

**ACME: Austin Collaborative for Mathematics Education,
Case Study, 1998-99
Executive Summary
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The Austin Collaborative for Mathematics Education (ACME) is a systemwide initiative to support the implementation of the curriculum and appropriate use of resources, thus improving instruction in all K-8 mathematics classrooms in the district. The initiative, funded by the National Science Foundation (NSF) in August of 1997 and district supplements, provides long-term, high quality professional development to build the capacity of all AISD mathematics teachers. The professional development focuses on the standards for mathematics education set by the state in the Texas Essential Knowledge and Skills (TEKS) and by the National Council of Teachers of Mathematics (NCTM). These standards include broadening the topics taught at all grade levels, developing children's mathematical thinking, and deepening children's conceptual understanding through concrete experiences (Russell, 1998). The standards contrast with traditional mathematics education characterized by rote memorization and practice of computation. ACME professional development supports teachers in the implementation of the AISD curriculum using the district-approved curriculum resources of Investigations in Number, Data, and Space and Connected Mathematics (CMP).

The purpose of this case study is to examine in-depth key factors that contribute to districtwide implementation of the AISD curriculum on individual campuses through skills and knowledge that teachers gain in ACME professional development. In particular, the study evaluates the following factors: (a) school culture, or staffs' shared values and beliefs, as it relates to teachers' implementation of standards-based mathematics; (b) differences between grade-by-grade and whole school implementation; (c) the principals' role in supporting teachers' implementation of standards-based curriculum resources and instruction; and (d) the formal and informal ways that teachers collaborate to improve their skills and knowledge in standards-based mathematics education.

Evaluators gathered information about implementation through multiple site visits to nine AISD campuses, which included schools with grade-by-grade and whole school implementation. Most schools were selected because they were thought to be further along the continuum of implementation than others and some were selected because they were thought to be struggling to implement. Most were elementary schools that received Title 1 funds. The information was derived from interviews with principals and teachers, observations of mathematics lessons, surveys of teachers' attitudes and behaviors, and participation in team and committee meetings and family math nights.

Implementation of Standards-Based Mathematics Education

The ACME project is unique in scope because its goal is to help all elementary and middle school mathematics teachers in the district implement standards-based teaching and learning in mathematics. To examine the degree to which all targeted teachers were implementing standards-based mathematics, evaluators rated mathematics lessons from low to high or no implementation at all. Teachers' and principals' reports also provided information. The examination of implementation revealed the following results:

- The mathematics lessons of teachers at all nine schools manifested a range in standards-based mathematics curriculum and instruction, regardless of whether the schools were far along or struggling to implement. Differences in implementation levels emerged by individual teachers, not by schools.
- In general, the study did not reveal differences between schools with whole school and grade-by-grade implementation; teachers' skills were varied regardless of implementation

- design. However, campuses with whole school implementation received on-site support from ACME staff (e.g., modeling and discussing lessons) and appeared to have stronger mechanisms for supporting reluctant or hesitant teachers in implementing than did schools with grade-by-grade implementation.
- The characteristics of teachers who implemented effectively included: (a) beliefs in the philosophy of standards-based mathematics education; (b) excitement about the curriculum, willingness to learn, or strong skills in teaching mathematics; (c) confidence in the academic capacities of children; (d) classroom management that supported children's active engagement; and (e) efforts to learn how to implement the curriculum resources, despite fears or hesitancy.
 - The more teachers reported that they liked using Investigations and CMP and the easier they found using the curriculum resources, the greater the number of lessons per week they reported teaching from the resources. There was a tendency for teachers new to the profession to be more willing to use Investigations and CMP than those with many years of experience.
 - Alternative curriculum resources to Investigations and CMP included conventional textbooks, standards-based supplemental materials, and test format practice.
 - Two factors negatively influenced whether teachers' implemented standards-based curriculum resources and instruction: On all campuses, some teachers expressed concerns about students' not passing the Texas Assessment of Academic Skills (TAAS) and, on a few campuses, compounded crises on campus detracted from implementation.

