BEAVERTON SCHOOL DISTRICT

BOARD MEETING DATE
November 16, 2015

WE EXPECT EXCELLENCE WE INNOVATE WE EMBRACE EQUITY WE COLLABORATE

MATHEMATICS CURRICULUM REVIEW AND ADOPTION PROJECT TEAM CHARGE

POLICY ISSUE/SITUATION:

The Beaverton School District reviews and updates its curriculum, instructional practices and classroom materials in the various subject areas according to Board policy and Oregon State Statute and Administrative Regulations. Teachers were asked to teach to the newly state-adopted Common Core State Standards in 2012 in grades 6-12 and in 2013 in grades K-5. The previous K-12 Mathematics review and adoption occurred in 2009 for both elementary and secondary.

BACKGROUND INFORMATION

The proposed curriculum review process will be a two-year process, allowing the District to implement curriculum and materials in September 2016 and September 2017.

The committees charged with this review include the Project Team, an Elementary (K-5) Cadre, and a Secondary (6-12) Cadre. The Project Team consists of teachers representing all content areas, levels, and programs, curriculum specialists, community members/parents, administrators and students, and a school board member. The composition of the committees and the process shall ensure that School Board policy is honored and State requirements are met.

The Project Team shall review existing curriculum and practices in mathematics and make curriculum, professional development, and adoption recommendations to the School Board. The School Board will receive regular updates on this work and will make final decisions regarding recommendations for curriculum, instructional materials, professional development, and instructional practices that come from the Project Team.

The Cadres shall report to the Project Team and are charged with: 1) researching best practices and instructional materials to be considered for possible adoption; 2) articulating long term and supporting learning targets and assessments; and 3) recommending professional development, and structures for ongoing professional learning for staff.

The proposed review and process will support the district goal for 2010-2015:
All students will show continuous progress toward their personal learning goals, developed in collaboration with teachers and parents, and will be prepared for post-secondary education and career success. Additionally, primary focus will be on the School Board's measures of student success:

1. Students completing Oregon University System minimum entrance requirements; (15 specified college-prep courses with C or better);

2. Students earning nine or more college-level credits;
3. Students completing four credits or more of high-school level career and technical education courses with a C or better (includes arts, automotive, health services, hospitality, engineering, and business courses);
4. Students participating in at least one job, internship, apprenticeship, job-shadow, or service learning experience while in high school;
5. Students recording learning goals; students reporting on track to achieve those goals;
6. Families reporting that they feel informed and valued as active partners in their child's education (broken out be school level.

RECOMMENDATION:

(15-603) It is recommended that the Board approve the following resolution:

BE IT RESOLVED that the School Board direct the Superintendent to form the Mathematics Project Team for the 2015-2017 Mathematics curriculum review. The committees will facilitate the program adoption proposal, materials recommendations, and an implementation plan.

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The Quality Curriculum Cycle (QCC) provides a systematic means for making decisions about curriculum review, revision, development, and adoption of practices and instructional materials in Mathematics, Science, World Languages, Social Studies, Fine Arts, English Language Arts, English Language Development, Physical Education and Health.

The Project Team is expected to complete the following:

(1) Description and evaluation of the current program
(2) Review of current research on effective practices and programs
(3) Philosophy/Position Paper articulating a vision and direction for the program
(4) Recommendations for instructional and assessment practices
(5) Recommendations for instructional materials
(6) Recommendations for professional development and implementation support
(6) Budget recommendations for covering the proposed plan

Regular opportunities for input from all staff, parents, students and other community members are provided.

Three groups are central to this work: the School Board, the Project Team, and District Staff (Teaching & Learning Department Staff and Teacher Cadre members).

SCHOOL BOARD

The School Board has the responsibility to prescribe the course of study and instructional materials for the District in accordance with State law. The School Board, by District policy and administrative regulations, charges the Superintendent to form Project Teams to conduct curriculum reviews and prepare recommendations for the Board. The Board receives regular updates on this work as it progresses. The Board makes the final decisions regarding the recommendations for curriculum, instructional materials, and instruction and assessment practices that come from the Project Team.

PROJECT TEAMS

Project Teams are created by the Superintendent at the direction of the School Board for the purpose of providing a thorough review of the current curriculum area program and making recommendations regarding materials to purchase, instruction and assessment practices, and professional development for teachers to the Board. Project Team members agree to serve for a minimum of two years. Parents, students, and other community members join teachers, administrators and a School Board member on the Project Team. The application process is administered by Community Involvement and Teaching & Learning departments. Once the roster is determined, it is presented to the Board for affirmation.

