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# Examining School Administrator Professional Development in Math and Science Education

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# Abstract

Lenses on Learning (LOL) and Eyes on Science (EOS) were PD opportunities for administrators as part of a Math Science Partnership to increase awareness and understanding of inquiry-based math/science pedagogy, introduce a process of teacher observation and teach the assessment of student learning through questioning/conversation.

Interviews conducted with participants discuss changes in their practice as a result of participation.



**Lenses on Learning (LOL)** is a research-based professional development opportunity funded by the National Science Foundation and developed by the Educational Development Center. LOL is designed to foster and deepen effective inquiry-based mathematics practices by engaging administrators in mathematical problem-solving, introducing observational methods for gathering evidence of student learning, and nurturing an iterative process of teacher supervision through co-inquiry questioning. Each series of LOL seminars begins in the summer months, prior to the start of the school year. Two full-day summer sessions are held first, followed by eight half-day sessions during the school year.

After successful completion of the LOL series, administrators can further their development by participating in **Eyes on Science (EOS)**. EOS, developed by the Math and Science Partnership of Southwest Pennsylvania (MSP), leads participants through the essential features of instruction in an inquiry-based science classroom. Its pedagogical foundations are rooted in the five essential areas of scientific inquiry as defined by the National Science Education Standards. Serving in a more condensed capacity, EOS consists of three seven-hour sessions held throughout the school year.



