

OVERVIEW REPORT: MATHEMATICS CURRICULUM SURVEY Newton, MA Public Schools July, 2004

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BACKGROUND / METHODS

In the early spring of 2004, the Newton Public Schools, as part of their periodic curriculum review process, asked Learning Innovations at WestEd to collaborate to gather data from several constituencies in the schools and community concerning the mathematics curriculum and other mathematics-related topics. A large, multi-constituency curriculum committee had worked together for over a year to identify critical issues concerning mathematics education in Newton schools and drafted a number of questionnaires for teachers, parents, and students. WestEd staff undertook the task of refining and shortening these surveys as well as adding an administrator questionnaire. They also created online versions of all the questionnaires, conducted the data analysis, and organized and briefly summarized the findings. Finally, they facilitated a brief session with the curriculum committee during which highlights of the survey findings were presented and discussed. Newton Public Schools staff took responsibility for all communication with potential survey respondents and coordinated efforts in all the schools.

The following ten questionnaires were administered online using Zoomerang:

- Elementary school teachers
- Middle school teachers
- High school teachers
- Elementary school students
- Middle school students
- High school students
- Parents of elementary school students
- Parents of middle school students
- Parents of high school students
- District and school administrators.

FINDINGS

Two separate documents summarize the findings of these surveys:

- Highlights of Mathematics Curriculum Survey, June, 2004
- Cross-Group Analysis, June, 2004.

REFLECTIONS

The ten online surveys have provided a great deal of useful data. However, the limitations of the data are numerous:

- Although the content validity of the questionnaires is probably strong, especially given the yearlong input from mathematics curriculum committee members and Newton district staff, the reliability of the questionnaires is undetermined.
- Response rates:
 - A total of 192 teachers responded to the questionnaires, with excellent response from middle school (81%) and high school mathematics teachers (89%). However, only 34% of the elementary school teachers responded.
 - Although 77% of the middle school students responded to the survey, high school (11%) and elementary responses (34% of grade 4 and 5 students) were more limited.
 - A very small percent of parents [depending on method of calculation, and still to be determined, but approximately 3 to 5%] responded to the questionnaire, with especially low numbers of parents with children in the high school.
 - Those who chose to respond may have done so either because they had particularly positive or particularly negative perspectives to share.
- Use of questionnaires only:
 - Responses to some items raise more questions than they answer, and questionnaires do not allow probing of respondents as would interviews or focus groups.
 - Questionnaires provide information limited to self-report, e.g., on classroom practice, that is not corroborated by observation or other methods.

This said, it is clear that this survey initiative yielded a great deal of useful information in some areas, especially curriculum strengths and weaknesses, that will serve to inform curriculum and other decisions for Newton Public Schools. In other areas, e.g., student placement (levels) and classroom practice, there is a beginning set of data that hints at very different perceptions from different groups, and that can be used effectively within the district to promote substantive, cross-constituency discussions.

Satisfaction with Curricula -- Overall, teacher satisfaction with the curricula they use is fairly low, except for the elementary teachers using Connected Math and the high school teachers of Honors and 1A classes. Teachers seem to have responded thoughtfully to the questionnaires, for instance, carefully distinguishing their satisfaction with different aspects, such as coverage of topics, use of inquiry-based investigations, and emphasis on interdisciplinary connections. This information, at least at the middle and high school levels, where response of teachers who teach mathematics was high, creates a fairly clear blueprint for curriculum planners, in terms of where curricula need to be strengthened, supplemented, or changed, or perhaps, where teachers need additional support to fully implement their current curricula. Dissatisfaction reigns with all three curricula/textbooks used at the middle school level. At the high school level, teacher satisfaction with the curricula/textbooks used generally decreases with the student placement level. Concerns about lack of adequate challenge for students are

raised, particularly in the SIMMS and Level 2 courses. Finally, with so many different curricula within the system, and with so many differing strengths and weaknesses, there seems to be little chance for consistent or coherent experiences for students in mathematics.

Classroom Practice – The questionnaires yield considerable teacher and student information concerning classroom practice in mathematics, however, given that these responses are self report and are not supplemented by follow-up clarifying interviews or classroom observations, one needs to use caution in drawing conclusions. For example, high percentages of teachers from all three levels (89%E, 93%M, 94%H) indicate that in all or most math lessons they require students to explain their responses when giving an answer. Over 70% of students responding also indicate that in most or all mathematics lessons they are asked to explain how they solve problems. However, it remains unknown the kinds of student explanations that are expected, teacher probes for additional ways to solve problems, or student-to-student dialogue that ensues. Likewise, over 90% of middle and high school teachers note that they spend class time in most or all lessons reviewing homework/worksheet assignments, yet the survey data alone do not reveal the nature of this work or its value. Similarly, high percentages of students at all levels indicate that they answer textbook or worksheet questions in all or most mathematics lessons. Yet, the survey data alone, do not illuminate whether this work is focused on repetitious “skill and drill”-type work or problem solving that involves higher level thinking. However, these data serve well to raise questions to be pursued within the Newton mathematics community about fruitful use of classroom time.

