GREAT SOURCE

Every Day Counts® Calendar Math

PROGRAM EFFECTIVENESS AND RESEARCH BASE

Program Effectiveness

Every Day Counts® *Calendar Math* Program Overview

Every Day Counts is an interactive K–6 bulletin board program that helps students build key math concepts a little at a time, every day. Working with a calendar, counting tape, clocks, coin counters, graphs, and other elements that change throughout the school year, students analyze data, see patterns, explore math relationships, and communicate their thinking to the teacher and each other. The continuous learning experience offered by *Every Day Counts* has been instrumental in increasing student math proficiency and test scores at many schools throughout the country.

Reports from school districts who have used *Every Day Counts* for one or more years have shown the following:

- Math scores on standardized tests have increased—in many cases dramatically.
- Students entering subsequent grades are more knowledgeable if they have used *Every Day Counts* in the previous grade.
- Students become more articulate and confident about their understanding of mathematics.

The constant communication inherent in *Every Day Counts* has allowed teachers to ask rich, open-ended questions, accept multiple strategies for solving math problems, and gain insight into how their students think and approach problems—important steps to helping students become better learners.

CASE STUDIES

Sacajawea Elementary School, Great Falls, MT

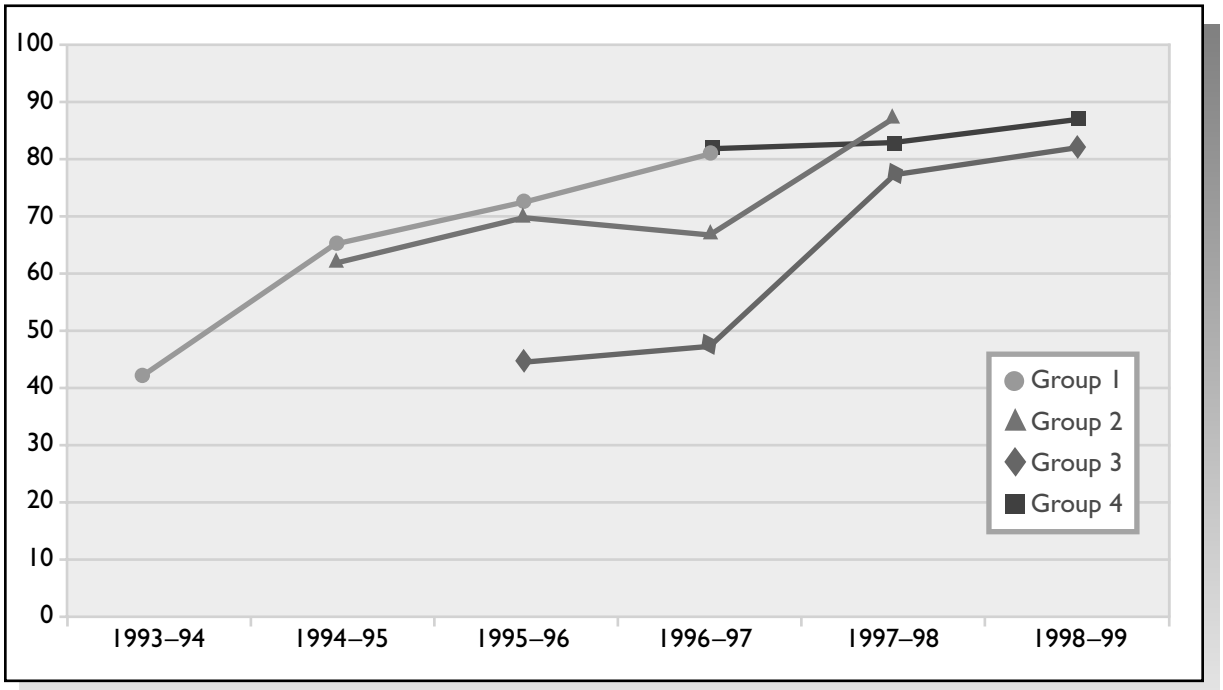
Student test scores on the Iowa Test of Basic Skills (ITBS) have increased at the Sacajawea Elementary School since the school first implemented *Every Day Counts* during the 1993–1994 school year. Starting with just a few elements from the program during the first year, the school eventually moved on to full K–5 implementation the following school year. Student test scores on the ITBS have increased as students progressed from grade 2 through grade 5 using *Every Day Counts*.

Everett Hall, teacher at Sacajawea Elementary School claims, "The daily practice and discussion not only reinforces needed math skills but it also serves to put math into a 'real world' and practical experience. Additionally, [*Every Day Counts*] serves as a conduit for pre-learning skills that will be reinforced at a later time."

