Exploring the Maturation of Educational Reform: A Seven Year Journey of a Math Science Partnership

Cindy Tananis and Tracy Pelkowski with colleagues, Cara Ciminillo and Keith Trahan
Collaborative for Evaluation and Assessment Capacity (CEAC)
University of Pittsburgh

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What is CEAC?

• CEAC is one of a number of field-based initiatives within the School Leadership Program, in the Department of Administrative and Policy Studies in the School of Education.

• We address pressing evaluation and assessment needs by drawing on resources throughout the University of Pittsburgh's School of Education and the evaluation community at large.

• Interdisciplinary and interagency collaboration, affiliates of CEAC work together to merge technical, evaluative, research design, statistical, and theoretical expertise to best address practical evaluation and assessment issues.
What is the MSP?

- MSP (Math Science Partnership) was launched by the National Science Foundation in 2002 to support partnerships that unite efforts of K-12 school districts with science, mathematics, engineering, and education faculties of colleges and universities.

- This program has made 80+ awards with over $500 million awarded, bringing together about 150 institutions of higher education with some 450 K-12 school districts and a host of other stakeholders.

- MSP of Southwest PA is one of seven comprehensive projects funded by NSF in 2003 to address K-12 Mathematics and Science reform. $18.1 million awarded
The MSP, its Goals, and the Role of CEAC

• 53 Districts, 4 Higher Education Institutions, 4 Intermediate Units, 114,000 students, and approximately 3,800 teachers who teach math and science.

• The MSP goals are to increase K-12 students’ knowledge of mathematics and science, increase the quality of the K-16 educator workforce, and create a sustainable coordination of partnerships in the IUs.

• MSP is housed in the Allegheny Intermediate Unit (AIU).

• From its inception in 2003, CEAC has conducted and managed the evaluation for the MSP.
Claims Explored

• The MSP claims that professional development diffusion can result in pedagogical reform in classrooms
  – Through teacher to teacher interaction
  – Has the potential to increase the successful engagement of students in math and science education.
  – Pedagogical reform and increased student engagement will lead to increased student learning (achievement)

• Further, the MSP is building an expanding regional capacity, via a critical mass of educators
  – Focus math and science instruction
  – Increase student achievement in math and science.
Inputs that support
- NSF funding
- PDE funding
- MSP staff and coordinators
- Intermediate Units

Inputs that guide
- Leadership Action Teams
- Student achievement data
- District development matrix
- Strategic action plans
- Project Teams
- MSP Cabinet
- Evaluation processes

Intervention / MSP Activities

Professional Development for Content & Leadership
- Leadership Action Academies
- Teacher Leadership Academies
- On-site Academies
- Content-deepening Seminars
- Lenses on Learning

Instructional Leaders
- Teacher Leaders
- Principal Leaders
- Teacher Fellows Program participants
- "MSP-Involved" IHE STEM Faculty (or IHE Faculty Partners)

Curricular and Planning Materials
- Refined math curriculum framework; science curriculum framework
- Access to inquiry-based instructional materials
- Refined IHE courses
- District action plans

Dissemination and Support for the Use of Research-based Resources & Tools
- Network Connections
- Educator Networks
- Journal and Coordi-net

Opportunities for Collaborations
- Among schools, districts, IUs, and IHEs

Outputs

Short-term Outcomes
- Increased awareness and knowledge of research-based instructional practices
- Increase in teacher content knowledge
- Increased leadership skills
- Use of math and science curriculum frameworks
- Increased collaborations among different partners
- Increased awareness of cultural differences
- Increased awareness of the importance of using data in decision-making

Mid-term Outcomes
- Changes in classroom instructional practices at both IHE and K-12 levels
- Changes in district and school-level policies and practices
- Use of data in decision-making
- Alignment of curriculum with PD and state standards
- Strategic allocation of district resources
- Implementation of challenging courses
- Implementation of on-site PD led by teacher leaders
- Improved administrative leadership
- Development of partnerships
- Creation of professional learning communities

Long-term Outcomes
- Increased K-12 students' knowledge of mathematics and science
- Increased quality of the K-16 educator workforce
- Sustainable coordination of partnerships in the IUs, feedback loops between K-12 districts and IHEs, improved math and science learning experiences for all undergraduates