Team members are expected to fulfill multiple roles as they work to serve the School Board and the community by providing recommendations that reflect educational research, a broad range of viewpoints, and current program effectiveness. One of the key challenges of the Project Team is to engage as many individuals among staff and the community in the process as possible. The Project Team typically meets once or twice per month during the school year. It does not meet during the summer.

TEACHER CADRES

Cadre members are recommended teachers selected by Teaching & Learning to provide classroom-based expertise to support the process. Cadre members supply background information, prepare initial drafts of documents, and make revisions of drafts based on Project Team direction. Cadre members also support communication to teachers across the District during the process. Several Cadre members also serve simultaneously on the Project Team to enhance the link between the two groups.

TEACHING & LEARNING SUPPORT

The Administrators for Curriculum, Instruction & Assessment take the lead in coordinating and supporting the Project Team and help facilitate Project Team meetings. Curriculum specialists are assigned to support the Project Team, help facilitate meetings, and coordinate the Teacher Cadre's work in support of the Project Team. The Administrator for Accountability supports the review of current program data, a critical element of the QCC.

Beaverton School District School Board Report
Overview of BSD Math Curriculum Work

Beaverton School District (BSD) Math teachers began work to address several curriculum and policy changes beginning Fall 2011. The Oregon Department of Education (ODE) made two significant changes, one related to curriculum and the other related to the Math requirements for Essential Skills and Graduation. ODE adopted the Common Core State Standards (CCSS) and Mathematical Practices as Oregon's Mathematical Standards and Practices. At nearly the same time, ODE changed minimum math requirements for graduation to include three one-year courses beginning with Algebra 1 and two additional courses beyond Algebra 1. This means students should complete a sequence of math courses that includes all the Algebraic Relations, Functions, Geometry, Statistics, Probability, and Math Modeling standards, and the Mathematical Practices that are outlined in the CCSS.

The BSD School Board adopted several strategic measures. One that had a significant impact on the design and implementation of the Math Curriculum is that all BSD students will graduate College and Career Ready. In Math, that is measured several different ways. The Oregon University System (OUS) defines it as completing an Algebra 2 course or above with a C or better. BSD has two main indicators of College and Career Readiness- ACT scores and Smarter Balanced Assessment Consortium (SBAC) scores.

BSD Math Teachers work on defining curriculum to address the changes.

The new Oregon State Math Standards, or CCSS, shifted curriculum and instruction. The content knowledge didn't change significantly. Some concepts moved from one grade level to another. Mostly from a higher grade to a lower grade, but in some cases the move was from a lower grade level to a higher-grade level. One significant component of the CCSS was that it was written with the assumption Kindergarten was a full-day program.

Even though the content didn't shift significantly, there was a significant shift in the way curriculum should be delivered. There was more emphasis on communication, problem solving, critical thinking, mathematical modeling and sense making.

Two documents are attached to better define the required shifts in instruction. The *CCSS Shifts in Mathematics* document defines six shifts that became a focus of the district work K-12. A second document, the *CCSS Mathematical Practices*, better defines the impact of the shift. It provides more details into the necessary instructional shifts required to prepare our students. Our Educator Effectiveness framework supports these shifts through the descriptors and rubrics defining an effective classroom. Many of our guiding documents are aligned and pointing us in the same direction.

Representative groups at the Elementary and Secondary level have created a curriculum defined by Long-term and Supporting Learning Targets, and Rubrics aligned to the CCSS and Mathematical Practices. The refinement of these targets and rubrics is an ongoing process. This work has given us a clearly defined curriculum that provides structure and guidance to meet the BSD Board's Strategic Measure of having our students' College and Career Ready when they graduate.

Our Data tell a different story.

Several measures indicated significant portions of our students were graduating unprepared for College and Career. The following tables represent several indicators of how we are progressing in meeting our goals.

The table below shows the number of BSD students at each high school that met the OUS College Readiness standard of completing three math classes including Algebra 2 and/or Statistics. The curriculum defined in the courses is determined by the school district, so it doesn't guarantee a student is ready for a 100-level course in college. The numbers are inflated since students who do not graduate are not included. For example, of the 2014 graduates at Sunset High School, 72% completed three math classes including Algebra 2 and/or Statistics with a C or better. The percent of all students meeting this requirement would be significantly lower if the students that did not graduate were included.

