

NATICK PUBLIC SCHOOLS

MATH CURRICULUM MATERIALS AUDIT

In preparation for procurement and contract renewal of math text and online materials/subscriptions (Winter 2018)

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RESPECTFULLY SUBMITTED BY:

DR. ANNA NOLIN
ASSISTANT SUPERINTENDENT TEACHING, LEARNING AND
INNOVATION/INTERIM SUPERINTENDENT

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MATH EDUCATION LANDSCAPE

In the Nation

In 2010 the Common Core State Standards for Math were released for use across the nation. The Common Core Standards (CCSS), developed by the nation’s council of governors, serve as a guide for what to teach in mathematics and English language arts, not how to do so—despite what is widely portrayed in certain aspects of social media. These standards, while a sea change for some states, represented the type of standards-based unity Massachusetts used for the past 25 years, beginning with Education Reform Act of 2003.

In Massachusetts

The release of the Common Core State Standards spurred Massachusetts to review its math curriculum frameworks that were published in 2011 and refreshed in 2017. The state Department of Elementary and Secondary Education (DESE) reviewed the Common Core State Standards and changed 20% of them to become more aligned with the rigor and expectation of MA education standards. When this document was released in 2017, Natick revised its curriculum units to meet the changes and map our work against the new expectations for “cross cutting principles” in mathematics learning and student competencies.

In Natick

How Curriculum and Assessments Have Developed and Changed Over Time

Natick’s mathematics curriculum has been the most scrutinized set of curriculum frameworks in the district. As noted above, the curriculum has been revised in 2011/12 and 2017 to articulate to new MA standards and then to those that incorporated the CCSS. In addition, in the years of 2005-2015, a rigorous review of middle school math and middle school math placement into standard and accelerated math tracks precipitated a ten-year tracking of student achievement in math, a review of assessments used to place students in what families and students perceive as these high stakes tracks, and therein drove continuous curriculum alignment at both middle schools to ensure almost lock-step coverage for all middle school students. If

alignment is not parallel, the worry was that students were not being given the same chance to accelerate into the district's most rigorous math classes. Student achievement, placement and success rates were tracked for 10 years and a placement process, portfolio of assessments and parent and student engagement process has been developed.

As an outgrowth of this math placement study and process, Dr. Nolin, then the principal of Wilson Middle School became concerned about trends of achievement for students of color in accelerated math classes. Despite scoring similarly on placement test measures, students of color—particularly African American and Hispanic students—were not placed in accelerated tracks or, if they were placed, they did not remain in the class—dropping to a lower level class mid-term. Her study continues to this day and has grown to include examination of the high school placement of students of color in advanced placement courses and high level math classes. Training for teachers in identifying biases in placement and eliminating barriers to taking on advanced math instruction have been executed since 2010 in the district, but a more aggressive education campaign began in 2013 with the results of this study being shared with all teachers in the new teacher on-boarding graduate course developed by Dr. Nolin in 2015.

Meanwhile, at the Natick High School, a new building was erected and the district implemented its 1:1 laptop program. Boston College was hired to study the implementation and effectiveness of this program—focusing on student experiences, behaviors and performance in grades 7-12. As the new high school opened in 2012, it was opened in a 1:1 environment and the then Assistant Superintendent of Curriculum, Instruction and Assessment, Dr. Karen LeDuc, led a math procurement process that resulted in Pearson's Math XL being chosen for use at Natick High School. The Boston College research correlational study, executed over a three-year period, found that the implementation of the 1:1 program had its greatest impact in the arena of secondary math achievement for students. Controlling for many variables, the report found that a spike in achievement in math on MCAS and performance in classes could indeed be linked to the implementation of the 1:1 program. The district found that the more personalized digital and online tools afforded students through the laptop program and commensurate online instructional materials made a difference in student achievement. To this end, the district has continued, through the district innovation teams, to

research, test and evaluate online digital resources as a matter of course in our professional work—not just something we do at audit or procurement (contract end) times.

Prior to her departure in 2013, Dr. Leduc also led a procurement process for K-8 mathematics resulting in a refresh of the K-4 TERC Investigations Mathematics (Pearson) with its CCSS inserts being reaffirmed as our elementary math base program. At the middle school level, staff and Dr. Leduc settled on GoMath! For grade 5 use And Big Ideas Math (2013) for grades 6-12 for both the standard and accelerated math course tracks.

As this process was concluding, the state joined on with many other states to execute the PARCC (Partnership for Advancement and Readiness for College and Career) assessment instead of the Massachusetts Comprehensive Assessment System (MCAS) in MA (now called “legacy MCAS”), this prompted some shifts in how Natick prepared students for the test. The test was digital and required students to execute traditional math skills and do so in a digital interface. Since there was talk that the new Scholastic Achievement Test (SAT), which was then in development, would also eventually be online, the district decided to invest in products that would adequately prepare students for an eventual future in online testing. Thus, a review of online math instructional resources began in 2013 to help prepare students for taking math assessments in a digital interface. After conducting a group procurement and vetting process that spanned three years, several pilots, and many sessions of teacher and parent feedback, the district settled on TenMarks Math (K-8), Math XL (9-12) and Reflex Math (K-4) as base instructional support resources to accompany any base units of instruction and assessment executed in the district.

