AUSTIN COLLABORATIVE FOR MATHEMATICS EDUCATION

1999-2000 Evaluation

Austin Independent School District
Office of Program Evaluation

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Austin Collaborative for Mathematics Education, 1999-2000 Evaluation Austin Independent School District

Executive Summary

The *Austin Collaborative for Mathematics Education* (ACME) is a districtwide initiative to improve mathematics education in all elementary and middle school classrooms in the Austin Independent School District (AISD). This initiative, funded by the National Science Foundation (NSF) and the district, provides long-term, high quality professional development to build the instructional capacity of over 2000 AISD mathematics teachers. ACME professional development supports teachers as they implement the district's curriculum resources of *Investigations in Number, Data, and Space* and *Connected Mathematics (CMP)*, which are aligned with the state standards for mathematics education in the Texas Essential Knowledge and Skills (TEKS) and the national standards set by the National Council of Teachers of Mathematics (NCTM). These standards focus on broadening the topics taught at all grade levels, developing children's mathematical thinking, and deepening children's conceptual understanding through concrete experiences. The standards contrast with traditional mathematics education which is characterized by rote memorization and computation practice.

ACME professional development is designed to help teachers deepen their knowledge of mathematics content and standards-based pedagogy as well as to grow as a community of learners. Every elementary and middle school mathematics teacher, including general education, special education, and bilingual teachers, is expected to participate in two years of summer institutes and follow-up days during the academic year. To promote districtwide change, the ACME project focuses on the development of professional school cultures, administrative and teacher leadership, and community and parental involvement.

MAJOR FINDINGS

The evaluation of ACME effectiveness was based on student TAAS and ITBS mathematics results; observations of mathematics lessons and professional development sessions; principal and teacher questionnaires; interviews with teachers, ACME staff, and district administrators; and other AISD documents.

- The percentage of students passing the 1999-2000 TAAS mathematics rose from the 1998-1999 passing rates for most groups. African American, Hispanic, and economically disadvantaged students made larger gains than did White students, although the scores remained lower than the scores of White students.
- Strong implementation of standards-based mathematics instruction was related to the highest student TAAS mathematics passing rates, to the highest mean TLI scores (scaled scores to permit comparison across years and across grades), and to the highest passing rates for each of the 13 TAAS mathematics objectives. Standards-based mathematics instruction prepared students to pass the four problem-solving objectives particularly well. Students' problem-solving skills will be essential to passing future versions of TAAS.

- As assessed by the ITBS, student basic mathematics knowledge has remained steady since the implementation of the ACME project.
- ACME staff provided teachers high quality, long-term professional development. ACME professional development has been effective in helping teachers who are not experienced with standards-based instruction learn how to use the designated curriculum resources. However, ACME professional development alone has not generally helped teachers who achieve a moderate level of competence become strong implementers of standards-based instruction. The improvement of teachers' pedagogical skills and content knowledge was somewhat limited.
- Effective campus support for teacher implementation of standards-based mathematics (e.g., coaching that focuses on mathematics content, mentoring, and collaborative planning) is still in its infancy in AISD.
- Since the inception of the ACME project, changes in district, campus, and project leadership have yielded mixed messages, unclear vision, and wavering support for the implementation of standards-based mathematics at AISD. The AISD dual textbook adoption also sent mixed messages about district goals for mathematics education, although the focus on the state standards TEKS has redressed some confusion.
- Persistent concerns about students' passing the state assessment, TAAS, has continued to distract some teachers from implementing standards-based mathematics, despite strategies to address these concerns.

RECOMMENDATIONS

1. *Enlist district administrators to communicate a clear message about the district's vision for mathematics education because mixed messages have fostered piecemeal implementation of standards-based instruction across the district.* Broadcast the message on the AISD cable channel to reach teachers, campus administrators, parents, and community members. In area principal meetings, include 10 minute updates on the mathematics program (e.g., attendance at ACME professional development, TEKS and TAAS mathematics objectives, and the association between standards-based instruction and student achievement).
2. *Make explicit the connections between ACME and other district initiatives, especially IFL, because the approaches to teaching and learning are compatible.* IFL is an opportunity to strengthen the instructional leadership of district and campus administrators, which is a weak link in AISD's implementation of standards-based mathematics. Making the connections explicit should foster a shared vision for AISD's direction in curriculum and instruction and bolster necessary administrative support. If AISD is not able to bolster administrative support for standards-based mathematics instruction, it should look at other mathematics programs.
3. *Hire and train campus instructional specialists who are skilled in standards-based mathematics instruction through AFL funding.* Establish collaborative relationships between these specialists and ACME facilitators to provide a network of strong support for implementation on campuses. Concentrate this campus support on cognitive coaching and content-focused collaboration. By developing effective forms of campus support, AISD will help more teachers become strong implementers of standards-based mathematics instruction, which is linked to high levels of student achievement on TAAS mathematics (especially problem-solving skills that will be key to passing future versions of TAAS).
4. *Provide new ACME staff with professional development to maintain the quality of ACME professional development for teachers*. To ease the transition in ACME staff, develop cognitive coaching among

team members and routinely examine teacher evaluations of ACME professional development to devise strategies to improve facilitators' skills.

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PROJECT OVERVIEW

In August of 1997, the Austin Independent School District (AISD) launched the Austin Collaborative for Mathematics Education (ACME) initiative to improve mathematics education in all elementary and middle school classrooms using standards-based curriculum resources and instruction. The National Science Foundation (NSF) and AISD funded the initiative, which is a collaborative with the Charles A. Dana Center and the University of Texas at Austin. In the 1998-99 school year, the ACME project served over 2000 AISD educators who teach about 55,000 students at 71 elementary and 17 middle schools in a district of approximately 77,000 students (46% Hispanic, 17% African American, 35% Anglo and 2% other; AISD Office of Student Services, Sept. 2000). The ACME project is unique because it serves every elementary and middle school mathematics teacher in a large urban district with long-term professional development.

The ACME project builds the instructional capacity of all mathematics teachers by providing a minimum of 120 hours of professional development through summer institutes and follow-up sessions. Some teachers also participate in campus level support, such as lesson modeling and collaborative planning. The intent of ACME professional development is to build teachers' capacity to deliver effective mathematics instruction to all students, to ensure consistent implementation of quality mathematics curriculum resources across the district, and to provide ongoing support for teachers and administrators as they implement standards-based curriculum and instruction. Specifically, district staff design ACME professional development to help teachers grow as a community of learners and to deepen their knowledge of mathematics content, pedagogy, and classroom management for inquiry-based mathematics instruction.

ACME provides every elementary and middle school mathematics teacher, including general education, special education, bilingual, and English as a Second Language (ESL) teachers, the opportunity to participate in a series of professional development activities lasting two years. Participants begin their training with a summer institute lasting two weeks and continue with four to five follow-up days during the academic year. The second year involves a three-day summer institute and three to four follow-up days. Teachers are paid a stipend to attend the summer institutes and follow-up sessions outside school hours, and substitutes are provided to release teachers during the academic year.

ACME professional development began working with teachers at the transition between elementary and middle school so that students would have consistent mathematics instruction from one year to the next. In the summer of 1997, fifth and sixth grade teachers began ACME professional development, followed by fourth and seventh grade teachers in the summer of 1998, second, third, and eighth grade teachers in the summer of 1999. Most kindergarten and first grade teachers began ACME professional development in the summer of 2000. Some kindergarten and first grade teachers, who were not yet targeted for implementation, chose to attend two days of professional development during the 1999-2000 school year because the district adopted the standards-based texts in the spring of 1999.

To accommodate the needs of AISD teachers and administrators, ACME staff adjusted the original design of ACME by adding professional development sessions on

Saturdays and evenings, designing sessions for special education teachers, and adding overviews for late hires. To address teacher turn-over (more than 500 new hires yearly), ACME staff continued to offer summer institutes and follow-up for teachers new to the district or who had not yet participated.

At most schools in the district, AISD implemented ACME professional development by grade levels. Yet, at eight pilot elementary schools, teachers of all grade levels participated in ACME professional development simultaneously. Three pilot middle schools participated in the NSF-funded State Systemic Initiative (SSI) beginning with sixth grade mathematics teachers in the summer of 1996. Pilot schools received modified summer institutes: fewer days of summer institutes and follow-up sessions, in exchange for campus support such as modeling lessons and conversations about curriculum and instruction. In the 1999-2000 school year, ACME staff continued to work with one pilot school that requested ongoing support.

The district supplies rigorous curriculum resources to support the mathematics instructional capacity of teachers as part of the ACME initiative. The resources are based on standards set by the National Council of Teachers of Mathematics (NCTM, 1989, 1991, 1995), by the state in the Texas Essential Knowledge and Skills (TEKS), and by AISD's Mathematics Department in the local curriculum document. In the spring of 1999, the district adopted the curriculum resources of *Investigations in Number, Data, and Space* for elementary grades and *Connected Mathematics* (*CMP*) for middle grades, and purchased these materials to support teachers' implementation of standards-based instruction. AISD also adopted the resources of *Math in My World* (English version)/ *Mathematicas in Mi Mundo* (Spanish version) for elementary grades and *Mathematics: Applications and Connections, Courses 1-3* (English version)*/ Mathematicas: Aplicaciones y Coneciones, Cursos 1-3* (Spanish version) to supplement TEKS areas not addressed in *Investigations* and *CMP*. This adoption ensures that all of AISD's mathematics education resources and efforts are consistent with local, state, and national standards.

The curriculum resources of *Investigations* and *CMP* are well suited for the ACME initiative compared to traditional textbooks because they support the following teaching practices:

- Promoting children's mathematical thinking, reasoning, and problem-solving skills;
- Developing children's deep understanding of mathematical concepts through concrete experiences, real-world problems, and communication; and
- Supporting a vertically and horizontally coordinated curriculum that addresses the needs of all students, including those who are served by the special education, bilingual, and gifted and talented programs (Russell, 1998).

These practices emphasize children's mathematical literacy by promoting the understanding of mathematics concepts and approach instruction through problem-solving and communication of ideas. These practices contrast with traditional practices that emphasize mathematical algorithms, rote memorization, and computation mastery (Cohen & Ball, 1990).

To promote districtwide change in mathematics education, the ACME project bolsters leadership and the development of school cultures in which communities continually improve mathematics teaching and learning. ACME staff provide institutes for campus administrators to build knowledge of standards-based mathematics curriculum resources and instruction and to help campus leaders develop strategies for supporting teachers in implementation. ACME staff also work with other organizational structures in AISD that promote teacher leadership (e.g., curriculum specialists) to support the continuous improvement of mathematics education on campuses. In addition, the ACME project has customized professional development for teacher leaders so that they may facilitate sessions and support their peers at the campus level in a variety of ways, including peer coaching, demonstration teaching, and information sharing. To garner parent participation in the mathematics curriculum, the project staff provides schools with deliverables (e.g., pamphlets and videos in English and Spanish) as well as assistance with organizing parent education and involvement (e.g., parent math nights). Additionally, the project staff enlists program support from AISD's administrative leaders.

IMPACT ON STUDENT MATHEMATICS ACHIEVEMENT

The impact of the ACME project on student mathematics achievement is central to evaluating its effectiveness. While ACME activities focus on intensive professional development for teachers, improving student learning is a major goal of ACME.

STUDENT RESULTS AND TEACHER IMPLEMENTATION OF STANDARDS-BASED MATHEMATICS

To examine the direct effects of curriculum and instruction on student mathematics achievement, associations between the quality of teacher implementation of standards-based mathematics and student scores on the Texas Assessment of Academic Skills (TAAS) and the Iowa Test of Basic Skills (ITBS) were analyzed.

Classroom Observations and the Quality of Implementation

In the spring of 2000, evaluators observed the mathematics lessons of 48 teachers, including teachers in 10 bilingual and three special education classrooms. Forty of the 48 teachers were first randomly selected and observed in the spring of 1998 or in the spring of 1999; eight additional teachers were randomly drawn in the spring of 2000. AISD evaluators and Dana Center staff were trained and certified to reliably rate the quality of implementation of standards-based mathematics education on an 8-point ordinal scale using the HRI Classroom Observation Protocol (HRI, 1999a; see Appendix C). Most of the classroom observations (over 90%) were in elementary classrooms because the sampling frame of all AISD mathematics teachers includes more elementary school teachers than middle school teachers.

The quality of implementation of standards-based mathematics was simplified to three categories: **Weak** implementation, **moderate** implementation, and **strong** implementation. Observers discussed the concepts underlying the 8-point scale of the HRI protocol to determine the subcategories.

Weak implementation refers to lessons that show little evidence of standards-based instruction. Students passively received information from the teacher or were involved in activities that lacked purpose and were unlikely to enhance mathematical thinking. Moderate implementation occurred when observers found evidence of the beginning stages of standards-based teaching strategies that engaged students in problem-solving, but the quality of the lesson was limited. The lesson may have lacked teaching strategies that pushed students to deep understandings, or may have muddled conceptual knowledge with inaccurate or superficial exploration of mathematics content. Strong implementation refers to lessons that observers coded as effective and engaging standards-based instruction that helped most students successfully solve mathematical problems and developed conceptual understanding.

Student TAAS Mathematics Results

The TAAS is a state-mandated, criterion-referenced test. TAAS measures student mastery of the state standards TEKS in mathematics at grades 3 through 8 and at exit level. (Reading, writing, science, and social studies are also tested, but not all subjects are administered at all grade levels.)

