



Lincoln Public Schools

Mary L. Sterling, Ph.D.
Assistant Superintendent of Schools

To: School Committee
From: Mary Sterling
Re: Status report on implementation of new programs in mathematics, science,
and technology/engineering in grades six, seven, and eight
Date: April 15, 2010

Three major curriculum implementation goals this year were targeted at the middle school level:

- Mathematics: introduction of *Impact Mathematics* at grades 6, 7 & 8 and Advanced Algebra I at grade 8.
- Science: restructuring of curriculum to include "every domain, every year" at all three grades.
- Engineering: introduction of new program and learning expectations at grades 7 & 8, building on the foundation established in the grade 6 program.

This report will provide a summary update on the implementation of each program. It also outlines proposed next steps for 2010-2011 and makes connections to the state STEM initiative. For each area, a verbal presentation involving students and teachers will be offered at the School Committee meeting on April 29, 2010.

Mathematics

- A total of 20 sections of mathematics at grades 6, 7 & 8 on both campuses have continued to use *Impact Mathematics* as the core program.
- Two sections of Advanced Algebra I at grade 8 have continue to use *Algebra I: Structure and Method* as the core text.
- Ancillary materials have been purchased and used to differentiate opportunities for students who are ready for more challenge and for those needing extra support. For example, the Problems of the Week from Drexel University's Math Forum have been made available at all grades on a weekly basis. Many students have taken advantage of these problems to extend their thinking and skill. Also, the purchase and use of Glencoe's *Math Triumphs*, a math intervention resource, provides focused support for students who need reinforcement in specific concepts and skills.
- Assessment in the form of quizzes, tests, and mid-year exams has been administered in a timely manner so that teachers, students, and parents have clear information about progress in math learning. Informal, formative assessment occurs frequently throughout any week of math learning.
- Recommendations for ninth grade math participation have been completed and communicated to Lincoln/Sudbury and Bedford high schools.
- Professional development for teachers has continued with ongoing consultation from Faye Ruopp, co-author of *Impact Mathematics*, for the whole middle school math team, including special educators and the METCO academic advisor. Specific guidance in using the Data Process to analyze student performance has been provided by district math content specialist, Ellen Metzger. The middle school math specialists – Ellen Metzger, Kathy Maloblocki, and Susan Totten – have partnered with middle school math teachers throughout the year in preparation of materials, developing instructional approaches, reviewing formative assessment information, and providing support with specific student needs.

Science

- Middle school students have studied science in each of the three domains: Life Science, Earth & Space Science, and Physical Science.

- Middle school teachers have designed, piloted and analyzed performance assessments for some of the new units.
- Middle school teachers have collaborated on the design of new lesson plans to support new units in each of the domains.
- Middle school teachers have developed common formatting expectations and rubrics for labs using the scientific method.
- Leadership and professional development was provided for the team in several sessions throughout the year by Maxine Rosenberg, an experienced middle school science leader.

Technology/Engineering

- Seventh and eighth graders attended classes in Technology / Engineering for one half of the school year.
- Direct instruction of typical MCAS components (i.e., Universal Systems Model) was provided and incorporated into course modules.
- Coverage of ALL state frameworks standards (6-8) was achieved.

Next Steps for 2010-2011

In each of these three areas, continued attention to the implementation of new curricula will be important to increase teaching expertise and ensure strong student learning. Key priorities for each subject area are highlighted below:

Mathematics

- Provide specific professional development for any new math teachers and specialists who are unfamiliar with *Impact*. Continue professional development and math specialist support for whole department.
- Work with the whole math team to refine the use of the core materials with emphasis on using formative assessment information to differentiate instruction for all learners.
- Pursue possibilities in use of materials and management of instructional time to assist students for whom learning mathematics presents significant challenges.
- Finalize assessments and scoring for mid- and end-of-year exams in order to enter and track results on the district student assessment data base.

Science

- Evaluate and revise learning expectations for existing science units.
- Adjust lessons and assessments for new science units that were piloted this year.
- Develop lessons & materials and assessments for next year's new units.
- Adjust the pacing and placement of some science units in each grade.
- Develop teacher expertise in using technology for data collection and analysis of assessments.

Technology/Engineering

- Consider spiraling the modules so each grade level is exposed to each domain (transportation

systems, construction systems, communication systems, manufacturing systems and bioengineering systems).

- Develop written and performance assessments for each module.
- Explore possible connections to science and math curricula.

STEM: Overview, district progress, and new possibilities

After the US Department of Education convened a national summit on Mathematics and Science, Massachusetts responded by launching the state's first "STEM" summit in 2004, organized by representatives of the state university system and the state departments of higher, secondary, and elementary education. STEM refers Science, Technology, Engineering, Mathematics education and career paths. One key objective of the Massachusetts initiative is: "Improved overall education for students in math and science as a foundation for STEM studies." The National Governor's Association hosted a plenary session on STEM in 2006 and issued a report which highlights the importance of strengthening STEM competencies in all K-12 students. In the same year, The Massachusetts Department of Elementary and Secondary Education established an office for Mathematics, Science, and Technology Engineering (OMSTE).

While much of the national and state STEM initiatives focus on high school and college opportunities and curriculum, goals for elementary and middle school education underscore the need for robust curriculum and instruction in K-8 classrooms. Lincoln has made significant progress in strengthening the science, mathematics, and engineering curriculum areas in the past few years. In 2007-08, the elementary science curriculum was streamlined and reorganized to include well-designed units and up-to-date materials in Life, Physical, and Earth & Space science for each grade. In grades 4 & 5, engineering units, developed by Boston's Museum of Science, were introduced. In 2008-09, a new mathematics program, *Everyday Math*, was implemented in grades K-5. New and revised math and science curricula at the middle school, described above, now provide continuity of program from kindergarten through grade 8.

This level of curriculum introduction and renewal in a short span of years has involved a substantial investment of resources, energy, and time on the part of School Committee, administrators, and teachers. Each new or restructured curriculum introduction has been accompanied by professional development and ongoing support from content specialists, mathematics specialists, and consultants. Yet such change takes time and effort to become embedded in the school district's instructional practice and to have an effect on student learning. Continued work on instruction and assessment in the STEM areas will be needed in the next few years with several priorities in mind:

- Teachers of science and math at all levels need time and content-specific guidance to refine their use of curriculum materials, especially to differentiate instruction to engage a full range of learners.
- Using formative and summative assessment data to inform instruction will continue to be an important approach to understand and monitor how learners are progressing.
- Interdisciplinary connections among the STEM subject areas should be explored to engage students in investigating the relevant links between disciplines and the potential for real life applications.

LINCOLN PUBLIC SCHOOLS

Middle School Science Curriculum

2009-11

Domain:

LIFE SCIENCE

PHYSICAL
SCIENCE

EARTH & SPACE
SCIENCE

TECHNOLOGY/
ENGINEERING

THEME:

Structures and Systems of
Living Things

Matter and Motion

Change over Time

The Engineering Design
Process

Grade 6

Cell Structures

Motions, Forces,
and Energy

Astronomy

Transportation Systems
Construction Systems

Grade 7

Ecology, Biodiversity,
Heredity

Forms of Energy

Energy System
Earth's Structure

Manufacturing Systems
Communication Systems

Grade 8

Systems of Living Things

Properties of Matter

Mapping the Earth

Bioengineering Systems