Appendix H

Process for selecting DMI from possible programs.

The goal of the proposed study is to assess the impact of a professional development program that focuses on developing teachers' knowledge of the formal mathematics that underlies fractions in order to promote development of student understanding of the mathematical ideas as well as computational proficiency. In order to maximize the chance that a promising professional development approach would be the target of the evaluation, the research team conducted a What Works Clearinghouse-type review of rigorous research evaluating mathematics PD approaches. A search of the research literature published between January 2006 and July 2012 (or were identified in a previous review by Yoon et al., 2007) was conducted. All studies that potentially could provide causal evidence of the effectiveness of teacher PD on student achievement were analyzed. Based on the five studies that were of acceptable technical quality, two professional development approaches, namely *Lesson Study* and *intensive math content courses* yielded either statistically significant outcomes on some mathematics measures or indicated relatively large impacts on mathematics outcomes (effect size greater than .25).

While it would have been ideal to scale-up one of these two empirically supported professional development approaches in the proposed study, neither of these were suitable for a large evaluation. First, neither of these approaches has an established infrastructure for training and support. Implementation of these programs in the research studies was conducted by university-based researchers who do not have a network of trainers available to travel the country or staff available to answer questions. Second, neither of the approaches are available in a packaged off-the-shelf configuration. The professional development approach in each study was designed and implemented idiosyncratically for each study. At first glance *Lesson Study* may seem an exception to this, as books are available; however, these materials do not lead one to the implementation actually conducted in the supporting study (Perry & Lewis, 2011). In summary, these approaches lacked the capacity for a multi-state, multi-site study.

The literature search did not yield mathematics professional development programs that had a sufficient support infrastructure for implementing a large-scale evaluation. However, members of our research team in consultation with math experts in the field[1] had identified four professional development programs with existing infrastructures to support an implementation on a large scale. Four approaches were identified in that effort: *Intel® Math* (Intel, 2013), *Developing Mathematical Ideas* (DMI; Schifter et al., 2010), *Math Solutions* (Burns, 2013), and *NUMBERS*

[1] These experts included: Sybilla Beckmann (University of Georgia), Everly Broadway (Mathematics Curriculum Director, Texas Education Agency), Mark Driscoll (Education Development Center), Philip Ogbuehi (Mathematics Specialist, Los Angeles Unified School District), Steve Schneider (WestED), John Woodward (University of Puget Sound).

(Woodward, Douglass, & Stroh, 2013).

These four approaches were evaluated in terms of the potential scalability into the context of a large-scale effectiveness trial, and appropriateness for the need of stakeholders in Georgia and South Carolina. However, based on our initial discussions with the research alliance partners, two of these programs *Intel Math* and *Math Solutions* were deemed not suitable for scaling-up in the context of the needs of the research alliance. *Intel Math* requires at least 80 hours of participation time from teachers. This was an unrealistic expectation for the LEAs involved with our alliance. The developers of *Math Solutions* did not have a well-defined fixed package of professional development. Instead *Math Solutions* customizes its deliverable for each LEA. Given the fluidity of what constitutes proper implementation, it was decided to drop this program from consideration.

Two approaches (*DMI* & N*UMBERS*) remained for consideration. Both had a robust infrastructure to deliver professional development on a large scale.

The findings about the various professional development programs were shared with the members of the research alliance. The research alliance members examined *DMI* and *Numbers* extensively and finally voted to select *DMI* for this evaluation.

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