School Name	2012-13 Met OUS Math	2013-14 Met OUS Math
Aloha High School	73%	72%
Arts & Communication Magnet Academy	86%	91%
Beaverton High School	74%	67%
Community School	32%	21%
Health & Science School	94%	82%
International School of Beaverton	90%	92%
School of Science & Technology	89%	94%
Southridge High School	80%	73%
Sunset High School	68%	72%
Westview High School	85%	85%

The next table indicates what happens after our students enter the OUS. This isn't a complete picture, since approximately 27% of BSD graduates enroll in Oregon Universities.

Two numbers stand out.
1. Of the BSD 2014 Graduates who enrolled in OUS Universities 29% of them did not take a math class as a freshman.
2. Of the BSD 2014 Graduates who enrolled in OUS Universities ***slightly more than 15% were required to take a remedial (below 100 level) math class*** *that does not provide them with college credit.*

Oregon University System: High School Transition Entering Freshman Profile

Math Highlights for BSD Class of 2012	Count	Percent of the Freshmen in each of the first math class categories	Average GPA for the class
Number of BSD High School Graduates…	**2425**		
… Entering OUS as Freshman	**650**		**3.06**
… Taking a math class as Freshmen	**461**		**2.93**
… Whose first math class is remedial (below 100 level)	**70**	**15.2**	**2.65**
… Whose first math class is College Algebra (Math 111)	**185**	**40.1**	**2.91**
… Whose first math class is Pre-Calculus (Math 112)	**60**	**13.0**	**2.74**
… Whose first math class is Calculus	**87**	**18.9**	**3.01**
… Whose first math class is beyond Calculus	**28**	**6.1**	**3.58**
… Whose first math class is another 100 level or above course	**31**	**6.7**	

Two other measures show similar results, 2015 SBAC scores and 2015 ACT scores. See the table below.

School Name	2014-15 SBAC Math (% College Ready)	2014-15 Students ACT Scores (% College Ready)
Aloha High School	19%	27.4%
Arts & Communication Magnet Academy	43%	44.6%
Beaverton High School	37%	41.7%
Community School	10%	0%
Health & Science School	45%	32.9%
International School of Beaverton	78%	70.7%
School of Science & Technology	83%	86.7%
Southridge High School	58%	47.7%
Sunset High School	59%	60.4%
Westview High School	50%	50.9%

Through the process of writing and aligning targets and developing coursework to prepare students for college and career, it became apparent that we must align our math courses across the district. Now that we have defined our BSD Math curriculum through a K-12 Learning Progression of Long-Term Learning Targets, the data clearly shows that it is possible for many of our students to get three credits in math by taking courses that provide them with a small portion of the knowledge and skills necessary to be ready for a college credit-bearing course. The criteria for success, for some, has become earning three credits, rather than being prepared for post-secondary study.

To meet the BSD School Board charge, work has begun on defining a set of math courses that upon completion will ensure our students have demonstrated a level of proficiency on all the math content, and developed skills and habits defined by the *CCSS Mathematical Practices*. This will provide our students with many college and career options. The defined Learning Progression will live in these courses. Students will be supported in order to successfully complete these courses, rather than allow them to complete a sequence we know doesn't prepare them.

Teachers will be supported in the delivery of the curriculum with materials, professional development and collaboration time. This will allow them to make the shifts in instruction and assessment required by the CCSS and Mathematical Practices, and prepare all BSD students for college and career.

COMMON CORE STATE STANDARDS OREGON

Common Core "Shifts"

Mathematics

The six shifts represent key areas of focus as teachers and administrators work to implement the Common Core State Standards for Mathematics (CCSSM). Oregon teachers are likely at different stages in practicing these shifts, however, establishing a statewide focus in these areas can help schools and districts develop a common understanding of what is needed in mathematics instruction as they move forward with implementation.

