

Snapshot #17

Improving Mathematics Learning: Crestwood Elementary School

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RESEARCH FINDINGS

In specifying activities which could enable them to reach their schoolwide mathematics goal, Crestwood Elementary School staff members drew from the researchbased practices identified in *Effective Schooling Practices: A Research Synthesis* (Northwest Regional Educational Laboratory, 1984). The validated practices selected include:

- 2.1 Everyone emphasizes the importance of learning.
 - 2.3 The curriculum is based on clear goals and objectives.
 - 2.5 School time is used for learning.
 - 2.8 There are high expectations for quality instruction.
 - 2.9 Incentives and rewards are used to build strong motivation.
 - 2.10 Parents are invited to become involved.
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SITUATION

Crestwood Elementary School is part of the Meridian Public Schools in Meridian, Mississippi. Meridian is 90 miles east of Jackson, not far from the Alabama state line. The Meridian district serves approximately 8,000 students in eight elementary schools, two middle schools (6-7), two junior high schools (8-9), one senior high schools, and one regional vocational center.

Approximately 400 students in grades K-5 attend Crestwood Elementary. Fifty-three percent are black, and forty-seven percent are white. The student body is diverse, drawing from both middle-income and povertylevel homes. Its attendance area includes Meridian's two largest federally subsidized housing projects, and three quarters of the students receive free or reduced lunches. There is a 25 percent annual turnover in the student population.

CONTEXT

In August 1984, Crestwood joined with several other schools in the Meridian district in receiving training to implement the Onward to Excellence (OTE) school improvement process. As OTE users, Crestwood staff organized a leadership team, compiled a profile of student performance in various areas, and selected an improvement goal based on review of the profile. They then developed a research-based prescription and a plan to achieve their initial goal, which was in the area of reading. Monitoring of goal-related activities followed, along with evaluation of improvements, celebration of successes, and profiling in preparation for the next OTE cycle.

Having met with success in pursuing their reading goal, in the spring of 1988 staff members turned their attention to profile data indicating weaknesses in the mathematics skills of Crestwood students. Standardized test scores were unacceptably low, and the data showed that students needed help particularly in the areas of applying mathematical concepts to everyday life, problem solving, logic and estimation skills.

Having identified these needs, Crestwood staff members specified as their goal, "to improve student performance in mathematics, with students' test scores improving in each quartile by 5 percent." Work in pursuit of this goal continued through the 1988-89 and 1989-90 school years.

Given the nature of students' math weaknesses, the school leadership team identified inservice activities which could increase teachers' skills in relevant areas. Inservices were held on topics such as "Mathematics for All Children"; "Using Manipulatives, Computers, Overhead Projectors, Calculators, and Learning Centers with Mathematics Instruction"; and "Communicating with Your Students About Mathematics." Teachers also shared tips with one another on teaching strategies they had used successfully.

Potential new mathematics materials and strategies are reviewed against a criteria checklist developed by teachers based on their review of effective practices research. Those approaches and materials selected are compatible with the "Math Their Way" program used in the school. This program places considerable emphasis on the use of manipulative materials, especially when introducing new concepts.

School staff have also conducted curriculum alignment activities. Gaps were identified between what was taught and what was tested, and additional learning activities were implemented to bridge these gaps.

Students engage in computer learning activities each week in Crestwood's computer laboratory. In addition, teachers review printouts indicating each student's degree of mastery of mathematics objectives and use these to specify appropriate learning activities.

Activities conducted to familiarize teachers with different learning styles have resulted in routine administration of a learning style inventory to students and selection of materials and strategies based on inventory results.

Review of school practices led Crestwood staff to acknowledge a need to increase student time-on-task by improving classroom organization and management. Accordingly, teachers devoted more attention to ordering classrooms so that all materials are in the proper places and ready for use. All teachers schedule mathematics instruction for a minimum of one hour per day, and this and other basic skills blocks are protected from the interruption of loudspeaker announcements, assemblies, or other special activities. A file of time-on-task activities is maintained. These are suggestions that teachers can implement to increase time-on-task, and teachers are expected to

select and make use of these suggestions.

Recognizing that academic performance is closely related to student motivation, self-esteem, and parent and community support, Crestwood staff have implemented a variety of other activities in addition to those related specifically to mathematics instruction.

For example, school staff have instituted a PAL (People Aiding Learning) program, in which at-risk students (fully a third of Crestwood's student body) are paired with peers, parents, teachers, and members of the business community:

- Peer PALs. Students are paired with study partners within classes and/or older students are linked with those in lower grades. Older PALs may eat lunch with their younger friends, provide support, and help them with schoolwork.
- Parent PALs. Parents spend time at home reviewing their child's work and signing a work folder (PAL Packet) indicating that they have done so. Parents also help out in classrooms, which benefits teachers and students, as well as teaching parents about discipline techniques and ways to support their children's learning at home.
- Teacher PALs. Teacher PALs select students outside their classrooms and spend time with them informally, reviewing their work and offering support and praise.
- Class PALs. These are parents and/or members of the business community who adopt a class and serve as a speaker, tutor, or informal supporter. These PALs often talk with students about the uses of mathematics in their work or personal lives. They may also review and sign PAL Packets. A city councilman who is a Crestwood PAL spoke favorably about the program at a televised city council meeting.

During the 1989-90 school year, students also had pen PALs from Meridian Community College who wrote to them about the importance of mathematics in school and in life. A group of these postsecondary students then visited Crestwood, made presentations, and visited with students.

Letters and flyers are periodically sent to adult PALs, offering suggestions and tips for helping students by showing them applications of mathematics in everyday life.