The TAAS results are presented as the percentage of students passing, the percentage of students passing each of 13 mathematics objectives, and the mean (or average) Texas Learning Index (TLI). The TAAS mathematics objectives are divided into three domains: Objectives 1 through 5 are designed to assess Concepts; Objectives 6 through 9 assess Operations; and Objectives 10 through 13 assess Problem-Solving. The TLI is a scaled score that permits comparison across years and across grades. A TLI score of 70 is considered passing, and indicates that a student meets minimum expectations and is in line to meet the exit level standard if current progress continues.

Student TAAS Mathematics Results and the Quality of Teacher Implementation

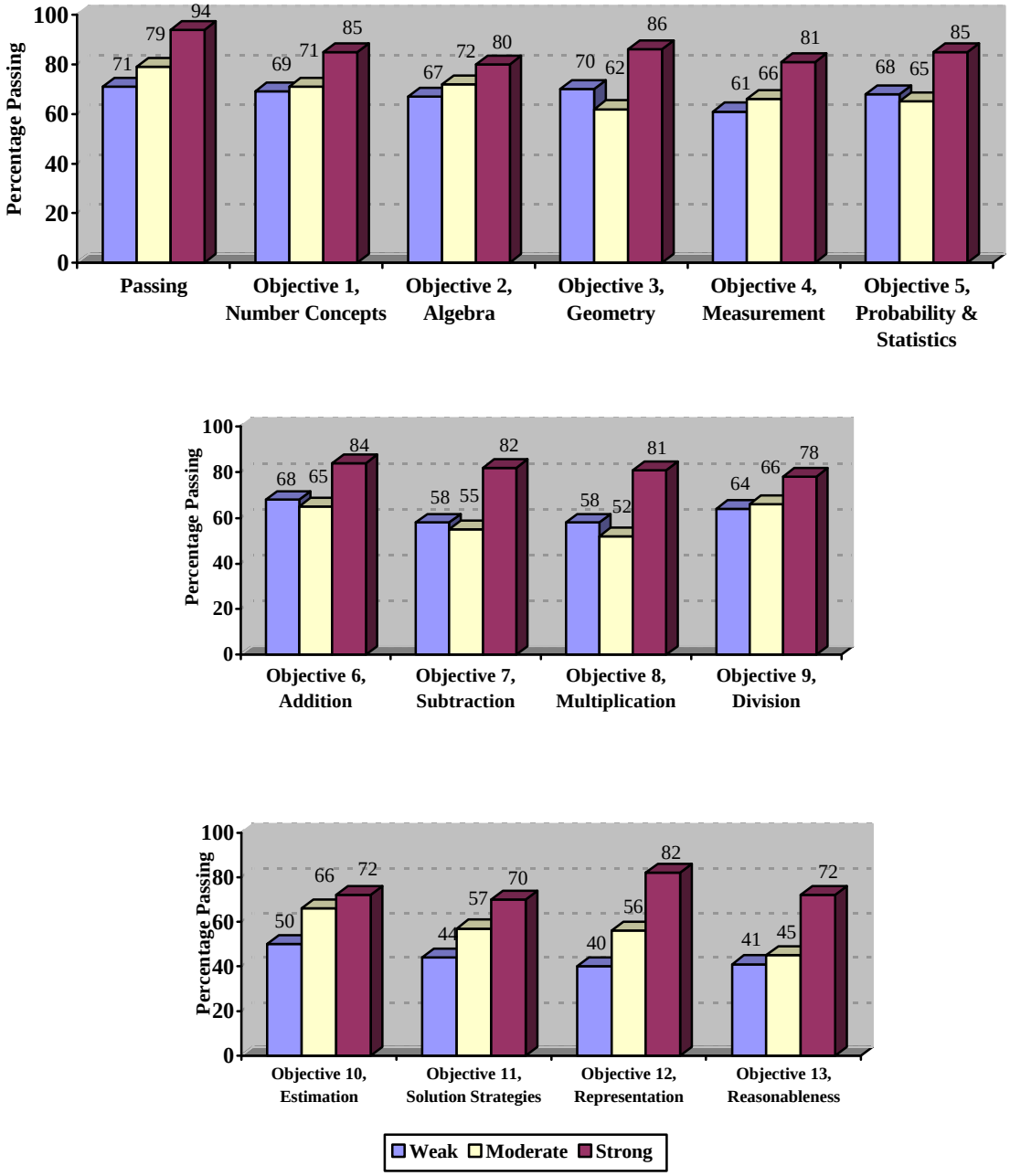
Student TAAS mathematics results were combined for the 30 classrooms out of the 48 observed in the spring of 2000, including bilingual and special education classes. The sample was limited to 30 classrooms because only grades 3 through 8 were tested on TAAS. Eleven of the lessons were rated as weak implementation, eight were rated as moderate implementation, and eleven were rated as strong implementation. The percentage of students receiving free and reduced-price lunch varied by teacher implementation: 60% in lessons rated as weak implementation; 55% in lessons rated as moderate implementation; and 40% in lessons rated as strong implementation.

Figure 1 presents the percentages of students passing the test and each objective, and Figure 2 presents the mean TLI in the observed classrooms by the quality of teacher implementation of standards-based mathematics.

The associations between student TAAS mathematics data and the quality of teacher implementation of standards-based mathematics suggest the following:

- Student mathematics achievement was higher in classrooms with strong implementation in all analyses than was student achievement in classrooms with weak and moderate implementation.
- Moderate implementation was associated with higher student achievement than was weak implementation in the Problem-Solving Domain, Objectives 10 through 13, and in Algebra and Measurement.
- Weak implementation was associated with higher student achievement than was moderate implementation in the Operations Domain, Objectives 6 through 9, and in Geometry.

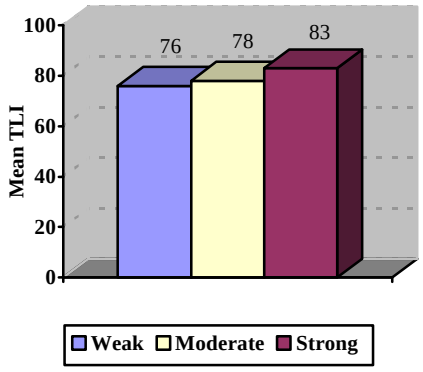
Figure 1. Percentage of Students Passing TAAS Mathematics by Quality of Teacher Implementation in Spring of 2000[1]



Note: For Objectives 1-8, the number of students in classrooms rated as weak implementation = 189; the number of students in classrooms rated as moderate implementation = 141; and the number of students in classrooms rated as strong implementation = 239. For Objectives 9-13, the numbers of students are smaller: TEA decided to collapse some TAAS Objectives for grades 3 and 4 due to limited exposure to some topics at those grade levels.

[1] Chi-square tests were statistically significant ($p < .01$) indicating that the number of students passing TAAS mathematics and passing each of the 13 objectives varied significantly by the quality of teacher implementation.

Figure 2. Mean TLI for Students in TAAS Mathematics by Quality of Teacher Implementation in Spring of 2000



Note: The number of students in classrooms rated as weak implementation = 189; the number of students in classrooms rated as moderate implementation = 141; and the number of students in classrooms rated as strong implementation = 239.

Student ITBS Mathematics Results

The ITBS is a norm-referenced test of general educational achievement that is administered to all AISD students at grades 3, 5, and 8 only. The ITBS assesses a wide range of skills including higher-order thinking skills, interpretation, classification, comparison, analysis, and inference. AISD students were administered two of three ITBS mathematics subtests: Concepts and Estimation, Problem-Solving and Data Interpretation, but not Computation. The ITBS results are presented as percentile ranks of the average standard score. A percentile rank of 50 indicates that 50% of all students who took the test nationally scored below that score.

Student ITBS Mathematics Results and the Quality of Teacher Implementation

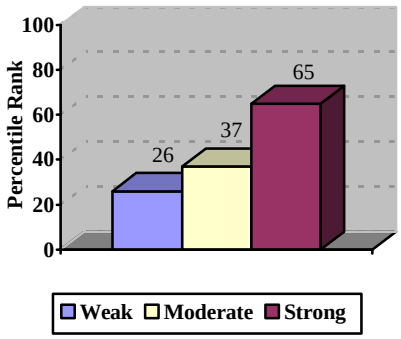
Student ITBS mathematics results were combined for 15 classrooms of the 48 observed in the Spring of 2000, including bilingual and special education classes. The sample was limited to 15 classrooms because only students in grades 3, 5, and 8, were tested on ITBS.

The ITBS results are presented as the percentile rank of the average standard score. Figure 3 presents the percentile rank for the students who were tested and enrolled in the observed classrooms in the Spring of 2000.

The association between student ITBS mathematics data and the quality of teacher implementation of standards-based mathematics suggests the following:

- Student mathematics achievement was associated with the quality of implementation.
- Students in classrooms with strong implementation scored higher than students in classrooms with moderate or weak implementation.

Figure 3. Percentile Rank of Students Tested in ITBS Mathematics by Quality of Teacher Implementation in Spring of 2000



Note: The number of students in classrooms rated as weak implementation = 48; the number of students in classrooms rated as moderate implementation = 37; and the number of students in classrooms rated as strong implementation = 67.

DISTRICT MATHEMATICS RESULTS

District TAAS Mathematics Results

To examine the global impact of the ACME project on AISD student mathematics achievement, district Texas Assessment of Academic Skills (TAAS) mathematics results are presented. The results for all AISD students tested were taken from the Texas Education Agency (TEA) Summary Reports for this evaluation. The data include scores of students who took the English version of the test, not the Spanish version; students in year-round schools; and students enrolled in special education classes, except in the 1997-1998 school year.

TAAS mathematics results are presented by grade and by disaggregated accountability student groups for the 1997-98, 1998-99, and 1999-2000 school years. The results for students in grades 3 through 8 are included because these grade levels are targeted by ACME. (Kindergarten through grade 2, although targeted by ACME, however are not tested with TAAS.) The results are presented by disaggregated groups; the groups are African American, Hispanic, White, and economically disadvantaged students. TEA differentiates student performance by these groups to hold districts and campuses accountable for the achievement of all students on all campuses.

The TAAS results are presented in two ways: (1) the percentage of students passing (i.e., a TLI score of 70 or above) and (2) the mean TLI (see explanation, "Student TAAS Mathematics Results," p. **4**). Figures 4 through 15 present the percentages passing TAAS mathematics and the mean TLI for grades 3 through 8 and disaggregated groups in 1997-98, 1998-99, and 1999-2000. The number of years of implementation of standards-based mathematics varied by grade level. By the 1999-2000 school year, teachers in grades 5 and 6 had been implementing for three years, teachers in grades 4 and 7 had been implementing for two years, and teachers in grades 3 and 8 had been implementing for one year.

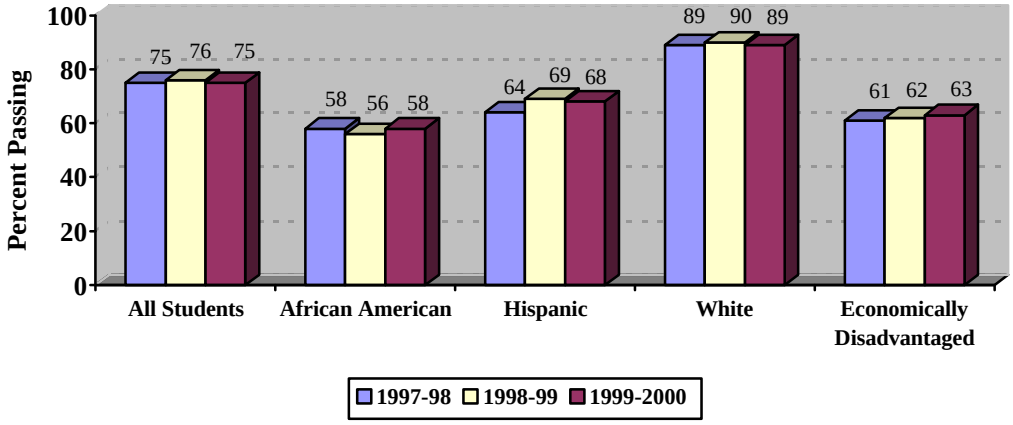
It is important to note that the influence of standards-based curriculum and instruction on the district TAAS and ITBS mathematics results is confounded by observed lessons that

were supplemented with materials that were neither standards-based nor recommended by the district's Mathematics Department.

AISD student performance on the 1999-2000 TAAS mathematics in comparison with the 1998-99 results suggest the following observations:

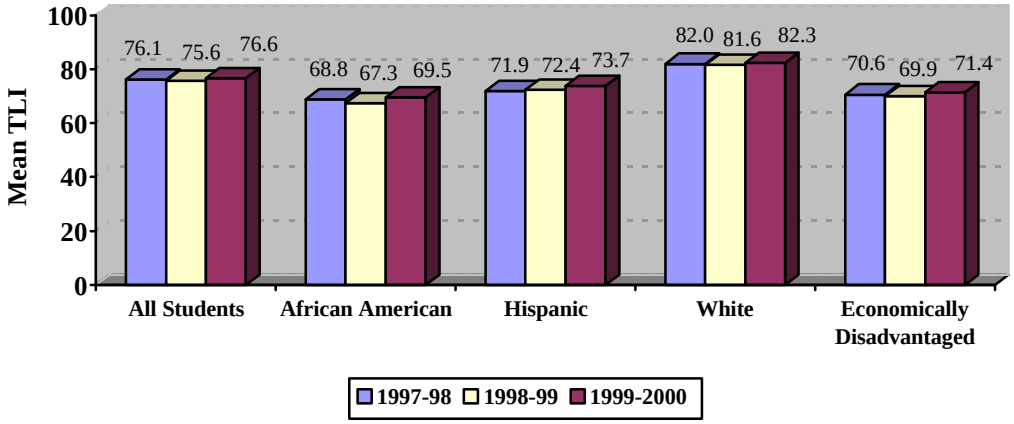
- The percentage of students passing TAAS mathematics increased for the majority of student groups, except for students in grade 3, even though students served by special education are included in the results after 1997-98.
- The mean TLI in mathematics increased for nearly every group across all grade levels.
- African American, Hispanic, and economically disadvantaged students made larger gains in mean TLI and in passing rates than White students (see Appendix A for gains and losses by disaggregated groups), although the results of African American, Hispanic, and economically disadvantaged students continued to be lower than the scores of White students.
- Middle school students made larger gains in mean TLI and in passing rates than did elementary students.
- Cohort analysis suggests that achievement gains made in grades 7 and 8 may be attributable to three years of standards-based mathematics instruction and ACME.

