

## Snapshot #26

### Achieving Success in Mathematics Through Innovative Programming

#### Davis Elementary School Portland, Oregon

Al Fitzpatrick

@@

---

#### RESEARCH FINDINGS

---

To meet the needs of both successful students and those at risk of academic failure, key elements of effective classroom and schoolwide practice need to be present. According to **EFFECTIVE SCHOOLING PRACTICES: A RESEARCH SYNTHESIS/1990 UPDATE** (Northwest Regional Educational Laboratory, April 1990), these include:

At the classroom level:

#### **1.2.1 INSTRUCTIONAL GROUPS FORMED IN THE CLASSROOM FIT STUDENTS' ACADEMIC AND AFFECTIVE NEEDS**

e. Small groups are used for instruction and practice in the use of higher-order thinking skills.

#### **1.3.2 INSTRUCTION IS CLEAR AND FOCUSED**

f. Teachers use strategies to develop students' higher-level thinking skills.

#### **1.4.1 THERE ARE HIGH EXPECTATIONS FOR STUDENT LEARNING**

1. Teachers set high standards for learning and let students know they are expected to meet with them. Standards are set so they are both challenging and attainable.

#### **1.4.3 PERSONAL INTERACTIONS BETWEEN TEACHERS AND STUDENTS ARE**

## **POSITIVE**

1. Teachers pay attention to student interests, problems, and accomplishments in social interactions both in and out of the classroom.

### **1.6.1 STUDENTS AT RISK OF SCHOOL FAILURE ARE GIVEN THE EXTRA TIME AND HELP THEY NEED TO SUCCEED**

- e. Whenever possible, at-risk students are given additional learning time for priority objectives; this time is spent in interactive learning activities with teachers, aides, or peer tutors.

At the school level:

### **2.2.2 SCHOOL TIME IS USED FOR LEARNING**

- e. During the school day, unassigned time and time spent on noninstructional activities are minimal.

### **2.6.1 STUDENTS AT RISK OF SCHOOL FAILURE ARE PROVIDED PROGRAMS TO HELP THEM SUCCEED**

1. The focus is on prevention of learning problems rather than remediation.

### **2.7.1 PARENTS AND COMMUNITY MEMBERS ARE INVITED TO BECOME INVOLVED**

- f. Special efforts are made to involve parents of disadvantaged students, who are often underrepresented among parents involved in the schools.

@@

---

## **SITUATION**

---

Reynolds School District. Seven thousand students attend the district's schools, which include one high school, two middle schools, and nine elementary schools. The district is directly adjacent to the city of Portland and blends into the nearby community of Gresham. It is a combination of urban, suburban and rural settings.

Davis Elementary School. Almost 400 students in grades K-5 attend Davis Elementary School. Over 60 percent of the students qualify for free or reduced-priced lunches, and the school has a mobility rate of approximately 30 percent. Davis's student population is 20 percent minority, with Hispanic students comprising the largest minority group. Many of the students live in apartment complexes, and many of these are government subsidized.

@@

---

## **CONTEXT**

---

Davis Elementary School staff have received training in the ONWARD TO EXCELLENCE (OTE) school improvement process developed by the Northwest Regional Educational

Laboratory. As called for by the OTE process, Davis staff reviewed previous and current test scores and identified mathematics as an area of concern. Specifically, they noted that in the fall of 1986, there had been more students who were below average in mathematics than were above average and, in 1987, Davis Elementary students had had a mean score in mathematics below both district and county averages.

In 1990, Davis Elementary was awarded a grant from the RJR Nabisco Foundation to implement an innovative program entitled "Recess Math."\* Recess Math derives its name from the fact that instruction beyond that provided during regularly scheduled mathematics lessons takes place during students' free time, such as during recesses and before and after school. An additional component of Recess Math is a six-week summer program. The aim of the summer program is to provide opportunities for students to learn important math skills and concepts in ways that are enjoyable and rewarding.

A key element of Recess Math at Davis Elementary School is that students attend by choice. It is not offered as a remedial math program, nor is it a special program for accelerated or gifted students. Any student who wants to attend is welcome to participate. Classes are mixed with regard to age, grade and ability. Recess Math has served nearly ninety percent of the school's population. In addition, the Recess Math summer program also accepts students who will enter kindergarten in the fall or who have completed the fifth grade at Davis Elementary and will be attending middle school in the fall.