Overlapping the above online materials testing process, Natick Public Schools set high goals for student college and career readiness for our graduates. To this end, we sought to engage a cross section of our students in the 2015 (PISA) test—an internationally benchmarked assessment that allowed us to stack our Natick students and their achievement in mathematics, science and English language arts against the international scene. The results were quite strong, particularly in mathematics and science. In 2015, and again in our most recent set of results (2017), Natick scored superior in all subject areas—second only to Shanghai China. Our high school administrators were asked to attend a national PISA conference in Washington, D.C. to share the

school's work in math and science so other districts could learn how to achieve similarly strong results.

Former NHS Principal and current Dean of Students, Rose Bertucci, was at the helm during the PISA testing rounds, but she kept her eyes also focused on our more fragile math students. Ms. Bertucci had cultivated strong partnerships with Mass Bay Community College and Framingham State University as part of her vision for student college and career readiness work. Mr. Bertucci was the designer and implementer of the early college block program at Natick High School—a program designed to give students who may not see themselves as “college ready” exposure to college courses.

In 2017, the district moved to MCAS 2.0, the state's new test—abandoning PARCC. In addition, the new SAT and its requirements began to be debuted across the nation. The implementation of the new MCAS 2.0 did not require additional changes on the part of the district, but the new SAT had some profound meaning for the Natick High School staff. Luckily, also in 2017, Natick High School appointed a new math department head who was given the charge of writing and refreshing the new math curriculum for Natick High School. Dr. Hollins spent the entire year leading his staff through an examination of the new SAT and a decision-making process about how new units would be realigned and the types of rigorous problems required in each of our high school courses so that we could prepare our students to succeed. Please note that this process was long complex as it requires each teacher team/professional learning community (PLC) within the high school math department to reevaluate scope, sequence and assessments for each course. This process continues during professional development half days and through the summer to this day and will continue this summer as well. The recently completed New England Association of Schools and Colleges (NEASC) self study completed by NHS staff this past year will indicate that particularly in this department, curriculum unit development and assessment alignment is in flux; and it must be in order to meet the demands of the new assessments for our students.

Also in 2017, Dr. Hollins joined forces with Dr. Nolin and METCO Program Director, Rasheedah Clayton, in sitting on the Natick High School data team and examining the performance of our students of color in advanced math classes. From their work, which continues to this day, the ACES program and RTI math intervention workshop classes have been developed.

In the summer of 2014, Dr. Nolin, one year into her work as the new Assistant Superintendent for Teaching, Learning and Innovation, brought together a K-12 group of math educators to identify their biggest obstacles as instructors and to discuss achievement trends they found worrisome or widespread within the district. For the past three summers, staff have come together to realign, reevaluate and coordinate math instruction through summer curriculum writing institutes. Out of one of these institutes in 2015, elementary staff, with representatives from all grades indicated that moving forward with the old TERC Investigations with just the CCSS inserts was not enough for them; they wanted the new Investigations 2 which included strong online materials and materials directly related to helping teachers execute math Response to intervention (RTI). This resource was planned for and purchased in phases and all K-4 staff have been retrained in the 2016-17 and 2017-18 school years on this resource, the online interface and the inquiry based investigations math teaching methodology that the curriculum requires. Newly appointed department heads Ms. Kelly (WMS) and Ms. Alagappan (KMS) joined the team in 2017 and 2016 respectively and continue to lead the teachers in examination of rigorous curriculum design, assessment coordination and join Dr. Hollins and Dr. Nolin in the curriculum materials audit and pilot process and planning.

PURPOSE

As we arrive at 2018, the math contracts for GoMath! (grade 5), Big Ideas Math (grades 6-8) and Math XL (grades 9-12) all expire in the next year or two.

Given the sheer amount of constant realignment and examination this curriculum has had over the past years, it is not necessary to conduct the type of curriculum mapping and audit process for the curriculum at this time. There is nothing static about this department's curriculum and all the metrics around which we would judge successful math programming (MCAS achievement, SAT, PISA and college admissions) indicate that our students are performing at extremely high levels and that even our most fragile students are making progress.

However, an audit of the base curriculum materials and needs relative to the expiring contracts is in order. This audit's purpose, therefore, is to assess if

teachers still feel the curriculum materials that help them to execute the curriculum are the right ones or if new materials should be procured.

STRUCTURE

Department heads were asked to develop a list of features needed for each level and text being decided upon. Dr. Nolin then created a rubric to evaluate each product based on the stated needs of the participating departments.