Figure 4. Percentage of Students in Grade 3 Passing TAAS Mathematics in 1997-98, 1998-99, and 1999-2000



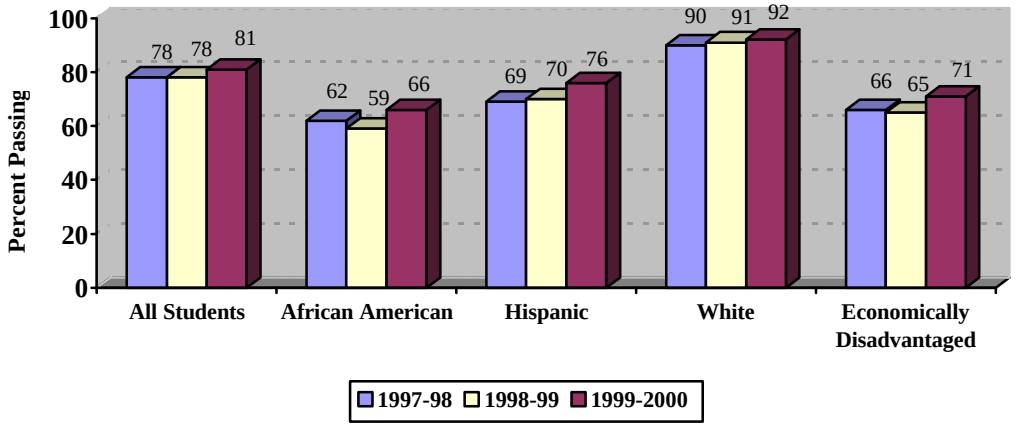
Note: The data for the 1997-98 school year did not include students in special education. The number of students each year were: 1997-98, *n* = 4488; 1998-99, *n* = 4995; and 1999-2000, *n* = 4867.

Figure 5. Mean TLI for Students in Grade 3 in TAAS Mathematics in 1997-98, 1998-99, and 1999-2000



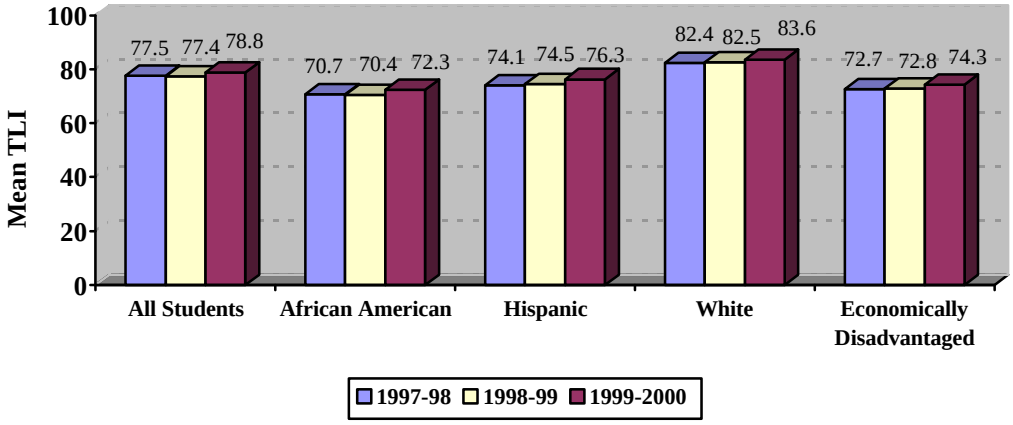
Note: The data for the 1997-98 school year did not include students in special education. The number of students each year were: 1997-98, *n* = 4488; 1998-99, *n* = 4995; and 1999-2000 *n* = 4867.

Figure 6. Percentage of Students in Grade 4 Passing TAAS Mathematics in 1997-98, 1998-99, and 1999-2000



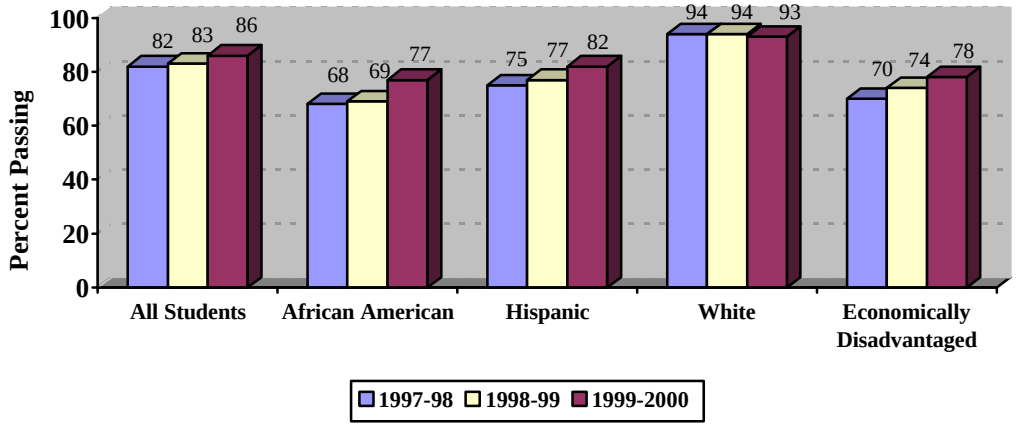
Note: The data for the 1997-98 school year did not include students in special education. The number of students each year were: 1997-98, *n* = 4540; 1998-99, *n* = 4936; and 1999-2000, *n* = 5058.

Figure 7. Mean TLI for Students in Grade 4 in TAAS Mathematics, 1997-98, 1998-99, and 1999-2000



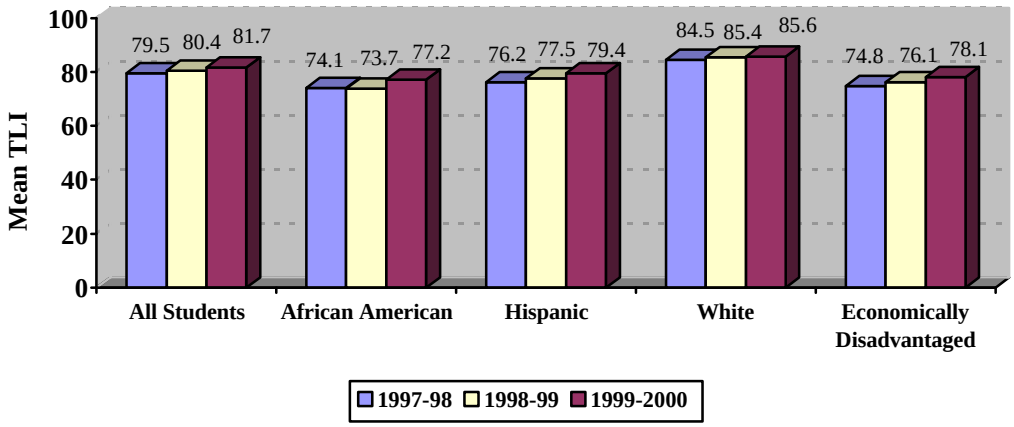
Note: The data for the 1997-98 school year did not include students in special education. The number of students each year were: 1997-98, *n* = 4540; 1998-99, *n* = 4936; and 1999-2000, *n* = 5058.

Figure 8. Percentage of Students in Grade 5 Passing TAAS Mathematics in 1997-98, 1998-99, and 1999-2000



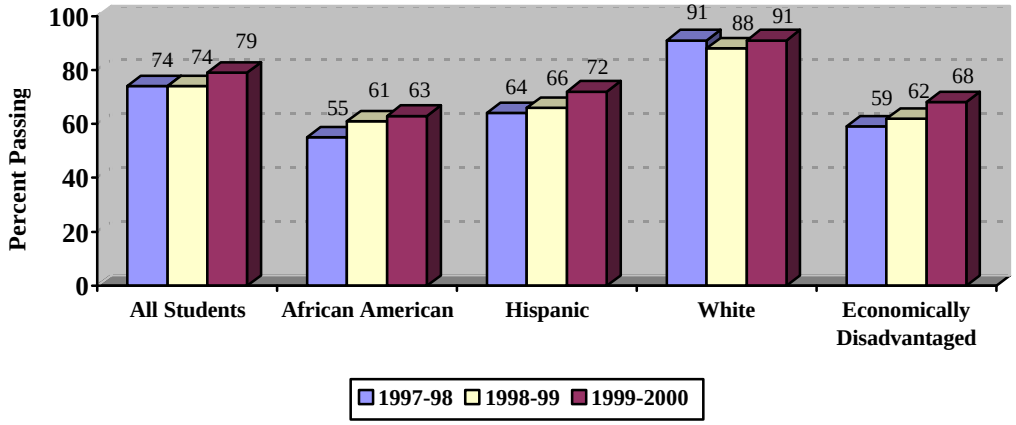
Note: The data for the 1997-98 school year did not include students in special education. The number of students each year were: 1997-98, *n* = 4416; 1998-99, *n* = 5102; and 1999-2000, *n* = 4797.

Figure 9. Mean TLI for Students in Grade 5 in TAAS Mathematics in 1997-98, 1998-99, and 1999-2000



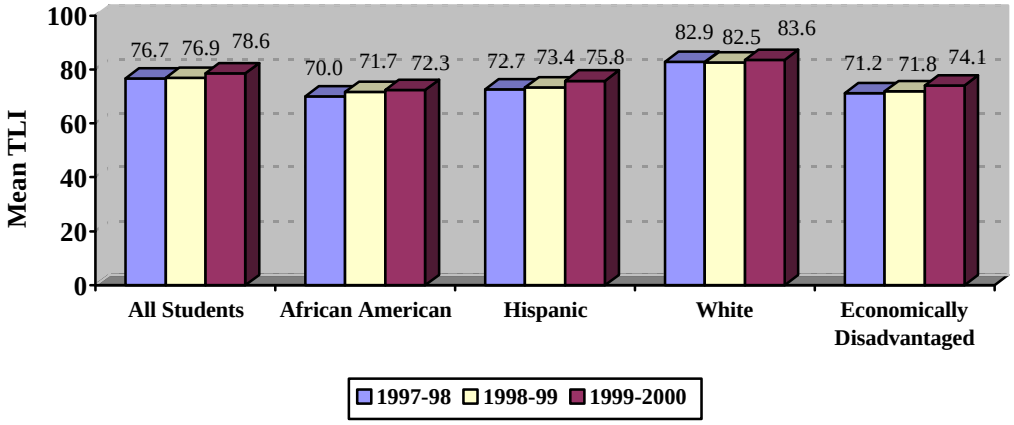
Note: The data for the 1997-98 school year did not include students in special education. The number of students each year were: 1997-98, *n* = 4416; 1998-99, *n* = 5102; and 1999-2000, *n* = 4797.

Figure 10. Percentage of Students in Grade 6 Passing TAAS Mathematics in 1997-98, 1998-99, and 1999-2000



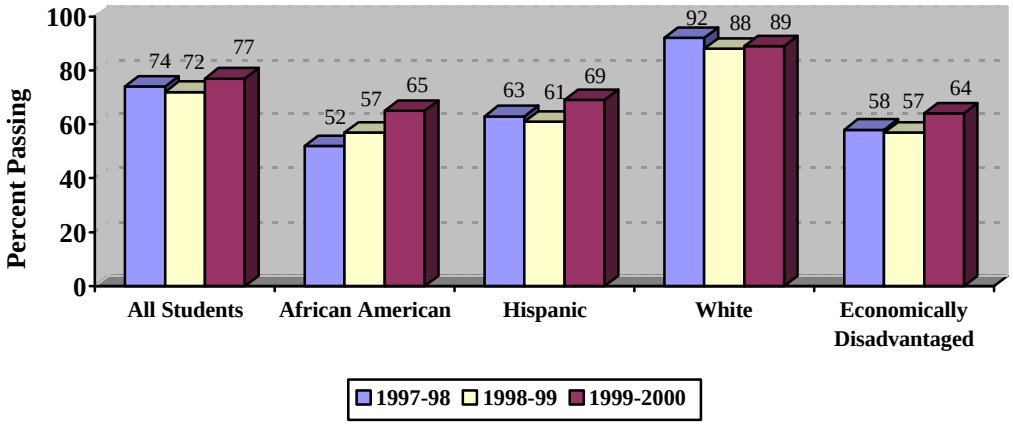
Note: The data for the 1997-98 school year did not include students in special education. The number of students each year were: 1997-98, *n* = 4202; 1998-99, *n* = 4738; and 1999-2000, *n* = 4894.