Shifts in Mathematics	
Shift 1: Focus	Teachers understand how the CCSSM emphasizes concepts prioritized in the standards so that time and energy spent in the math classroom is focused on critical concepts in a given grade. Students develop a strong foundational knowledge and deep conceptual understanding and are able to transfer mathematical skills and understanding across concepts and grades. (CCSSM, 2010, p.3-5; NMAP, 2008, p. 15-20)
Shift 2: Coherence	Principals and teachers carefully connect the learning within and across grades so that students can build new understanding onto foundations built in previous years. A teacher's strong understanding of learning progressions helps them monitor a student's progress and intervene in a timely basis. A student's understanding of learning progressions can help them recognize if they are on track and can enable them to productively take more responsibility for improving their skills. (NMAP, 2008, p.20-22 ; Mosher, 2011; CCSSM, 2010, p.4)
Shift 3: Procedural Fluency	Students are *efficient* and *accurate* in performing foundational computational procedures without always having to refer to tables and other aids. Teachers help students to study algorithms as "general procedures" so they can gain insights to the structure of mathematics (e.g. organization, patterns, predictability). Students are able to apply a variety of *appropriate* procedures *flexibly* as they solve problems. Helping students master key procedures will help them understand and manipulate more complex concepts in later grades. (NRC, 2001, p. 121; CCSSM, 2010, p.6)
Shift 4: Deep Conceptual Understanding	Deep conceptual understanding of core content at each grade is critical for student success in subsequent years. Students with conceptual understanding know more than isolated facts and methods - they understand why a mathematical idea is important and the contexts in which it is useful. Teachers take time to understand the Standards for Mathematical Practice that describe the student expertise needed to develop a deep conceptual understanding of mathematics. (NRC, 2001, p. 118; CCSSM, 2010, p. 4, 6-8)
Shift 5: Applications (Modeling)	Teachers at all grade levels identify opportunities for students to apply math concepts in "real world" situations. The process of modeling, that includes choosing and using appropriate mathematics and statistics to analyze and understand situations, is key in improving decisions as well as linking classroom mathematics and statistics to everyday life, work, and decision-making. Students are expected to use math and choose the appropriate mathematical models even when they are not prompted to do so. (NRC, 2001, p. 124; CCSSM, 2010, p. 72-73; NMAP, 2008, p.49-50)
Shift 6: Balanced Emphasis	Students need to both practice and understand mathematics. There is more than just a balance between these two priorities in the classroom – both are occurring with intensity. Teachers create opportunities for students to participate in authentic practice and make use of those skills through extended application of math concepts. The amount of time and energy spent practicing and understanding is driven by the specific mathematical concept and therefore, varies throughout a given school year. (NMAP, 2008, p.45-46; NRC, 2001, p.115)

Works referenced:

Common Core State Standards for Mathematics (CCSSM). (2010, June). Retrieved from Common Core State Standards: *http://www.corestandards.org/assets/CCSSI_Math%20Standards.pdf*

Common Core Instructional Shifts. (2011). Retrieved from Engage:NY: http://engageny.org/resource/common-core-shifts/

National Mathematics Advisory Panel (NMAP). (2008). *Foundations for Success: The Final Report of the National Mathematics Advisory Panel*. Washington, DC: U.S. Department of Education. *Available online at: http://www.ed.gov/about/bdscomm/list/mathpanel/report/final-report.pdf*

National Research Council (NRC). (2001). *Adding it up*. (J. Kilpatrick, J. Swafford, & B. Findell, Eds.) Washington, DC: National Academy Press.

Mosher, F. A. (2011, September). *The role of learning progressions in standards-based education reform*. Retrieved from Consortium for Policy Research in Education: http://www.cpre.org/images/stories/cpre_pdfs/lp%20policy%20brief%20web%20ready.pdf