Recommendations for improving the implementation of standards-based mathematics include the following:

- Continue to provide varieties of professional development that address the range of skills, knowledge, and interest levels teachers have in standards-based curriculum and instruction and include some information about TAAS successes and alignments.
- Continue to educate principals about strong support for the project to address the concerns of hesitant or reluctant teachers (see "The Role of Principals in Implementation").
- Continue to encourage teachers to try out standards-based mathematics materials and supplements because their feelings about them are related to use.
- Provide every campus with a library set of all curriculum resources so that teachers can access resources of lower grade levels to simplify lessons.

The Role of Principals in Implementation

Principals play an important role in the adoption of innovations like standards-based mathematics curriculum as leaders at the campus level. Strong support lies in the technical and ideological leadership they provide teachers. Interviews with principals and teachers on the nine campuses revealed the following information about how administrators were supporting the ACME project and the implementation of standards-based mathematics:

- Basic principal support for implementation included supplying kits to every teacher, special copying budgets for student sheets, and time for professional development. (Note that in the 1999-2000 school year, the board of trustees has funded kits for every teacher and copies of student sheets.) This level of support focused on the management of implementation, which, according to the Concerns-Based Adoption Model (CBAM, Hord et al., 1989), occurs early on in an innovation before concerns about its impact on children, teacher collaboration, and improvements the project itself.
- Strong principal support for implementation included: a. principal commitment to the ACME project, communication of the expectation that all teachers will implement the curriculum, and monitoring teachers' standards-based mathematics instruction;

- a. principal commitment to the ACME project, communication of the expectation that all teachers will implement the curriculum, and monitoring teachers' standards-based mathematics instruction;
- b. gathering information about standards-based mathematics education and selling it to parents, teachers, and the community;
- c. having a systemic vision of implementation and the need for district support of reforms; and
- d. providing time for teacher collaboration and peer coaching outside of weekly team meetings, and organizing and promoting strong teacher leadership, which occurred more often at schools with whole school than grade-by-grade implementation.

Despite strong principal support, all faculty included teachers reluctant or resistant to implement standards-based curriculum (see "Implementation of Standards-Based Mathematics Education").

- A few assistant principals who had knowledge and expertise in standards-based mathematics education bolstered principal support for implementation on campus.
- Principal support that detracted from implementation included:
 - a. campus goals that conflicted with the goals of ACME or were not broad enough to include standards-based mathematics curriculum and instruction;
 - b. unclear understanding of how principals could support teachers in implementation, although thoughts about principals' roles developed over the course of the study;
 - c. mixed messages about implementation (e.g., advocating for alternative curricula or no curriculum in particular), linked to a campus identity of separateness from the district; and
 - d. support for the implementation of a few teachers on campus but not for all.

Recommendations for improving principal support for implementation:

- Continue to educate principals about the components of strong support for the implementation of standards-based mathematics education, and encourage them beyond basic support as managers of implementation.
- Educate central office administrators, board of trustees, and the community about the ACME project to foster clear messages districtwide and support for the implementation of standards-based mathematics.
- Address principal support that detracts from implementation and other AISD programs as a district initiative campus

Teacher Collaboration

Teacher collaboration allows educators to explore and learn innovative curriculum and instruction through the support of colleagues. Strong principal support for implementation occurred when administrators orchestrated teacher collaboration and leadership. Observations of teacher collaboration at sites included the following:

- Although principals and teachers cited team meetings and shared planning times as opportunities for teachers to share materials and ideas about mathematics education, discussion of content and pedagogy at these times was rare.

- Teachers found "meaningful minutes" to share their experiences trying out the ACME resources. Sometimes the messages promoted implementation with good news; occasionally the information was negative or neutral.
- Only a few teachers collaborated deeply on standards-based mathematics education in pairs that were self-organized or mentoring relationships between experts and novices.
- Although several teachers on most campuses identified an expert in standards-based mathematics education, typically few teachers collaborated with that person to hone their skills and knowledge. Common reasons for not collaborating were structural, such as teaching different grade levels, having conflicting schedules, being too busy, and not working near one another.