Figure 11. Mean TLI for Students in Grade 6 in TAAS Mathematics in 1997-98, 1998-99, and 1999-2000



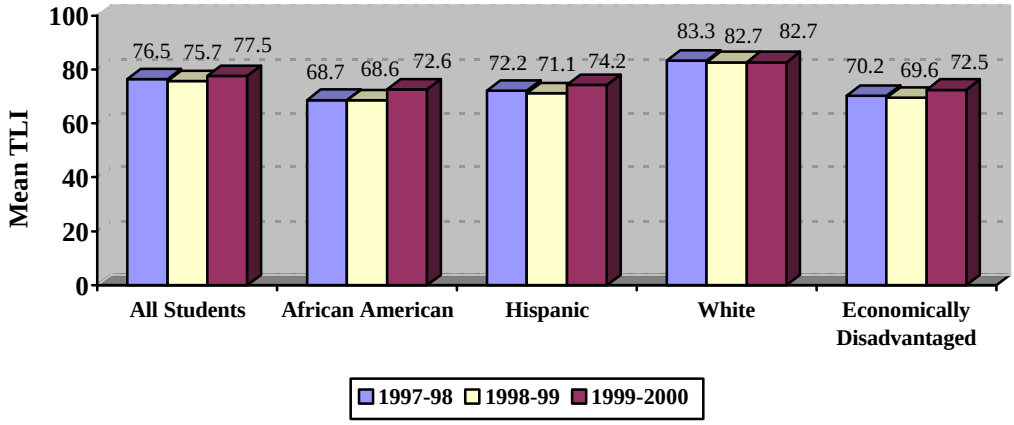
Note: The data for the 1997-98 school year did not include students in special education. The number of students each year were: 1997-98, *n* = 4202; 1998-99, *n* = 4738; and 1999-2000, *n* = 4894.

Figure 12. Percentage of Students in Grade 7 Passing TAAS Mathematics in 1997-98, 1998-99, and 1999-2000



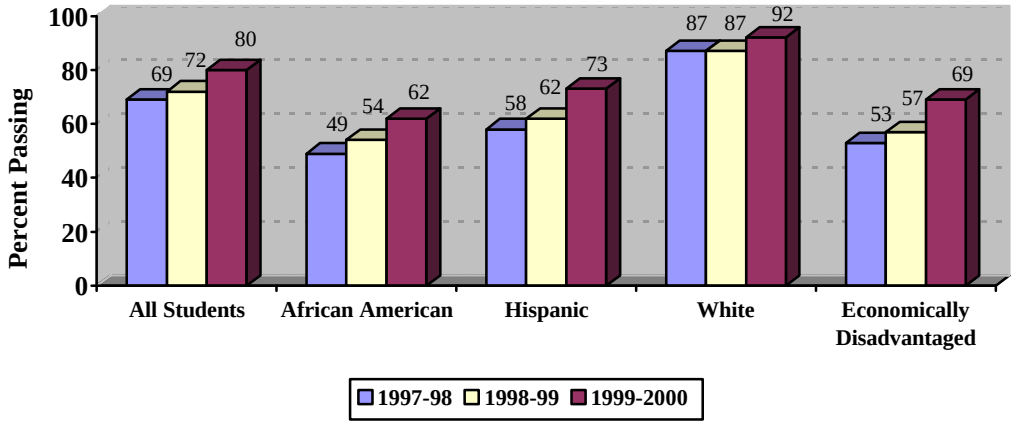
Note: The data for the 1997-98 school year did not include students in special education. The number of students each year were: 1997-98, *n* = 4286; 1998-99, *n* = 4623; 1999-2000, *n* = 4621.

Figure 13. Mean TLI for Students in Grade 7 in TAAS Mathematics in 1997-98, 1998-99, and 1999-2000



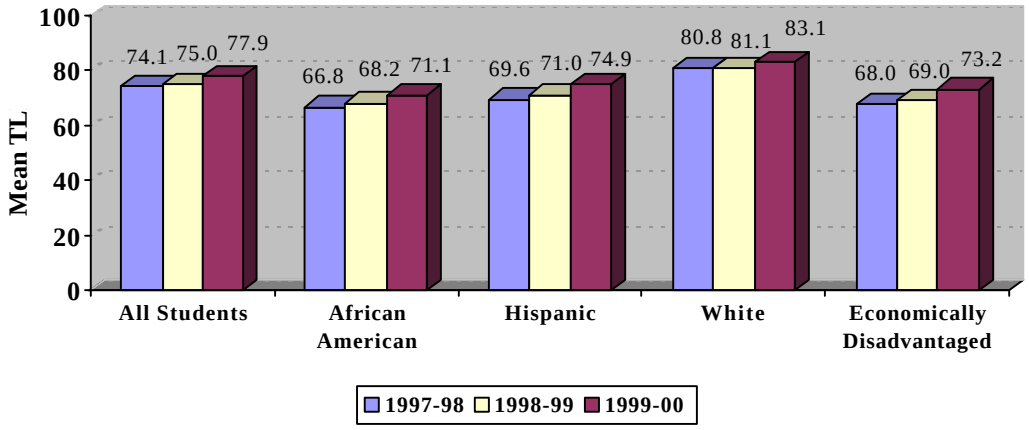
Note: The data for the 1997-98 school year did not include students in special education. The number of students each year were: 1997-98, *n* = 4286; 1998-99, *n* = 4623; 1999-2000, *n* = 4621.

Figure 14. Percentage of Students in Grade 8 Passing TAAS Mathematics in 1997-98, 1998-99, and 1999-2000



Note: The data for the 1997-98 school year did not include students in special education. The number of students each year were: 1997-98, *n* = 4156; 1998-99, *n* = 4654; 1999-2000, *n* = 4466.

Figure 15. Mean TLI for Students in Grade 8 in TAAS Mathematics in 1997-98, 1998-99, and 1999-2000



Note: The data for the 1997-98 school year did not include students in special education. The number of students each year were: 1997-98, *n* = 4156; 1998-99, *n* = 4654; 1999-2000, *n* = 4466.

District ITBS Mathematics Results

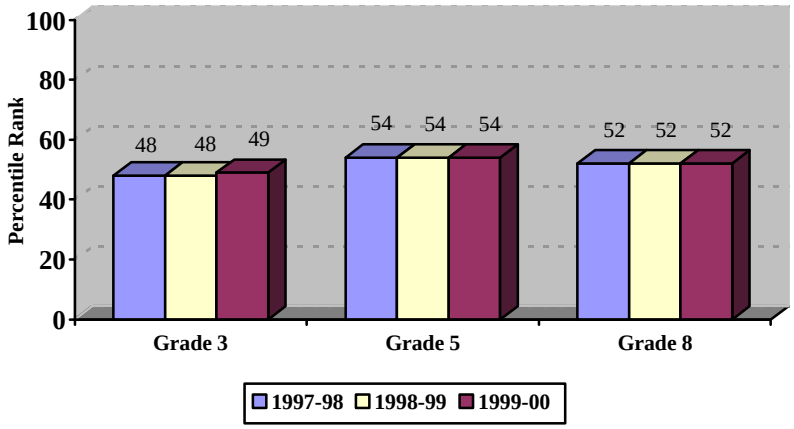
An argument against standards-based instruction is that students' mathematics achievement will decline because the emphasis on problem-solving may not provide opportunities to learn mathematics facts. TAAS measures students' knowledge of the state standards TEKS, which are consistent with the mathematical content and process standards of the AISD curriculum resources. To examine further the impact of the ACME project on students' mathematics achievement, district Iowa Tests of Basic Skills (ITBS) results are presented by grades tested for the three years of implementation of ACME. The ITBS is nationally-normed, assesses broader range of knowledge than TAAS, and allows for comparison with student scores nationwide.

The ITBS mathematics results for all AISD students enrolled at grades 3, 5, and 8 are analyzed in this report. Figure 16 presents the percentile rank (for explanation, see "Student ITBS Mathematics Results," p. **7**) for the average performance of all AISD students in grades 3, 5, and 8 who took the test in the 1997-98, 1998-99, and 1999-2000 school years. Teachers in grade 5 were targeted for implementation of standards-based instruction for all of the three years presented, while teachers in grades 3 and 8 were targeted for implementation only in the 1999-2000 school year.

AISD student performance on the ITBS suggests the following observations:

- Mathematics achievement has remained steady since the inception of the ACME project.
- Grade level comparisons show that grade 3 has performed slightly below the national average, while grades 5 and 8 have performed slightly above the national average.
- Implementation of the ACME project appears to have neither helped nor hindered student achievement on the ITBS.

Figure 16. Percentile Rank of Students Tested in ITBS Mathematics, 1997-98, 1998-99, 1999-2000



Note: In 1997-98, Grade 3 (n=5363), Grade 5 (n=5716), and Grade 8 (n=5267); in 1998-99 Grade 3 (n=5634), Grade 5 (n=5859), and Grade 8 (n=4998); and in 1999-2000 Grade 3 (n=5634), Grade 5 (n=5540), and Grade 8 (n=5138).

QUALITY OF ACME PROFESSIONAL DEVELOPMENT

The key activity of the ACME project to improve mathematics instruction districtwide is intensive professional development for teachers. This section provides a description of ACME professional development and an analysis of the impact the project has had on mathematics teachers and standards-based instruction in AISD classrooms in the 1999-2000 school year.

SOURCES

Professional Development Observations

The information for this analysis came from several sources. The lead evaluator observed 7 ACME professional development sessions throughout the 1999-2000 school year, and formally rated five of these sessions on an 8-point scale using the HRI Professional Development Observation Protocol (HRI, 1999b; see Appendix C). Five were formally rated to meet NSF requirements, and additional sessions were informally observed to supplement the information.

Teacher Interviews

Ten randomly selected mathematics teachers, most of whom (8 of 10) had participated in 60 or more hours of ACME professional development, completed phone interviews. The interviews included questions about teachers' thoughts and feelings about ACME professional development, changes in practice, and school and district policies that facilitate or hinder reforms in mathematics education (see Appendix C).

Teacher Questionnaires

A random sample of 300 AISD elementary and middle school mathematics teachers were sent questionnaires, and 250 teachers of the 266 eligible returned valid questionnaires (return rate, 88%). One-third (34%) had taught school for 5 years or less, one-third (31%) had taught for 6 to 15 years, and one-third (34%) had taught for 16 years or more. The Local Systemic Change (LSC) Teacher Questionnaires surveyed teachers' beliefs about mathematics instruction, preparation, classroom practice, mathematics content knowledge, perceptions of district support, and experiences in ACME professional development (see Appendix C).

Principal Questionnaires

The 88 AISD middle schools and elementary principals completed LSC Prinicpal Questionnaires about standards-based mathematics and ACME professional development (see Appendix C).

Additional Sources

Additional sources of information included interviews with district and ACME project staff, observations of district and project meetings, district and state mathematics curriculum documents, professional development materials, brochures, letters, and newsletters.

ACME PROFESSIONAL DEVELOPMENT FACILITATORS

Composition of ACME Professional Development Team

In the third year of the project, the organization of ACME professional development facilitators was similar to that of the previous year. A core team of six ACME facilitators supported by the NSF grant provided the bulk of the ACME professional development and support to teachers.

Two district administrators and one district mathematics specialist supported the initiative by working with teachers and principals on campuses, by providing ACME professional development in the summer, and by observing the day to day realities of implementing the curriculum resources.

As in previous years, *CMP* facilitators from Michigan were hired to provide middle school summer institutes. Follow-up sessions during the academic year for middle school teachers were provided by one of the six ACME facilitators and a liaison with the Dana Center at the University of Texas.

A consultant with Marilyn Burns' *Math Solutions* provided additional professional development to a cadre of teachers and ACME staff as in the previous year. ACME staff invited teachers who appeared to be highly motivated to implement standards-based curriculum resources and expressed deep understanding of standards-based pedagogy to participate. The cadre was expanded from 40 teachers in the previous year to 80 teachers. In addition to elementary and middle school teachers, project staff added high school teachers. The cadre sessions focused on mathematical content knowledge (i.e., algebraic thinking, geometry, and vertical links from elementary content to calculus), spheres of influence for leading standards-based instruction, discourse in the classroom, and content-focused coaching. Several teachers who participated in the cadre helped provide professional development for summer institutes by modeling lessons and sharing their classroom experiences implementing the resources.

Changes in ACME Professional Development Team

At the beginning of the 1999-2000 school year, the ACME project lost a charismatic leader, an original designer and cheerleader for the grant, and has been struggling to recapture its original vigor. By the end of the summer of 2000, four ACME professional development facilitators had left the project for other positions because they were no longer wanted to work on the ACME team. Five new professional development facilitators were hired. Most of the new facilitators were participants in the ACME teacher cadre and teachers fresh out of the classroom. One new facilitator had extensive experience providing professional development and campus support with a New York Local Systemic Change (LSC) initiative. At the end of the school year, only one original member of the core ACME team remained, and many new members were still getting acclimated to the work.

In the summer of 2000, the district divided its mathematics curriculum team into secondary and elementary teams. The interim ACME project director, who had been a district mathematics specialist for three years, led the secondary team and a new leader was hired from outside the district to lead the elementary team and to supervise the ACME project.

FORMAT OF ACME PROFESSIONAL DEVELOPMENT

Design of Support for Teachers

ACME professional development for teachers consisted of weeklong summer institutes and follow-up days during the academic year. Follow-up days included sessions during school, after school, and on Saturdays. In the 1999-2000 school year, professional development was held at the district's Professional Development Academy (PDA) and at an additional site to meet the needs of teachers who live and work in north as well as in south Austin.

ACME professional development facilitators continued to integrate mathematics content knowledge, pedagogy, and the use of curriculum resources into the summer institutes and follow-up days as before. The ACME project did not hold separate sessions to focus on mathematics content knowledge. Although a professional development session on cognitive coaching was offered for the first time in the fall of 1999, it was canceled because only two teachers in the district had registered.

