

# Elementary Mathematics Instruction Report

## Introduction

In an effort to gather evidence regarding standards-based curriculum and instruction at the Pittsfield Public Schools eight elementary school, observations of mathematics instruction were made at the request of the Coordinator of Mathematics and Science and scheduled by the building Principal at each school. A variety of mathematics classes were observed with a special focus on grade 3 through 5 due to statewide MCAS testing for those grades. Based on the observations, certain global patterns emerged as strengths and challenges for the improvement of mathematics within the district.

### Number of grade levels observed at each school:

School	Date	Grades
Allendale	10/10/06	K, 3,4,5
Capeless	11/07/06	1,2,4,5,5
Conte	10/13/06	2,2,2,5
Crosby	10/24/06	3,3,4,5,5
Egremont	10/17/06	3,4,5,5
Morningside	10/23/06	3,4,5
Stearns	10/2/06	1,2,4,5
Williams	10/5/06	1,2,3,4,5

### Total number of observations by grade level:

Grade level	Number of observations
K	1
1	3
2	6
3	6
4	7
5	12
Total	35

## Strengths

### 1. Mathematics Literacy Focus

There were many examples of how teachers are using literacy strategies to develop content knowledge in mathematics. Teachers had mathematics word banks displayed that they referred to during the lesson. Teachers asked students to communicate their ideas in small groups and with the whole class using appropriate mathematical terms, and one teacher developed a short activity using math terms and definitions.

## 2. Evidence of Effective Daily Instruction Implementation

Almost all of the teachers had a clearly defined objective written on the board or a focus articulated to the class. The use of engagement activities included the use of manipulatives, individual white boards, mathematical games, and instructional practices involving pairs and small groups. Teachers actively checked for student understanding by walking among students and observing student work. Also, teachers would ask students to “show” their work on individual whiteboards by having the students raise the boards up and the teacher could scan the work from the front of the room.

## 3. Scheduled Mathematics Instruction

Each school has a grade level schedule with more mathematics instruction as part of each day. The reinforcement of mathematics content as part of each day has provided students with a focus of learning mathematics.

## Challenges

### 1. Procedural Instruction

Elementary Mathematics instruction tends to emphasize the application of problem-solving procedures rather than an exploration of mathematics concepts through problem solving. In some instances, teachers corrected students for employing alternate solution methods that led to correct answers forcing the student to use only the proscribed teacher taught method. Research in mathematics education indicates that the superior mathematical thinking skills developed in Asian countries comes from the use of an open-ended approach where students explore either individually or in small groups possible solution methods to problems prior to formal mathematics instruction. In all of the observations only one lesson demonstrated the use of the open-ended approach.

### 2. Framework Standards and MCAS Language

While many teachers demonstrated the use of literacy strategies in mathematics instruction, the language used was often from the textbook or presented in ways that was student friendly. The reinforcement of this language through repetitive practice encouraged students to learn the mathematics concepts associated with these terms. However, the MCAS test items are written in the language of the Curriculum Frameworks Standards and students unfamiliar with the language of the standards may not understand the questions on the test, if they have not had exposure to benchmarking progress against the standard itself.

### 3. Instructional Time Irregularities

While all schools have daily mathematics instruction for all grade levels, the time allotted to mathematics instruction varies from school to school. The district improvement plan included a performance objective for increasing the time for mathematics instruction to 60 minutes per day. Some teachers accomplished this by including number sense activities in the morning meeting time and by providing mathematics games for use during recess. Some teachers provided a range of

instructional activities for a full 60-minute block. Other teachers did not meet the performance objective with 40 to 45 minutes of mathematics instruction.

## Recommendations

### 1. Content-based Professional Development

In order for teachers to employ an open-ended approach to mathematics instruction, teachers need to be knowledgeable of alternative approaches to the solution of problems and applications of mathematics concepts. Teachers also need to have a full knowledge of the grade level standards and be able to “unwrap” the standard for the development of instructional activities. Since all textbooks and curriculum programs have varying degrees of alignment to the Curriculum Frameworks Standards, it is important that teachers develop units of study in mathematics beginning with the standards as opposed to driven by textbook scope and sequence.

### 2. Mathematics Coaches

Teachers need ongoing support to implement a standards-based curriculum and instruction. Using the coaching model, trained teacher leaders can assist peers in the development of instructional activities, implement effective lessons, analyze data for improving student achievement, and model innovative instructional strategies.

### 3. Resources for Intervention and Mathematical Literacy Development

While all students in Pittsfield Public Schools have access to research-based effective mathematics programs, teachers need to have supplementary resources emphasizing the language of the Frameworks standards and programs designed for meeting the needs of students not able to meet grade-level standards prior to promotion to the next grade level. The Massachusetts Curriculum Framework Standards in Mathematics have been written to increase the range of and application of basic math skills in grades pre-k through grade 5. When a student fails to meet grade level standards without on-time intervention, the student will be unable to meet standards at the next grade level. In order to diminish the long-term impact of gaps in learning that can occur, teachers need a grade level intervention plan and resources.

### 4. Revision of Elementary Mathematics Pacing Guides

The Massachusetts Curriculum Frameworks have been revised for grades pre-k through grade 5 and the National Council of Teachers of Mathematics (NCTM) have published the Curriculum Focus Points document with grade level (k-8) themes for the development of mathematical literacy and numeracy. The Pittsfield Public Schools elementary pacing guides need to be revised with respect to grade level standards.