Summary of Standards for Mathematical Practice	Questions to Develop Mathematical Thinking
1. Make sense of problems and persevere in solving them. • Interpret and make meaning of the problem to find a starting point. Analyze what is given in order to explain to themselves the meaning of the problem. • Plan a solution pathway instead of jumping to a solution. • Monitor their progress and change the approach if necessary. • See relationships between various representations. • Relate current situations to concepts or skills previously learned and connect mathematical ideas to one another. • Continually ask themselves, "Does this make sense?" Can understand various approaches to solutions.	How would you describe the problem in your own words? How would you describe what you are trying to find? What do you notice about...? What information is given in the problem? Describe the relationship between the quantities. Describe what you have already tried. What might you change? Talk me through the steps you've used to this point. What steps in the process are you most confident about? What are some other strategies you might try? What are some other problems that are similar to this one? How might you use one of your previous problems to help you begin? How else might you organize...represent... show...?
2. Reason abstractly and quantitatively. • Make sense of quantities and their relationships. • Decontextualize (represent a situation symbolically and manipulate the symbols) and contextualize (make meaning of the symbols in a problem) quantitative relationships. • Understand the meaning of quantities and are flexible in the use of operations and their properties. • Create a logical representation of the problem. • Attends to the meaning of quantities, not just how to compute them.	What do the numbers used in the problem represent? What is the relationship of the quantities? How is _____ related to _____? What is the relationship between _____and _____? What does_____mean to you? (e.g. symbol, quantity, diagram) What properties might we use to find a solution? How did you decide in this task that you needed to use...? Could we have used another operation or property to solve this task? Why or why not?
3. Construct viable arguments and critique the reasoning of others. • Analyze problems and use stated mathematical assumptions, definitions, and established results in constructing arguments. • Justify conclusions with mathematical ideas. • Listen to the arguments of others and ask useful questions to determine if an argument makes sense. • Ask clarifying questions or suggest ideas to improve/revise the argument. • Compare two arguments and determine correct or flawed logic.	What mathematical evidence would support your solution? How can we be sure that...? / How could you prove that...? Will it still work if...? What were you considering when...? How did you decide to try that strategy? How did you test whether your approach worked? How did you decide what the problem was asking you to find? (What was unknown?) Did you try a method that did not work? Why didn't it work? Would it ever work? Why or why not? What is the same and what is different about...? How could you demonstrate a counter-example?
4. Model with mathematics. • Understand this is a way to reason quantitatively and abstractly (able to decontextualize and contextualize). • Apply the mathematics they know to solve everyday problems. • Are able to simplify a complex problem and identify important quantities to look at relationships. • Represent mathematics to describe a situation either with an equation or a diagram and interpret the results of a mathematical situation. • Reflect on whether the results make sense, possibly improving/revising the model. • Ask themselves, "How can I represent this mathematically?"	What number model could you construct to represent the problem? What are some ways to represent the quantities? What is an equation or expression that matches the diagram, number line.., chart..., table..? Where did you see one of the quantities in the task in your equation or expression? How would it help to create a diagram, graph, table...? What are some ways to visually represent...? What formula might apply in this situation?

Summary of Standards for Mathematical Practice	Questions to Develop Mathematical Thinking
5. Use appropriate tools strategically. • Use available tools recognizing the strengths and limitations of each. • Use estimation and other mathematical knowledge to detect possible errors. • Identify relevant external mathematical resources to pose and solve problems. • Use technological tools to deepen their understanding of mathematics.	What mathematical tools could we use to visualize and represent the situation? What information do you have? What do you know that is not stated in the problem? What approach are you considering trying first? What estimate did you make for the solution? In this situation would it be helpful to use...a graph..., number line..., ruler..., diagram..., calculator..., manipulative? Why was it helpful to use...? What can using a _____ show us that _____may not? In what situations might it be more informative or helpful to use...?
6. Attend to precision. • Communicate precisely with others and try to use clear mathematical language when discussing their reasoning. • Understand the meanings of symbols used in mathematics and can label quantities appropriately. • Express numerical answers with a degree of precision appropriate for the problem context. • Calculate efficiently and accurately.	What mathematical terms apply in this situation? How did you know your solution was reasonable? Explain how you might show that your solution answers the problem. What would be a more efficient strategy? How are you showing the meaning of the quantities? What symbols or mathematical notations are important in this problem? What mathematical language...,definitions..., properties can you use to explain...? How could you test your solution to see if it answers the problem?
7. Look for and make use of structure. • Apply general mathematical rules to specific situations. • Look for the overall structure and patterns in mathematics. • See complicated things as single objects or as being composed of several objects.	What observations do you make about...? What do you notice when...? What parts of the problem might you eliminate..., simplify...? What patterns do you find in...? How do you know if something is a pattern? What ideas that we have learned before were useful in solving this problem? What are some other problems that are similar to this one? How does this relate to...? In what ways does this problem connect to other mathematical concepts?
8. Look for and express regularity in repeated reasoning. • See repeated calculations and look for generalizations and shortcuts. • See the overall process of the problem and still attend to the details. • Understand the broader application of patterns and see the structure in similar situations. • Continually evaluate the reasonableness of their intermediate results	Explain how this strategy work in other situations? Is this always true, sometimes true or never true? How would we prove that...? What do you notice about...? What is happening in this situation? What would happen if...? Is there a mathematical rule for...? What predictions or generalizations can this pattern support? What mathematical consistencies do you notice ?