

To: Alan Oliff, Superintendent of Schools
From: Debra Shein-Gerson, Elementary Mathematics Specialist
Dennis McCowan, Mathematics Department Chair
Date: September 20, 2007
RE: Response to 2007 K-12 Mathematics Program Review

We are gratified by the support offered the mathematics program by the Review Committee. Strong programs remain so through persistent effort and evolution, and we welcome the suggestions made by the committee. The report contains a variety of recommendations and suggested enhancements for the current K-12 mathematics program, most of which can be grouped under two large headings: Differentiated Instruction and the Achievement Gap. We have spent time reviewing the report, meeting with faculty, and analyzing our programs in order to offer our responses.

Differentiated Instruction

Recommendations in this category deal with direct support services, professional development, providing challenge to all students, and materials. The bolded paragraphs are taken directly from the report from the Program Review Committee.

Direct Support Services

Recommendation 1. “There are no direct services, i.e., regular education support, beyond Grade One. The Field School (Grades 4 and 5) has a tutor available for 15 hours per week but this is not sufficient. Teachers and parents would like to see regular education support for Grades 2 and 3 such as the direct services and intervention programs currently being provided to Grade 1. The Committee recommends that the Weston Public Schools take steps to address this unmet need.”

Response: Student performance data indicates the continued success of the Grade 1 early intervention program, which began in the fall of 2005. The first students to participate in that program are now in Grade 3. With Title I funding, we have direct support services at the Field School this year. While there may always be students who would benefit from such support, we are carefully monitoring those numbers and student progress. We expect that recent initiatives in flexible grouping, tiered lessons, math centers, and varied supplementary materials will result in a decrease in the number over time. In the meantime we are working with the principals, grade leaders, and special education teachers to support students in our current model. We do not believe at this time that it is necessary to add additional personnel.

Recommendation 2. “The Topics courses for middle school mathematics courses and Algebra 2 are very favorably regarded by teachers and students. Teachers, students, and parents feel a Topics course for Geometry is now needed. The Committee endorses this recommendation.”

Response: Grades in college preparatory geometry indicate that students are achieving success in the current program. Adding a Topics program in Geometry would limit the opportunity for students to enroll in other courses and would create the appearance of a “Topics track.” At the current time we do not feel such a program is warranted, but we will monitor student success carefully this year and reexamine the recommendation in the future.

Instructional Practices

Recommendation 3. “Teachers, students, parents, and administrators voiced concern that differentiation practices may be falling short...(Elementary teachers desire) more training and more materials for providing challenging differentiation...(Secondary teachers desire) more differentiation materials to meet the needs of students who may be caught in the cracks between the quick-paced students and the slower ones in the class. The Review Committee supports these teacher suggestions and recommends that teachers be encouraged to locate and/or develop materials to enrich class offerings.”

Response: At several places in the report the Committee describes the mathematics program as “grappling with differentiation and making appropriate progress.” The topic of “differentiation” has been and continues to be the focus of the district’s professional development, K-12. Each of the following relevant summer workshops enabled teachers to work on differentiation by updating Weston’s Standards, developing or refining pre and post assessments as well as creating and modifying lessons:

- Resolving Dilemmas around Differentiated Instruction and the Achievement Gap
- Continued Revision of the 8th grade Algebra Curriculum
- Differentiated Instruction at the Elementary Level: Practical Applications
- Differentiating the 6th grade Math Curriculum
- Grade 4 Enrichment Projects in Math
- Looking at Student Work to Improve Differentiated Instruction
- Pre-Assessments for Grade 7 Math
- Secondary Math Benchmarks/Unit Guides
- Supporting Differentiated Instruction for Sixth Grade Inclusion Students in level two math
- Writing in Math- Focus on Open Responses

System release days and team meetings have made differentiation a priority in all curriculum areas. Looking at student work and the use of error analysis to design alternative teaching approaches will continue to be a focus for the 2007-2008 school year.

Since the review the district has purchased supplementary materials such as those produced by Kathy Richardson for the early elementary grades. Kathy Richardson, one of the nation’s leading educators of elementary mathematics, has spent over 30 years teaching classroom educators, working with elementary students, writing books, and developing teacher resource materials. In addition, we have purchased software such as

FASTTMATH to provide assessment and differentiation for the mastery of math facts in grades 2-6. The use of websites such as *Rainforestmaths* has enabled us to provide differentiated instruction targeted to a student's readiness and needs in grades K-5.

