Aligning Inquiries in a Mathematics Coaching Research Project

Colloquium on Mathematics Coaching Research
Northern Kentucky University
Kentucky Center for Mathematics
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Today's Topics

- Background on the MCP research context.
- Development of the evaluation study methodology, including instrumentation.
- Role of collaborators.
- Development of the growing research project.

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Background on the MCP research context

- Implemented in Grades 3-6, in mathematically low-performing schools in Ohio.
- Trains coaches to provide on-site professional development in a content-focused coaching model.
- The model includes one-on-one intensive interactions between coach and teacher for planning, teaching and assessing students.
- Quality of coaching interactions is dependent upon teacher knowledge of content and pedagogy.
- Desired student outcome is improved student achievement.

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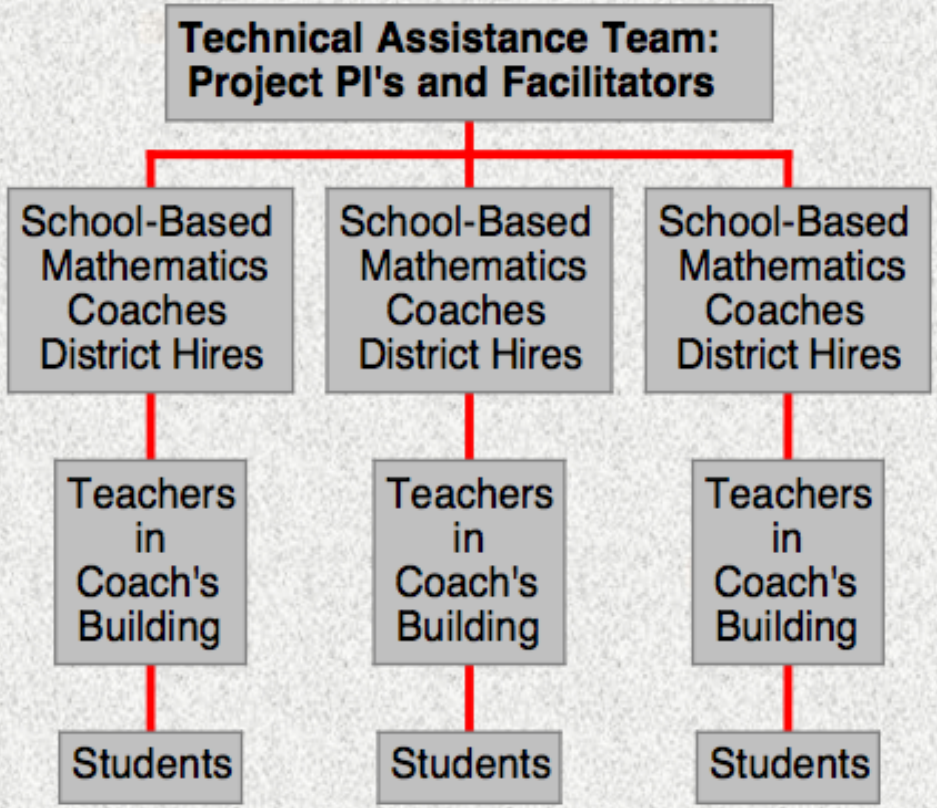
MCP Structural Model



Facilitators: A Distinctive Feature of the MCP

- Facilitator role in the program
  - Provide monthly small group support sessions at program sites and additional PD between MCP sessions.
  - Serve as liaisons between MCP and schools: Develop and maintain relationships with coaches and school administrators.
- Facilitator role in the research
  - Serve as Key Personnel in research, connecting to schools, assisting coaches in the data collection.