Sacajawea Elementary School, Great Falls, MT

Year	ITBS Scores			
	Group 1	Group 2	Group 3	Group 4
1993–94	41	–	–	–
1994–95	65	62	-	–
1995–96	72	70	45	–
1996–97	81	67	47	82
1997–98	–	87	78	83
1998–99	–	–	82	87

ITBS Scores by Group of Students



Independent School District, Alief, TX

All 21 elementary schools in the Alief Independent School District use *Every Day Counts*. There are 23,000 students in grades K–6 and 10,000 of the students using *Every Day Counts* are either bilingual or ESL students. The following information shows the significant improvement of TAAS (Texas Assessment of Academic Skills, the state's required standardized test) scores in mathematics strands that are relevant to inquiry, reasoning, and problem solving.

TAAS Objectives

Objective 10: The student will estimate solutions to a problem situation.

Objective 11: The student will determine solution strategies and will analyze or solve problems.

Objective 12: The student will express or solve problems using mathematical representations.

Objective 13: The student will evaluate the reasonableness of a solution to a problem situation.

The scores below reflect the percentage of students who took the test and achieved mastery in the first three years of implementation.

Grade Levels	1994	1995	1996
Grade 3			
objective 10 & 13	55%	54%	58%
objective 11	64%	69%	77%
objective 12	61%	74%	70%
Grade 4			
objective 10 & 13	38%	45%	52%
objective 11	61%	64%	74%
objective 12	64%	67%	78%
Grade 5			
objective 10	67%	79%	77%
objective 11	70%	70%	73%
objective 12	62%	68%	68%
objective 13	63%	83%	77%

Outley Elementary School, Alief, TX

Outley Elementary School is a Title 1 School within the Alief School District with a diverse student population that has achieved striking results with *Every Day Counts*. Students' TAAS scores rose dramatically during the first year of use (1996–97) and rose continually year after year as *Every Day Counts* gradually became implemented across all grade levels.

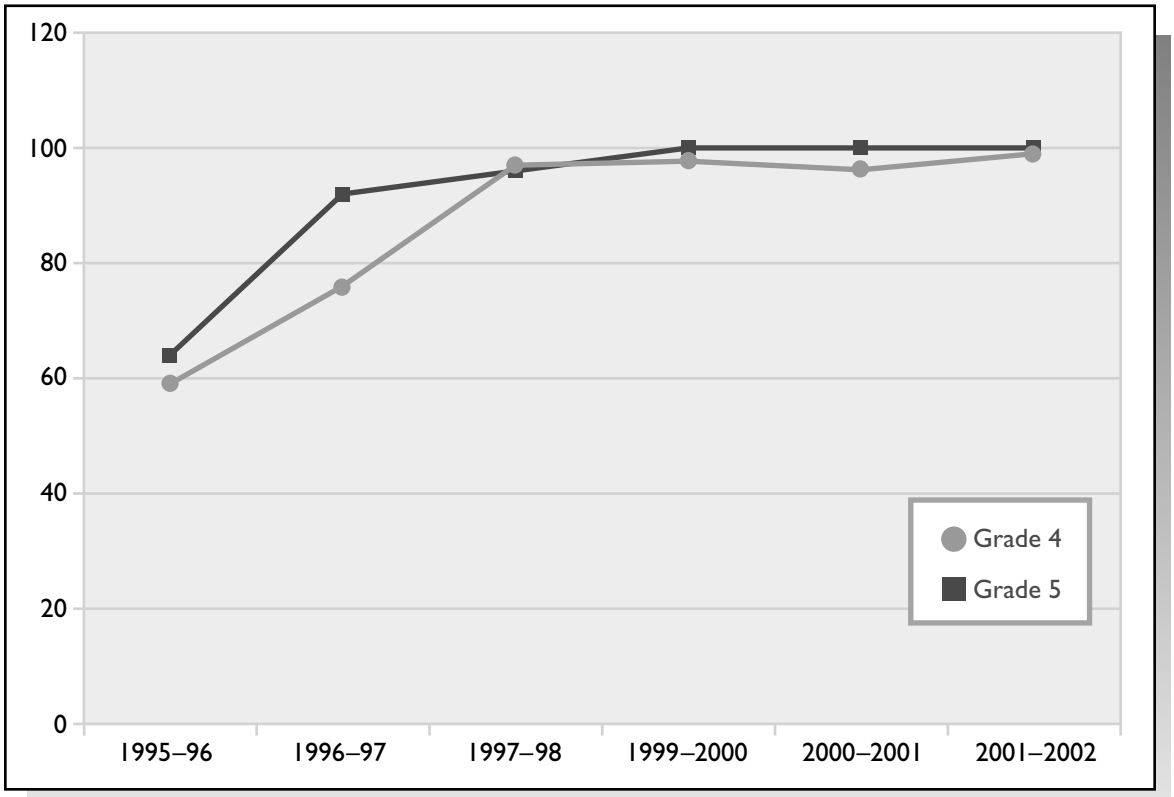
According to Earl Snyder, math specialist at Outley Elementary School, the only change in the math curriculum in the 1996–97 school year was the implementation of *Every Day Counts*.