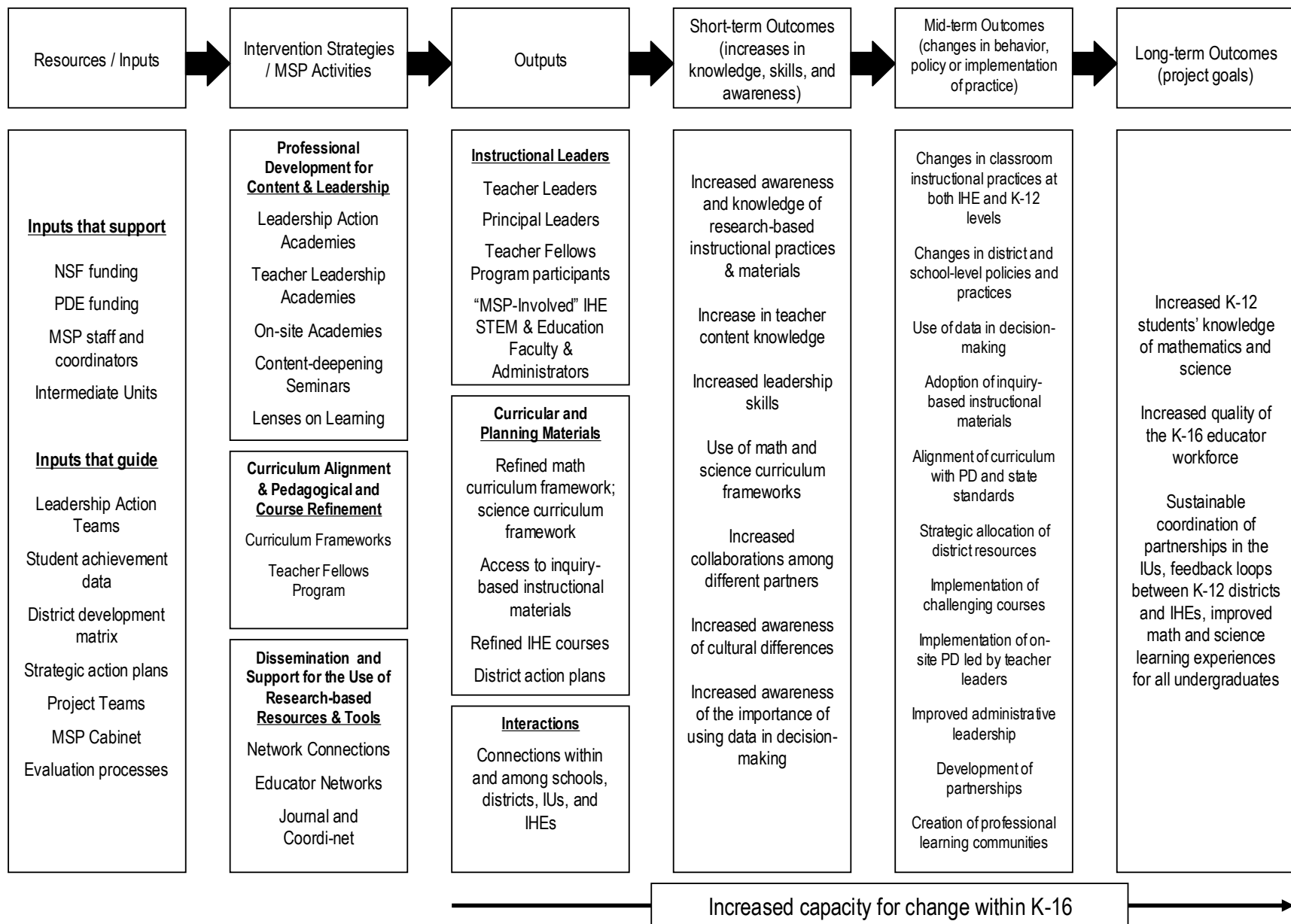
# Context

- This evaluative study explored the participation of 81 districts, and 315 administrators in approximately 8,569 hours of LOL and EOS since 2003.
- Both LOL and EOS are intervention strategies identified in the overall Math and Science Partnership of Southwest Pennsylvania (MSP) logic model which includes components designed to provide professional development to support participants' math and science content knowledge and instructional leadership.
- As support from district leadership is seen as an important component of instructional improvement, LOL and EOS are key intervention strategies of the MSP for gaining administrator support.
- Offered since Year One of the MSP (2003-2004), LOL became a required administrator activity for districts wishing to become a part of the MSP during the Year Three (2005-2006) expansion (Williams, Pane, Tananis & Olmsted, 2005). Data collection continued through 2009.
- Additional follow-up is planned for 2012-2013 of teacher and administrator sustained change.



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- The MSP Logic Model illustrates the collective theory of action for the MSP and identifies LOL and EOS as one of the five professional development intervention strategies designed to impact content knowledge and instructional leadership.
- Engagement in LOL and EOS is designed to increase participant knowledge, skills and awareness of mathematical and science content, teaching and learning (short-term outcomes), leading to changes in behavior, policy or implementation of (mid-term outcomes) that will ultimately achieve the project goals of the MSP (long-term outcomes)





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- As the MSP began implementation and evaluations progressed, compelling information began to emerge, and alluding to the importance LOL and EOS had in supporting change in instructional leadership among participants.
- In 2003, participants expressed high praise for LOL and indicated that the trainings had been some of the most significant professional development of their career. (Williams, Pane, Tananis & Olmsted, 2005).
- Principal surveys conducted in 2004 and 2006 revealed higher values for LOL participants in the areas of administrative leadership skills and changes in district and school level policies (Tananis, et al, 2007).
- Burgess (2009) conducted a quantitative analysis of MSP data in which administrator participation in LOL was positively correlated to the amount of site-based professional development offered in the same district.
- Recognizing the growing importance of LOL in fostering administrator support for instructional improvement, CEAC commissioned this evaluation to gauge the change in principal practice resultant from involvement in LOL.



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- What was the most influential LOL or EOS experience as a participant?

How did that impact your practice?

Was that a practice you learned through LOL?

Is this something you've been able to continue?

Can you give me an example of this occurring in your district/school?