At the secondary level, the creation of Topics courses has empowered our weaker students to be active participants in their college preparatory level classes and given the teachers of college preparatory courses the ability to offer a wider variety of activities to their classes. In college preparatory Geometry, tests, quizzes, and many assignments are prepared in two versions - a B level version which offer students the opportunity to demonstrate basic mastery of the topic (but which can earn at best a "B") and an A level version in which students are required to apply the ideas in more complex and original settings. Students select which level activity they want to try (with teacher assistance at times) and in the process become better at assessing their own current level of understanding. In grades 6 and 7 a similar choice option is used for Continental Math League contests where Weston teachers have themselves written a third level of less demanding problems so that all students can have some success. The elimination of level three classes at the Middle School has resulted in almost all courses being taught by several teachers, increasing teamwork, and allowing for producing and sharing rich problems such as last year's use of the Boston "Shot-spotter" program as an application that uses hyperbolas. One response to the report this fall was a significant increase in the use of pretests before the first unit in each course to gather information on students' entry knowledge and to make it clearer to students what skills and concept they will be acquiring in the unit.

The report indicates the need for further study of what it means to "challenge" a student in mathematics. From the committee's observations, secondary teachers have been effective in creating Honors mathematics classes that students "appear to truly enjoy" and that are "rich in challenging problems." The committee did not find that this was always the case in College Prep (level II) classes where there is a need to offer greater challenge to students who are the top of those classes. The 6-12 Mathematics Department has focused on this issue and taken the following steps to address it: 1) collecting feedback from students on their experiences in College Prep classes; 2) encouraging work in those classes that goes beyond competence; 3) working in teams to collaborate on lesson planning and assignments; 4) participating in professional development that increases understanding and skills in differentiating instruction; and 5) providing opportunities for students to partner with teachers in meeting their needs.

Professional Development

Recommendation 4. "The teachers work hard to take advantage of professional development and appear to be constantly rethinking their teaching. The Review Committee supports the following teacher suggestions:

- **Release time for teachers to learn from each other and observe each other teaching**

- **More information on the best technologies and more release time for working with and exploring the potential of various software already owned by Weston**
- **More Kathy Richardson training**
- **Professional development in teaching *Investigations* for new teachers and teachers hired since its implementation”**

Response: We agree that the current level of professional development activities should be maintained and expanded when possible. We will work to insure that teachers are aware of opportunities to visit other classes and encourage them to take advantage of that opportunity. This spring fifth grade teachers visited sixth grade math classes and the sixth grade teachers have arranged to visit the fifth grade in the fall.

This summer several staff attended EDCO workshops to explore the potential and use of Smartboards and some of the existing software and websites. The kindergarten and first grade team leaders have all attended Kathy Richardson training in assessment. Two teachers attended training in Understanding Mathematics K-2, and five teachers (including both Field School Special Education teachers) attended Understanding Mathematics 3-5, for five days. Professional development in teaching *Investigations* was offered to new teachers this past summer. At team meetings, teachers analyze and reflect on the use of all curriculum materials.

Materials

Recommendation 5. “The Review Committee supports the following teacher suggestions

- **Additional sets of manipulatives**
- **Additional computer projectors as well as Smartboard technology, as tools to strengthen pedagogy**
- **More mathematics games to supplement the curriculum**
- **Additional Kathy Richardson materials**
- **A second laptop cart at the Middle School**
- **A second laptop cart at the High School”**

Response: We agree that these materials would benefit instruction and will include them in initial budget requests. We have inventoried elementary materials and will develop a plan to purchase additional manipulatives, support materials, and games as needed. A second laptop cart has been purchased for the High School and will be available this fall. We will continue to work with the technology department to develop a plan to acquire additional computers, projectors and Smartboards as needed.

