

# The Effect of STEM Faculty Engagement in MSP: A Longitudinal Perspective

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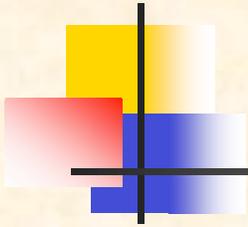
**MSP Evaluation Summit**

**October, 2006**



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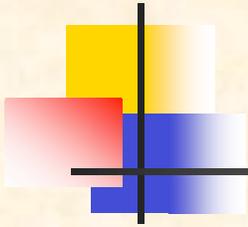


# STEM faculty in MSP

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*Mathematicians, scientists, and engineers, particularly mathematics, science and engineering faculty in higher education partner organizations, play substantial roles in MSP-funded projects; it is their substantial involvement in these projects that distinguishes the MSP program from others seeking to improve K-12 student outcomes in mathematics and science.*

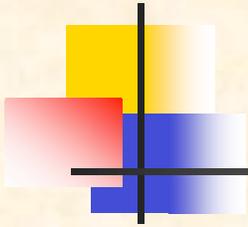
----MSP solicitation



# Project Goals

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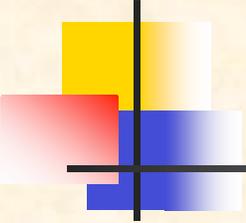
- **Understand how STEM faculty members are involved in MSP.**
- **Examine the effects of STEM faculty engagement on K-12 teachers, students, themselves and their institutions.**



# Research base

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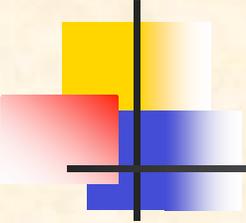
- **Systematic reviews: 1980-2004**
- **Issues**
  - **IHE: reward system**
  - **K-12: professional development experience**
- **Empirical evidence**
  - **Some literature on programs**
  - **Limited on impacts: teachers (Thompson, 2002; Lawrenz, 2003); faculty (Decock, 1996; Haug & Marion, 1996)**



# Research questions--I

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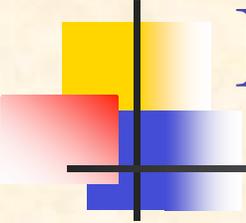
- What **methods** are being used by the projects to engage STEM faculty in their activities, and how do these differ by type of IHE?
- What **levels** of involvement are garnered by various methods?



# Research questions--II

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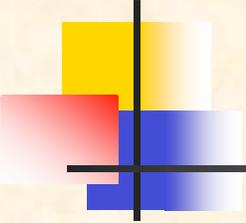
- What are the **policy** implications for engaging STEM faculty?
- How does STEM faculty involvement **evolve**, and does it appear to have the ability to be sustained?



# Research questions--III

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- To what extent does STEM faculty involvement contribute to increases in **teacher** content and pedagogical **knowledge**?
- To what extent does STEM faculty involvement contribute to **student** **achievement**?



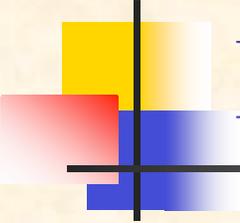
# Research activities

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## ■ Mixed-method design

### Case studies

- **8 MSP projects:** cohorts 1-3 (comprehensive, targeted, institute)
- **Annual site visit:** document reviews, interviews (PI, STEM faculty, education faculty, IHE dean/chair, teachers, principals), classroom observations
- Analysis of project-collected data
- Qualitative (pattern matching) and quantitative analyses (descriptive, correlational)