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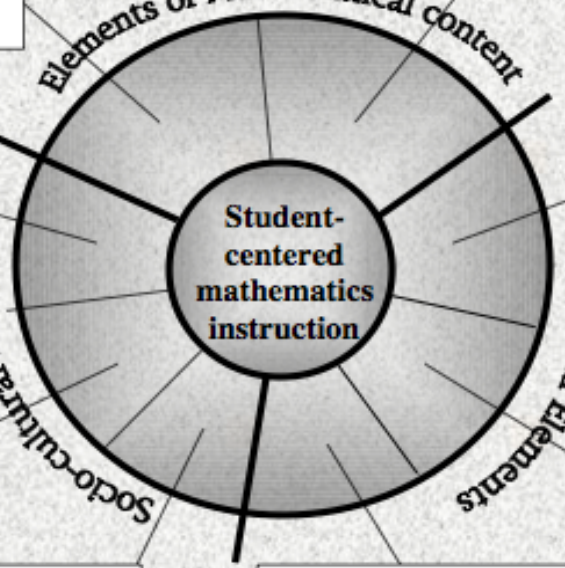
MCP Conceptual Framework



Processes: Static application to dynamic integration

Content knowledge: Limited to rigorous

Classroom interactions: teacher-centered to student-centered

Societal norms: Cultural ignorance to cultural awareness

Task selection: Rigid procedural focus to richly connected and integrated conceptual/ procedural focus

Classroom norms: Externalized authority to shared authority

Equity, Diversity & Social Justice: Umbrella focus to individual focus

Assessment: Judgmental focus to informative focus

Research Question and Sites

- Project Research Question: What is the relationship between the MCP and student achievement?
- The schools: Low-performing elementary and intermediate schools.
  - Rural and urban locations in Ohio.
  - 200-600 students per school.
  - Communities are economically fragile and racially and ethnically diverse.
  - Control schools are aligned with MCP schools based on student achievement level, socio-economic status, racial and ethnic percentages and other pertinent criteria and do not have an MCP coach in the school.

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Research Populations

- Teachers
  - All teachers who teach mathematics in MCP schools are eligible to participate in the research.
  - Involvement in the MCP is not mandatory.
  - Teachers not involved in the MCP serve as an additional control sample.
- Students
  - Full populations for achievement data at grades 3-6.
  - Student population sampled for descriptive data.

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Key Outcomes Investigated

- Teacher Content Knowledge (LMT)
- Teacher Pedagogical Content Knowledge (LAMP)
- Student Mathematics Achievement (OAT)

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Methodological Learnings from 05-06 pilot

- LMT for teacher content presented problems.
- Continue using the LAMP for pedagogy.
- Develop the LAMP instrument for content.
- Develop instrument for data on student mathematical processes.
- Change use of previous year's exams for the grade level to use of comparable exams for the pre and post.
- Change protocol to eliminate the IRB issues.

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Protocol for 2006-2007

- Same research question, types of schools in project, populations, outcomes investigated.
- Addressed instrument issues (removed LMT, developed LAMP, created Problem Sets, used pre-post OAT).
- Changed protocol to address IRB compliance (utilized district contacts, school support, and coaches' MCP data work in getting the de-identified student data).

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Instruments and Protocol in 2006-2007 Evaluation Study

- LAMP for teacher content knowledge.
- LAMP for teacher pedagogical content knowledge.
- Released, full-length OAT as student pretest.
- May OAT as post test.
- Problem Sets for descriptive data on student processes.

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Instrumentation: LAMP

- Instrument collaboratively developed.
- Problem sources: texts, NAEP exams, general resources.
- Ten items, each for both content and pedagogy.
- Each item centered on a problem and student responses.
- Each of the 10 items scored 2 times holistically, once for content and once for pedagogy.
- Using MCP integrated procedural/conceptual scoring guide.

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Instrumentation: OAT Pre and Post Tests

- Pre test is the released full version of each grade level test for grades 3-6
  - ODE trains coaches to score short answer and extended response.
  - Facilitators work with their coaches on scoring.
  - Coaches work with their teachers on scoring.
  - Coaches enter data in MCP data base.
- Post test is the state's May administration of the exam
  - Coaches retrieve individual student data for end of year OATs, and enter in MCP data base

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Instrumentation: Student Problem Sets

- Demographically-sampled student set of 12 per school.
- De-identified by coaches so researchers can align with test scores.
- Focused on process, not content.
- Administered across the school year.
- Scored holistically with scoring guide.