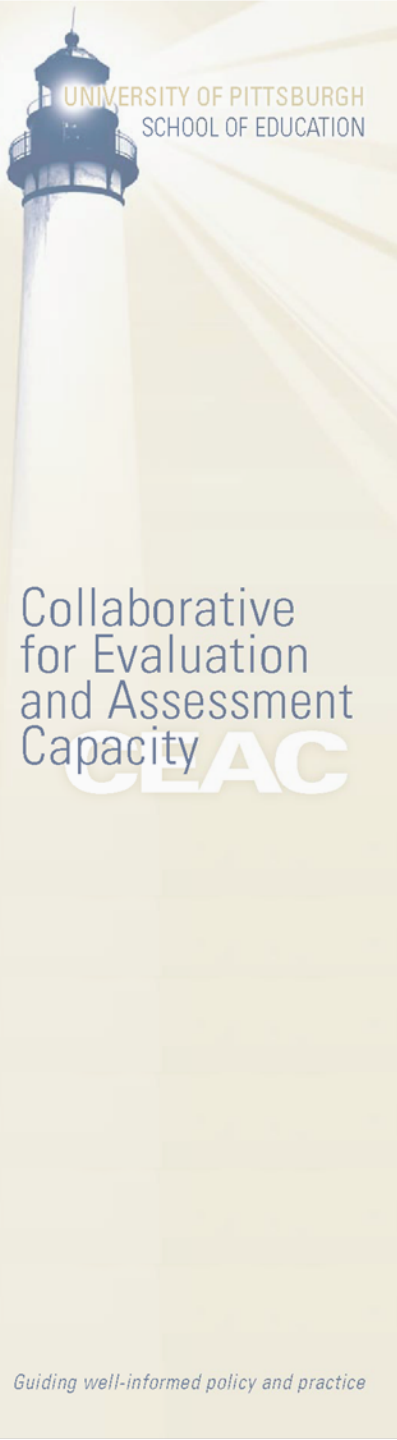
- How would you describe your role as a leader of math and science reform?
- Have you seen overall growth in math or science teaching and student learning in your school?

If so, do you think this is related to the MSP and/or your participation in LOL and/or EOS?



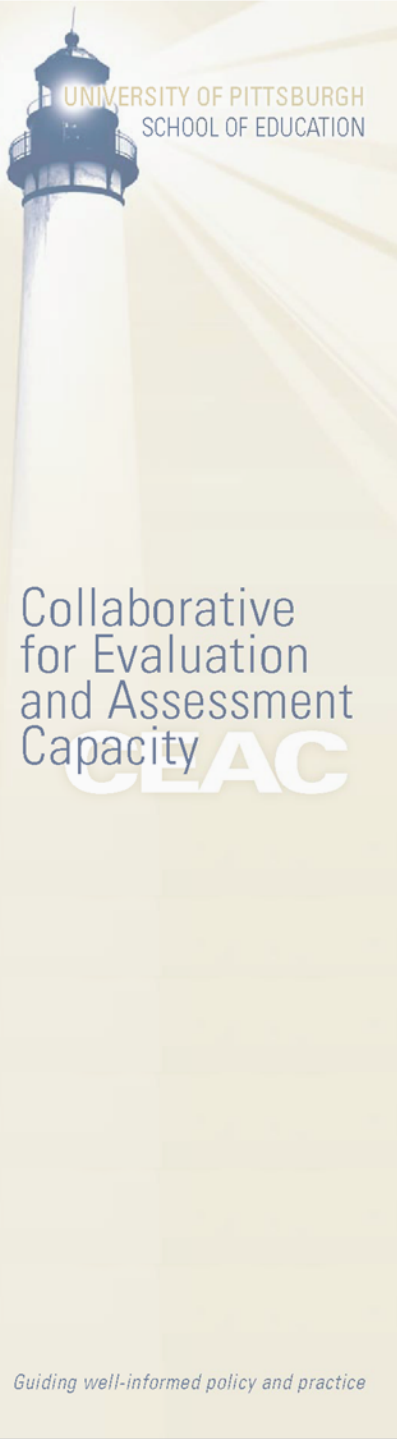
## Emergent themes include:

- A shift from teacher actions to student learning during observations
- Value of engaging in inquiry-based math/science during PD
- Importance of listening to student conversations as evidence of learning
- Increased content area knowledge as stronger basis for reform
- Teacher “buy-in” is necessary for continued reform



## **You Want to Hear Them Thinking: Student Conversation as Evidence of Learning.**

Participants overwhelmingly indicated that LOL had shown them that student conversations are a rich source of information to assessing student learning. Developing an environment where students are encouraged and required to explain both their process as well as their answer was seen as a key component of good teaching.

