GADSDEN MATHEMATICS INITIATIVE, MAY 2000 – DECEMBER 2007
FINAL REPORT – AN *ABBREVIATED VERSION OF THE ORIGINAL NSF REPORT*

In May of 2000, the Gadsden School District was considered one of the lowest achieving school districts in the state of New Mexico. Academic proficiency was dismal and the turnover rate of teachers was very high (about 100% every four years.) There was no district math curriculum to speak of and the professional development of teachers was sporadic and not well related to what teachers were doing in their classrooms. Today, Gadsden paints a much different picture. Its 14,000 plus students, who are predominantly from Spanish speaking, low-income homes, are educated in what is considered an up and coming school district. Principals and teachers across the district are regularly provided with high quality professional development, all K-8 schools are implementing a rigorous mathematics curriculum, teachers are provided classroom-based support by one of twenty district math coaches, and new teachers are required to participate in a new teacher induction program for mathematics. Most importantly, the academic proficiency of students is on the rise and the achievement gap between Gadsden students and the rest of the state is closing (See Figures 1-3). The district that was once among the lowest performing is now considered the most improved district in the state and other school districts and state leaders in mathematics education are looking to Gadsden to adopt its model for school reform.

Student Achievement

This GMI was remarkably successful in improving K-8 students' mathematics achievement in a district with low-income (100% free and reduced lunch) and with 60% English Language Learners (ELLs). Student achievement steadily increased each year of the project in grades K-8 and the effects seem to be maintained in Grade 9. However, achievement was not sustained throughout high school; in eleventh grade mathematics achievement of Gadsden students remained way below the state average. The initiative was aimed at K-8 students in the first five years, but the results helped the district to realize the need to expand the GMI efforts to high schools if students were to have a successful mathematics experience for their entire K-12 education. Figure 1 shows where student achievement scores were when we started the project in 2000.

Figure 1: 2000 Achievement Scores for GISD Students as Compared to the State

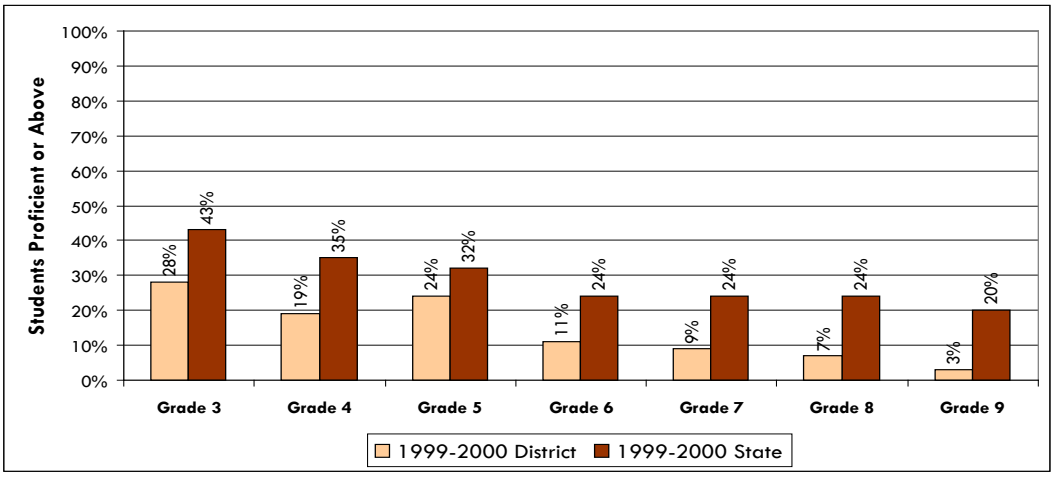
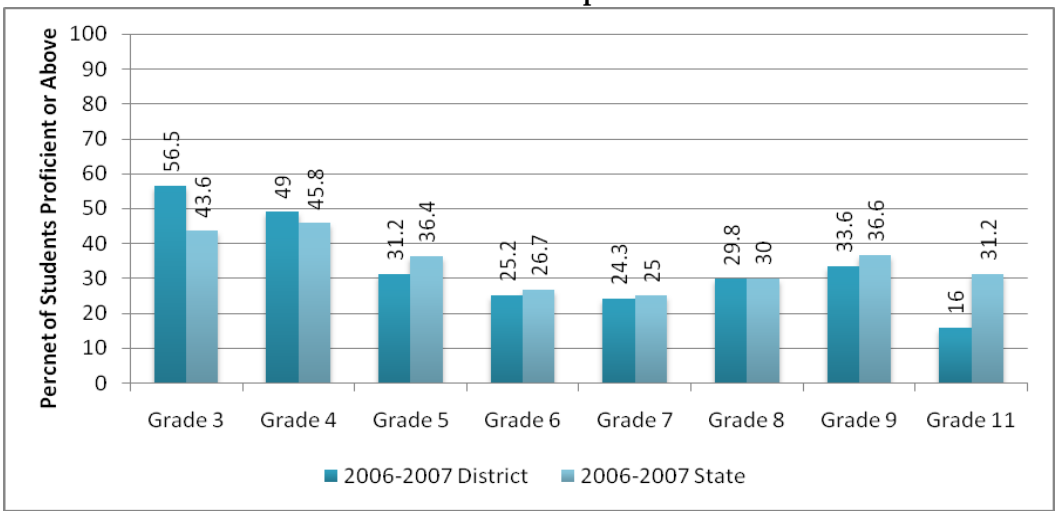


