills Inventory (CSI)
- ❑ Coaching Knowledge Survey (CKS)
- ❑ Mathematics Knowledge for Teaching (MKT)
- ❑ Inside the Classroom Observation Protocol (ITCOP)
- ❑ Teacher Survey (TS)
- ❑ Coaching Intensity and other measures

EMC RESEARCH METHODS: MODEL



- Two versions of explanatory variables
 - ▣ Differences between coaches (aggregated to the mean for each coach)
 - ▣ Variability over time for the coach (“centered”)

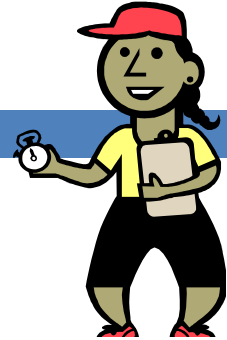
EMC RESEARCH METHODS: MODEL



- Employed linear mixed models (Pinheiro & Bates, 2000; Singer & Willett, 2003; Bickel, 2007)
- ▣ to fit all the multilevel hierarchical models, estimated using the nlme package (Pinheiro, Bates, DebRoy, Sarkar, & the R Development Core Team, 2012) in R

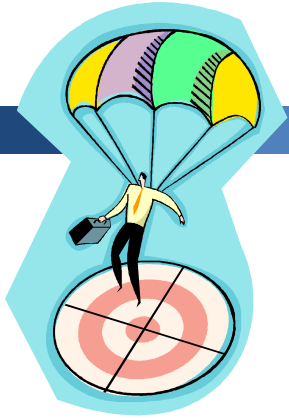


EMC RESEARCH METHODS: MODEL



- Cumulative probit mixed models were used for the ITCOP capsule response (Agresti, 2010)
- estimated using the ordinal package (Christensen, 2012)

RESULTS



Improvements over time in coaches' self-assessment of mathematics coaching skills (CSI) were related to:

- increases in teachers' mathematics knowledge (MKT);
- increases in teachers' self-efficacy (TS);
- and improvements in teacher practices (ITCOP).

RESULTS



Improvements in coaches' knowledge of, and alignment with, predominant coaching recommendations (CKS) were related to increases in teachers' mathematics knowledge (MKT).



RESULTS

- ❑ Higher rates of coaching intensity were related to higher teacher ITCOP but not related to improved teacher MKT and TS.
- ❑ We found no evidence that increases in coaches' MKT scores explained increases in any of our teacher measures.

Estimated Model Coefficients for the ITCOP Capsule Rating Predictive Model

Effect	Estimate	Std.Error	z-value	p-value
CIntMean	0.001	0.001	1.264	0.206
CIntCentered	0.001	0.001	1.898	0.058
CKSmean	-0.980	1.042	-0.940	0.347
CKScentered	-0.318	0.725	-0.439	0.661
CSImean	0.144	0.239	0.603	0.547
CSICentered	0.920	0.148	6.226	0.000
CMKTmean	0.065	0.115	0.565	0.572
CMKTcentered	0.150	0.140	1.075	0.282
CoachOutsideCoachPD	-0.032	0.122	-0.266	0.790
CoachOutsideMathPD	-0.018	0.132	-0.137	0.891
TeacherOutsideMathPD	0.298	0.124	2.413	0.016



Estimated Model Coefficients and Likelihood Ratio Test p-values for Fixed Effects in the Teacher MKT Model

Effect	Estimate	Std.Error	t-value	p-value
(Intercept)	0.294	0.702	0.418	0.657
CIntMean	0.000	0.001	0.524	0.568
CIntCentered	0.000	0.000	1.076	0.280
CKSmean	-1.608	0.868	-1.853	0.056
CKScentered	0.534	0.316	1.686	0.089
CSImean	0.190	0.208	0.914	0.342
CSIcentered	0.208	0.062	3.346	0.001
CMKTmean	0.171	0.094	1.811	0.016
CMKTcentered	0.044	0.061	0.728	0.463
CoachOutsideCoachPD	-0.056	0.058	-0.980	0.327
CoachOutsideMathPD	0.095	0.061	1.562	0.117
TeacherOutsideMathPD	0.063	0.057	1.094	0.262

Estimated Model Coefficients and Likelihood Ratio Test p-values for Fixed Effects in the TS Total Score Predictive Model

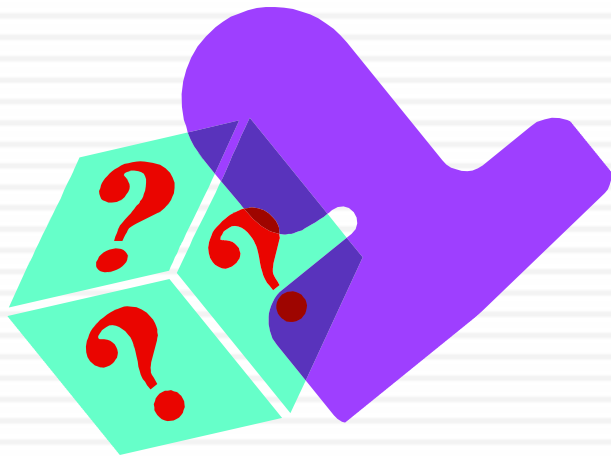
Effect	Estimate	Std.Error	t-value	p-value
(Intercept)	5.187	0.590	8.786	0.000
CIntMean	0.001	0.001	1.572	0.102
CIntCentered	0.000	0.000	1.584	0.102
CKSmean	-0.677	0.734	-0.924	0.342
CKScentered	0.249	0.332	0.749	0.455
CSImean	0.091	0.173	0.526	0.617
CSIconcentered	0.198	0.065	3.037	0.002
CMKTmean	0.043	0.079	0.542	0.602
CMKTcentered	0.052	0.064	0.808	0.420
CoachOutsideCoachPD	-0.065	0.059	-1.100	0.275
CoachOutsideMathPD	-0.068	0.063	-1.077	0.281
TeacherOutsideMathPD	0.216	0.059	3.639	0.000





Questions regarding project, methods,
findings, or others?

Creating Policy



We appreciate you joining us today!



Thank you!

<http://www.math.montana.edu/~emc>

John Sutton, sutton@rmcres.com

David Yopp, dyopp@uidaho.edu