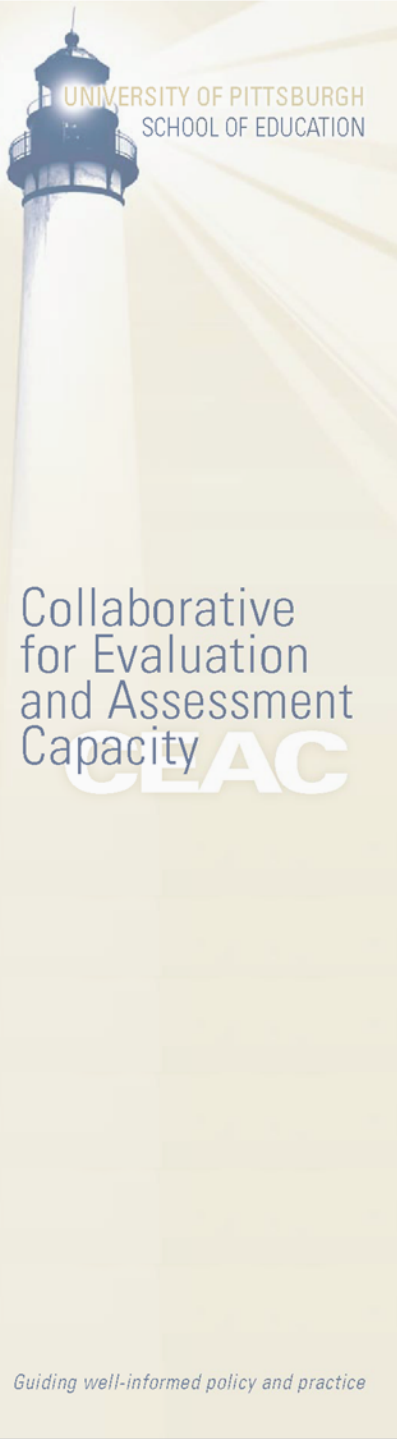


## **Because I Understood It, I Could Support It: The Role of a Leader of a Math and Science Reform.**

Participants saw themselves as being a strong support to teachers by providing the materials, instructional leadership and trusting environment necessary for implementing school-wide reform in math and science instruction.

## **Observational Paradigm Shift: Focusing on Student Learning vs. Teacher Actions.**

Participants placed significant emphasis on the influence LOL had in directing their attention to student learning as opposed to solely observing teacher actions during classroom observations, a practice either solely learned or professionally validated through their participation.



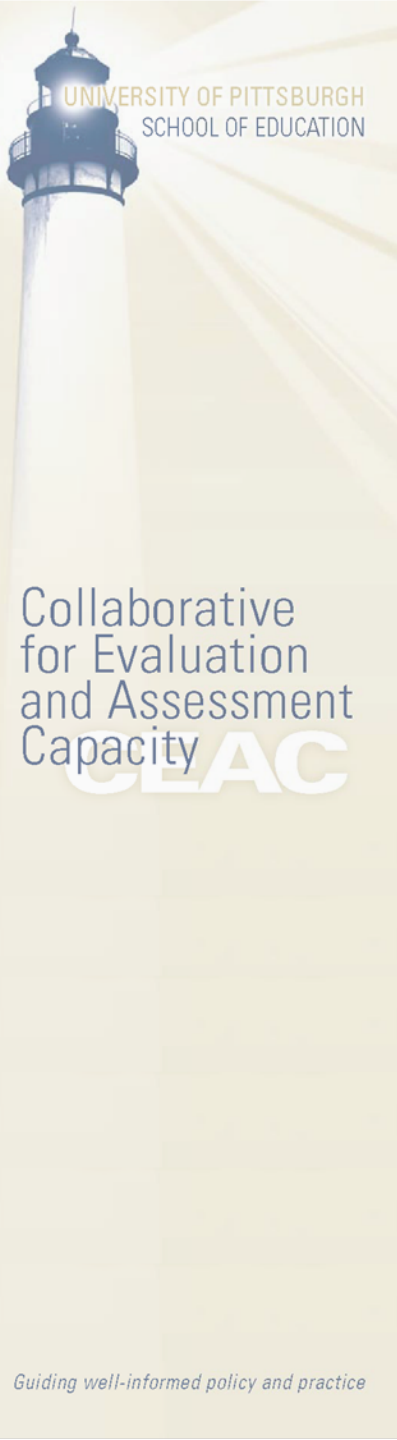
## **Hands-On Experience: The Value of Engaging in Inquiry-Based Math and Science During Professional Development.**