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Collaborations in the MCP Research

- Districts
- Schools
- Coaches
- University
- State Dept
- Funders
- IRB

- Support for data collection
- Maintaining voice
- Support for research and project
- Infrastructure
- Support and accountability
- Influence methodology
- Complex compliance vs. informed problem-solving

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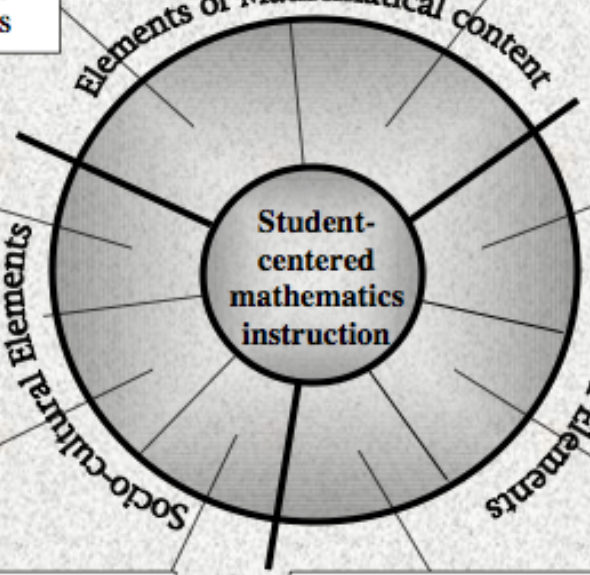
MCP Conceptual Framework



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Revisiting the MCP Conceptual Framework Lens

- Frames the overall research project.
- Provides direction for overall evaluation plan.
- Provides a lens for analysis of evaluation plan.
- Reveals absences in evaluation research.
- Suggests areas for additional study in the overall evaluation plan.
- Suggests parallel frameworks for complimentary studies.

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Addressing Absences

- Grant, M. (2006-2007). Pilot for 2008-2009 dissertation. Coach/Teacher shared authority, leadership.
- Forrest, D. B. (2006-2007). Coach development across MCP Conceptual Framework elements.
- Erchick, D. & Tyson, C. (2007-2008). Pilot: Social Justice in Mathematics Coaching.
- Flevarus, L. (2007-2008). Pilot for MCP primary grades evaluation.
- Farland, D. (2007-2008). Pilot on classroom norms, equity and diversity in the school setting.
- Brosnan, P. & Erchick D. (2007-2008). Evaluation of MCP PD and curriculum as delivered to Coaches.

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Context-Framework-Opportunity

- The context of this coaching program.
- The relationships within this coaching program.
- The conceptual framework's thoroughness, utility, and flexibility.

Provide a wealth of opportunities for multiple studies and the cohesiveness for a successful research project comprised of those studies.

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Thank You!

Diana & Patti

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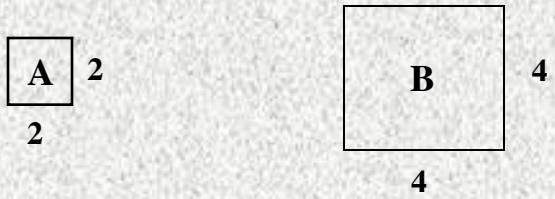
LAMP Sample Item

You ask your students to compare Figures A and B below.



Frank says, "Figure B is twice as big as Figure A" and Sheryl says, "Figure B is 4 times as big as Figure A".

a. Are these answers correct or incorrect? Describe what these students may have been thinking.

b. How might you compare the Figures A and B?

c. How might you teach students to learn about comparing figures as in this problem?