Two especially successful aspects of the PAL program have been "Lunch and Learn" and "Skills Tournament." Lunch and Learn involves business community PALs visiting the school and having lunch with their student PALs to give them encouragement and set a career example. The "Skills Tournament" is the culmination of a series of after-school tutoring sessions in which students increase their basic skills in mathematics, reading, language, science, and social studies. Attendance at the sessions has been high, and tournament competitors win prizes and awards.

Rewarding and reinforcing students are major avenues through which Crestwood staff seek to achieve their school improvement goal. Obviously, many of the PAL activities provide reinforcement, and in addition, Crestwood staff reward both achievement and improvement in a variety of ways. While some tangible rewards are provided, the focus is more on verbal (praise) and symbolic rewards. Examples include:

- A "Most Improved Student" award of a badge and a treat for impressive progress in mathematics learning
- Certificates of accomplishment for mastering mathematics objectives, presented during a courtyard ceremony

- Learning games and extra computer time for mastering objectives
- Acknowledgement among the school's "Math Superstars"--students who have reached specified mathematics goals.

Confirmation that staff have implemented these practices to good purpose is evident in many ways. There is abundant anecdotal evidence that teachers, parents, and students feel positively about goal-related activities. Most impressive of all, however, is student performance on standardized tests, which indicates that Crestwood has been successful in meeting its overall goal. Some highlights from 1989-90 SAT and other achievement test results for different grade levels include:

- Ninety-four percent of second grade math students taking the SAT scored in the upper two quartiles. This represented a fourteen percent increase over the previous year.
- There was a 4.3 percent increase on the total mean percent of items correct on the Basic Skills mathematics test administered to third graders.
- Sixty-eight percent of fourth graders taking the SAT scored in the top two quartiles, an increase of thirteen percent. No fourth graders scored in the bottom quartile.
- Sixty-one percent of fifth graders taking the SAT scored in the top two quartiles, a nine percent increase of students moving from the bottom two quartiles and a fourteen percent increase in the number of students moving into the top quartile.

PRACTICE: ELEMENTARY MATHEMATICS INSTRUCTION

GRADE 2

A visit to Mrs. Lackey's second grade classroom during mathematics instruction revealed, first of all, a room displaying colorful pictures and posters, several of which showed people making use of mathematics skills at home and at work. Students were engaged in a learning activity which called for them to use construction paper cutouts, yarn, and blocks to solve the problems posed by the teacher. Questioning began after Mrs. Lackey demonstrated how students could move the materials around on their desktops to solve the problems. The instructional pace was unhurried but continuous, leaving little opportunity for off-task behavior. Students received praise for listening to directions and for giving correct responses. Students were enthusiastic, giving answers in loud voices during choral response time and waving their hands to be called on during individual response periods.

Classroom rules, mathematics-related posters, and other pictures were on display in Mrs. Barnes's second grade classroom. Children were learning to write addition problems which have a sum of three, then four, then five, and so on. Beans were used as counters and placed on cards in different combinations to make the concepts more concrete. Mrs. Barnes began by demonstrating the procedure on the chalkboard, engaged students in group problem solving using their counters and cards, and then had students solve problems individually, while she monitored their activities and gave reminders to the group.

Throughout the activity, Mrs. Barnes focused on students who were exhibiting appropriate behavior, praising them and offering them as positive examples, e.g., "I like the way Russell follows my instructions."

GRADE 3

A subtraction lesson was underway in Mrs. Herbison's third grade class. She made use of an overhead projector to demonstrate problem-solving steps, then worked through several problems with the students, calling for group responses. In this class, students used wooden tiles as counters. At one point in the lesson, Mrs. Herbison asked the class why addition and subtraction are important. "You need to do them if you work in a bank," responded one student. "You need to know how so you can do your schoolwork," said another.

GRADE 4

The day's mathematics lesson in Mrs. Posey's fourth grade class began with a discussion of family relationships as a lead-in to a discussion of the relationships among addition, subtraction, multiplication and division.

Mrs. Posey then selected five children to stand at the front of the class, each holding a large card. Printed on one card was the number "6", on another a "+" sign, and on the other three "8", "=", and "14". As seated students took turns arranging the cardholding children so as to make "true number statements," (such as $8+6=14$), others in the class were asked to confirm or deny the correctness of the arrangements. This activity generated a lot of enthusiasm, and Mrs. Posey needed to remind students to raise their hands and not call out.

Mrs. Posey then engaged students in a game of "concentration." Large construction paper cards with domino and Arabic number arrangements were placed face down on a table, and students had to remember the positions of different cards in order to identify related number statements.

Activities in this classroom proceeded at a brisk pace, with clear explanations and demonstrations and individual help provided as needed.

GRADE 5

Motivation for the estimating and graphing exercises in Mrs. Walker's fifth grade class was enhanced by using M&M's as the "math manipulatives." With their unopened bags of M&M's in hand, students were asked to make "a reasonable guess based on past experience" of the number of candies in the bag. Then they opened their bags to determine how close they had come in their estimates.

Students then grouped their candies by color (red, green, brown, tan, and yellow), and recorded the number of each. Finally, they made bar graphs illustrating the relative amounts of different colored candies in their bags.

Although the observer had to leave the classroom at this point and did not actually see the students eat the M&M's, she has little doubt that they did so.

In a discussion of Crestwood's programs with the school leadership team, team members made several telling statements about their successes: "We have built pride and self-esteem in our children." "Enthusiasm has greatly increased among both students and teachers; we're learners, too." "We share everything. We view ourselves as a family." And finally, from Crestwood principal, Carol Matfey, "We truly have achieved, and that's important. But the delightful part is that the children like math and that they now have someone--a PAL--in the community to relate to and to help them understand how math fits into the world."

Those interested in knowing more about Crestwood's program are encouraged to contact Carol

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