



## **The 2004-2005 Pershing/Rice University Math Partnership: PUMPing Up Math Achievement**

Pershing Middle School, a comprehensive multi-cultural middle school in the Houston Independent School District (HISD) with the support of the Rice University School Mathematics Project (RUSMP), a nationally recognized center in mathematics education, was awarded a \$50,000/ year, five-year Focused Impact Grant by the Houston A+ Challenge. This grant, The Pershing/Rice University Math Partnership: PUMPing Up Math Achievement, focuses on developing a mathematics enrichment program for students at-risk of failure in mathematics – both in their mathematics classrooms as well as on the state-mandated Texas Assessment of Knowledge and Skills (TAKS). Grant activities focus on the development and implementation of a problem-solving enrichment program that allows students to practice and refine the problem-solving strategies that they are taught in their mathematics classes.

The enrichment program is a departmental effort with all twelve Pershing Middle School's mathematics teachers teaching approximately 240 students at the sixth-, seventh- and eighth-grade levels. RUSMP Directors assist with the development and implementation of the program. Throughout the course, students work in cooperative groups to develop the higher-level strategies necessary to solve engaging problems. All the students in the program work on the same problem(s) each day.

Research was conducted during the 2004-2005 school year as part of the evaluation of the effectiveness of the program during its first year of operation. Survey and achievement data were supplemented by observational data collected from the frequent interaction by RUSMP Directors with the teachers and students participating in the program.

Student achievement data was particularly noteworthy. Data from the administration of the mathematics portion of the Stanford 10 indicated increased student performance for both students in the enrichment program as well as for the entire student population. For the students enrolled in the enrichment program, the 2004 Stanford 10 mean mathematics score was 44.84 ( $SD = 16.9$ ,  $N = 209$ ), and the 2005 Stanford 10 mean mathematics score was 50.25 ( $SD = 18.4$ ,  $N = 212$ ). Of the 198 students for whom both 2004 and 2005 scores were available, the mean 2004 score was 44.90 ( $SD = 16.8$ ), and the mean 2005 score was 50.12 ( $SD = 18.2$ ). A paired sample t-test was conducted. Results indicated a statistically significant increase in mathematics scores  $t(197) = 3.88$ ,  $p < .001$ . Problem-solving scores for the entire student population (including English Language Learners and special education students) indicated an increase in problem-solving achievement at all grade levels.

Over 80% of the students believed that their teachers encouraged them to find different ways to solve problems, accepted mistakes as long as they were learning, and wanted them to understand mathematics rather than simply memorize procedures. Survey results indicated that a majority of students found the course fun and interesting. Observational data illustrated the strengths and weaknesses of the departmental collaborative effort and the effectiveness of the mathematics faculty in leading student-centered problem solving instruction.

All of the data collected informed the stakeholders to the successful assets of the program as well as to obstacles that needed to be addressed and overcome for effective long-term implementation to occur.

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