In addition to the grant from RJR Nabisco, local businesses, the Davis Parent-Teacher Group, and the school district have provided financial support for equipment and supplies for the program. Recess Math is staffed by both certified and classified staff members. Staff allocations have been adjusted periodically to keep the student-to-teacher ratio at or below fifteen to one.

Students who choose to participate in the program must complete an application and pledge to attend class for one "unit," or about twenty days. Seven units are scheduled during the school year. Students may enroll in one of the following classes: before school, after school, or at lunchtime. They may also choose to spend some of their recesses in the program during the time they are enrolled. Davis Elementary does not provide special transportation to attend Recess Math classes; students without access to transportation are placed in lunchtime classes. Classes vary in length from 30 to 60 minutes each day. In 1992, an additional component was added to the program to address the need for early intervention. All kindergarten students visit the lab one day each week as part of their regular curriculum.

The heart of the Recess Math curriculum centers around seven goals and standards set forth by the National Council of Teachers of Mathematics:

- Students will learn to value mathematics.
- Students will become confident in their mathematics abilities.
- Students will become mathematical problem solvers.
- Students will learn to communicate mathematically.
- Students will learn to reason mathematically.
- Students will demonstrate a higher rate of learning mathematics than those who choose not to participate in Recess Math.
- Students will demonstrate a higher rate of learning mathematics than they did in previous years without Recess Math.

The environment of the Recess Math laboratory is nonthreatening and encourages risk taking.

Math lessons are always varied so that students who attend additional units will not repeat the same activities. Activities are enjoyable, but they do necessitate that students use mathematical thinking in order to complete them. Math manipulatives are in abundant use, and students have access to computers and calculators. Students spend considerable time solving problems together in small and large groups. Participants are encouraged to communicate verbally with adults and peers.

@@

---

## **PRACTICE: RECESS MATH THROUGH THE SCHOOL DAY AND YEAR**

---

### **BEFORE SCHOOL**

The regular school day at Davis Elementary begins at 9:15 a.m. As is typical, students began entering the math lab at 8:00 a.m. on the day of the observation. They had either walked to school or had been transported by a parent or other adult. A bank of computers is set up on one side of the classroom, and each student took a seat at one of the computers. A teaching assistant and a student volunteer from a nearby community college were available to help students select an appropriate program. Most students were able to operate the computer on their own, but individual assistance was provided for students who needed it. Most students selected a program that provided them practice with math computational skills.

After about 15 minutes, when most students had arrived, the students were instructed to turn off their computers, put away materials and assemble on the rug. Recess Math teacher Vicky Porter displayed some coins on the overhead projector and asked individual students to show different combinations of coins that equaled one dollar. After demonstrating success with this skill and some discussion about the value of each coin, Mrs. Porter explained the activity for the day. Students would be making name tags (this was the first day of a new unit). The tag itself was free, but items to decorate the name tag would need to be "purchased." Students were each given a plastic bag containing a variety of play coins.

Arranged throughout the room were stations that contained decorating items and the needed materials to affix items to the name tags. The price for each item was posted at each station. As this was a mixed-age grouping of students, prices varied according to grade levels. For example, all students needed string so the name tag could be worn around their necks. Primary students paid ten cents for a length of string, while intermediate students were required to pay a penny for each two inches of string. "Jewels" were available for twenty-four cents. Stickers cost primary students four cents, while intermediate students could buy them "two for a nickel." Glitter, easily the most popular item, was thirty cents a scoop. Colored paper was available for five cents per color. Seashells were an expensive item, and most students chose not to purchase them. When purchasing items to adhere to their name tags, students were responsible for counting out the coins needed for the purchase and for determining how much change they were to receive back.

The direct application of previously learned mathematics skills was apparent, but the opportunity to practice social skills was a terrific bonus. Students were required to make decisions and choices and to interact with peers and adults. The students' pride in their ability to make these transactions was evident, and they were clearly enjoying themselves.