Increased capacity for change within K-16
Presentation

- Case Studies of Educational Reform
- “Learning Lab” – Making the Connection Between Teaching and Learning
- Teacher and System Variables in Educational Reform
K-12 Case Studies

• Designed to add depth of contextual understanding to the other data sources.
• Years 1, 2, and 3 focused on *levels of teacher participation and depth of reform implementation* in the classroom.
• Years 4, 5, 6, and 7 focused on explorations of *successful implementation* (changes in teaching practice, changes in student engagement, and the maturation of reform adoption).
K-12 Case Studies (cont’d)

• Data categorized by educator’s and districts’ levels of participation: high-participating, mid-level participating, and low-participating districts.

• Classroom observations use the Classroom Instruction Observation Protocol (CIOP) a revised version of instrument earlier developed by Horizon Research, Inc.

• Interview with educators
Analysis

• Classroom Observations: n= 234 lesson observations, analysis across 4 Lesson Elements of Lesson Design, Lesson Implementation, Content, and Classroom Culture

• Five to six subcategories within each of these elements were rated on a rubric from less than effective to highly effective

• Educator Interviews: n=58, focus on richer context for the classroom observations

• Augmented with Teacher and Principal Survey data analysis in Years 2 and 4
Findings

• Engagement = Participation + “Buy-in”
• Range in variation in engagement exists across both *individuals* and *systems*
• High participating teachers demonstrate a clear continuum of growth in content knowledge and teaching strategies evaluate student thinking to guide their instruction.
• Clear development of teachers’ metacognition from the beginning years of the program to the latter years of the project demonstrates teachers’ consistent ability to effectively impact student learning.
“Learning Lab” – Making the Connection Between Teaching and Learning

Participants
- Teacher Leaders (teachers in their 4th or 5th years of training with the MSP)
- Administrators
- IHE faculty

University of Michigan’s Learning Lab
- Forum to examine mathematics instruction
- “The Fishbowl”
- Focus on a single student
- Observation and interview
- Group debriefing
All students can learn:
Using a real, live case example

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>2008</th>
</tr>
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<tbody>
<tr>
<td>Sites</td>
<td>High-poverty, low-performing urban-suburban school district</td>
</tr>
</tbody>
</table>
| Students        | • 3 week summer school session, attendance based on academic difficulties  
                  • Morning math and science lessons  
                  • Inquiry-based instruction  
                  • Not coached or provided any prior exposure to the facilitators or participants |
| Participants    | • 4 day professional development  
                  • Observe an assigned student’s learning  
                  • Afternoon debriefing session  
                  • Field notes and nightly reflections  
                  • Student interview |
| Program         | • MSP math and science coordinators taught lessons  
                  • MSP project director facilitated Learning Lab |
Focus for participants:
• Evidence-based assessment of student learning
• “All students can learn”
• Cooperation and collaboration
• Ongoing learning of practicing educator
• Continued progress in MSP sustainability

Data Collection:
• Observations
• Interviews (joint interviews and a focus group)
• Documentation analysis (journals and reflections)
### Emergent Themes

<table>
<thead>
<tr>
<th>Primary Goals of Learning Lab</th>
<th>Themes from Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>All students can learn</td>
<td>All children can learn with the right supports</td>
</tr>
<tr>
<td>Evidence-based assessment of student learning</td>
<td>Focus on student thinking and learning</td>
</tr>
<tr>
<td>Cooperation and collaboration in a dialogue about learning</td>
<td>We “see” more together than alone</td>
</tr>
<tr>
<td>Ongoing learning on the part of the practicing educator</td>
<td>Pedagogy matters. Direct relationship between teaching and student learning</td>
</tr>
</tbody>
</table>
Challenges

- De-privatize the classroom
- Teacher collaboration
- Professional risk-taking
- Limited teaching experience with high poverty, low performing students pose challenges
- Putting theory into practice with low-performing students
- Varying perspectives on instructional methods
- Focus more on the lesson and instructional methods
Teacher and System Variables in Educational Reform
Individual Engagement

No Engagement

- Doesn’t support “their” learners
- “Biding their time” in their district (veterans on their way out; teachers that may be leaving in a year or two)
- “Am already doing some of this; this is a repeat of what I know”
- Doesn’t align with professional interests
- District is too challenged; can’t see how the MSP could be implemented in their district
Individual Engagement