Achievement Gap

Recommendation 6. “An achievement gap does exist for a small number of children. Expanded interventions and support are needed to help these children, particularly

at the elementary level...Teachers observed that the achievement gap for METCO students narrows from September to June but grows back over the summer. They also observed that METCO students are underrepresented in Honors courses. Weston should consider exploring the possibility of developing an intensive program for the beginning of the school year to jump-start these students... Teachers and administrators uniformly identify the achievement gap as a priority. They desire to find the root causes and ways to address them. The Committee agrees that the achievement gap is a major issue; it is a systemic problem confronting all public school systems.”

Response: Addressing the Achievement Gap is currently a system-wide priority. The Anti-Bias course addresses this challenge as well as some of the other workshops this summer including Addressing the Achievement Gap, Resolving Dilemmas around Differentiating Instruction and the Achievement Gap. All of the workshops on differentiation also addressed this issue.

We are exploring the creation of summer programs and ran a small pilot program in July 2007 for rising ninth graders. This is the first step in designing a multi-year program to increase the diversity of students enrolled in AP Math Classes.

The suggestion to expand direct support services in the elementary grades has been addressed under Recommendation 1 above.

The “Sum Math” newsletter sent to all K-5 parents in June suggested summer activities in mathematics to help prevent loss of mathematical competencies over the summer. We will explore additional ways of encouraging METCO families to make use of these activities.

Other Recommendations

Recommendation 7. “In recent years, the Weston Public Schools have transitioned from homogeneous to heterogeneous classes...As perhaps may be expected, these changes have met with some initial parental misgivings...Communicating to parents the goals and practices of the mathematics program may help to ease concerns.”

Response: The Elementary Grouping Report, attached, will respond in greater depth to the transition from leveled to flexibly grouped classes in grades 3-5. Parent information sessions are held annually for parents of students entering grades 6 and 9; we will re-examine the mathematics portion of those sessions. We will work with the Weston Science and Mathematics Council (formerly the Weston Science Council) to offer a parent forum during the 2007-2008 school year to promote a better understanding of the goals and practices of the mathematics program. Together we will also offer a Family Math Night on March 28, 2008.

Recommendation 8. “Elementary school faculty expressed concern that children entering the Field School from the two K-3 schools, Woodland and Country, *might*

have inconsistent backgrounds. They indicated that their lack of joint planning meant they could not *know* that their programs were inconsistent. They recognize the need to coordinate across primary schools, and then to vertically align with Field. The Committee recommends that such joint planning be implemented.”

Response: Grade Four teachers currently report that it is not possible for them to identify which third grade team a student was in, so in general we believe student backgrounds are consistent. Nevertheless, we believe increased joint planning and curriculum articulation would be productive. This summer third grade teachers from each building worked to identify and share math resources. Our work last year on grade 5 to 6 articulation reinforced the value of such efforts; we recommend a similar experience be undertaken between grades 3 and 4 and in other grades if time allows.

Recommendation 9. “The committee supports integration with other disciplines. The mathematics program may wish to look at the document, *Teaching Mathematical Biology in High School*, produced in connection with a 2005 summer workshop held at Rutgers University on connections between mathematics and biology.”

Response: The past two summers have seen joint math science workshops exploring the connections between freshman physics and geometry, and chemistry and pre-calculus. We will propose a summer workshop for 2008 on Biology and Algebra Two to include exploration of the Rutgers materials. As previously mentioned the Weston Science Mathematics Council supports the integration of mathematics and science.

Recommendation 10. “The learning standards are well thought out and clearly stated. From the Committee’s limited time in Weston, it was difficult to see how well assessments are aligned with the standards, and if students are being measured based on those standards. ...A new record-keeping approach that tracks each student’s growth and progress from year to year (should be considered.)”

Response: Work begun this summer in revising Benchmark Assessment tasks and plans for compiling and using the results is an appropriate next step in insuring alignment of assessments and standards. This work will continue during the 2007-2008 school year.

We have begun the creation of an elementary mathematics data base to track student achievement. The existing secondary math database is being expanded to include data concerning benchmark test performance. The time involved in creating and maintaining such databases is significant, however. The district is investigating options for creating a system-wide database, which would make the task more manageable. There are a number of pilots being started at Field School this year in data collection: using Rediker and creating an excel spreadsheet. The grade 5 team is focusing on collecting advisory data in May to support student achievement.