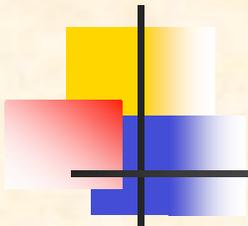


# Research activities—continued

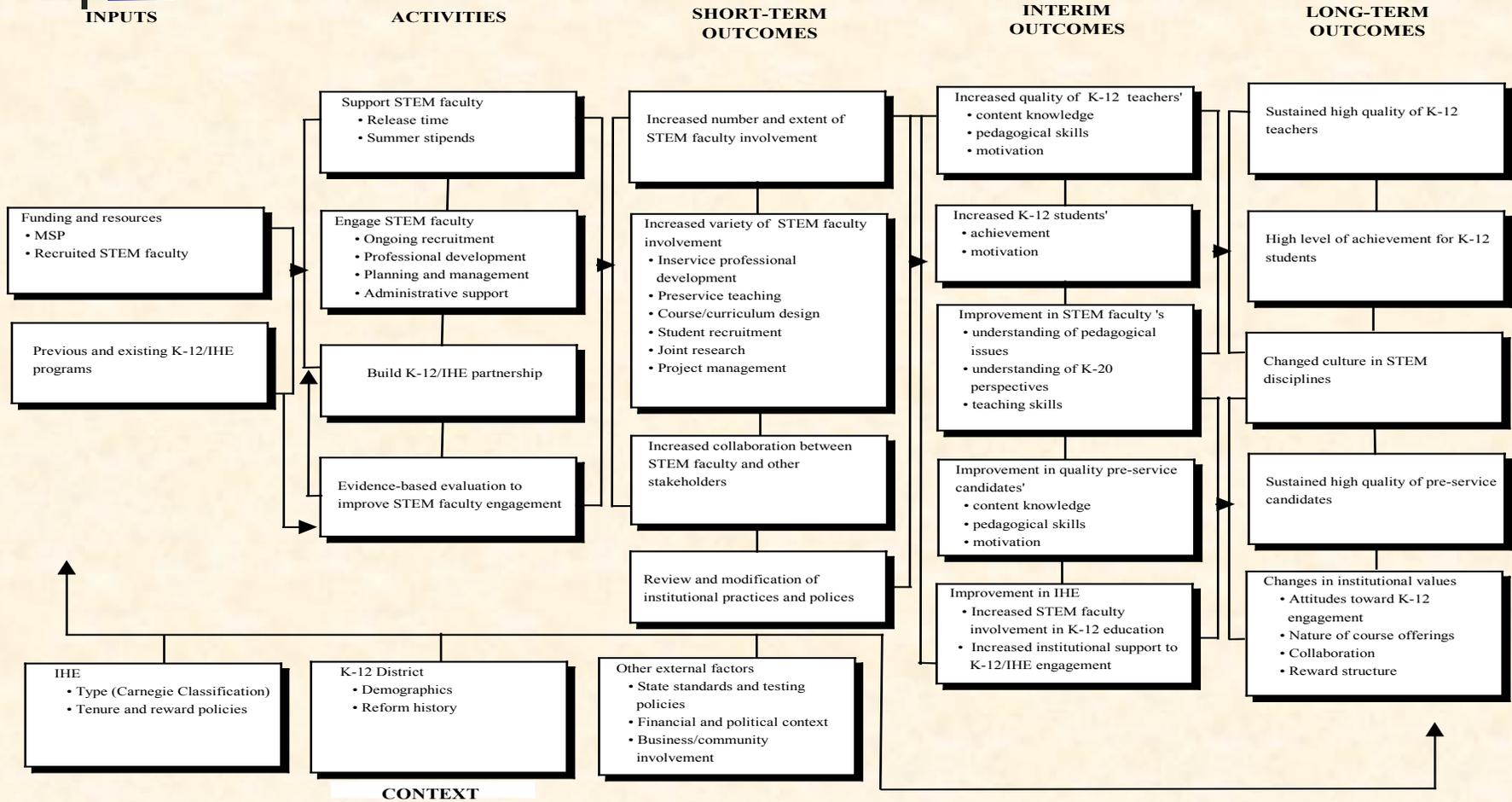
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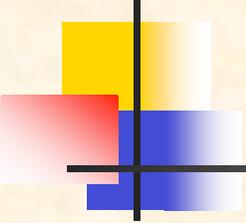
## Management Information System (MIS)

- **All 48 MSP projects**
- **IHE faculty survey**
- **IHE institution survey**
- **K-12 district survey and teacher survey**
- **Descriptive, correlational analysis**



# Logic Model



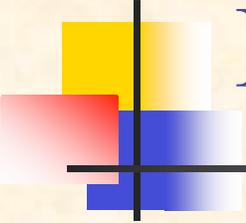


# Preliminary findings

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## Context and project strategies

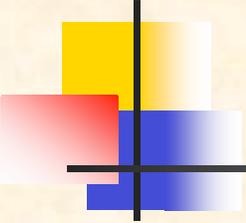
- Traditional **reward structures** and faculty perceptions about the status are major **barriers** for faculty involvement in MSP-like projects. Many IHEs regard MSP involvement as outreach or service but rarely as a “scholarly contribution.” Such activities are a distant **third priority** as compared to research and teaching.
- A number of **policies** are credited with increasing STEM faculty engagement (i.e. targeted hiring, dual appointment).
- Projects have created extrinsic and intrinsic **incentives** (i.e. release time, stipend, PD, redefinition of scholarly work).