Campus Support

Ongoing support to teachers implementing the curriculum resources generally took the form of follow-up days held at PDA. Few teachers received support on campuses. Several ACME professional development facilitators visited a handful of campuses, but the visits were short-term.

In the previous year, campus support was limited to teachers at several pilot schools (i.e., eight campuses that implemented standards-based curriculum and instruction in all grade levels simultaneously). In the 1999-2000 school year, campus support was the charge of two ACME facilitators. Each of the two facilitators selected five campuses to visit weekly for half a day. They met with second and third grade teachers who were in their first year of implementation of standards-based mathematics, about four teachers per campus. The two facilitators also visited 20 additional campuses on when requested.

To design a model of campus support, the two ACME facilitators collaborated with a colleague from a New York LSC and with ACME staff who had provided campus support with pilot schools the year before with the ACME evaluator. These facilitators selected several schools with low student passing rates on TAAS mathematics and schools whose teachers were highly engaged in the 1999 ACME summer institutes and showed motivation to implement standards-based curriculum and instruction. Included in the plan were strategies for establishing rapport with campus staff and guidelines for principals about the purpose of visits. These facilitators ended campus support in the fall because the ACME project needed staff to provide professional development sessions. Additionally, the ACME campus support facilitators perceived a lack of interest from teachers and administrators and found that visits lacked meaning (which ACME staff coined as the "parade wave"). They believed that developing trust was key to establishing a professional dialogue on campuses, which takes time, perhaps a year. One facilitator said, "To go into classrooms you need to build trust before you can begin talking. People who need help either don't know they need it or don't want it. It's like going into somebody's home."

Another ACME facilitator explored a model of campus support with one pilot school in which teachers and administrators wanted to continue professional development after completing the two years of summer institutes and follow-up days. The *"Collaborative Assessment"* model focused on improving instruction by examining student work and organizing content-focused conversations among colleagues. This approach appeared more effective than the one described in the previous paragraph because it focused discussion and reflection on student learning. It also reportedly refocused conversations in the teachers' lounge on teaching and learning mathematics. This focus on student learning also is a major goal of the Institute for Learning (IFL) a district initiative to improve leadership.

The differences in effectiveness of these two approaches to campus support centered on three elements: the school climate, the facilitator's skill level, and the model. When the school climate consisted of teachers and administrators who were knowledgeable about standards-based mathematics and motivated to improve instruction as in the case of the pilot school, the professional dialogue reached more campus staff than when the school climate was characterized by a lack of interest in changing instruction. The facilitator at the pilot school had honed her skills in guiding teachers' conversations about student learning and professional development for several years, whereas the other facilitators were less skilled in supporting teachers. The model of campus support provided structured discussions of teaching and learning, whereas the model at other campuses focused on brief, superficial discussions about how implementation of standards-based mathematics instruction was progressing. Thus, in the 1999-2000 school year, effective campus support apparently occurred on one AISD campus.

In sum, developing campus cultures that provide ongoing support for teachers in their classroom, an original goal of the NSF grant, is still in its infancy. Campus support was not structured, rarely focused on mathematics content and pedagogy, and reached few teachers. Teachers' standing requests for observation and feedback were not systematically addressed. The ACME project offered to help teachers develop cognitive coaching relationships, but teachers did not appear ready for the opportunity. On the basis of a recent study of implementation of standards-based curriculum and instruction on AISD campuses (Batchelder & Christian, 1999), the synergism necessary for meaningful professional development to manifest on campuses is not yet common in the district.

PREPARATION OF ACME PROFESSIONAL DEVELOPMENT FACILITATORS

Orientation to ACME Professional Development

All professional development facilitators were former classroom teachers who were campus leaders in standards-based curriculum and instruction, and many had provided professional development for district, state, and national organizations. To orient new facilitators to the project in previous years, new members built on the expertise of established ACME facilitators by observing professional development sessions before facilitating their own sessions. However, in the 1999-2000 school year, orientation to the ACME project was skipped in part because most new facilitators learned about the project through the teacher cadre. New facilitators were assigned sessions, provided notebooks with professional development pieces, and received little guidance on the ACME approach to developing

learning communities and to the needs of teachers. (In the fall of 2000, new professional development facilitators are again taking time to observe experienced ACME facilitators and become oriented to the project.) ACME facilitators continued to participate in national conferences for professional development such as the Technical Educational Research Center (TERC) leadership conference, "Administrators as Leaders, Parents as Partners," and the conference, "Diversity, Equity, and Standards, An Urban Agenda in Mathematics Education," sponsored by NSF, NCTM, and New York University. Additional professional development for ACME facilitators included "Effective Strategies for Engaging Teachers in Staff Development" and "Quality of Implementation of Standards-Based Instruction" provided by district staff.

Communication of ACME Professional Development Facilitators

In the third year of ACME, changes in central office and project leadership brought changes in how ACME facilitators worked together and communicated. Communication from district leaders and among ACME leaders was segregated from other ACME staff. Communication among ACME facilitators changed from a focus on improving ACME professional development to concerns about personal needs. For example, although lunch breaks previously were times for reflection and debriefing among ACME facilitators, in the summer of 2000 conversations focused on changes in district and uncertainty about the direction of ACME project organization. Thus, changes in the district and the project had an impact on time spent reflecting and improving the effectiveness of ACME professional development.

Shared Vision of ACME Professional Development Facilitators

Many of the ACME professional development facilitators continued to hold a shared vision of the goals of the project: The vision, as one ACME facilitator reported, focused on improving mathematics instruction with "professional development at the center… for really getting teachers excited about teaching mathematics, empowering them to work as a team, and really learn how to implement the curriculum,… to get teachers to take over leadership roles, and to see the bigger picture." Yet, during the third year of the ACME project, talk that questioned the value of standards-based curriculum and instruction emerged among AISD mathematics specialists. In addition, rather than directly supporting standards-based mathematics instruction, district administrators emphasized teaching the curriculum embedded in the state standards TEKS, students' knowledge of which the TAAS assesses. Consideration of resources, other than *Investigations* and *CMP*, that prepared students for TAAS also surfaced. Although most ACME facilitators valued standards-based instruction to improve mathematics education, a shift in emphasis destabilized the vision.

CULTURE OF ACME PROFESSIONAL DEVELOPMENT

Development of a Learning Community

In the third year of the ACME project, the culture of ACME professional development focused on developing a learning community. To lay the groundwork for the learning community, ACME facilitators established norms on the basis of national standards for staff development and teacher feedback. These norms, posted and discussed at ACME

professional development, included: (a) honor our time; (b) take responsibility for your learning and the learning of others; (c) focus on the purpose; and (d) keep student learning at the forefront. The goal was to make respect for colleagues explicit and to emphasize adult and student learning.

An introductory ACME professional development session for kindergarten and first grade teachers exemplified how the norms worked. The facilitator launched the session by starting on time stating, "I'm going to honor your time." Participants spent several minutes discussing the question, "Why do we come to professional development?" The facilitator commented that much of the discussion focused on the challenges of implementing the standards-based curriculum resources (e.g., reading the teacher books, organizing materials), but not on student thinking. This comment guided participants to turn to a discussion of student learning.

The facilitator, then asked for feedback on the discussion, which encouraged participants to reflect on the process of professional development and to be open about their reactions. One woman thought it was "helpful to realize that other people are going through the same things I am." After sharing stories about personal experiences learning mathematics, one woman stated "If a lot of the same things come up, you could just list it. It would take less time." Another woman responded, "This discussion reinforces my belief in a balance of manipulatives and drill." Thus, the facilitator guided teachers in sharing opinions that were supportive as well as oppositional to the professional development activities and to reform in mathematics instruction.

In ACME professional development, teachers and facilitators shared their struggles and insights about implementing standards-based mathematics in their classrooms. In a kindergarten and first grade summer institute, teachers and the facilitators participated in a book study of *Growing Mathematical Ideas in Kindergarten* (Schulman-Dacey & Eston, 1999). One teacher expressed the challenges of changing teaching practices and said, "I have problems going from rote [instruction] to exploring deeper." The facilitator set the tone for reflection by conceding that questioning is "what's hard about *Investigations*." He figured out questioning strategies were "the reason my kids weren't making the 'Aha.'" He then tied that discovery to the participants' success in a problem-solving activity from that week of ACME professional development. He said, "This is the first time I felt the groups understood the 'Swimming Pool Problem,'" to which he attributed his development of effective questioning strategies.

Although most professional development facilitators focused on developing a learning community, the quality of facilitation varied across sessions, as was seen in previous years. In one observed ACME professional development session, for example, the facilitator directed the discussion in ways that seemed unresponsive to teachers' needs, which seemed to alienate some participants. Yet, despite or perhaps because of this apparent unresponsiveness, several teachers in the session added focus and leadership to the discussion by sharing their experiences implementing standards-based curriculum and their beliefs about reforming mathematics instruction. While variability in the quality of facilitation may hamper teachers' experiences in ACME professional development, some

participants' motivation to implement standards-based mathematics may endure and influence others.

Levels of Engagement in ACME Professional Development Activities

In the third year of the ACME project, more teachers were observed to be actively engaged in professional development activities than before. However, in some observed sessions, 25% of the participants were not actively engaged (e.g., were discussing campus politics, grading papers) as in previous years. Some participants arrived in late (up to 30 minutes), as before, which was not consistent with commitment to the "honor our time" norm for professional development.

While some ACME facilitators employed effective strategies for engaging participants, others appeared to disregard the issue. Effective strategies included: (a) validating and giving voice to a variety of opinions by summarizing what participants said during break out sessions; (b) changing seating arrangements daily to mix participants from across the district; (c) using name sticks to draw out participants and to encourage every participant to be responsible for learning; and (d) talking to participants during breaks, including unfamiliar faces and quiet ones. Ineffective strategies included not talking to teachers that did not seem engaged and asking teachers to hold their comments without returning to the points later in a session. It appeared that making the norms explicit in dialogue with participants throughout sessions was more effective than simply posting the norms and presenting them once in a session.

Relevance of ACME Professional Development

Some lack of engagement in ACME professional development activities may be due to some teachers' not finding relevance in ACME professional development. In interviews, teachers expressed positive and negative beliefs about ACME professional development. As in the past, some teachers were impatient with the structure of sessions. One teacher reported that ACME professional development "could be faster; you do activities, and a lot of talking between is a waste of time; I'd like not to go." Other teachers wanted more time spent learning games of *Investigations*. One teacher said, "I would have spent more time on games and not put much theory into it, [I'd spend] more time on individual book activities." Other teachers expressed positive experiences in ACME professional development. One teacher said, "It was really helpful to plan as a team…. Working with [an ACME facilitator] was more helpful than playing the games." Another teacher stated, "They're doing a good job, and they're good at answering people's questions…. I learn much more with *CMP* than kill kids with drill."

Although some teachers did not find activities of ACME professional development relevant, attitudes in general have remained lukewarm. On the basis of the LSC Teacher Questionnaire, over half of the teachers surveyed (57%) rated the quality of ACME professional development as "good," "very good," or "excellent," while less than one third of respondents (29%) rated it "fair," and a small proportion (14%) rated it "poor" or "very poor." The overall quality of rating of ACME professional development declined slightly in the Spring of 2000 from the Spring of 1999.

DEEPENING TEACHERS' UNDERSTANDING OF MATHEMATICS CONTENT

The ACME approach to deepening teachers' understanding of mathematics content continued in the project's third year as in previous years. Mathematics content was infused throughout ACME professional development. The approach included the following components:

- ACME facilitators presented engaging problems to provide opportunities for participants to explore mathematics deeply and to reflect on their experiences as adult learners and compare their experiences to those of students.
- ACME professional development activities asked teachers to examine children's mathematical thinking and problem solving strategies (e.g., videos presenting student strategies for solving multiplication and division problems and the derivation of what students need to know to solve these problems).
- While working with the curriculum resources, ACME professional development addressed a variety of content areas such as number sense, computation strategies, measurement, algebraic thinking, and geometry (e.g., how children learn to count from the *Investigations* Teacher Notes); probability and statistics were not covered.

Thus, placing student mathematical thinking at the forefront of professional development discussions was a focus of ACME professional development in the third year. Although this approach appeared to make mathematics content accessible to a number of teachers, for some teachers, gaining understanding was hit or miss. Not all content areas were explored thoroughly, nor was mathematics content differentiated for the needs of various teachers.

The informal assessment of how well teachers were learning mathematics content continued as before through informal conversations and observations during ACME professional development. On the basis of responses to the LSC Teacher Questionnaire, increases in how prepared teachers felt to teach mathematics content that had occurred in the second year of the ACME project had stabilized by the third year.

FAMILIARIZING TEACHERS WITH CURRICULUM RESOURCES AND PEDAGOGY

Curriculum Resources

The approach of ACME professional development to helping teachers become familiar with standards-based curriculum resources and pedagogy continued as in the previous year. The approach to familiarizing teachers with standards-based curriculum resources included:

- To begin, a scavenger hunt helped teachers discover parts of the curriculum resources.
- ACME professional development often asked participants to engage in activities with manipulatives, to play the games in the resources, and to explore the mathematics underlying the activities. In follow-up during the school year, professional development activities focused on books that teachers were scheduled to use in the coming months.
- Teachers shared classroom experiences with the resources in group and panel discussions, including information about how to organize materials and classroom management.
- Classroom teachers from the teacher cadre modeled lessons from *Investigations* and *CMP* and shared classroom experiences in summer institutes.