Figure 2 shows the proficiency levels for students in the district in spring 2007 compared to all students in New Mexico. While the state is making improvements as a whole, the Gadsden students are closing the achievement gap that was so prevalent in 2000.

Figure 2: 2007 Student Mathematics Achievement for Students in Gadsden as Compared to the State



Of special interest is the effect of the program on subgroups, especially among students who are economically disadvantaged and English language learners (ELLs) who are now scoring well above the state average for these same subgroups. See Figures 3-4.

Figure 3: 2007 Student Mathematics Achievement for Economically Disadvantaged Students in Gadsden as Compared to the State

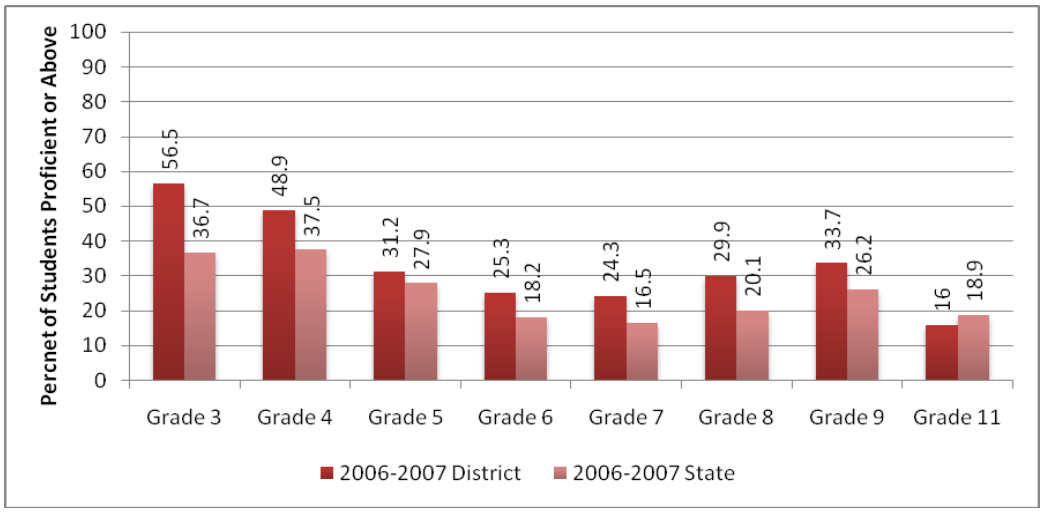
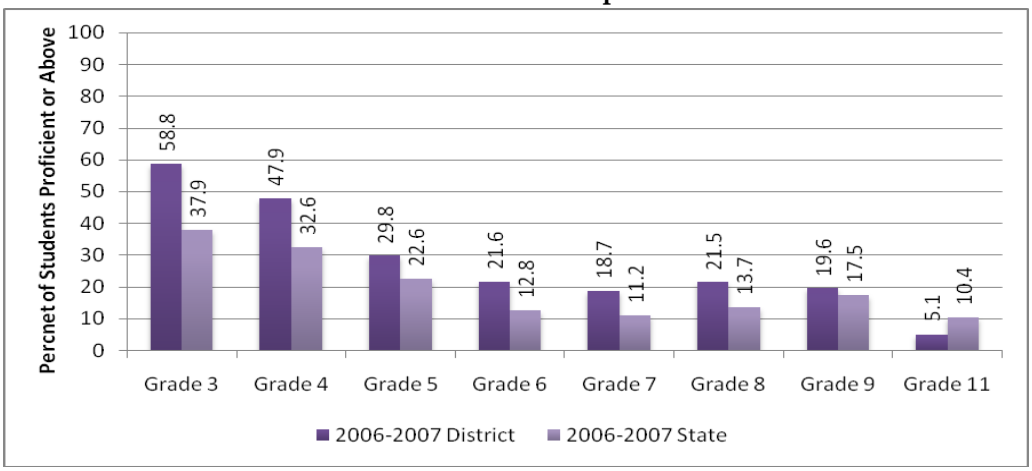