Conclusion

In general, the committee's recommendations are aligned with the K-12 mathematics programs ongoing initiatives to insure that all students experience significant mathematical growth each year. We will continue our efforts to raise the achievement of our weakest students, diversify and enrich the mathematical experiences of all students, apply technology appropriately, and keep our program focused on the Weston K-12 Standards. We are gratified that the committee's report supports and encourages us in these efforts.

To: Dr. Cheryl Maloney
From: Debbie Shein-Gerson
Date: September 15, 2007
Re: Elementary Mathematics Grouping Practices Review and Recommendation

As you know, we have been piloting flexible grouping practices across all of our elementary mathematics classrooms in the district beginning in 2004. After several years of implementation, the principals, teachers, and I are unanimous in our recommendation to make this regular practice in the future. Our conclusion is based on a review of assessment data including MCAS/ ERB scores, Weston benchmark performance measures, teacher surveys, and extensive observations in classrooms. In addition, we have reviewed data from other comparable communities using flexible grouping practices and find that their results also support this recommendation.

Up until 2004, students in Grade 3-5 were placed into two or three “leveled” math classes. The placement was done each fall and based on teacher recommendations and any standardized test scores that existed. Students were rarely, if ever, moved from one group to another and over half of students were usually placed in the “top” level. The students’ math teachers were usually different from their “homeroom” teachers, who kept all of their students for English Language Arts, Science and Social Studies. To accommodate the change of teachers, math was scheduled for the same time each day and required students to move from one classroom to another. This produced discrepancies in challenges for a number of students as placement was static and instruction was “watered down” for students thought to be less capable in mathematics. In addition, scheduling problems were noted as the mathematics time was fixed with little flexibility and valuable teaching time was lost as students moved to and from their math groups.

The district’s initiative to ensure high standards of performance for all students resulted in a focus on improving teaching and learning through a standards based education. Teachers identified what it was they expected all students to know and be able to do through the learning standards in mathematics. Through this work, it became clear that the existing grouping practices were no longer meeting the needs of the students and school system. The importance of offering all students access to curriculum and instruction that provided them the opportunity to meet our high standards was deemed essential. Teachers developed assessments linked to Weston learning standards to monitor student progress toward learning the related concepts and skills. A review of these benchmark assessment tasks led to extensive discussions of the grouping practices by elementary teachers and principals who seriously questioned the model of leveled math grouping as the best method for supporting student achievement. A pilot program of flexible grouping was recommended and over the past several years, teachers began to implement flexible grouping, a practice that allows students to be grouped and regrouped dependent upon the results of formative and summative assessments. After a number of years assessing these pilots, we are confident that this is the best way to present our standards based curriculum, address individual needs and support student achievement in mathematics.

We have been analyzing assessment data and teacher feedback linked to grouping practices over the last three years. In terms of assessments, we have been closely monitoring both standardized test results and the district benchmark assessment tasks. An analysis of the ERB data indicates that the cohorts that experienced some or all of their math classes in flexible grouping in grades 3-5 over the last three years did as well as classes in previous years. In a comparison of ERB scores with suburban or independent schools, our students actually have been scoring higher than those students over the last few years. In the 2006 MCAS mathematics results, 72% of the Grade 4 and 75% of the Grade 6 students scored in the combined Advanced and Proficient category, scores that were higher than many neighboring communities. The scores from the 2007 spring MCAS are not yet available, but data from preliminary reports indicate that students in grades 3-5 continue to do well. (Longitudinal standardized test results, both MCAS and ERB, are attached in Appendix A.)

Benchmark assessments, post-assessments and standards-based progress reports provide indicators of individual student success. Although we have only used this progress report for two years, initial reports are that most of our students are performing at or above grade level and all but approximately 8% are meeting the benchmarks.

In the spring of 2004, elementary teachers in each school met with the Elementary Mathematics Curriculum Specialist, Laurie Penney, and their principals to evaluate the piloting of flexible grouping practices. They were positive about its impact and identified several key advantages to this model: 1) teachers have greater knowledge of the diverse learning styles of their homeroom students; 2) all students receive the benefit of being a part of the rich mathematical conversations and concepts that previously occurred mainly in the “high” math class; and 3) teachers could devote more time to mathematics instruction when no longer locked into one block each day. The decision was made to continue this pilot into the 2005-2006 school year.

