This material is based upon work supported by the National Science Foundation under Grant No. 0831615. Any opinions, findings and conclusions or recommendations expressed in this material are those of the author) and do not necessarily reflect the views of the National Science Foundation (NSF).
Agenda

- MMP Background
- Key Questions for Discussion
- Conceptual Framework
- Explanatory Framework
- Discussion
MMP Goals

- Comprehensive mathematics framework
- Distributed leadership
- Teacher learning continuum
- Student learning continuum
MMP Background

- Funding
  - October 2003 MSP Phase I Award (Year 8)
  - January 2009 MSP Phase II Award (Year 3)
  - September 2008 funding from the State of Wisconsin for released MTL positions (Year 3)

- A key strategy for teacher development has been offering college credit courses to MPS classroom teachers through UWM
Key Questions

- What constitutes reasonable evidence that the theory of action proposed by an MSP project is actually working?
- How have other projects examined the link between teacher professional development (PD) and student achievement?
- Have other projects developed reasonable evidence to support similar claims?
Conceptual Framework

○ UWM Courses
  ● Content
  ● Embed aspects of Mathematical Knowledge for Teaching (MKT)
  ● Deepen teacher understanding of the mathematics they teach to students

<table>
<thead>
<tr>
<th>PD</th>
<th>→</th>
<th>MKT</th>
</tr>
</thead>
<tbody>
<tr>
<td>MKT</td>
<td>→</td>
<td>Student Achievement</td>
</tr>
</tbody>
</table>
Hypotheses

1. A positive relationship exists between the number of MMP courses completed by a classroom teacher and his or her MKT assessment score.

2. Classroom teachers who have completed at least one MMP course score higher on the MKT assessment than teachers who have not completed at least one course.

3. Teacher MKT is positively related to variation in student achievement after controlling for student demographic differences.

4. Course completion is positively related to variation in student achievement after controlling for student demographic differences.
Explanatory Framework—Methods

- Divide teachers who have taken MKT into 2 groups—those who have taken courses and those that have not—compare these results
- Link student achievement data to teachers taking the MKT
- Use HLM to analyze the relationship between course enrollment, teacher MKT, and student achievement
Results

1. Course attendance predicts MKT Scores
   $F(1,663)=10.06$, $p=.002$; $R^2 = .015$
Results

2. Teachers completing at least one course score higher on the MKT
\( t=2.43; \) df=663; \( p=.016 \)

\[ X_0 = -0.28 \]

\[ X_1 = -0.13 \]
Results

3. Teachers MKT is positively related to student achievement
4. Course completion was NOT found to be related to student achievement
## Results

**Table 4. Results from fitting the Conditional Model to WKCE Scale Scores**

<table>
<thead>
<tr>
<th>Estimated Fixed Effects</th>
<th>Coefficient</th>
<th>SE</th>
<th>t-ratio</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean WKCE Scale Score</td>
<td>383.60</td>
<td>8.26</td>
<td>46.42</td>
<td>70</td>
<td>0.00</td>
</tr>
<tr>
<td>Teacher MKT Score</td>
<td>14.10</td>
<td>5.44</td>
<td>2.59</td>
<td>70</td>
<td>0.01</td>
</tr>
<tr>
<td>Teacher Course Enrollment</td>
<td>-1.49</td>
<td>3.08</td>
<td>-0.49</td>
<td>70</td>
<td>0.63</td>
</tr>
<tr>
<td>Gender</td>
<td>-3.09</td>
<td>1.53</td>
<td>-2.02</td>
<td>3055</td>
<td>0.04</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>14.15</td>
<td>3.37</td>
<td>4.19</td>
<td>3055</td>
<td>0.00</td>
</tr>
<tr>
<td>Special Education Status</td>
<td>35.82</td>
<td>2.17</td>
<td>16.47</td>
<td>3055</td>
<td>0.00</td>
</tr>
<tr>
<td>ELL Level</td>
<td>5.52</td>
<td>0.93</td>
<td>5.90</td>
<td>3055</td>
<td>0.00</td>
</tr>
<tr>
<td>Free-Reduced Lunch Status</td>
<td>17.46</td>
<td>2.23</td>
<td>7.81</td>
<td>3055</td>
<td>0.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimated Random Effects</th>
<th>SD</th>
<th>Var</th>
<th>df</th>
<th>x²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean teacher scale score</td>
<td>34.14</td>
<td>1165</td>
<td>70</td>
<td>2000</td>
<td>0.00</td>
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<tr>
<td>Student WKCE scale score</td>
<td>41.42</td>
<td>1716</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Conclusions

- The theory of action proposed by the Milwaukee Mathematics Partnership does, in part, hold true.
- We found that differences in MKT can be linked to whether or not classroom teachers have participated in MMP professional development courses.
- We found that MKT predicts variability in student achievement on the state mathematics examination.
- We do not see evidence, though, that course enrollment by classroom teachers predicts student mathematics achievement.
Discussion

- What constitutes reasonable evidence that the theory of action proposed by an MSP project is actually working?

- How have other projects examined the link between teacher PD and student achievement?

- Have other projects developed reasonable evidence to support similar claims?