# Examples from the field/faculty

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- **Positive:** *“As long as I am chair, it will play positively in terms of tenure and review.”*
- **Negative:** *“Any consideration of coupling the three areas (research, teaching, and service) as equal is moving slower than a glacier.”*  
*“What reward system!”*
- **Neutral:** *“There is no reward for doing this, but it is okay for you to do it.”*

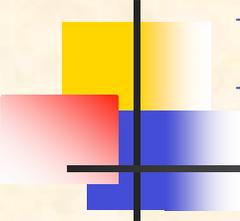


# Preliminary findings—continued

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## STEM faculty in MSP (MIS = 48 sites)

- Nationally, 1084 STEM faculty participated in MSP: 61% male, 86% white and 75% are **tenured** or in a tenure track.
- Majority (85%) of the participants had **previous experience** with K-12.
- STEM faculty involvement is **extensive** and **substantive**: 80% reported more than 40 hours of involvement, 41% had over 160 hours last year.

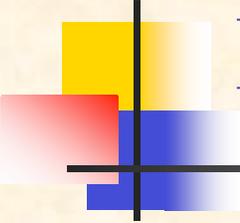


# Examples from the field/faculty

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## Characteristics of ideal STEM MSP faculty

- “ ... a good scientist committed to the education mission as well as to research in their discipline.”
- “ A good general Ph.D. in their discipline, respect for teachers, a keen interest in teaching, openness to new approaches— plus faculty who are ...
- “ ... in touch with their inner adolescent.”

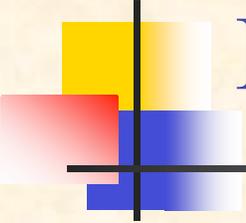


# Preliminary findings—continued

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## **Involvement in inservice (case studies = 8)**

- **Main focus for STEM faculty involvement (7)**
- **STEM faculty work in team: with teacher leaders (7), with education faculty (5)**
- **STEM faculty role: leading (3), equal (3), supportive (1)**
- **Area of contribution: content only (2), content and pedagogy (6).**

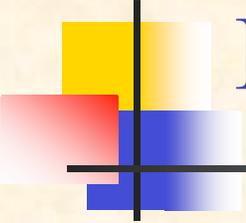


# Preliminary findings—continued

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## Other involvement (case studies = 8)

- **Pre-service:** teaching pre-service content course(4), course/curriculum design (3), student recruitment and mentoring (2).
- **Management:** project management and joint research (8).

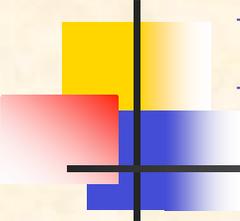


# Examples from the field / faculty

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## Tradeoffs from MSP participation

- **Negatives:** *“Long days, missed family time”*  
*“I lead two lives, research and education. It can be scattered.”*  
*“It dominates my existence.”*
- **Positives:** *“Especially neat to teach what you write.”*  
*“Rewarding—the aha moments”*  
*“Teaching teachers is “the best part—the reward.”*

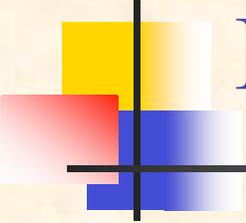


# Preliminary findings—continued

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## Processes and impacts

- **Relationships** with other players are critical to the success of MSP projects.
- Positive impacts were reported for **K-12 teachers** in terms of content and pedagogy.
- Evidence on **student achievement** is not yet available.
- **STEM faculty** acknowledged **learning** (i.e. discernment about pedagogy, understanding of K-12, team work).

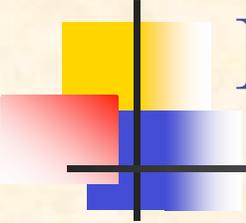


# Examples from the field/ teachers

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## Reactions to working with STEM faculty

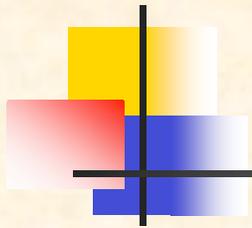
- *“(STEM faculty) see the big picture”*
- *“Challenging but manageable.”*
- *“Reinforces foundation blocks for the future.”*
- *“They do a good job here. It shows us a process we have not had yet—beyond formula.”*
- *“There are lots of ‘aha moments’ in this class.”*
- *“We found that they are just like us.”*



# High STEM involvement projects

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- Institutional and structural support
- High profile of key players
- Critical mass of STEM faculty
- STEM faculty provide instruction
- True collaboration
- Looking Ahead



# The Team

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- **Westat researchers**

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Glenn Nyre, Joan Michie, Atsushi Miyaoka, John Wells

- **STEM site visitors**

Alexander Hahn, Rhonda Hatcher, Nancy Jestel,  
Donald Jones, Katrina Palmer, Eric Rawdon,  
Wilfred Schmid, Eric Sheppard

- **Advisory panel**

Jerry Gaff, Laurie Fathe, David Kaplan,  
Alfred Manaster, Eugene Rice.