



# Evaluating Math Pathways & Pitfalls: Lessons Learned

## What is *Math Pathways & Pitfalls (MPP)*?

- Professional development for K-7 teachers
- Lessons for K-7 students that boost achievement and academic language use

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## Research Team

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## Comparison Group Studies

### Some options:

- Treatment vs. Control
- Treatment A vs. Treatment B
- Treatment A (1 year) vs. Treatment A (multiple years)

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## Comparison Groups Example Study

- **Group A:** Teachers participating in PD
- **Group B:** Teachers conducting PD

Pre-post math assessments were administered to both groups.

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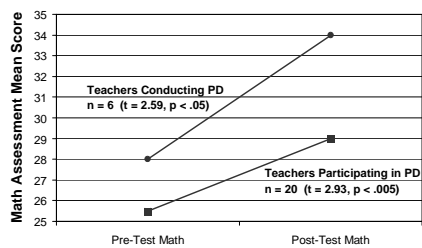
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## Teachers Conducting PD versus Teachers Participating in PD

Interaction Line Plot



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## Treatment versus Control Comparisons

### Establishing equivalent groups

- Use matched pairs
- Control for differences between groups statistically
- Randomize groups

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# Evaluating Math Pathways & Pitfalls: Lessons Learned

## Lessons Learned

- Anticipate flaws in the design
- Ask an advisory group to troubleshoot the design and the implementation plan
- Diversify advisory group composition  
Teacher, School Administrator, District Person, Teacher Educator or Professional Developer, Content Person (mathematician), Researcher, Statistician

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## Ethical Issues in Designing and Conducting an Evaluation

- Who has access to the treatment?
- Are participants treated equitably and ethically?

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## Research Design Overview *Math Pathways & Pitfalls*

Teachers and students in grades 4 and 5

	Cohort A Teachers	Cohort B Teachers
<b>Year 1</b> 2006-2007	<ul style="list-style-type: none"> <li>• 4 days summer PD</li> <li>• 7 MPP lessons (with minis)</li> <li>• 3 meetings</li> </ul>	<ul style="list-style-type: none"> <li>• 3 meetings</li> </ul>
<b>Year 2</b> 2007-2008	<ul style="list-style-type: none"> <li>• 7 MPP lessons (with minis)</li> <li>• 2 meetings</li> </ul>	<ul style="list-style-type: none"> <li>• 4 days summer PD</li> <li>• 7 MPP lessons (with minis)</li> <li>• 3 meetings</li> </ul>

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## Ethical Ways to Reduce Participant Attrition and Anxiety

- Design PD that:
  - Addresses needs of students
  - Relates to key standards
  - Bridges to instructional materials

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## More Ways to Reduce Participant Attrition and Anxiety

- Design teacher assessments that:
  - Relate to the PD
  - Reveal gaps in knowledge
  - Consider when, where, and how to administer the assessment

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## It Is Ethical to Inform Participants Up Front

- Provide information in writing regarding:
  - Responsibilities
  - Risks
  - Rewards

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## Ethical Responsibilities of Our Staff

- Staff training in human subjects research
- Offering and maintaining confidentiality of data
- Letters of consent

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## Deciding What Data To Collect

### Assessments

- Standardized
- Norm-referenced
- Multiple choice items
- Short open-response questions
- Open-ended questions
- Performance based tasks

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## Other Sources of Data

- Classroom observations
- Videotaping
- Audiotaping
- Portfolios
- Interviews
- PD assignments
- Written reflections
- Self-assessments
- Surveys
- Demographic databases

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## Language and Discourse Study

- Compares classrooms participating to those not participating in MPP
- Examines the use of mathematical language by teachers and students

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## Fidelity Study

- Classroom and PD observations
- PD agendas and attendance records
- Lesson logs
- Questionnaires
- Lesson audiotapes

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## Data Collection Costs to Consider

- 1) Design and field test data collection instruments
- 2) Administer and score assessments
- 3) Analyze data from videotapes, audiotapes, portfolios, or interviews
- 4) Interpret results and findings to inform the process

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# Evaluating Math Pathways & Pitfalls: Lessons Learned

## Lessons Learned About Data Collection

- Use less expensive methods on a larger sample
- Use more expensive methods on a smaller sub-sample
- Make use of doctoral students to help conduct qualitative studies

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## Deciding What Analyses to Use

Lesson Learned

Make sure the analyses fit the study design

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## References for Cluster Randomized Trials

Murray, D. M. (1998) Design and analysis of group randomized trials. New York: Oxford University Press.

Raudenbush, S.W. & Bryk, A. S. (2002) (2nd ed.) Hierarchical linear models: Applications and data analysis methods. Thousand Oaks, CA: Sage Publications.

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# Evaluating Math Pathways & Pitfalls: Lessons Learned

## The Effects of *MPP* on Elementary School Students' Mathematics Achievement

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