In preparation for the 2006 program update, teachers in grades 3-5 were polled again regarding their opinion of flexible grouping practices. 92% of teachers indicated that they believed it was a positive change. A subsequent discussion was held at a grade leader meeting and the teacher-leaders confirmed their belief that flexible grouping should continue because the practice was in the best interest of students. Teachers therefore continued in 2006-2007 to pilot a variety of approaches to flexible grouping. Last spring, I spoke with teachers individually to gather data on their assessment of student achievement under the flexible grouping pilot. Out of 27 teachers, all but one indicated strong continued support of this program. When asked to explain their views, teachers cited the following benefits: better for students overall, fosters variety of grouping and teaching strategies, and allows for more time devoted to math in the course of a day or week.

Teachers in grades 3-5 and their principals believe in flexible grouping as a practice because it supports the needs of all students more effectively than fixed grouping practices. They are teaching mathematics for longer periods of time and are not limited by a schedule. Students can easily ask for help or clarification before school or during

the day if needed because their “homeroom” teacher is also their math teacher. Instructional time is not lost while moving from one class to another. Teachers feel they know their math students better as learners and that knowledge makes it easier for students to take risks and for teachers to support them. In a flexible grouping model, teachers are able to utilize differentiated instruction to support the individual needs of students. Flexible grouping means teachers may conduct whole-class introductory discussions of mathematical big ideas followed by small group, pair or individual work. Grouping of students is not fixed. Based on the content, project, and on-going assessments, students are grouped and regrouped for instruction. Students no longer label themselves as “high or low” in math and students’ attitudes toward mathematics have improved. The emphasis is on individual achievement, not group ranking.

While there are strong arguments for this model to continue, there is also the need for ongoing professional development, appropriate technology and resource support, and ongoing teacher feedback to improve the teaching and learning of mathematics for all students. I will continue to collect and closely monitor test data as indicators of student achievement. I am working with teachers as they analyze and interpret data while lesson planning. In addition, each principal is committed to the success of flexible grouping and to that end will continue to support teachers, review student data I have collected, and communicate with parents. As the Elementary Math Curriculum Specialist, I strongly believe that flexible grouping is integral to a successful mathematics program.

**ERB TEST RESULTS
MATH**

Mathematics - Test Dates, May 1999 - May 2007										
90th Percentile - Scaled Scores										
YOG		Grade 3	Grade 4	Grade 5	Grade 6	Grade 7				
Current 12th	2008	335 (99)	348 (00)	372 (01)	400 (02)	420 (03)				
Current 11th	2009	331 (00)	344 (01)	371 (02)	377 (03)	419 (04)				
Current 10th	2010	332 (01)	345 (02)	370 (03)	381 (04)	421 (05)				
Current 9th	2011	334 (02)	349 (03)	376 (04)	384 (05)	423 (06)				
Current 8th	2012	340 (03)	346 (04)	375 (05)	381 (06)	423 (07)	410 (07)*			
Current 7th	2013	331 (04)	348 (05)	377 (06)	379 (07)					
Current 6th	2014	336 (05)	349 (06)	379 (07)						
Current 5th	2015	339 (06)	348 (07)							
Current 4th	2016	336 (07)								
75th Percentile - Scaled Scores										
YOG		Grade 3	Grade 4	Grade 5	Grade 6	Grade 7				
Current 12th	2008	318 (99)	335 (00)	350 (01)	382 (02)	403 (03)				
Current 11th	2009	316 (00)	333 (01)	354 (02)	363 (03)	397 (04)				
Current 10th	2010	317 (01)	330 (02)	357 (03)	368 (04)	404 (05)				
Current 9th	2011	320 (02)	336 (03)	358 (04)	368 (05)	401 (06)				
Current 8th	2012	320 (03)	331 (04)	358 (05)	367 (06)	405 (07)	358 (07)*			
Current 7th	2013	315 (04)	337 (05)	366 (06)	365 (07)					
Current 6th	2014	313 (05)	336 (06)	362 (07)						
Current 5th	2015	321 (06)	338 (07)							
Current 4th	2016	320 (07)								
50th Percentile - Scaled Scores										
YOG		Grade 3	Grade 4	Grade 5	Grade 6	Grade 7				
Current 12th	2008	302 (99)	319 (00)	336 (01)	362 (02)	380 (03)				
Current 11th	2009	301 (00)	317 (01)	338 (02)	343 (03)	373 (04)				
Current 10th	2010	300 (01)	313 (02)	339 (03)	348 (04)	377 (05)				
Current 9th	2011	304 (02)	320 (03)	344 (04)	351 (05)	381 (06)				
Current 8th	2012	303 (03)	312 (04)	340 (05)	347 (06)	386 (07)	333 (07)*			
Current 7th	2013	301 (04)	323 (05)	345 (06)	350 (07)					
Current 6th	2014	299 (05)	319 (06)	344 (07)						
Current 5th	2015	301 (06)	316 (07)							
Current 4th	2016	304 (07)								