Lillie Beth Wilson, Principal of Outley Elementary School commented "[*Every Day Counts*] is a wonderful program… It brings lifetime skills into the program. The teachers enjoy it. It does enhance the quality of our math program. It makes math meaningful for the students each and every day."

Outley Elementary TAAS* Scores

Grade	Percent of students passing the TAAS					
	1995–96	1996–97	1997–98	1999–2000	2000–2001	2001–2002
4	59	76	97	97.7	96.2	99
5	64	92	96	100	100	100

Percentage of Students Passing the TAAS*



*** Note: The TAAS test was changed to the TEKS test in 2000.**

Warren Consolidated Schools, Warren, MI

Warren Consolidated Schools has been using *Every Day Counts* since the 1994–1995 school year. The school implemented the program in grades K–5 and recorded increased student test scores on the MEAP state assessment tests with continued use of *Every Day Counts*.

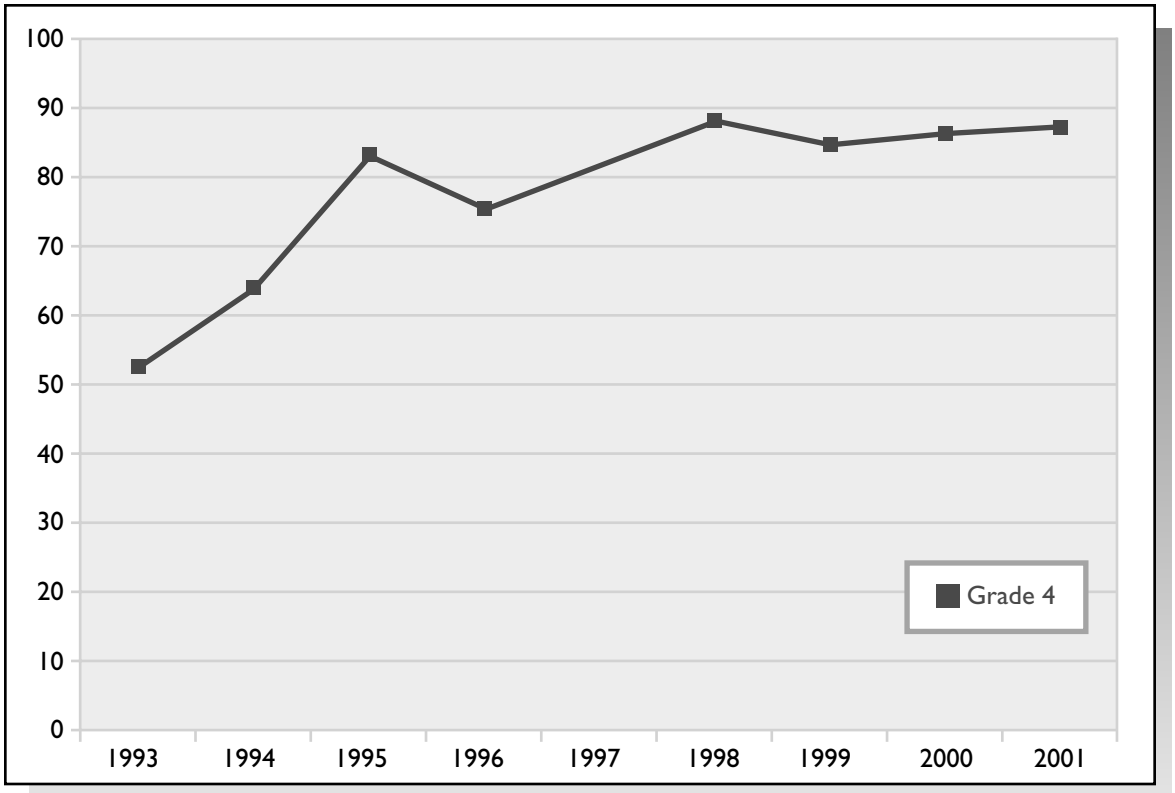
According to Jean Banta, third grade teacher in Warren, MI, "Students at all levels participate enthusiastically with *Every Day Counts*. [Math] terms have become meaningful to the students. I find the students using the materials to develop high level thinking skills in areas like money and patterns."