- To address the needs of diverse learners teachers discussed extensions and adaptations to activities, and the ACME project developed charts with extensions for gifted and talented, special education, and bilingual/ESL students.

Increasing Teachers' Standards-Based Pedagogical Knowledge

The approach to increasing teachers' knowledge of standards-based pedagogy included:

- ACME facilitators modeled inquiry-based pedagogy, pointed out the questions they asked to push participants' thinking to new levels, and asked teachers to discuss the strategies used to facilitate exploration of mathematics content and student thinking.
- Summer institutes included a book study of *Beyond Arithmetic* (1995) in which teachers reflected on inquiry-based pedagogy, student learning, and mathematics curriculum.
- Participants examined Bloom's taxonomy of learning and related it to the mathematics TEKS.
- ACME facilitators presented videos of AISD teachers implementing standards-based pedagogy and held discussions on teaching strategies and student dialogue.
- Second grade teachers who administered the Performance Assessment in Language Arts and Mathematics (PALM) and who were targeted for implementation of ACME curriculum resources scored their students' work with rubrics and discussed how describing the work could inform instruction. (Although kindergarten and first grade teachers also administered PALM, they were not targeted for implementation in the 1999-2000 school year.)
- Teachers also received an extensive set of handouts with questions to promote deep exploration of mathematics with students.

Observations of ACME professional development revealed variability in the depth of discussions and in putting into practice these approaches. While some ACME facilitators appeared to effectively engage participants and motivate deep exploration, other facilitators were not stimulating or attentive to best practices for staff development.

On the basis of the LSC Teacher Questionnaire, the teachers surveyed continued to endorse standards-based teaching strategies as in previous years. Yet, their level of endorsement increased in the previous year and stabilized in ACME's third year. Although the teachers surveyed continued to report that their pedagogical knowledge was higher than mathematics content knowledge, pedagogical knowledge had increased in the previous year and stabilized in the third year of the ACME project.

Professional Development Tailored to Special Education Teachers

To help special education teachers become familiar with standards-based curriculum resources and pedagogy, ACME professional development was expanded to include sessions tailored to their needs. Special education teachers attended professional development on number sense in the fall and on operations in the spring, with primary and secondary teachers attending separately. A key feature of the session was a special education teacher who presented case studies recounting how she adapted one lesson to the unique learning styles of three children. The special education teachers who attended reported appreciation of the rare opportunity to get together and to talk about work.

IMPACT OF ACME PROFESSIONAL DEVELOPMENT ON CLASSROOM INSTRUCTION

CLASSROOM OBSERVATIONS IN THE SPRING OF 2000

Evidence of the impact of ACME professional development on instruction was derived from classroom observations (for a sample description, see "Classroom Observations and the Quality of Implementation," p. **13**). These observations provided a small, representative sample of mathematics instruction in the district. Although a large number of the observations (69%) included the curriculum resources of *Investigations in Number, Data, and Space* and *Connected Mathematics* (*CMP*) that were selected for the ACME initiative, observers remarked that a few teachers may have chosen to use these materials only because an ACME evaluator was observing the lesson.

Many of the observed lessons included key elements of standards-based instruction such as problem-solving, communication, and using manipulatives for concrete representation, but a proportion of the observations involved rote activities such as drilling mathematics facts with flash cards. The observed lessons covered a variety of topics, including numeration and number theory, computation, patterns and relationships, and/or geometry. A majority of the lessons (67%) involved students as an entire classroom and/or individuals; thirty-eight percent involved students in small group activities. (Some lessons included more than one organizational structure.) Centers were used infrequently (19% of observations). The teachers' stated purpose for most of the observed lessons (60%) was to develop or review children's conceptual understanding, and the teachers intended students to learn mathematics facts in some lessons (23%). A majority of the observed lessons centered student activities on problem-solving (88%) and/or the use of manipulatives (54%). Classroom discussions occurred in many observations (42%), and in some lessons (25%) students answered textbook or worksheet questions. Computers, calculators, and audio-visual resources were used infrequently (21% of observations).

Definition of Rating Scale

The quality of implementation of standards-based instruction was rated using the Classroom Observation Protocol (HRI, 1999b), an 8-point global scale. Previous analyses simplified these ratings to three categories: weak, moderate, and strong implementation.[1] On the 8-point scale, level 1 refers to instruction that shows little evidence of student engagement with mathematical ideas. Level 1 has two subcategories. *Level 1A* involves passive learning in which raters observed the students receiving knowledge from the teacher or text. *Level 1B* refers to activity for activity's sake in which hands-on lessons lacked purpose or content. *Level 2* describes instruction that may have included elements of standards-based strategies but observers coded the lesson as having substantial problems in design, implementation or content and was limited in the likelihood to enhance children's mathematical understanding. At *Level 3* observers coded instruction at the beginning stages

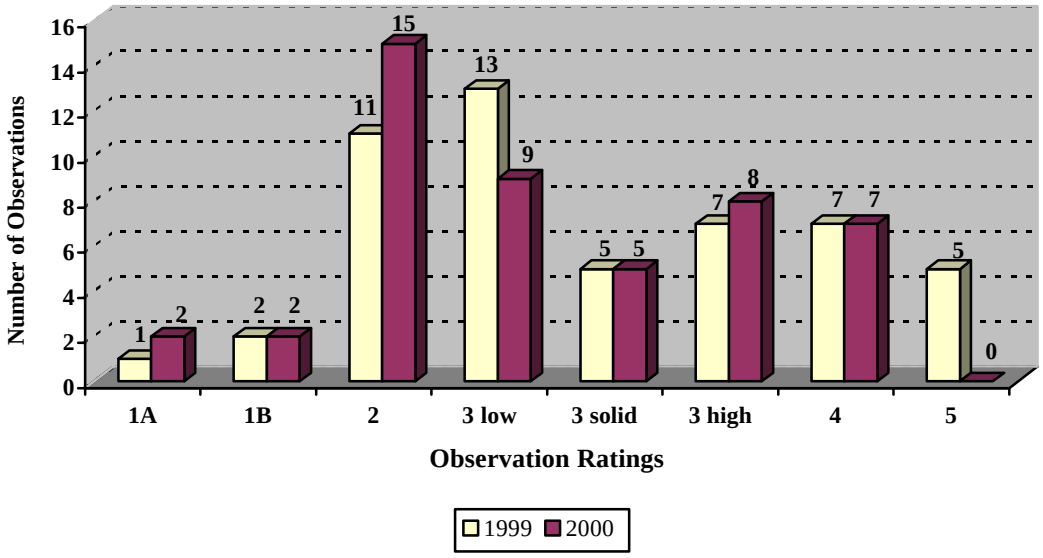
[1]Weak implementation includes levels 1A, 1B, and 2 of the HRI Classroom Observation Protocol; moderate includes levels 3 low and 3 solid; and strong includes levels 3 high, 4, and 5.

of standards-based teaching strategies by engaging children in mathematical concepts and problem-solving but may not have reached some children. Level 3 is broken down into low, solid, and high. *Level 4* reflects standards-based instruction that was effective and engaging and appeared to help most students solve mathematical problems successfully. *Level 5* describes exemplary instruction that engaged all of the students most of the time in mathematical problem-solving, communication, and conceptual understanding and represented the art more than the craft of teaching.

QUALITY OF IMPLEMENTATION IN THE SPRINGS 1999 AND 2000

The observation ratings of the quality of implementation of standards-based mathematics instruction in the Springs of 1999 and 2000 were similar[2], although the 1999-2000 school year brought some decline (see Figure 17). In the Spring of 2000, more lessons were rated at level 2 and fewer lessons were rated at level 3 low than were in the Spring of 1999. In addition, no mathematics lesson in the Spring of 2000 was rated at level 5. These results suggest a slight shift in the district away from high quality standards-based instruction.

Figure 17. Frequencies of Observation Ratings of the Quality of Teacher Implementation for the Springs of 1999 and 2000



Source: Classroom Observations

It is important to interpret these results cautiously. Differences in longitudinal observation ratings may be due to the differences in raters from one year to the next. Two AISD evaluation staff rated classroom observations in the Spring of 1999, and were replaced in 2000 by raters who had strong mathematics content backgrounds and who may have rated

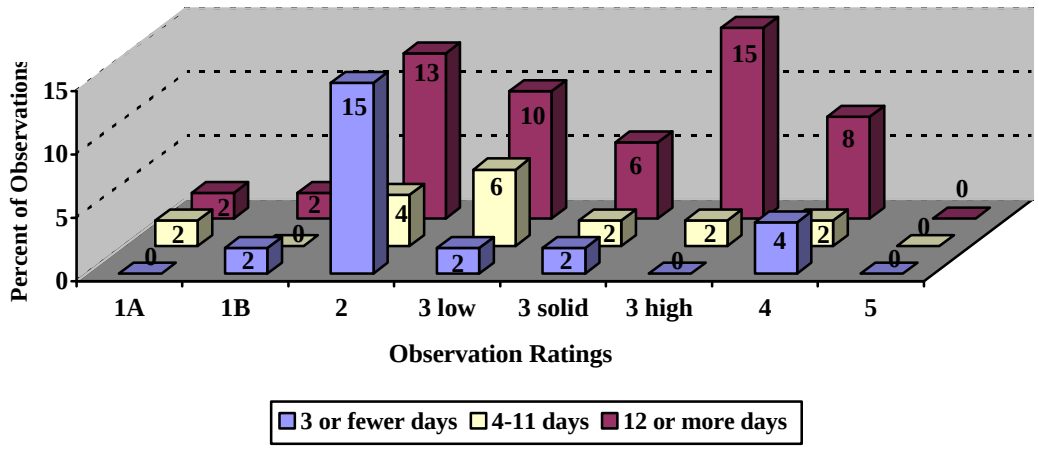
[2] Longitudinal observation ratings were correlated, $r(40) = .57$, $p < .001$.

lessons more stringently than the observers in 1999[3]. In addition, Horizon Research, Inc. (HRI), subcontracted by NSF to design and direct the national evaluation of LSC initiatives, provided intensive training viewing and rating classroom videos for one and a half days. HRI certified raters as reliable if their ratings of a set of classroom videos fell within one level of the official NSF rating. Thus, differences across years could also be due to the inter-rater reliability criterion. Moreover, measuring a teacher's instruction on the basis of one observation per year is not reliable. An educational researcher postulated that frequent observation, about six ratings in one year, might provide reliable data of a teacher's instructional competence (Ball, 1999).

ACME PARTICIPATION AND QUALITY OF IMPLEMENTATION IN THE SPRING 2000

The time teachers spent in ACME professional development by the Spring of 2000 appeared to influence the quality of implementation of standards-based mathematics instruction (see Figure 18). The teachers observed in 56% of the 48 lessons had participated in 12 or more days of ACME professional development, and most of the ratings demonstrated moderate and strong levels of implementation of standards-based mathematics instruction (level 3 low and above). Nineteen percent of the teachers observed had participated in 4 to 11 days of ACME professional development, and the ratings centered around moderate levels of implementation of standards-based instruction (level 3 low). Twenty-five percent of the teachers observed had participated in 3 or fewer days of ACME professional development, and most of the ratings reflected weak levels of implementation (level 2 and below).

Figure 18. Percentage of Observation Ratings of the Quality of Teacher Implementation by ACME Professional Development Days in the Spring of 2000



Source: Classroom Observations

[3] One 1999 observer who did not observe in the Spring of 2000 tended to rate lessons 2.5 levels above the other 1999 observers, ANOVA, $F(5, 44) = 2.09$, $p = .09$.

Participation in ACME professional development appears to not be helping a number of teachers become competent at standards-based instruction, however. Twenty-three percent of the teachers whose lessons were rated as weak implementation (level 2 and below) had participated in a great deal of ACME professional development (4 or more days). These results are cause for concern. This finding may be due to ineffective professional development as well as teachers' unwillingness to change their practice. On the other hand, other systemic factors may influence these results such as lack of administrative support on campuses for implementation, little time during the school day for teacher collaboration focused on mathematics content knowledge and student learning, and AISD's lack of clear vision about mathematics education.

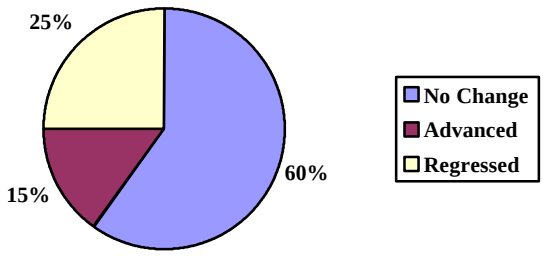
A few of the teachers observed (8%) had spent little time in ACME professional development but presented moderate or strong levels of implementation of standards-based instruction (level 3 low and above). As noted in a previous ACME evaluation (Batchelder & Christian, 1999), teachers who are "experts" in standards-based teaching practice are an untapped resource in AISD. These teachers could provide support such as mentoring or peer coaching on campuses.

LONGITUDINAL CLASSROOM OBSERVATIONS

Change in the Quality of Implementation of Standards-Based Instruction

The mathematics lessons of 40 teachers were observed longitudinally, once in either 1998 or 1999 and once in 2000. The pie chart (Figure 19) illustrates the percentage of the 40 rated lessons that "advanced," "regressed," and did not change ("no change") in quality of teacher implementation of standards-based mathematics (weak, moderate and strong implementation; see Appendix B for the changes in observation ratings). A majority of the mathematics lessons observed (60%) did not change in the quality of implementation of standards-based instruction, 25% of the observed lessons regressed, and only 15% of the observed lessons advanced.