Participants found the hands-on activities focusing on inquiry-based practices extremely valuable in deepening their conceptual understanding of mathematics which supported their ability to recognize and support inquiry-based teaching and learning in their schools.



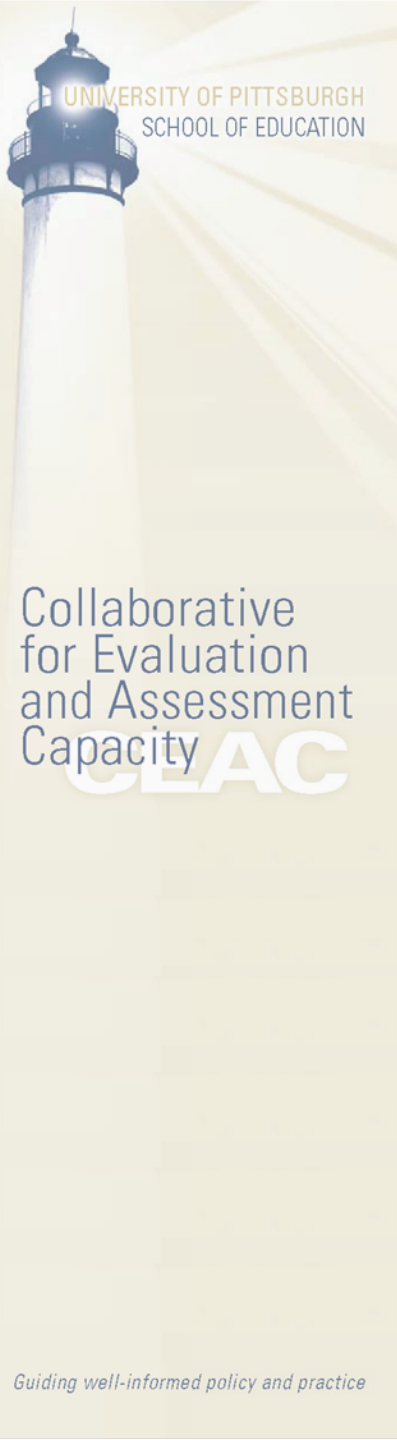
## **From Small Steps to Leaps and Bounds: Growth and Innovation in Inquiry-Based Instruction.**

Participants believed that where there was administrator and teacher buy-in; there was growth in inquiry-based mathematics and science instruction. New and inventive methods of instruction and assessment were identified and seen as a positive result of MSP involvement.



## **Moving in the Right Direction: Growth in Student Learning Outcomes.**

Several participants identified both a steady growth in assessment scores in math and science, an improvement they perceived to be attributable to the adoption of an inquiry-based curriculum and the cumulative effect of their district's involvement in the MSP.



## **MSP Outcomes are Supported through Administrator Professional Development.**

Feedback from the participants was extremely positive and indicated that the areas targeted by LOL and EOS support the achievement of the short-, mid- and long-term goals established by the MSP logic model.





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