Warren Consolidated Schools MEAP Scores

Percentage of Grade 4 students passing the MEAP test								
1993	1994	1995	1996	1997	1998	1999	2000	2001
52.4	64.3	83.2	76.4	*	88.9	85.4	87.4	87.6

***Test not administered.**

Percentage of Grade 4 Students Passing the MEAP Test



Lafayette Parish School, Lafayette, LA

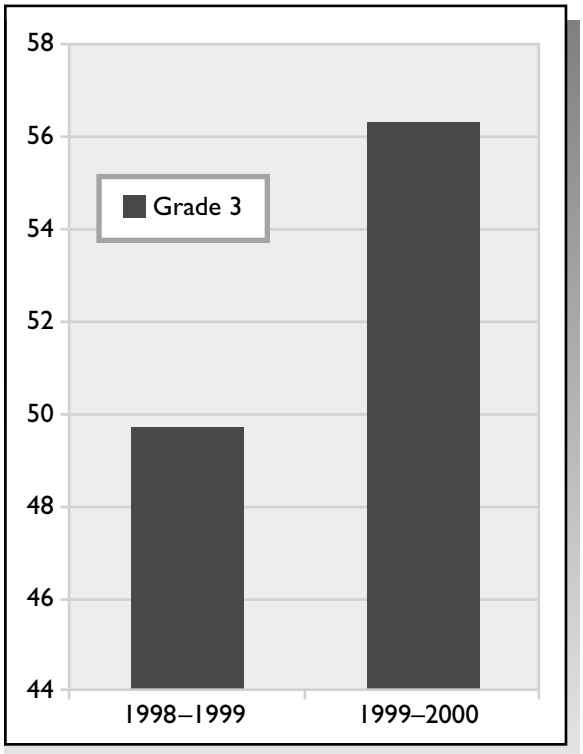
The following information was compiled by Patricia Ann Sonnier, Pre-K–5 Instructional Supervisor for an internal evaluation of *Every Day Counts* to Dr. James H Easton, Superintendent of Lafayette Parish School Board.

The following information was gathered using the average third and fifth grade Iowa Test Scores for the 1998–1999 school year before any *Every Day Counts* inservice was held. The scores were gathered on the average student scores of those teachers who received training and remained at their same grade level and school. We were able to compare these scores to the 1999–2000 school year.

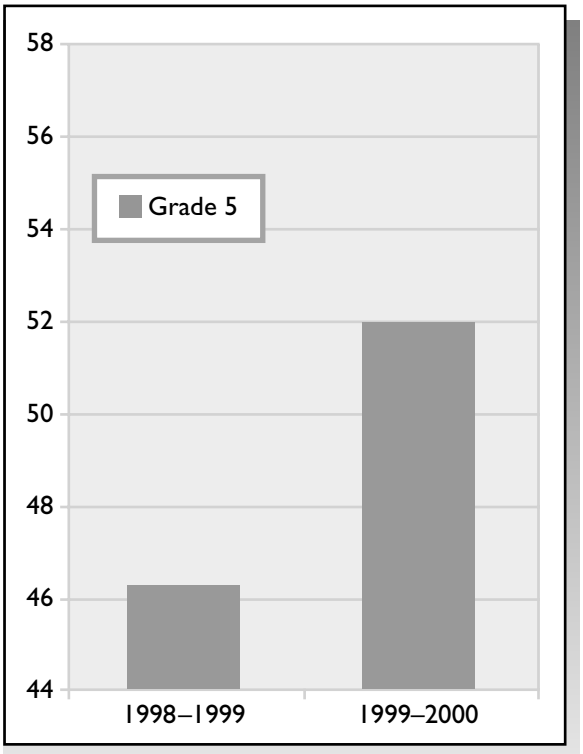
Lafayette Parish School Iowa Test Scores

Grade	National Percentile Ranking	
	1998–1999	1999–2000
Grade 3	49	57
Grade 5	47	52

