MODEL FOR SCAFFOLDING THE SCALE UP OF A MATHEMATICAL FUNCTIONS PROFESSIONAL DEVELOPMENT PROGRAM UTILIZING LESSON STUDY

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This poster proposes a model for scaffolding the scaling up of a professional-development (PD) program in the USA for the teaching of mathematical functions across three school districts. The poster will include the theoretical framework for mathematical functions PD program as well as the layout, methods, measures, key actors, and challenges for each component of the scale up model.

PURPOSE

The purpose of the project is to develop and test the promise of a PD program for math specialists and teachers for the teaching of functions in middle schools. One recommendation for PD that significantly impacts student learning is the use of lesson study and inquiry instruction. This project builds off of a fully developed project of lesson study with fractions by Catherin Lewis and colleagues (2017), which has been evaluated under an IES Efficacy and Replication grant, resulting in a model for middle school math functions. Four research questions for scaling up the PD are described below.

RQ 1: What does it take to scale up a PD program?

The initial design of the PD program is improving the teaching of mathematical functions. The PD includes lesson study (Lewis & Perry, 2017), instructional strategies (e.g. inquiry instruction), function tasks, and function knowledge support (MKT). The PD initially supported with state funds for 20 teachers each year to providing more teachers access through an online experience. This includes responses to research RQ 2-4 as well as the culminating quasi-experimental study with a replication for the PD program.

RQ 2: Which aspects of the intervention could be scaled up, which couldn't and which shouldn't?

The model utilizes design experiment (Cobb et al., 2003) to determine which aspects of the PD program (see RQ 1) could be scaled up, which couldn't, and which shouldn't. The details for the process include (a) providing functions content as a baseline, (b) providing content and lesson study, (c) providing content with LS cycle.

RQ 3: What types of measures about teachers' MKT can be applied and why?

Measures used to characterize teacher's fidelity of implementation include math specialist and teacher logs, surveys, observations, and interviews. Measures of student learning outcomes from the pilot study include the state exam, NWEA-MAP, and functions assessment designed and validated during the development process.

RQ 4: What challenges arise when collaboration includes multiple school districts?

Here we describe the formation of the collaboration with the three distinct school districts and their mathematics specialists This includes some of the challenges we have had thus far and what challenges we anticipate. Also, we include why some challenges are good and can inform future research of the PD program in other schools.

References

Cobb, P., Confrey, J., DiSessa, A., Lehrer, R., & Schauble, L. (2003). Design experiments in educational research. *Educational researcher*, *32*(1), 9-13.

Lewis, C. & Perry, R. (2017). Lesson study to scale up research-based knowledge: A randomized, controlled trial of fractions learning. *Journal for Research in Mathematics Education*, *48*(3), 261-299.