Low Engagement

• Doesn’t support “their” learners
• “Biding their time” in their district
• “Am already doing some of this; this is a repeat of what I know”
• Has misunderstanding of the MSP philosophy and goals
• Privatized perspective of practice
• Attendance at MSP events is voluntary or required by district; in either case attendance is intermittent
• “Just another reform effort in a long history of reform efforts”… this too will pass
• Not enough time
Individual Context

Medium Engagement

• Often shares many reasons why this isn’t working; rationalizing failure
• Has misunderstanding of the MSP philosophy and goals; narrow representations
• Attendance at MSP events is either voluntary or required; in either case attendance at MSP events fairly consistent
• Hesitant to invest their time as a result of district contextual issues
  — Not enough time
Individual Context

High Engagement

- High buy-in or “readiness” of reform effort
- Supports their professional interests
- Timing was right (looking to increase their leadership in their department/district)
- Has good understanding of MSP philosophy; more robust models of PD and reform
- Supports other initiatives their district is focusing on; cohesiveness across a broader mission
- Is a problem solver; interested in solutions
  - Has created the time
Individual Engagement

Educational Philosophy
- Misaligned with Reform
- Aligned with Reform

Professional Interests
- Misaligned with Discipline
- Aligned with Discipline

Engagement
- Resistant
- Willing

Leadership
- Perceived Powerlessness
- Agency

Systemic Components
Systemic Engagement

No Engagement

• No buy-in from lead administrator, principal and/or teachers
• No participation from lead administrator, principals and/or teachers
Systemic Context

Low Engagement

- Limited support or statement of endorsement from lead administrator, principals and/or teachers
- Low participation from lead administrator, principals and/or teachers
- Accountability motivation
- Passive, hierarchical leadership
- Unfocused vision; fragmented reform initiatives
Systemic Context

Medium Engagement

• Varied buy-in or “readiness” for reform effort
• Varied participation for reform effort
• Larger districts with more buildings, principals, teachers
• “Reactive” response: reaction to poor results or AYP status; accountability motivation
• Administrator and teacher turnover
• “School Improvement” for some schools
• Prohibitive union contracts
• Lack of integration across reform initiatives
Systemic Context

High Engagement

• High buy-in or “readiness” of reform effort
• High participation for reform initiative
• Smaller districts, fewer buildings, principals, teachers
• “Proactive” planning: planning for high achievement; continuous improvement as motivation
• Stable lead administrator in central position
• Active and distributed leadership
• Reform efforts integrated with mission
Systemic Components

Vision
- Unfocused
- Focused

Mission
- Fragmented
- Integrated

Culture
- Resistant
- Willing

Leadership
- Passive
  - Hierarchical
- Active
  - Distributed

External and Internal Resources (Community, Businesses, Financial, Staff, etc)
Aligned Individual and Systemic Reform Agendas

**Educator**

- **Educa1onal Philosophy**
  - Misaligned with Reform
  - Aligned with Reform

- **Professional Interests**
  - Misaligned with Discipline
  - Aligned with Discipline

- **Willing**
  - Perceived Powerlessness
  - Agency

**District or School**

- **Focused Vision**
  - Unfocused Vision

- **Integrated Mission**
  - Fragmented Mission

- **Willing Culture**
  - Resistant Culture

- **Active Distributed Leadership**
  - Passive Hierarchical Leadership

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Alignment, System-Driven
Alignment, Educator-Driven
Sustainability

Educators

System
Learning Across the Journey, Across Evaluation Activities
What Have We Learned About 
*Educational Reform*?

*Engagement = Participation + “Buy-in”*

Range in variation in engagement exists across both *individuals* and *systems*

Sustainable change occurs when individual and system engagement are *dynamically aligned*
What Have We Learned About Educational Evaluation and Research?

*Longitudinal study* is needed in complex, evolving change efforts

*Multiple approaches* are needed to recognize and examine important variables across various conditions and contexts

*Models need to be flexible* to address the changes in context and implementation as they occur

Much can be learned from *qualitative approaches* to examine and document the context and nuances of change

Changes in student engagement and learning are very difficult to measure and attribute to specific interventions
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