Figure 4: 2007 Student Mathematics Achievement for ELL Students in Gadsden as Compared to the State



Along with student achievement data, teachers and parents also report that students have greater interest in mathematics and enjoy being in their mathematics classroom. As the mathematics program improves, teacher satisfaction has also increased which is evidenced by the now low turnover rate. In 2000, Gadsden lost about 25% of its staff each year. In 2007, the rate has dropped to about 5%.

Developing a Capacity Building Model for District Change

Over the course of the GMI project, as the district began to transform and student achievement began to increase, education researchers and other high need districts began to inquire of the GMI model.

As a result of the Gadsden Mathematics Initiative a model that could be used by a district to build capacity for mathematics achievement began to emerge. The model was refined through extensive data feedback loops based on 1) district evaluation, 2) feedback from district teachers, staff and administrators, 3) district-hired external evaluators in year 3 of the grant, 4) NSF-required random classroom observations by external, trained Horizon evaluators each year, and 5) feedback from the Student Outcomes Study (Wiburg et al., 2007) which begun in year two. The model at the end of this project suggested several critical elements in three columns or interacting circles that would help create student achievement.

Quality Teaching and Intentional Collaboration	Aligned and Learned Curriculum	Support from Administrators, Parents & STEM community
▪ Dedicated professional learning community time during the school day for teachers to work together to study and align their teaching around student learning needs, 2 hrs/week ▪ Site-based mathematics coaching by instructional specialists ▪ Monitoring of instructional	▪ Quality aligned math curricula that meets the needs of all students including addressing ELL and SPED students. ▪ High expectations for all students. ▪ High levels of student engagement (shown by classroom observations) ▪ Students engaged in	▪ All administrators supporting teachers in collaborating to provide a high quality mathematics curriculum ▪ All administrators monitoring time and quality of instruction as well as student achievement on a continuous basis. ▪ Parents participating as partners in supporting math at

coaching and collaboration by principals and other administrators	generative learning and problem solving. ▪ Extensive math discourse in the classroom with teachers able to build on students' multiple approaches to solving math problems.	home with kids ▪ Mathematicians working with educators to plan and implement professional development and support lesson or unit study ▪ Use of coaches with high levels of ability to teach mathematics ▪ Availability of extended learning tools such as games and after-school activities and on-line learning (e.g. First in Math) to extend learning time beyond the school day.