Mathematics (cont.)								
25th Percentile - Scaled Scores								
		Grade 3	Grade 4	Grade 5	Grade 6	Grade 7		
YOG								
Current 12th	2008	285 (99)	302 (00)	316 (01)	340 (02)	348 (03)		
Current 11th	2009	289 (00)	295 (01)	316 (02)	325 (03)	348 (04)		
Current 10th	2010	283 (01)	294 (02)	324 (03)	329 (04)	345 (05)		
Current 9th	2011	287 (02)	297 (03)	327 (04)	335 (05)	354 (06)		
Current 8th	2012	290 (03)	297 (04)	326 (05)	337 (06)	363 (07)	317 (07)*	
Current 7th	2013	285 (04)	304 (05)	331 (06)	333 (07)			
Current 6th	2014	288 (05)	302 (06)	329 (07)				
Current 5th	2015	291 (06)	300 (07)					
Current 4th	2016	291 (07)						
10th Percentile - Scaled Scores								
		Grade 3	Grade 4	Grade 5	Grade 6	Grade 7		
YOG								
Current 12th	2008	272 (99)	281 (00)	293 (01)	305 (02)	320 (03)		
Current 11th	2009	274 (00)	271 (01)	293 (02)	302 (03)	316 (04)		
Current 10th	2010	267 (01)	274 (02)	297 (03)	311 (04)	320 (05)		
Current 9th	2011	273 (02)	283 (03)	307 (04)	318 (05)	323 (06)		
Current 8th	2012	275 (03)	282 (04)	303 (05)	320 (06)	341 (07)	303 (07*)	
Current 7th	2013	274 (04)	291 (05)	317 (06)	318 (07)			
Current 6th	2014	274 (05)	290 (06)	311 (07)				
Current 5th	2015	278 (06)	290 (07)					
Current 4th	2016	277 (07)						
*Non-standard								

Mathematics
2001 – first administration of test at Grade 6
2006 – first administration of test at Grades 3, 5, 7

Grade	Advanced	Proficient	Needs Improvement	Warning***	Year
3	11%	65%	20%	3%	2006

4	35%	37%	24%	4%	2006
	27%	40%	27%	6%	2005
	25%	35%	33%	6%	2004
	35%	33%	25%	7%	2003
	33%	30%	29%	7%	2002
	26%	33%	34%	8%	2001
	36%	37%	23%	4%	2000
	33%	34%	30%	4%	1999
	23%	38%	31%	9%	1998

5	41%	28%	24%	7%	2006
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6	32%	43%	19%	7%	2006
	37%	38%	20%	6%	2005
	45%	25%	23%	7%	2004
	33%	33%	24%	9%	2003
	42%	35%	13%	11%	2002
	39%	36%	20%	5%	2001

7	32%	38%	21%	9%	2006
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8	32%	34%	20%	14%	2006
	34%	36%	20%	11%	2005
	47%	28%	18%	7%	2004
	36%	32%	25%	7%	2003
	38%	32%	24%	6%	2002
	27%	40%	27%	6%	2001
	35%	39%	19%	7%	2000
	23%	45%	23%	9%	1999
	37%	40%	19%	4%	1998

10	76%	19%	3%	2%	2006
	69%	25%	6%	0%	2005
	65%	20%	15%	1%	2004
	52%	32%	15%	1%	2003
	59%	27%	14%	1%	2002
	47%	35%	12%	6%	2001
	35%	30%	24%	12%	2000
	39%	26%	21%	13%	1999
	36%	28%	19%	17%	1998