

Improving Mathematics Learning Across and Within High-Need Urban Schools: Results From a Research Community”

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Midvale and Lincoln Schools are “paired” schools in the Madison Metropolitan School District. The schools were “paired” in 1984 as the district response to court-ordered desegregation. The Midvale and Lincoln neighborhoods were joined to form one community of learners with two schools. Midvale serves students in grades kindergarten through second and Lincoln serves students in grades third through fifth with a total enrollment of approximately 800 students. 70% of Midvale and Lincoln students live in poverty, 40% speak English as their second language, 25% of the students are African-American, 25% are white, 35% are Latino, 11% are Southeast Asian, 2% are Asian, and 2% are Native American. Both schools are active participants in the UW’s Professional Development School (PDS) Program.

Beginning in fall 2005, Margaret Jensen, a district math support teacher and coach, began working with Midvale teachers exploring research-based practices to support learning mathematics in the primary grades. This explicit and intentional professional development seemed to be worth noting as it related to improved student achievement. During the 2007-2008 school year, a leadership team (comprised of Midvale and Lincoln’s principals, school-wide and math instructional resource teachers, district math resource teachers, the PDS site supervisor, and two university professors) formed to study the impact of explicit and intentional professional development and the causal interface with the PDS model as they relate to both schools’ efforts to improve the quality and the continuity of math instruction K-5. This leadership team developed a graduate course for Midvale-Lincoln teachers specifically designed to meet needs

expressed by school staff. This professional development studies the effectiveness of a district supported framework for teaching balanced mathematics at Midvale and Lincoln Schools discussed next.

The Madison Metropolitan School District (MMSD), based on the guidelines outlined by the National Council of Teachers of Mathematics (2000), has been exploring a pedagogical framework for teaching mathematics in elementary schools. This framework assumes a balanced approach to mathematics instruction that incorporates problem solving, number work, inspecting equations, and fluency/maintenance. The framework is outlined in two MMSD created guidebooks, *Learning Mathematics in the Primary Grades* and *Learning Mathematics in the Intermediate Grades*, and has been supported through ongoing professional development offered by the district.

For the past 18 months district and school personnel have been working with Midvale-Lincoln Elementary Schools to support teachers as they incorporate the ideas of the framework in their own teaching. During this time, teachers have utilized *Fact Fluency Assessments* to inform their instruction regularly. These assessments were developed by the district to help teachers know their students' number knowledge. These interviews, designed to inform instruction, have also caused teachers to crave additional knowledge and support to guide their instruction. Given this teacher feedback, school staff felt it imperative to gather input from our PDS partnership with the potential of researching and gaining understanding of how our schools' were making progress as a direct result of specific professional development efforts.

Our leadership team had been meeting monthly to discuss the outcomes of this intentional professional development as it relates to student outcomes. In summer 2008, the leadership team contacted and engaged additional University of Wisconsin faculty into the

conversation to investigate two key issues: (1) In what ways does this model for teaching balanced mathematics provide a pedagogical framework that supports access and opportunity for all students as measured by participation, status, and achievement? (2) How effective is professional development in supporting teachers to develop the disposition toward and strategies to address the standards within this pedagogical framework?

To respond to these questions the University sponsored a semester-long professional development seminar offered as a graduate course worth three credits. In collaboration with members of the Midvale-Lincoln team, the course was designed to (a) build on current district sponsored professional development to further teachers' understanding of and use of the balanced mathematics framework and (b) explicitly consider the equity implications of the framework. During the seminar teachers studied how the framework supports access and achievement by (1) reading, discussing, and reflecting on research articles, (2) identifying ways to use the framework in conjunction with district standards by developing and observing lessons, and (3) writing weekly reflections that track their perceptions of how their pedagogy is changing and providing explicit examples of how they perceive access to learning was changing. During the 10 three-hour seminar sessions, teachers worked together to discuss ways they could support student learning in relation to the district's balanced-math framework. Outside of the seminar, teachers videotaped their interactions with select students and reflected on how those interactions aligned with the ideas of the framework and addressed equity.

During the school year and the time of the seminar, Midvale and Lincoln's math Instructional Resource teachers had also been gathering data regarding student's fact fluency assessments. These assessments designed to guide teachers in choosing appropriate number work for students require teachers to take note of the students' strategies to solve the problems. These

assessments track students' number knowledge in addition, subtraction, multiplication, and division of single digit numbers. As a result of gathering data teachers report that they have developed a more in depth understanding of strategies students employ to solve problems. This has moved teachers to improved instruction in the area of number development. To illustrate, teachers have sought out strategies to develop students' ability to cross tens. Clearly, instruction is moving beyond memorizing facts to developing strategies for solving problems and understanding. We will continue to collect and study student achievement data and the relationship intentional and explicit professional development has to this data.

In closing, this kind of integrative collaboration between school, district, and university staff offers an example of how these entities can work together to address students' needs. The key aspect of this work is the way that the university contribution was integrated into what was already going on in the schools regarding math professional development. Instead of the math education professor teaching a more general course, Anita Wager designed the course around the specific needs of the teachers and the school improvement goals of the schools. In addition, she modified her research to incorporate data collection about topics the schools wanted to know more about. At the end of the seminar, teachers' requested that their professional development continue as they realized that they were beginning to gain a deeper understanding of mathematics and equity in their classroom practices. Teachers also reported that they appreciated the opportunity to collaborate with their peers across the two schools with the guidance and benefits of university professor. The success of this seminar exemplifies the possibility for school improvement as a result of intentional professional development supported by the collaboration of K-12 public school and higher education.