Figure 19. Proportion of Observation Ratings that Advanced, Regressed, or Did Not Change in Quality of Teacher Implementation



Source: Classroom Observations

In general, the mathematics lessons of teachers whose ratings advanced by the Spring of 2000 were not implementing standards-based teaching strategies when they were first observed. The advanced group was rated significantly lower at the first observation on average than were the regressed group or no change group[4]. The average first rating for the advanced group was level 2. At level 2, instruction focuses on practicing computation and does not appear to help children deepen their conceptual understanding of mathematics. The average first rating was level 3 solid for lessons that did not change and regressed. At level 3, instruction includes many components of effective standards-based instruction that help children develop conceptual understanding and solve complex mathematical problems.

It is important to note that the small proportion of teachers whose lessons advanced may have been affected by the number of teachers not continuing in the longitudinal study. Thirty-seven percent of the 63 teachers who were observed in either the Spring of 1998 or the Spring of 1999 did not participate in a second observation for various reasons (e.g., personal leave, not teaching mathematics, hired for other positions), and several teachers refused to continue. Additionally, the district has a teacher turnover rate between 15% and 20% per year, including retirees, recently certified teachers, and others. The teachers who did not continue to participate in the study in the Spring of 2000 tended to have a first observation rating that averaged one level below the rating of the teachers who participated longitudinally[5]. Because the average first observation rating of teachers whose lessons advanced was lower than the ratings of teachers whose lessons regressed or did not change, it is likely that if more teachers had continued the study, the size of the advanced group might be larger.

ACME Professional Development Participation and Change in the Quality of Implementation

The amount of participation in ACME professional development should relate to changes in the quality of the implementation of standards-based curriculum and instruction. However, the results were complex (see Appendix B, Table 1). Changes in observation ratings were not directly related to the number of ACME professional development hours attended for all of the teachers who participated in the longitudinal study.

Advanced ratings. Most of the teachers whose ratings advanced (5 of 6 observations) had participated in 4 or more days of ACME professional development in the last year. Participation appeared to help some teachers who lacked knowledge and skills in standards-based instruction begin to develop those teaching strategies.

No change ratings. Among the group whose ratings did not change, 46% (11 of 24 observations) had participated in little ACME professional development (i.e., 3 or fewer days) in the past year. Over half of the teachers whose ratings did not change (13 of 24 observations) had participated in a considerable amount of ACME professional development (i.e., 4 or more days) in the past year. Thus, for a number of teachers, ongoing participation in ACME professional development did not render major improvements in standards-based teaching practices.

[4] One-way ANOVA, F (2, 37) = 3.75, $p < .05$.

[5] One-way ANOVA, F (1, 61) = 3.43, $p = .07$; the mean levels of first observations tended to be 3 low for teachers who left the study and 3 solid for teachers who participated longitudinally.

Regressed ratings. Most of the teachers whose ratings regressed (7 of 10 observations) had participated in a considerable amount of ACME professional development (i.e., 4 to 11 days) in the past year. Thus, despite participating in ACME professional development during the 1999-2000 school year, some teachers did not maintain or advance to higher levels of competence in standards-based teaching strategies. Observers noted that some regression was due to teachers' decisions to steer away from standards-based curriculum resources (e.g., by integrating mathematics and art or by drilling students with flash cards to control a class in which many students had disruptive behavior).

Caveats. The results of this longitudinal analysis should be considered cautiously. First, the observations reflect ratings of one day in an academic year, while many factors can influence the quality of instruction (e.g., mood, familiarity with the lesson, external events). Second, as noted above, the observers in 2000 may have rated lessons more stringently than the observers in 1999 and thus influenced the size of the regressed group. Additionally, observers noted that many observations took place after TAAS when instruction appeared to "shut down," and the quality of instruction was compromised. Although some teachers may have the capacity to implement standards-based instruction, which is linked to student mathematics achievement, they appear to abandon the curriculum after testing. Consequently, AISD students may loose three to four weeks of quality instruction and learning.

GENERALIZATIONS FROM OBSERVERS

The following generalizations of the observers inform these results:

- Although the district has adopted the curriculum resources of Investigations in Number, Data, and Space and Connected Mathematics (CMP) and the supplemental texts of Math in My World and Mathematics: Applications and Connections, Courses 1-3, teachers were observed routinely supplementing lessons with materials that were not standards-based (e.g., Excel worksheets and Arithmetic Done Daily, A.D.D.) to drill students for TAAS.
- Teachers did not seem to learn what makes lessons engaging from ACME professional development; they reduced lessons to the procedures and cut out rich activities in which students establish mathematical understandings.
- Teachers have not become skilled in teaching strategies that raise the quality of instruction (e.g., asking questions that challenge student thinking and wrapping up lessons with key concepts of lessons that reinforce student learning.)
- Teachers have not developed a complex understanding of mathematics content knowledge.
- The difference between lessons rated at accomplished levels of standards-based instruction and lessons rated as lacking standards-based instruction were teacher expectations and value for what students would learn from the lesson.

These generalizations support the conclusion that ACME professional development may help teachers who are not experienced with standards-based instruction learn how to use the high quality curriculum resources and develop some competence in the teaching strategies. Yet, teachers who develop a level of competence do not develop their skills further and become highly effective at standards-based instructional strategies. The ACME project has not yet helped a majority of AISD teachers gain the mathematics content

knowledge and the pedagogical skills necessary to become highly effective at standards-based instruction.

ONGOING SUPPORT TO TEACHERS IMPLEMENTING STANDARDS-BASED MATHEMATICS

Materials for Campuses

Before the third year of ACME, the district had purchased curriculum resources for all grade levels implementing standards-based instruction (second through eighth grades) and kits for every two teachers implementing. In response to teacher feedback, the district supplied every teacher with a kit. Additionally, the district provided packets of most student sheets for teachers implementing in the 1999-2000 school year to reduce teachers' photocopying load.

In the 1999-2000 school year, distribution of materials to teachers on campuses did not run smoothly. Materials for kindergarten and first grade teachers were not available from the publishers by the first day of classes in August. Although these grade levels were not yet targeted to implement the ACME-designated resources, the district adoption of *Investigations* required distribution. The student sheets were also copied and distributed to campuses for every classroom. The sheets were delivered a few weeks after school began. Additionally, keeping track of campus inventories with packing slips as well as with staff turnover continued to be problematic as in previous years.

Follow-up Support

Ongoing support to teachers implementing the curriculum resources generally took the form of follow-up days. As stated previously, on campus support was rare. As in previous years, some teachers found benefits in the ACME follow-up professional development during the academic year whereas others did not receive what they felt they needed. For example, one teacher valued working with the curriculum resources during follow-up professional development. She stated, "The follow-up training really shows you how you need to be teaching the materials; the facilitators point out difficulties and suggest different ways to approach the activities…. If you pick up a book without training, it's very difficult." Other teachers questioned the plan of ACME follow-up. One teacher stated, "In the follow-ups we didn't get into every book; it was rushed. I think the TAAS activities were not relevant." It appeared that teachers appreciated support using the materials during the academic year, but some disagree about how the time should be spent. While exploring the TAAS, TEKS, and links to standards-based resources allayed the concerns of some teachers, other did not see the relevance of these activities.

IMPLEMENTATION OF ACME PROFESSIONAL DEVELOPMENT

In the third year of the ACME project, implementation of ACME professional development has continued as planned. With kindergarten and first grade beginning the two year professional development series, all targeted grade levels, kindergarten through eighth grade, have participated on schedule.

Changes in the design were instigated the previous year to provide the ACME professional development annually for new hires and teachers who change grade levels. Although the changes addressed the ongoing need for ACME professional development,

many new teachers were hired just before school started and missed the foundation provided in ACME summer institutes. A one day overview provided after the first day of classes was not sufficient preparation for teachers new to standards-based instruction. While some struggled with implementing standards-based curriculum resources, others did not attempt implementation.

Teacher attendance at ACME professional development continued for first time participants at rates similar to previous years, although in the summer of 2000 many teachers did not return for a second summer institute. For elementary, many kindergarten and first grade teachers (over 80%) participated in the first week of the ACME summer institute and a smaller number returned for the second week (70%). Similarly, approximately 85% of new second grade teachers, 70% of new third grade teachers, and 80% new fourth grade teachers attended the first week of their first ACME summer institute. Attendance dropped off in the second week for new fourth grade teachers (45% returned). A large number of second and third grade teachers also did not return for their second ACME summer institute; only 30% of second and third grade teachers returned to complete ACME professional development. For middle school, while most new teachers (almost 100%) attended the first ACME summer institute, few middle school teachers (less than 33%) returned for the second summer institute.

SUPPORT FOR ACME REFORMS

CHANGES IN LEADERSHIP

Change in district leadership has impacted the level of support for the ACME vision of mathematics education. The district has had a different superintendent every year since the ACME project began. Deputy and area superintendents as well as ACME project leadership have changed. Key voices that originally rallied support for changes in mathematics education are no longer AISD leaders. Although in the past support for changes in mathematics education advocated by ACME was incomplete, recent changes in leadership resulted in a set back. New district leaders need to become knowledgeable of the design and implementation of the ACME project as well as its advantages and disadvantages for teaching and learning.

Change in district leadership has blurred the messages about the direction of mathematics education in the district and has yielded uncertainty on campuses. Support from campus administrators for the ACME vision of change in mathematics education continued to be variable across the district. While some campus administrators expect teachers to implement standards-based mathematics curriculum and instruction and structure time for teachers to collaborate and improve, other campus administrators do not endorse standards-based instruction and direct teachers toward other curriculum resources (Batchelder & Christian, 1999). Campus administrators who support ACME reforms organize teacher leaders to mentor other teachers as they develop standards-based instructional strategies, provide half-days for grade levels to collaborate on mathematics content. Campus administrators who do not support ACME reforms encourage teachers to use a battery of curriculum materials that are not standards-based, do not learn about standards-based

curriculum and instruction, or do not communicate expectations that teachers will implement it.

Data from the LSC Principal Questionnaires indicate that support for standards-based mathematics instruction has declined from high endorsement in the Spring of 1998 to moderate endorsement in the Spring of 2000. In the third year of ACME, fewer principals strongly agreed that they were knowledgeable of national standards in mathematics and well-prepared to support teachers implementing standards-based instruction than had in the first year of the program. The difficulty establishing support for standards-based instruction may be due in part to high principal turn-over rates in the district. Some elementary and middle school principals (41%) reported that they were new to the job, holding the position of principal for 3 years or less; two-thirds (66%) had been principal at that particular school for 3 years or less; half (52%) had been a principal in AISD for 3 years or less.

The ACME project designed and used to provide professional development to help campus leaders support teachers implementing standards-based curriculum resources, however none were held in ACME's third year. The effectiveness of professional development for campus administrators appears to depend on principal's knowledge of systemic reform and readiness to implement standards-based curriculum and instruction on their campuses as well as on support from central office leaders.

SUPPORT FROM STAKEHOLDERS

Stakeholders in the ACME project include elementary and middle school mathematics teachers, principals, central office administrators, as well as, parents, professionals in higher education, and other community members. In general, teachers supported the instructional practices of the ACME initiative in mathematics education highly; for example, a majority (90%) of the teachers surveyed on the LSC Teacher Questionnaire considered developing students' conceptual understanding in mathematics and hands-on activities "very important." A small proportion of teachers expressed opposition to implementing standards-based instruction by supplementing the curriculum resources with materials that are not standards-based. Opposition from the teachers' union to implementing the curriculum resources surfaced in the Spring of 2000 but was incited primarily by teachers on one campus. The number of teachers not attending the second summer institute raises concern that the design of ACME professional development is not meeting their needs.

According to teachers who responded to the LSC Teacher Questionnaire, parents continued to express neither strong support nor opposition to standards-based mathematics instruction as in previous years. District and ACME leaders have responded to opposition from vocal parents, however. To educate parents about what to expect from standards-based mathematics curriculum and instruction, many campuses have held family math nights annually, often with the support of ACME facilitators. ACME staff have also developed pamphlets to inform parents and distributed videos about standards-based mathematics. A new district initiative to spur parental involvement may further garner parental support in the 2000-2001 school year.

CONSISTENCY OF DISTRICT INITIATIVES

The consistency of district initiatives has gone far to align district policy and practices with the ACME vision for mathematics education. The AISD Language and Literacy Department has been implementing the Balanced Literacy Program and the Science and Health Education Department has been implementing FOSS for several years. Both initiatives are based on a constructivist approach to teaching and learning.

The new superintendent contracted with the Institute for Learning (IFL) in Pittsburgh to help district and campus leaders refocus teaching and learning districtwide. District staff and campus administrators have participated in workshops, demonstrations, and discussions with IFL staff. The district chose to focus on two of nine Principles of Learning, clear expectations and accountable talk, which ACME facilitators have posted and discussed in ACME professional development. While the knowledge and beliefs advocated by IFL appear to align with the ACME vision for mathematics education, it is unclear whether district and campus administrators are making connections explicit. IFL has the potential to help campus administrators become strong instructional leaders. This initiative could support the goals of the ACME project if the message about the connections is clear.

Another local initiative has the potential to support the ACME vision for mathematics education, although in practice the support has been spotty. In the 1999-2000 school year, the district initiated the Account for Learning (AFL) funding source to improve instruction on 42 campuses where student achievement was low. The initiative included an instructional specialist on each of these 42 campuses to support teachers. ACME staff were formative to the professional development for these instructional specialists and shared information about standards-based mathematics instruction.