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LAMP Data

- Quantitative scores for teacher pedagogy and content.
- Qualitative data for detail and description of subtle changes/growth.
- Example: …what concepts are addressed? (in a geometry context)
  - Pre-test: "Basic geometry math concepts are being addressed here. Understanding shapes and their identity"
  - Post-test: "Recognize or identifying shapes via their attributes: vertices, angles, closed/open shapes, comparing".

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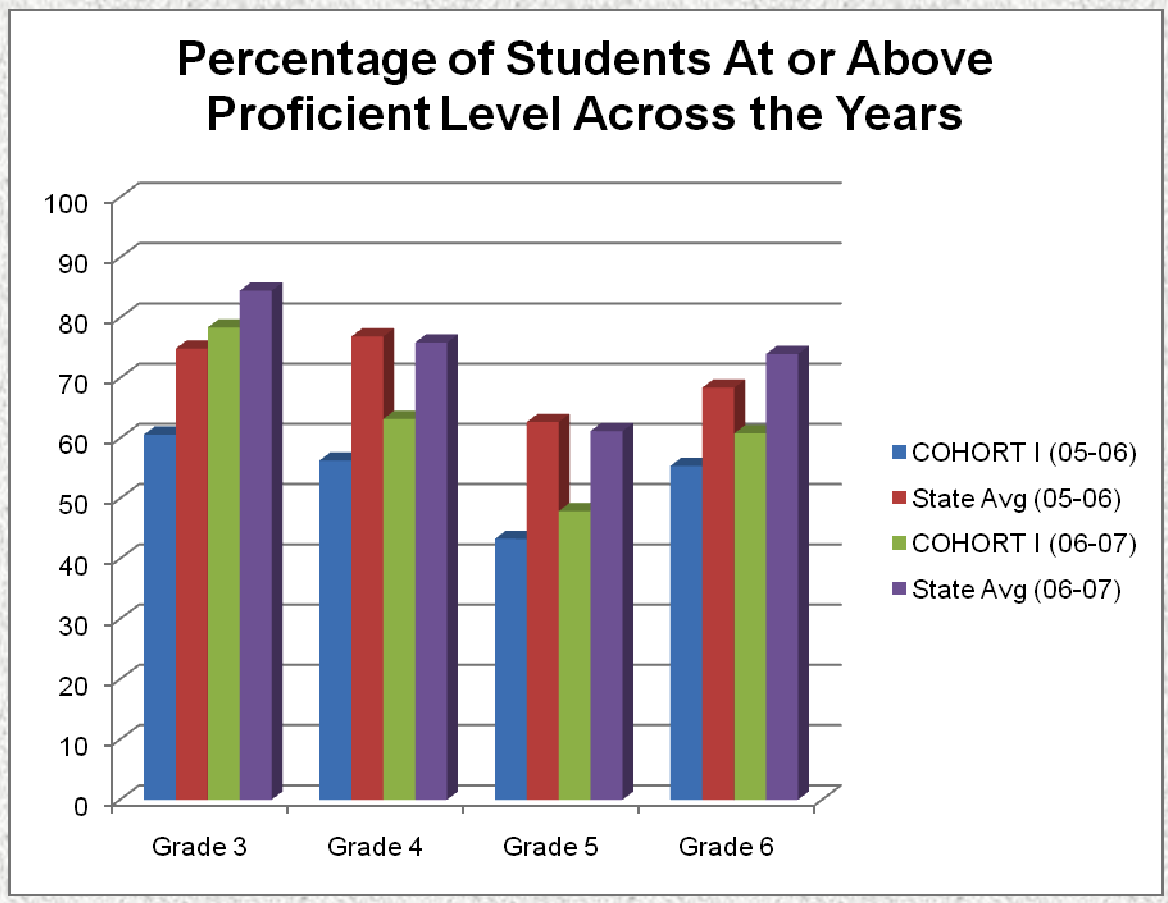
Sample use of OAT Data



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