Grade 3 Iowa Test Scores



Grade 5 Iowa Test Scores



Norfolk City School District, Virginia

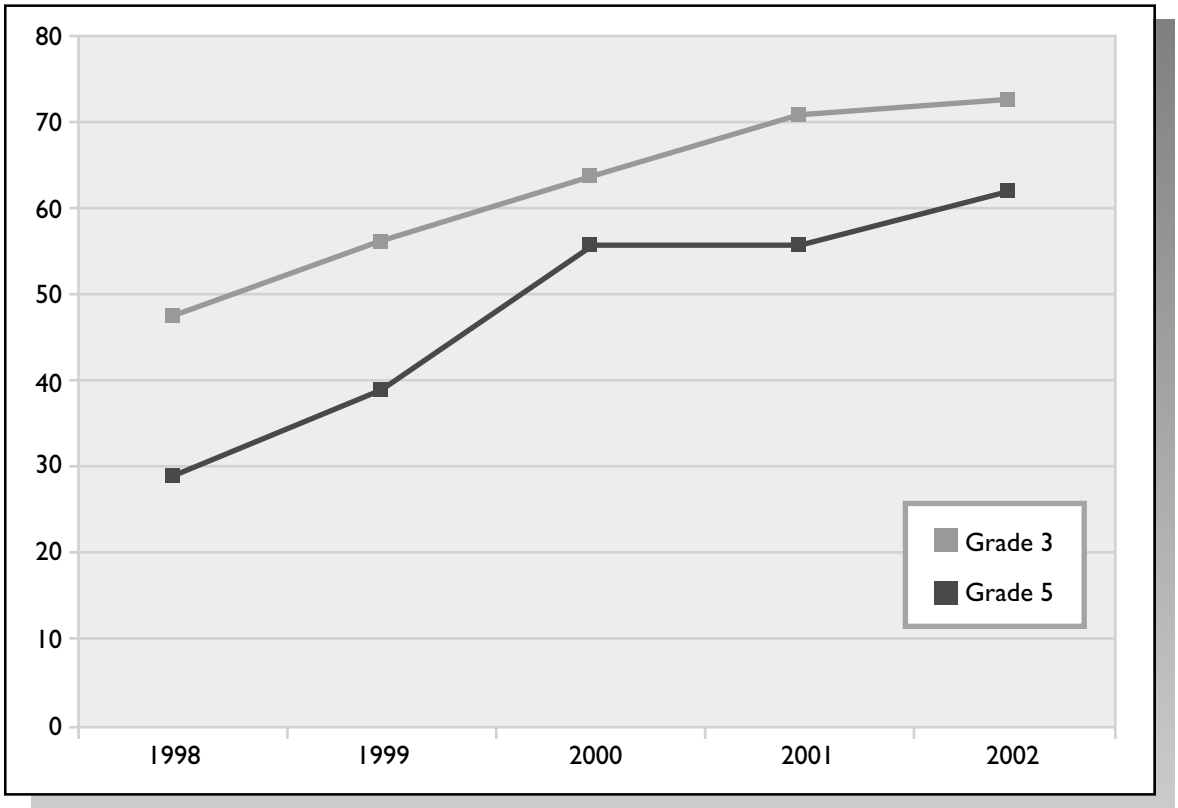
Scores in 1998 for grades 3 and 5 at the Norfolk City School District indicated that less than 50% of students in both grades were passing the Mathematics Standards of Learning Test. The district began using *Every Day Counts* in 1999 and saw a steady increase in test scores for both grades every year since the implementation of the program.

Denise Walton, Senior Coordinator, Mathematics attributes the consistent rise in test scores to *Every Day Counts* commenting, "We credit the connections that *Every Day Counts* makes with multiple objectives for helping us to achieve consistently positive results."

Norfolk City School Test Scores

Grade	Percentage of students passing				
	1998	1999	2000	2001	2002
Grade 3	47.1	56.3	63.5	70.3	72.8
Grade 5	29.8	39.8	56.5	56.5	61.9

Percentage of Students Passing



Every Day Counts Research Base

Introduction

Education in the United States is receiving renewed focus from current and emerging federal policies. Under the No Child Left Behind legislation, all students in grades 3–8 will be tested yearly in mathematics to ensure that every child achieves in math. Additionally, as more school districts implement the recommendation of the National Council of Teachers of Mathematics that all students enroll in algebra by grade 8 (NCTMb, 2000), they must find ways to make sure that students gain the prerequisite skills they need to enroll in the higher-level math courses they will need to be successful in school and in life.

Every Day Counts Calendar Math is based on best classroom practices for teaching mathematics that have been validated by scientific research. These practices include daily whole class discussion and dialogic discourse, the usage of real life data and visual models, continuous exposure to critical mathematical concepts, making connections across mathematical strands, offering students multiple points of entry, cooperative learning, developing number sense and computational fluency, the usage of informal learning and games, differentiating instruction, and ongoing assessment.

Daily whole-class discussion encourages social interaction and dialogic discourse to help promote a deeper understanding of key mathematical concepts.

The five mathematical process standards—communication, reasoning and proof, connections, problem solving, and representation—are ways in which children can acquire and use content knowledge (NCTMa, 2000). By making communication the centerpiece of *Every Day Counts* Calendar Math, children can listen to their peers to learn and solidify their understanding through explanation and discussion, and teachers can listen and observe to assess learning (Copley, 2000). "Cobb, Yackel, and Wood (1991) say that when children are given opportunities to talk about their mathematical understanding, occasions for learning mathematics are natural" (Steele, 1998).

Instruction through discourse and collective reflection helps children achieve mathematical understanding. Whitin and Whitin discovered "[T]alking was an effective way for children to clarify their thinking, discuss new possibilities, [and] extend the thinking of others" (Whitin & Whitin, 2002; NCTMa, 2000). Cobb states in his observations of first-grade students, "the children did not happen to spontaneously reflect on a prior activity at the same moment. Instead, reflection was supported and enabled by participation in discourse" (Cobb, Boufi, McClain, & Whitenack, 1997). "Language has a distinctive orienting function (Maturana & Varela, 1980), and classroom discourse can exploit this function to orient students' attention to mathematical relationships of interest. … Communication among the students and teachers is enhanced because all participants can focus their attention on the same entities and relationships between entities. … In fact, the language used to talk with others about materials may be crucial for students in constructing relationships (Greeno, 1988b; Resnick & Omanson,

1987)" (Heibert & Carpenter, 1992). "The establishment of a classroom participation structure that provides students with opportunities to explain and justify different solutions allows teachers to build on students' contributions as they move toward desired pedagogical goals. This discourse is central to reform and makes possible students' development of mathematical beliefs and values that contribute to the development of their intellectual autonomy" (McClain & Cobb, 1999).