CONTRIBUTIONS

The GMI project provided a unique opportunity to study a whole district in-depth as it adopted and implemented a new standards-based mathematics program across all schools from Kindergarten -8th grade. Through a process of continuous study and feedback by the cohesive district/university team working on the Gadsden Mathematics Initiative a district site-based approach for systemic change in mathematics teaching and learning evolved that provided a promising approach to improving achievement for all students. The model soon became known as the "Gadsden Model" and was introduced to the state through a state-wide Town Hall held in 2004. The model clearly identifies elements of change that are needed to move a district toward quality mathematics alignment, teaching, and administrative support. This "building capacity model" has most recently served as the basis for a new NSF research grant in a neighboring district (SUMA, September 2007, NSF #0733690). The Scaling Up Mathematics Achievement (SUMA) project is part of a university-wide STEM Success Alliance to improve K-12 education in science, technology, engineering, and mathematics.

b) Observations of student learning within classrooms. While this grant began as a professional development grant to help teachers implement new standards-based curricula in their classrooms because of the addition of the requirement for a student outcomes study a systematic effort was made to closely observe mathematics learning in classrooms. From these observational findings the GMI researchers began to develop a clear picture of the strengths and weaknesses of the implementation of the new mathematics program in terms of student learning and challenges for teachers and administrators. The findings confirm that it is necessary to have both a rich curriculum and a standards-based learning environment for students to increase their achievement. A curriculum by itself without changes in standards-based classroom learning environments and schools will have little effect on achievement (Tarr et.al, 2008).

c) Administrative instructional support emerged as a critical component during the Gadsden Mathematics Initiative. Principals received training along with their teachers. This result influenced the state Math and Science Partnership (MSP) project, Mathematically Connected Communities to work only with whole district partners. Previous projects that had pulled in teachers for summer academies without working with the district administration had not shown success in sustainable achievement. In contrast the Gadsden Independent School District

continued to sustain gains even after the end of the GMI project. Additional support was also provided in the form of full-time mathematics process trainers (MPTs) administrators who facilitated teacher collaborative implementation on standards-based instruction in schools. The district has now hired MPTs for the high schools because of the success they found in providing a mathematics specialist at each K-8 school site.

d) One of the unique and powerful aspects of this project was that as a result of true university and public school collaboration the Gadsden Mathematics Initiative was able to combine the practical wisdom of experienced practitioners with the expertise of university mathematics educators and researchers. The GMI project was in fact an early experiment in building expertise and sustainability within a district so that the university, while continuing to be a partner in professional development, would no longer be needed to sustain the project. In fact, Yvonne Lozano, Associate Superintendent in the district, and Karin Wiburg, university researcher for the Student Outcomes Study wrote a chapter in a book that outlined how a district and a university could work together to create sustainable chang**e**.(Wiburg& Lozano, 2001)

Contributions to Human Resource Development

The GMI project made a change in how teacher professional development is approached in a district. The aim of the PD in Gadsden became how to mentor teachers so they can then work as mentors in their own schools thus adding a strong structure for continued professional groups by teachers. This is demonstrated by some of the teachers from this rural and poor district actually were able to move into coaching and professional development positions. The Gadsden MPTs are now being hired directly by other districts in New Mexico to help with mathematics professional development. The nature of this partnership project between the district and the university will build new structures in which schools will work collaboratively with teacher educators at the university to improve teacher preparation. There is continued collaboration between the district and the university. The university currently has a lab school in the district that supports teacher candidates in learning how to teach English Language Learners and is currently working with the district to build 21st century communities of learning for after-school services for underserved students and families.

Kinzer, C. (2007) *Pointing in the Right Direction: The Gadsden Mathematics Initiative*. Noticias de Todos, 3(2) 8-10.

Tarr, J., et.al. (2008) The Impact of Middle-Grades Mathematics Curriculum and the Classroom Learning Environment, *Journal for Research in Mathematics Education*, V (39), (3), pp. 247-280.

Wiburg, K.M. & Lozano, Y. (2001) Finding Keys to Educational Improvement through Collaborative Work. In edited by Ravid, R. and Handler, M. *The Many Faces of School-University Collaboration: Characteristics of successful partnerships*. Englewood, Colorado: Greenwood Press.

Wiburg, K & Brown, S. (2007) *Lesson Study Communities: Increasing Achievement with Diverse Students.* Thousand Oaks, CA: Corwin Press.