Recommendations for improving teacher collaboration:

- Establish monthly or bi-monthly opportunities for teachers to collaborate on the content and pedagogy of standards-based mathematics education in their first two years of implementation. To ensure meaningful collaboration, require teachers to set goals for deep exploration of materials and to report back to faculty their discoveries made. Include book studies and analysis of student work and thinking.
- Identify teachers who are experts on campus in standards-based mathematics; organize mentoring and peer coaching relationships between expert and novice teachers; and provide experts with release time to visit other classrooms to observe or demonstrate lessons.
- To provide release time, for example, pay for substitutes for half-days, pay for extra planning times, make use of student teachers, or other methods. Funding sources could include NSF, Title, or Excel funds among others.

Teachers' Attitudes Toward ACME Professional Development

ACME professional development is a tool that supports the districtwide implementation of standards-based mathematics education. Teachers reported the following attitudes toward professional development:

- The most common benefit of ACME professional development was sharing their experiences with colleagues, which included innovations, extensions, and struggles. Previewing lessons, reviewing student work, discussing assessment, and having planning time also were appreciated.
- Information about the links between TAAS and the ACME curriculum resources in professional development allayed the fears of some teachers, but other teachers who had embraced the curriculum or were not interested in the details did not need the information.
- Teachers' attitudes toward ACME professional development were related to the positivity or negativity of their school cultures.

Recommendations for ACME professional development:

- Continue to provide high quality professional development in standards-based mathematics education that incorporates collaboration and the variety of interests and needs that teachers express.

Teachers' and Principals' Perceptions of Parents' Responses to Standards-Based Mathematics Education

Teachers and principals reported the following about parents' responses to standards-based mathematics:

- Teachers generally reported that parental involvement on their campuses was low.
- Teachers observed that parents struggled with standards-based mathematics, which demanded approaches to problem-solving that were unfamiliar and did not rely on traditional methods such as drill and computation practice; standards-based mathematics education confused and "took power away from parents."
- Teachers' attitudes toward the curriculum and their reports of parents' responses to standards-based mathematics appeared linked; teachers with positive attitudes seemed to report support from parents whereas teachers uncomfortable with the curriculum seemed to report negative parental attitudes.

Recommendations for garnering parental support for standards-based mathematics education:

- Educate parents about standards-based mathematics and improve parental involvement at the campus level; for example, send home classroom and/or campus newsletters with tips for implementation at each grade level, provide parents curriculum guides or primers on children's mathematics classroom activities, and expand family math nights to all campuses (e.g., the Dana Center's kit for standards-based parent education events).
- Enlist support for standards-based mathematics education from Campus Advisory Councils (CAC), parent leaders, and Parent Teacher Associations (PTA).

Teachers' and Principals' Views of Children and Standards-Based Mathematics Education

Relationships with children and improvements in their learning are some of the rewards of teaching. Teachers and principals reported the following changes in children's classroom experiences with mathematics:

- More children felt successful in and enjoyed mathematics than before. They also acquired a deep understanding of the mathematics content.
- Some teachers perceived drawbacks to standards-based mathematics education as they observed children struggling to communicate and write about mathematics.
- At a few sites, school culture reflected low expectations for students' capacities to achieve academically and a hopelessness about implementing standards-based mathematics curriculum.

Recommendations for improving views of children and standards-based mathematics education:

- Provide opportunities for teachers to observe students in classrooms of others skilled in standards-based mathematics instruction where children are excited about learning mathematics.
- In ACME professional development and at the campus level, encourage teachers to share their experiences with children's success in standards-based mathematics education.
- Continue to provide experiences in professional development that promote teachers' confidence in helping children to communicate and write about mathematics.
- Develop a districtwide strategy to increase expectations for all students' mathematics performance.