The activities in *Every Day Counts* Calendar Math are based on whole-class discussions. These daily discussions work to foster interaction among all the students and promote dialogue about mathematics. During these discussions students exchange ideas and approaches to mathematical topics that help them develop a deeper understanding of various mathematics concepts as they compare and contrast different ways to view and solve problems (Schoenfeld, 1992). Furthermore, daily discussion benefits students by providing them opportunities to express their thinking before a group in a non-threatening, secure setting. "Children learn from one another as they communicate" (NCTM, 1989).

One result of this exchange of ideas and strategies is that students build their own understandings of mathematics concepts based on their discussions. Their understanding is deeper than that gained by memorizing a teacher's examples. "Children who have the opportunity to consistently construct their personal understandings of mathematics concepts are more mathematically powerful than those who do not" (Kamii, 1993). Research clearly supports the superior depth and stability of the mathematical concepts that children construct for themselves based on effective experiences provided by the *Every Day Counts* Calendar Math (von Glasenfeld, 1995; Kamii, 1993). When children have built their own personal understandings, they have a more solid grasp of the concept and a stronger base on which to build future concepts. While mathematical vocabulary can be difficult for young children to acquire, the repeated conversations fostered by *Every Day Counts* Calendar Math help students learn and retain key mathematical terminology. "When children talk about mathematical concepts, they are actually increasing their understanding of that concept. Language allows them to reflect on and revise their thoughts" (Andrews, 1997).

The teacher's role in initiating and shifting the discourse is critical. Open-ended questions are provided in the Teacher's Guide to promote thinking and reasoning, reflecting and understanding. Sample questions and discussions in the Teacher's Guide are provided to give the teachers guidance. "The teacher plays a proactive role in guiding the development of reflective discourse while simultaneously stressing that both such discourse is an interactional accomplishment and that students necessarily have to make an active contribution to its development. The teacher also needs to record the children's contributions" (Cobb et al., 1997; Shane, 1999). For example, records may include graphs, data, or estimates. Getting children to talk about what they see and do helps to make their knowledge more explicit (Sophian, 1999).

Using real-life data, everyday objects as manipulatives, and visual models to create patterns promotes students' problem solving ability.

Patterns pervade *Every Day Counts* Calendar Math. A variety of patterns, linear and non-linear, number patterns (counting), geometric patterns, and patterns involving measurement terms are used in activities throughout the year. The calendar presents a unique pattern each month to help children develop skills in the area of patterning, logic, and reasoning. The patterns begin simply in the primary grades, but by grade 3 the program includes overlapping patterns, patterns

that include geometric shapes and fractions, and by grade 6 the recognition of prime and composite numbers. According to Economopoulos, being able to generalize about a pattern and use known information to predict unknown information is a powerful aspect of patterns. "Because our number system is built on a system of patterns and predictability, students must be able not only to identify the patterns that they see but also to give reasons and evidence for why the patterns exist" (Economopoulos, 1998).

Continuous exposure to critical math concepts allows children to develop an understanding of important mathematical concepts over time and learn at an individual pace.

Not every child acquires mathematical understanding at the same time, the same pace, or through the same modality (Bowman, Donovan, & Burns, 2001). *Every Day Counts* Calendar Math is designed to deliver content incrementally to promote continuous learning and understanding. Using Heibert and Carpenter's definition of understanding, "the structuring process that produces understanding is built on networks of mental representations that are built gradually as new information is connected to existing networks, or as new relationships are constructed between previously disconnected information" (Heibert & Carpenter, 1992). Students confront a specific skill, (i.e. working with money) in different settings and in different question formats during the program. They may make change, represent a specific amount in different ways, or select the coins needed to purchase a particular item. *Every Day Counts* Calendar Math allows students to develop understanding of important mathematical concepts over time and learn at an **individual** pace. Allowing students to build understanding over time with continuous review has proven to be an effective way to maintain skills and an understanding of critical mathematical concepts (Baratta-Lorton, 1994).

This understanding thus promotes remembering. "Evidence from verbal learning and comprehension suggests that these modifications are made to bring the information in line with the person's current knowledge" (Rumelhart, 1975). That way, the information is represented by students in a way that fits with their existing network of knowledge. Making connections between new information and existing knowledge already represented in networks is one way of characterizing Bartlett's (1932) observation of a natural "effort after meaning." Memory, if viewed as a reconstructive process, involves the same cognitive activity as understanding: constructing connections between representations of new knowledge and existing knowledge" (Heibert & Carpenter, 1992).