Communication with Parents – Although the number of parents who responded to the questionnaires is small, the findings raise important questions to be further discussed within Newton. There is a large discrepancy between teachers, administrators, and parents concerning information that is provided to parents about expectations in math and progress of individual students. High percentages of the teachers (85%E, 93%M, 91%H) agree that “parents are provided adequate information about what is expected in math in my classroom,” whereas under 50% of administrators and parents agree to similarly worded questions to them. Results were similar for provision of timely information to parents about their child’s progress in mathematics. Given the importance of such communication, further discussion of communication practices as perceived by different constituencies seems critical within the Newton school community.

Attitudes toward Mathematics -- Some of the most telling, and perhaps controversial findings of the survey are the attitudes toward mathematics from students and parents. Although a large percent of responding students at each level (71%E, 77%M, and 82%H) agree that they usually do well in math, the percent of students who indicate that they enjoy doing math in school is much lower (45%E, 50%M, 57%H). Similarly, percents of students who agree that they need to learn math to get the kind of job they want in the future hovers around 50% for each level. These data raise concerns about student motivation and likelihood of continuing to higher levels of mathematics and remaining open to mathematics-related areas of study and future careers.

Although the percent of Newton parents who responded is very small, certainly some of the survey results warrant examination and discussion across the district. For example, that:

- Only 39% of E parents agree that the math content is demanding enough to meet the learning needs of their children,
- Only 48% of E parents and 45% of H parents agree that their children receive the additional instruction needed from their teachers when they don't understand something in math, and
- 22% or less of parents agree that their children's teachers give students more challenging work if a child already knows something or has finished an assignment.

That students at all levels are optimally challenged in mathematics is a critical importance. Many questions arise from the survey data collected:

- Is this perception of challenge pervasive among the broader group of parents? If so, is it founded?
- Are teacher expectations of students in mathematics consistently high?
- Do teachers need additional professional development that will provide them with strategies to more effectively challenge all students?

Teacher Professional Development – The data from the teachers about preferred topics and formats for professional development provides some clear suggestions for planning of the coming year's approach and focus. At the elementary and middle school levels teachers are particularly interested in using technology in mathematics instruction. A common focus that emerged as important for elementary and high school teachers is using inquiry/investigation-oriented teaching strategies. Other top interests, of course, are noted in the findings. In terms of professional development formats, consistent messages came from teachers at all levels—school-based workshops on mathematics teaching and observation of other teachers. These responses seem to open the door to professional development that is based on specific needs of teachers and students at the individual school level and builds on the expertise and collegial relationships in the schools as well as drawing from district and external resources.

RECOMMENDATIONS

Based on the many findings from these ten questionnaires, Newton educators may wish to consider the following general recommendations to guide their future activities and decisions:

- Based on the rather straightforward teacher assessments of the current curricula/textbooks, as well as additional knowledge of committee members and staff, identify those that may need to be:
 - Eliminated,
 - More fully and accurately implemented, or
 - Supplemented by other materials/curricula to fill gaps identified.
- As curriculum and classroom practice assessments are being made, based upon survey data and other information, focus on and expressly address the notion of

providing adequate challenge to all students in the system. The data point to the need for work to be done in a comprehensive fashion, addressing lack of challenge in certain curriculum materials as well as classroom practices that promote challenge for students.

- Consider strategies to streamline and make more coherent the curricula across the full spectrum of grade levels.
- At the beginning of the school year make efforts to gather additional data, particularly from a broader sample of parents and elementary teachers.
- Take advantage of the current available data to provide opportunities for Newton constituencies to participate in a variety of forums, informal conversations, or meetings in which they can:
 - Discuss and give feedback on initial recommendations for curriculum changes and plans for professional development as well as discussion of the data on which the recommendations are based;
 - Further discuss other aspects of mathematics education in Newton Public Schools and how it might be improved, using the survey data as a springboard. Examples of topics may include:
 - Parent-School Communication about expectations of students in mathematics and progress of individual children,
 - Implications of current student placement policies and practices,
 - Developing a common understanding and valuing of standards for mathematics teaching and learning,
 - Productive use of homework,
 - Classroom practices that promote higher order thinking in mathematics.