MSP Learning Network Conference 2012 Theme: Framing Effective Teaching in STEM

Conference Goals

1. **To learn more about effective STEM teaching: What are ways of defining and theorizing it? What are ways of measuring it? What are supports that work to improve STEM teaching?**
2. **To network: What can we learn from each other? How can we benefit from each other's expertise and what we are learning?**
3. **To continue learning: What new ideas can you take from this conference and put to use in your MSP work when you return home? What ways will you continue to work with others you meet at the LNC?**

Conference Strands:

1. **How do we define effective STEM teaching in preK-12 and post-secondary education?**
2. **How do we prepare and support teachers and faculty to teach effectively?**
3. **How do we know we are making progress toward more effective STEM teaching?**

In order to think about "effective teaching in STEM," we offer this description of teaching as a way to initiate some conversation and reflection:

Teaching is what teachers do, say, and think with learners, concerning content, in a particular organization of instruction, in environments, over time. What we often mistakenly refer to as the practice of teaching is a collection of practices, including pedagogy, learning, instructional design, and managing instructional organization. (Cohen, Raudenbush, & Ball, 2002, p. 90)

Theme: Framing Effective Teaching in STEM

Effective STEM teaching is necessarily viewed from multiple perspectives, including those of different stakeholders (students, instructors, administrators, policymakers) as well as different views on how to implement and interpret teaching (e.g., different learning theories, prioritizing different aspects such as pedagogical content knowledge vs. pedagogy vs. application of content knowledge). There is a need to articulate how different perspectives construe and contribute to understanding what effective teaching is in different disciplines.

Additionally, achieving effective STEM teaching, at all different levels (pre-K, elementary school, middle school, high school, undergraduate, graduate school), and in different contexts and communities, is an ongoing evolutionary journey of improvement rather than a fixed destination at which one can arrive (and remain). Thus, research examining effective STEM teaching necessarily evolves to push the boundaries of the field's knowledge.

While teaching and learning are inextricably connected, the focus of this year's LNC is on effective teaching in STEM, with the understanding that teaching cannot be effective if it is not connected to learning. STEM teaching is much broader than classroom practices, as interactions among teachers, learners, and content are situated in theories of teaching and learning, as well as multiple environments that impact effective STEM teaching.

One way to characterize the different influences on STEM teaching is to use a logic model, breaking it down into *conditions*, *activities*, and *outcomes*. The *conditions* are what make effective STEM teaching possible, and include, but are not limited to: coherence among the various components of the education system (or sub-systems); common or differing visions and values among stakeholders; theories of teaching and learning; productivity of relationships among stakeholders in teaching and learning;

student, teacher, and school accountability and responsibility; cross-disciplinary connections; curricula and standards; school culture and leadership; and ongoing, effective professional development.

The *activities* of STEM teaching include: the craft of teaching; processes of teacher preparation, community building, systems thinking, flexibility; and changing the culture of teaching and learning. While the primary desired *outcome* of STEM teaching is student success in STEM learning, there are many other outcomes of interest as well, including: interest in and aspirations to further study and pursue careers involving STEM disciplines; value for STEM; ability to use and adapt understanding of STEM content in interpreting information and making decisions in daily life; transfer of STEM content and reasoning to other academic disciplines; understanding the origins of learners' misconceptions; assessing/diagnosing student difficulties/challenges in order to intervene strategically in fostering learning; and preparation for and success in post-secondary STEM.

Strand 1: How do we define effective STEM teaching?

Abstracts submitted to this strand should carefully specify your MSP project's definition of effective STEM teaching, as well as how you document teaching for the purpose of determining effectiveness. Abstracts should include your MSP's theory of action, theory of leadership, and/or theory of learning/instruction related to effective STEM teaching. Abstracts may address how schools or school districts recognize effective STEM teaching, or what effective STEM teaching looks like at the post-secondary level. How has your MSP's definition of effective STEM teaching evolved since you first wrote your proposal?

Strand 2: How do we prepare and support STEM teachers and faculty to teach effectively?

Abstracts submitted to this strand should first include your MSP project's definition of effective STEM teaching. Abstracts should address how effective STEM teaching should be supported, especially at the system level, at either preK-12 or post-secondary education levels. Abstracts should also address the strategies, resources and policies needed to support effective STEM teaching, and the implications for teacher and faculty preparation, recruitment, retention, professional development, compensation and evaluation. What has your MSP learned about preparing for and supporting effective STEM teaching that you did not know when you wrote your proposal?

Strand 3: How do we know we are making progress toward more effective STEM teaching?

Abstracts submitted to this strand should first include your MSP project's definition of effective STEM teaching. Abstracts should describe how your MSP gathers and analyzes evidence of effective STEM teaching. What types of evidence inform progress toward more effective STEM teaching? How can and does your MSP assess progress toward more effective STEM teaching? What is the intersection between K-16 student success and effective STEM teaching? What does your MSP know now about measuring progress toward more effective STEM teaching that you did not know at the time you wrote your proposal?