Making connections across mathematical strands promotes students' understanding of mathematics as an integrated system.

Every Day Counts Calendar Math presents connections across several math strands daily including patterns, algebra, measurement, geometry, number, operations, data, and problem solving. This enhances transfer of learning. "This configuration is supported by Thorndike's (1914) view of shared components. According to Thorndike, the degree of positive transfer from one task to another is a function of the number of elements that the tasks share. If many of the elements or components that make up the tasks are alike, then the transfer from one task to another is high" (Heibert & Carpenter, 1992). Instructional approaches that use multiple representations help children to understand mathematics as an integrated system, allowing children to more easily access information when they need it (Sophian, 1999).

Offering children multiple points of entry helps them construct mathematical knowledge.

By presenting appropriate mathematical concepts orally, visually, and kinesthetically, each child can move the information into long-term memory in a manner that works best for him or her. It is these deep and sustained interactions with key mathematical ideas that enable children to acquire mathematical understanding (NAEYC/NCTM, 2002). *Every Day Counts* Calendar Math is based on the information gleaned from brain research and the understanding that young children must actively construct mathematical knowledge. The program organization allows children continuous points of entry through a variety of modalities. From the beginning of *Every Day Counts* Calendar Math to the end, children have the opportunity to preview and review math concepts. One example involves the patterns on the calendar that invite children to see relationships and make predictions throughout the school year at every grade. A child who does not fully understand the pattern in September has an opportunity each month throughout the year to grasp this and other concepts. Most of the elements in *Every Day Counts* Calendar Math offer this continuous entry to provide deep understanding of concepts not achievable in a single chapter or unit. *Every Day Counts* Calendar Math also uses a variety of manipulatives (from the kit and the classroom) to help students to better visualize and understand the mathematical concepts. "Classroom lessons involving manipulatives have a higher probability of producing greater mathematics achievement than do lessons not using manipulatives" (Johnson, 2000).

Cooperative learning engages students, encourages them to share their thinking, and helps students to learn from each other.

An integral aspect of *Every Day Counts* Calendar Math is that children gather together around the calendar and work together to discuss what's happening every day. "Cooperative learning promotes the use of effective reasoning strategies and greater critical thinking than do individual learning strategies." (Johnson, Johnson, Holube, & Roy, 1984). Students learn to work with others in a collaborative effort and are encouraged to explain their thinking to the whole group. Cooperative settings promote a positive attitude towards mathematics, as well as continuing to motivate children (Johnson et al., 1984). Each child does his or her share of the explorations. Then, children share their thinking with others and benefit from hearing how others thought about and solved a particular problem (Mueller & Fleming, 2001).

Developing number sense and computational fluency allows students to construct understanding internally.

Every Day Counts Calendar Math allows students to acquire number sense by constructing understanding internally rather than the teacher telling the children what to do. Proportional thinking can begin in pre-kindergarten. At each grade level, students keep track of the number of school days on the counting tape. In kindergarten, each number, from one to ten, is represented by a different color and this color pattern is repeated for each group of ten. Students can visually see that numbers that are the same color also end with the same digit. By first grade, students are counting the days of school in groups of ten. In the upper elementary grade levels, the counting tape is utilized to highlight multiples, fractions, and decimals. Without using abstract symbolic notation, children begin to see a proportional relationship (Curcio & Schwartz, 1997). The counting tape helps to strengthen students' number sense. "[T]he number line gives a unified geometric representation of integers and rational numbers within the real

number system, later to be encountered in geometry, algebra, and calculus" (National Research Council, 2001).

Through a variety of structured daily activities, children develop number sense and computational fluency. Children use manipulatives to compose and decompose number; sort, count and group objects; combine and compare quantities. While doing these activities, children explain what they see and making predictions and generalizations based on what they understand. "Taking the time to listen to other strategies is important … it is an opportunity for students who may not be as confident to hear a strategy that they can relate to, and also for students who consistently rely on one strategy to hear other strategies verbalized" (Sisul, 2002; Griffin, 2003).

Every Day Counts Calendar Math uses a variety of physical and visual models to show number. In pre-kindergarten, groups of five are represented by fingers colored in on a cutout of a hand and quantities to nine are represented by circles arranged in domino configurations and ten frame configurations. Children are telling stories about quantities of classroom objects. They discuss the similarities and differences of the different representations for numbers. Teachers are guiding the children's discussions and encouraging them to reflect on their discoveries. These activities build oral language skill and good listening and thinking skills. The verbal and visual supports promote understanding of oral number words and cardinal number (Fuson, Grandau, & Sugiyama, 2001). "Counting and counting knowledge in its various forms is an integral aspect of young children's everyday life. Indeed, it could be argued that the construction of counting concepts and skills is the single most important element in young children's mathematical development. Not only are counting competencies essential everyday 'survival skills' in their own right, they provide a basis for the development of number and arithmetic concepts and skills" (Baroody & Wilkins, 1999).