These specialists could participate in cognitive coaching, mentoring, and teacher collaboration necessary to help teachers develop standards-based pedagogical skills. However, only about five of the 42 specialists hired had participated in the ACME teacher cadre and had competence in standards-based mathematics instruction. Other AFL specialists were strong in language arts and some were pulled from classrooms to meet other organizational needs. Thus, a small number had the competence to lead standards-based mathematics instruction on their campuses. Moreover, interviews with specialists revealed that much of their time was spent mentoring new teachers, helping teachers analyze TAAS data, sharing strategies for TAAS preparation, and organizing campus instructional materials. To support the ACME vision for mathematics education, instructional specialists would be central to a plan to help teachers become strong implementers of standards-based mathematics instruction, including cognitive coaching and content-focused collaboration. The professional development provided AFL specialists may prepare them for some of these responsibilities, their success may depend on their beginning the position with a high level of knowledge and pedagogical skills in standards-based mathematics instruction as well as strong leadership skills and district and campus support.

CURRICULUM RESOURCES

In the Spring of 1999, AISD decided on dual textbook adoptions. The district chose to supplement the ACME curriculum resource *Investigations in Number, Data, and Space* with the traditional texts *Math in My World* for elementary schools and to supplement *CMP* with *Mathematics: Applications and Connections* for middle schools. A committee of teachers used a rubric that the Dana Center developed to evaluate curriculum resources. Although the two ACME resources were rated the highest, the district chose a dual adoption to fill in a few gaps in the TEKS standards, which vary by grade level, that emerged in *Investigations* and in *CMP*.

The dual adoption sent mixed messages to teachers and administrators. While adopting a textbook to fill a few gaps in the TEKS and appease stakeholders who prefer a textbook, it sends mixed messages about AISD's direction in mathematics education. In interviews, some teachers expressed concern about others not implementing *Investigations* and *CMP*. In classroom observations, a few teachers used the textbooks for topics covered in *Investigations* and *CMP*. In AISD, dual adoption was a compromise that deterred the complete implementation of standards-based curriculum resources.

STUDENT ASSESSMENT

A persistent deterrent to implementing standards-based mathematics curriculum and instruction was teacher concern about the statewide assessment TAAS and preparing students to pass the test (see "Student TAAS Mathematics Results and the Quality of Teacher Implementation," pp. **5-8**). As in previous years, teachers expressed anxiety about the compatibility of standards-based curriculum and instruction with student achievement on TAAS (see Batchelder & Christian, 1999). One teacher stated, "We are all bound by TAAS; I don't feel like *Investigations* leads us to TAAS." The fear of low TAAS performance continued to influence decisions about curriculum. One teacher reported in April of 2000, "For the past six weeks, I have had to abandon *Investigations* to teach TAAS test-taking strategies."

AISD and the ACME project have taken several approaches to allay this anxiety. Early on, the ACME project addressed these teacher concerns by designing ACME professional development activities to examine TAAS items as they relate to standards-based curriculum and instruction. In the 1999-2000 school year, AISD administrators established the policy that teachers would teach the state standards TEKS. The district also contracted the Dana Center's professional development "TEKS for Leaders" for campus administrators and district curriculum staff. These sessions demonstrated the direct link between the TEKS and the TAAS.

INSTITUTIONALIZATION OF ACME REFORMS

HIGH QUALITY PROFESSIONAL DEVELOPMENT

The foundation for institutionalizing ACME reforms rests on the extensive, in-house professional development program that helps teachers learn to implement standards-based curriculum resources and instruction. If AISD decides to continue providing ACME professional development, staff development days, and stipends for teachers, many AISD teachers will continue to learn how to implement standards-based curriculum and instruction. This sustenance also depends on maintaining a small staff of high quality professional development facilitators. However, limitations on the quality of implementation most likely will persist without widely available structures of professional development that promote improvements in teachers' pedagogical skills and content knowledge (e.g., cognitive coaching, content-focused collaborative inquiry, and mentoring).

SUPPORT FOR STANDARDS-BASED MATHEMATICS EDUCATION

The strongest support for standards-based mathematics education currently comes from teachers and some district and campus administrators. Given the link between student mathematics achievement and strong implementation of standards-based instruction, an advantage of the ACME reforms is the impact on student learning. Thus, institutionalizing standards-based mathematics curriculum and instruction would support the central goal of AISD, improving student learning. To institutionalize the ACME reforms, work is still needed to inform district and campus administrators about standards-based instruction and the process of systemwide change and to garner the support of a majority. A clear message about the direction of AISD mathematics education is lacking. Continued work educating parents about standards-based mathematics instruction and helping them feel comfortable with the changes is also necessary. Developing relationships with institutions of higher education could be a means for addressing the preparation of new hires in standards-based instruction and for improving the mathematics content knowledge of teachers.

SUMMARY AND RECOMMENDATIONS

STRENGTHS OF ACME PROJECT

In the third year of the project, the ACME project presented the following strengths:

- Strong implementation of standards-based mathematics curriculum and instruction was associated with high student achievement.
- ACME professional development helped teachers learn to implement standards-based curriculum resources.
- In conjunction with the ACME project, AISD provided all teachers with standards-based curriculum resources (including kits, copies of student sheets, and planning tools).

ADAPTATIONS TO ACME PROJECT

From the start, staff adapted ACME professional development to meet teachers' needs by:

- Focusing conversations and professional development activities on student thinking;
- Developing the culture of a learning community;
- Providing copies of student sheets and bilingual materials;
- Designing separate sessions for special education teachers;
- Establishing norms for professional development;
- Integrating planning time into ACME professional development;
- Developing planning tools to support implementation; and
- Scheduling sessions on Saturday, after school, and at North and South locations.

Although staff have adapted the ACME project to meet the needs of many teachers, some weaknesses in the design have not been addressed either by ACME or AISD. Districtwide structures that support implementation of standards-based instruction on all AISD campuses and meaningful teacher collaboration have not been developed. Teacher leadership from "experts" in standards-based instruction has remained untapped, except at a few sites.

CHALLENGES OF ACME PROJECT

In the third year of the project, the ACME project manifested the following challenges:

- Teachers across the district did not receive support for developing standards-based pedagogical skills and for deepening their mathematics content knowledge.
- Low attendance at summer institutes indicated that ACME professional development was not a high priority for many teachers.
- District and campus administrators did not uniformly support teacher implementation.

RECOMMENDATIONS

1. *Enlist district administrators to communicate a clear message about the district's vision for mathematics education because mixed messages have fostered piecemeal implementation of standards-based instruction across the district.* Broadcast the message on the AISD cable channel to reach teachers, campus administrators, parents, and community members. In area principal meetings, include 10 minute updates on the mathematics program (e.g., attendance at ACME professional development, TEKS and TAAS mathematics objectives, and the association between standards-based instruction and student achievement).

2. *Make explicit the connections between ACME and other district initiatives, especially IFL, because the approaches to teaching and learning are compatible.* IFL is an opportunity to strengthen the instructional leadership of district and campus administrators, which is a weak link in AISD's implementation of standards-based mathematics. Making the connections explicit should foster a shared vision for AISD's direction in curriculum and instruction and bolster necessary administrative support. Strong principal support occurs when administrators have knowledge of standards-based instruction and the process of systemic reform, commit and advocate for implementation, and organize teacher collaboration and leadership (Batchelder & Christian, 1999; St. John et al., 1999). If AISD is not able to bolster administrative support for standards-based mathematics instruction, it should look at other mathematics programs.

3. *Hire and train campus instructional specialists who are skilled in standards-based mathematics instruction through AFL funding.* Establish collaborative relationships between these specialists and ACME facilitators to provide a network of strong support for implementation on campuses. Concentrate this campus support on cognitive coaching and content-focused collaboration. By developing effective forms of campus support, AISD will help more teachers become strong implementers of standards-based mathematics instruction, which is linked to high levels of student achievement on TAAS mathematics (especially problem-solving skills that will be key to passing future versions of TAAS).

4. *Provide new ACME staff with professional development to maintain the quality of ACME professional development for teachers*. To ease the transition in ACME staff, develop cognitive coaching among team members and routinely examine teacher evaluations of ACME professional development to devise strategies to improve facilitators' skills.

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APPENDICES

APPENDIX A. GAINS AND LOSSES IN STUDENT TAAS MATHEMATICS

Figure 21 presents the gains and losses in the percentage of students passing TAAS mathematics between the 1998-99 and 1999-2000 school years by grade levels and by disaggregated groups (i.e., all students, African American, Hispanic, White, and economically disadvantaged). This figure shows that the greatest gains were made by African American, Hispanic, and economically disadvantaged students (except for 3rd grade students), although their percentage passing continued to lag behind White students (see Figures 1 through 12).

Figure 22 presents the gains and losses in the gains and losses in the mean TLI between the 1998-99 and 1999-2000 school years by grade levels and by disaggregated groups. This figure also demonstrates that greatest gains were made by African American, Hispanic, and economically disadvantaged students than by White students, although the mean TLI for these groups was consistently lower than that of White students (see Figures 1 through 12).

Figure 21. Gains and Losses in Percentage of Students Passing TAAS Mathematics Between 1998-99 and 1999-2000

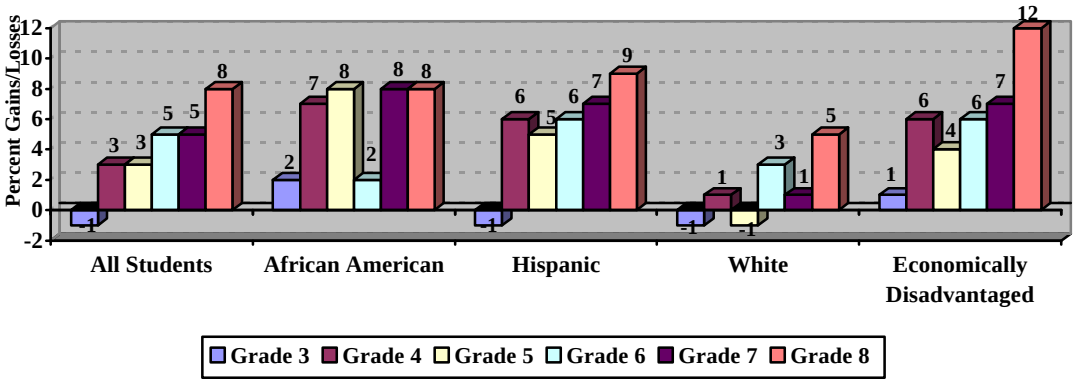
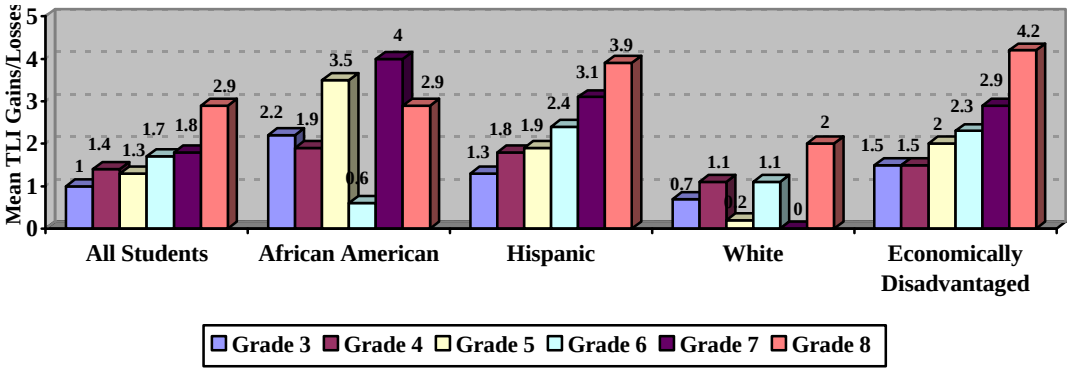


Figure 22. Gains and Losses in Mean TLI for Students in TAAS Mathematics Between 1998-99 and 1999-2000



APPENDIX B. ACME PROFESSIONAL DEVELOPMENT AND CHANGE IN IMPLEMENTATION

Table 1. Frequencies of Changes in the Number of Professional Development Days by Changes in Observation Ratings from Spring of 1999 to Spring of 2000.

	Change in Professional Development Days			
Change in Observation Rating	**3 or fewer days**	**4-11 days**	**12 or more days**	**Total**
ADVANCED				
Weak to moderate implementation				
1A∏ 3 solid	1			**1**
2∏ 3 low		1	1	**2**
2∏ 3 solid			1	**1**
Moderate to strong implementation				
3 low∏ 3 high		1	1	**2**
Total	**1**	**2**	**3**	**6**
NO CHANGE				

Weak implementation				
1A∏ 2		1		**1**
2	5		1	**6**
2∏ 1A		1		**1**
Moderate implementation				
3 low∏ 3 solid	1			**1**
3 low		1		**1**
3 solid		1		**1**
3 solid∏ 3 low	1	1	1	**3**
Strong implementation				
3 high		2		**2**
4	1	3		**4**
4∏ 3 high	1		1	**2**
5∏ 4	2			**2**
Total	**11**	**10**	**3**	**24**
RE GRESSED				
Moderate to weak implementation				
3 low∏ 1A		1		**1**
3 low∏ 1B		1		**1**
3 low∏ 2	2	1		**3**

Strong to moderate implementation				
3 high∏ 3 low		1		**1**
3 high∏ 3 solid		1		**1**
4∏ 3 low		1		**1**
Strong to weak implementation				
4∏ 2		1		**1**
5∏ 2	1			**1**
Total	**3**	**7**	**0**	**10**

APPENDIX C. EVALUATION INSTRUMENTS[6]

[6] For a copy of evaluation instruments, please contact:

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