Upon completion of the activity, materials were neatly put away, name tags were deposited into a box, and students were quietly excused to go to their classrooms for the beginning of the regular school day. As they walked out the door, each student was invited back for another activity during their morning recess. Most of them returned.

## **RECESS TIME**

At most schools, students are provided choices at recess times: they may choose to go outside where additional choices can be made, for example, between kickball and hopscotch. Some schools also allow students the choice of going to the library. At Davis Elementary, students have an additional choice: they can go to the math lab. Computers are available for individual or paired skill reinforcement, and a variety of other math activities are always available.

## **KINDERGARTEN STUDENTS**

At 10:00 a.m., seven kindergarten students entered the Recess Math lab. They assembled around tables where brightly colored pattern blocks were available. They were allowed to experiment and quickly developed repeat patterns of two-diamond, hexagon, diamond, hexagon. After patterns were checked by an adult, the children were given similar shapes cut from construction paper and glued their "recreated pattern" on strips of paper. At the end of the session, they left the lab with their pattern strips, enthused about returning to their regular classroom and telling their teacher what a hexagon is. They were to return to the lab the following week for another math activity.

Involving kindergarten students in the Recess Math lab is a new practice in the 1992-93 school year. It is part of their regular schedule, each child attending once a week in a small group of six or seven students. This component supports the concept of early intervention and provides young students with early introduction to key math concepts.

## **FAMILY MATH NIGHT**

Twice each year Davis Elementary School opens its doors in the evening and invites all families to attend a "Family Math Night." Over half of the families attend these events, at which students have an opportunity to "show off" their math abilities. Families participate in a variety of hands-on math activities (e.g., estimating, graphing). The purpose of these activities is to inform parents about the Recess Math program.

## **SUMMER PROGRAM**

Students at Davis Elementary can also choose to attend Recess Math classes during the summer months. Three two-week sessions are available, with most students attending the entire six weeks. Students come for either a morning or an afternoon session. Each session lasts for two hours. Both large- and small-group activities are provided. The areas of emphasis are similar to those of the regular program-application of mathematics skills, decision making, and developing an appreciation for mathematics. All activities are skill or concept oriented, with an additional emphasis on having fun.

A visitor to the Recess Math lab will observe students actively involved in mathematics practices appropriate to their ages and developmental levels. Activities are open-ended, encouraging the application of problemsolving and critical thinking skills. Students are allowed plenty of time to complete activities. Exploration is the norm; adults provide assistance when

needed, but their approach is to use questioning strategies that will allow students to find their own answers.

Students exhibit high levels of interest. While student-student interaction takes place, children complete activities with purpose and task commitment. The climate of the classroom is relaxed and encouraging. Since program participation is optional, it is obvious that students attend Recess Math because it is fun for them.

@@

---

## PROGRAM EVALUATION

---

The staff of Davis Elementary School, recognizing the need to evaluate and monitor the Recess Math program, developed an extensive system for assessing program success. They have now completed two annual evaluations. Highlights from among the findings include:

- Student attitude surveys show uniformly positive attitudes about their confidence with math, valuing of math, and communicating about math.
- Parent response to a questionnaire was overwhelming supportive.
- 100 percent of the staff indicated high satisfaction with the program.
- By the end of the 1991-92 school year, 89 percent of Davis students had participated in the program.
- Achievement test scores showed significantly higher gains than those for a comparison population.
- Thanks to the Recess Math summer program, Davis Elementary students exhibited mathematics growth during summer 1992, whereas the comparison population showed a slight loss of growth during this same period.

Those desiring more information about the Recess Math program are encouraged to contact former Davis Elementary principal, Dr. Donnise Brown, who is now principal of Margaret Scott Elementary School, 14700 N.E. Sacramento Street, Portland, Oregon 97230-3860, (503) 255-2031 or current Davis Elementary School principal, Curt Anderson, 19501 N.E. Davis Street, Portland, Oregon 97230-8035, (503) 665-6193.

---

**This publication is based on work sponsored wholly, or in part, by the Office of Educational Research and Improvement (OERI), U.S. Department of Education, under Contract Number RP91002001. The content of this publication does not necessarily reflect the views of OERI, the Department, or any other agency of the U.S. Government.**

**April 1993**