Spatial concepts and measurement concepts are also important skills for children. Geometric and measurement attributes connect to language development at this age. Children are defining objects in their environment based on size, shape, and position. "As can be seen, then, spatial concepts and language are intimately related. As language and concepts develop, performance on spatial tasks has been shown to improve" (Hermer, 1994). Thus, it is important that young children be given numerous opportunities to develop their spatial and language abilities in tandem" (Greenes, 1999). "Shape concepts begin forming in the preschool years and stabilize as early as age six. Children can and should discuss the parts and attributes of shapes. Activities that promote such reflection and discussion include building shapes from components. We should encourage children to describe why a figure belongs are does not belong to a shape category" (Clements, 1999).

Programs that provide informal learning, games, and tasks that challenge students without overwhelming them, motivate and engage students in the learning process.

The content of the mathematics in the *Every Day Counts* Calendar Math program is drawn from topics that are appropriate for each grade level, but is not simply a repetition of what students see in their math textbook. Students discuss thought-provoking patterns that are rich in mathematical content and application that will improve their mathematical abilities. Students continue to be interested in mathematics because the activities of *Every Day Counts* Calendar

Math are not simply drill and practice. Students search for patterns, make and test engrossing conjectures, and discover interesting mathematics concepts. In addition to being engaged, these various tasks promote an interest in mathematics and a determination in children to learn more interesting aspects of mathematics. While doing so, students improve their skills and understanding of mathematics at their level (O'Conner & McGuire, 1998).

Every Day Counts Calendar Math has a positive effect on the general attitude students have about mathematics. Many younger children are interested in all school subjects, but their interest in mathematics wanes as they approach the upper elementary school grades. Students involved in supplemental mathematics programs are more likely to have a positive attitude towards mathematics (Bransford, Brown, & Cocking, 2000). Children in the *Every Day Counts* Calendar Math work with mathematics concepts in compelling problem contexts. The activities are designed to maintain student interest in mathematics by putting mathematics in engaging types of problems that focus on major concepts rather than rote drill and memorization. Students learn that mathematics can be appealing and fun.

Mathematics instructional materials should be accessible for all students.

Every Day Counts Calendar Math appeals to students with many different learning styles and backgrounds including ELL students, children of poverty, and the learning disabled. The visual, verbal, kinesthetic, social, and interpersonal aspects of the program not only help make mathematics accessible to all students but also help students in their overall academic achievement. A study of limited English proficiency students funded by the Office of Educational Improvement found that children learn best when they are given a relevant context for their learning. For example, for students learning a new language, "[r]ather than participating in structured skill-and-drill practice selected and directed by the teacher, these students are practicing English by using it to communicate their own ideas to each other and to the teacher" (McLeod, 2004). During the whole-class discussions, students are given numerous, tangible real-world contexts for their learning. As a result, students internalize important concepts quickly and are able to communicate their understanding to others and connect it to new topics. In addition, children of poverty need greater opportunities to direct their own learning (Knapp & Shields, 2004). *Every Day Counts* Calendar Math encourages all students to be active participants in their learning by involving everyone in the whole-class discussions. Also, since the various elements of the program remain on the bulletin board throughout the school year, a struggling learner who may not have been able to recognize a pattern in September will still have the opportunity to see that pattern and may understand it in December.

Meaningful, ongoing assessment helps students achieve.

"Assessment should be more than merely a test at the end of instruction to see how students perform under special conditions; rather, it should be an integral part of instruction that informs and guides teachers as they make instructional decisions" (NCTMa, 2000). The informal assessment in *Every Day Counts* Calendar Math is not cumulative, occurring after a number of weeks, but is ongoing, and provides students the opportunity to demonstrate mastery at several opportunities in addition to daily checks of understanding. The student discourse that occurs as a result of *Every Day Counts* Calendar Math allows teachers to evaluate students' understanding and comprehension. "The teacher 'becomes aware' of the students' thinking through their language" (Steele, 1998). Students reap the benefits of immediate assessment by correcting any

flawed reasoning and applying this corrected thinking to subsequent problems. The assessment is in line with the National Council of Teachers of Mathematics recommendations for effective assessment in mathematics classrooms (NCTM, 1995).

Conclusion

The *Every Day Counts* Calendar Math program format is similar at every grade, ensuring continuity throughout the program from pre-kindergarten to grade 6. The topics and challenges at each grade are aligned with NCTM standards and build on what students learn in class with activities that engage students, allowing them to explore, make and test conjectures, and apply their mathematical understanding. The activities regularly include games and explorations that students find captivating. While involved in these activities, students are motivated and interested as they learn mathematics concepts and relationships. *Every Day Counts* Calendar Math promotes children's social skills as they actively participate in discussions about mathematics. They are part of activities and explorations that are age-appropriate and involve topics that are suitable for their respective grade levels, in a safe, secure environment.

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