



## Mathematically Connected Communities- Leadership Institute for Teachers (MC2-LIFT)



### Our Definition of Effective STEM Teaching

Our definition of effective STEM teaching is: creating an environment in which students actively engage in problem solving and mathematical dialogue. Effective STEM teaching facilitates learning for *all* students as they engage in cognitively demanding tasks. The teacher designs the classroom environment so that students have sufficient opportunities for reasoning and sense making which result in useful mathematical knowledge, skills, and dispositions. Effective STEM teaching requires the teacher's continual development of their professional content, pedagogical knowledge and skills, and relies on feedback through ongoing assessment of what students are understanding and not understanding.

### Our Theory of Action

In order to have effective mathematics teaching, we believe that public school teachers need to have strong backgrounds in mathematics and how to teach mathematics content. They need to be knowledgeable of research-based pedagogical practices, knowing how to facilitate a student-centered classroom with a heavy emphasis on activities leading to deep understanding and good synthesizing of learning. Our institute courses are designed to give teachers content and pedagogical knowledge, and the institute facilitators model good teaching practice. Notably, we make great efforts to model the launch/explore/share/summary lesson structure and facilitator questioning. The study of mathematics through vertical trajectories creates a learning environment with multiple entry points, many landing places, and high ceilings. Institute work is designed to integrate mathematics and pedagogy, and to require application of institute learning to the teacher's classrooms and schools.

### What are we learning?

- We have learned that it takes trust, time and opportunities to develop a learning culture. Teachers need to know their voice is valued.
- Work in LIFT courses is improving teachers' content knowledge, based on pre/post data.
- Teachers are improving in creating Standards-based learning environments, based on OLE data. Gains are not uniform, and do not extend into periods preceding standardized testing.
- We have learned to provide teacher-to-teacher support systems to help teachers redefine themselves as leaders. We realized that if we want teachers to develop as teacher leaders who collaborate with others to improve classroom practice, it was necessary to model a reflective and collaborative learning environment for teachers in the cohort.
- The development team learned strategies for classroom discourse to highlight the richness of elementary teachers' mathematical thinking. LIFT instructors learned to intentionally scaffold class discussions to encourage elementary teachers to share their conceptual understanding and make connections to procedures presented by secondary teachers.
- It is important to give effective feedback and to build useful mechanisms for peer feedback.

### What have we found challenging?

- Getting the teachers to give effective peer feedback can be difficult, especially when we did not provide a good structure for their feedback.
- Getting primary grade teachers to voice their ideas was often difficult, especially early in the program. While they often have good ideas, they can be reluctant to share, especially with higher-grade teachers in the cohort.
- Getting higher-grade teachers, especially high school teachers, to fully value input of primary grade teachers and primary grade perspectives.
- Having to be constantly aware of how our actions, feedback, etc., affects the teachers. We need to make sure we are modeling effective behavior and making sure we keep a healthy learning environment.

### Brief Bibliography

- Kinzer, C., Virag, L., Morales, S. & Wiburg, K. (accepted 2012) Partnerships for Learning: Using an Innovation Configuration Map to Guide School-University Partnerships.
- Kinzer, C., Virag, L., & Morales, S. (2011). Mathematics Learning Environments. *Teaching Children Mathematics Journal*. 480-487.
- Kinzer, C., & Bradley, J. (2010). A district mathematics leadership team: Deepening the collective focus. *Journal of Mathematics Education Leadership*, 13
- Kinzer, C., Wiburg, K., & Virag, L. (2010). University/public school research partnerships in mathematics. *Border Walking Journal*, 61-69.
- Kinzer, C., & Bradley, J. (2009). Developing a shared vision. *Journal of Mathematics Education Leadership*, 11(1), 39-41.