That Rubric is here:

The department heads were also asked to canvass their staff and ask if there were specific products and resources they wanted to be sure to have visit for the audit. Dr. Nolin, who visits vendors, conferences and curriculum job-alike meetings regularly, also had some input into deciding who came to speak with the decision-making team. Dr. Nolin then made contact with the vendor representatives to schedule them to visit the decision-making team.

A digital rating form was then created for use as different text/instructional materials sets were reviewed with visiting vendors. Decision-making staffers were brought together for a two day workshop to hear from different vendors. The schedule of vendor demonstrations/the agenda for the two-day workshop is here:

At the conclusion of the two-day session, materials and texts/online services were chosen for pilot in the 2018-19 school year (September -January).

Decisions about which products to ultimately use will be made in January 2019. Funds reserved in the FY19 budget for these texts will be used at that time.

PARTICIPANTS

The following staff participated in the two-day vendor demonstration / discussion of resources days:

- Linda McKenna, Math Coach and Instructional Interventionist, WMS
- Tina Kelly, Math Department Head, WMS, grade 7 teacher
- Heidi Porten, grade 6 KMS
- Nandini Alagappan, Math Department Head KMS, grade 8 teacher
- Michelle Hamm, grade 5 KMS

- Susan Camiel, Math Teacher, NHS
- Michael Heiden, grade 8 WMS
- Alyce Burnell, Computer Science Curriculum Leader and Math Teacher, NHS
- Andy Hollins, Math Department Head, NHS and Math Teacher, NHS
- Kevin Casey, grade 6 math WMS
- Brittany Marshall, grade 7 KMS
- Jennifer Briffett, Math Coach and Instructional Interventionist, KMS
- Grace Magley, Director of Digital Learning PK_12
- Megan Folan, grade 5 WMS
- Jay Pillai, Math Teacher, NHS
- Anna Nolin, Assistant Superintendent for Teaching, Learning and Innovation

While these staffers participated in the two day workshop, the agenda for which is listed here:

https://docs.google.com/document/d/1_p59LYUTLEqztdprtf4tgz2mDZyUtlJaAoHBZLRVxo/edit

All math department members from all of the schools were included in discussions, pilots, etc. Feedback on the vendor presentations by product and person is listed here:

https://drive.google.com/open?id=1c_tpOhROna85fY9KBeZGREWcL5PIUAsD

The staff designed and used this [Evaluation Rubric](#) to audit the various products and curriculum materials.

OUTCOMES

Middle School

Overview of Middle School Math Pilot 2018-2019

Grade 5 - **(in each middle school)**

- one teacher - Envision
- one teacher - Investigations

Grade 6 - **(in each middle school)**

- one teacher - Envision
- one teacher - Carnegie

Grade 7 - **(in each middle school)**

- one teacher - Envision
- one teacher - Carnegie

Grade 8 - **(in each middle school)**

- one teacher - Envision
- one teacher - Carnegie

Teachers from each grade level across Wilson and Kennedy will be experiencing and piloting two math programs so that they will be able to weigh the pros and cons of each program.

Additionally, teachers at both schools will be able to utilize the free resources offered by Engage NY and Illustrative Math for response to intervention (RTI) and extensions. This will allow teachers to get more familiar with two additional programs.

During the May 31st half day PLC meeting, math teachers met as a district wide PLC to look at the two programs and decide on which two units to pilot. Additionally, teachers were given an opportunity to explore the materials.

Piloting two different programs while also using the current math program (Big Ideas) creates challenges when administering the current common benchmark assessments. The benchmark assessments act as growth assessments and also for math placement in 7th and 8th grade. The Math Department heads will be meeting over the summer to highlight power standards that will be assessed in the common benchmarks the next school year. The Math Department Heads and Math Specialists will also be doing summer work around creating curriculum mapping

templates for each standard Grade 5-8. This includes determining the best way to utilize half days and PLC meeting times and how to best prioritize standards and the timeline for completion.

Other work that will be done over the summer includes gathering of resources for RTI and extension. There are 16 teachers meeting to do this work. This includes teachers from grades 5-8 from both schools, the math specialists, and department heads. Teachers will be meeting on June 14th for 1 hour to discuss expectations and guidelines around summer work. Each group will then be working within their grade level cohort for an additional 8 hours to design pre-and post-tests, lessons, formative assessments etc. around the essential topics that students need intervention around within their grade level.

High School

HS math came to consensus and agreed to pilot Pearson and Cengage (Big Ideas) in the fall. A balance of teachers across grades and courses will pilot each of the products, after training that will occur early in the fall. In PLC course groups and as a department, we will consider the pros and cons of each platform, including features that can support student learning across different grades and course levels.

The high school will also complete curriculum alignment grids — aligned under our essential learning or power standards by grade level/math content area. With the integration of new materials into the high school, additional revisions to the curriculum grids will be needed to ensure appropriate alignment across courses and grades. We will continue to work on embedding SAT preparation into our courses in a systematic manner, so that students are prepared for tests without having classes “teach to the test”.