

Practices Worthy of Attention
K–12 Aligned Mathematics Curriculum
Bellevue School District
Bellevue, Washington

Summary of the Practice. Bellevue School District has been working to create a coherent mathematics program through mathematics curriculum alignment and teacher professional development, with the goal of having all students take and pass Precalculus (the course and the exam) before graduating. Bellevue has partnered with higher education institutions and education consultants for advice on how to create such a curriculum.

Need. Although Bellevue is a largely affluent, suburban community with a high number of academically successful students, the district realized that not all students were receiving the same rigorous education. Bellevue identified the need to provide a high-quality education to all students in the district.

Goal. Bellevue’s goal was to create a coherent K–12 aligned mathematics curriculum with support structures for teachers and students to ensure all students would be prepared to attend and graduate from college.

Demographics

Bellevue School District, which serves grades K–12, has seen enrollment increase by about 600 students since 2002–2003 (see Table 1).

Table 1. Bellevue School District Enrollment Data

Academic Year	Enrollment
2002–2003	15,656
2003–2004	15,663
2004–2005	15,848
2005–2006	16,258

Table 2 shows the percentage of students enrolled since 2002–2003 by race/ethnicity, limited English proficiency, and economic disadvantage. The majority of students in Bellevue are white (declining from 68.4% to 57.7% over the four-year period documented here), followed by Asian American (23.6% and growing), Hispanic (8%), and then black (2.6%) students. About 9% of Bellevue students are classified as having limited English proficiency, and about 20% of students are classified as economically disadvantaged, a statistic that continues to increase.

Table 2. Bellevue School District Enrollment Rates

Demographics	Academic Year	Percentage of Enrollment
All Students	2002–2003	100
	2003–2004	100
	2004–2005	100
	2005–2006	100
Asian American	2002–2003	20.7
	2003–2004	23.0
	2004–2005	22.8
	2005–2006	23.6
Black	2002–2003	2.7
	2003–2004	2.6
	2004–2005	2.6
	2005–2006	2.6
Hispanic	2002–2003	7.8
	2003–2004	8.5
	2004–2005	8.2
	2005–2006	8.0
White	2002–2003	68.4
	2003–2004	65.6
	2004–2005	58.9
	2005–2006	57.7
Limited English Proficient	2002–2003	8.8
	2003–2004	7.6
	2004–2005	8.8
	2005–2006	8.8
Economically Disadvantaged	2002–2003	17.6
	2003–2004	18.0
	2004–2005	18.6
	2005–2006	20.5

Table 3 shows the percentage of on-time graduates (for all students only) and four-year cohort dropouts. Although Washington provides very little information on high school graduation and dropout rates, the dropout rates provided for 2004–2005 are higher for black and Hispanic students (29% and 24%, respectively) than for all students.

Table 3. Bellevue School District Graduation and Dropout Rates

Demographics	Academic Year	Percentage Graduating	Percentage Dropping Out
All Students	2002–2003	84	10
	2003–2004	86	9
	2004–2005	83	10
Asian American	2004–2005	*	6
Black	2004–2005	*	29
Hispanic	2004–2005	*	24
White	2004–2005	*	9

Note: The asterisk (*) notes that data were not available.

Description of the Practice

Bellevue School District began a transformation of their practices when a new superintendent came to the district in 1996. He spent his first year observing and learning about the decentralized, site-based district, seeing what was working and what curricula were being used. He found no standard curricula in place. Each school used its own choice of books and supplementary materials. He believed that the district needed standardization, with clear goals and measurable steps. The superintendent’s plan for mathematics teaching in the district focused on an aligned curriculum and improved teacher performance, and a key support for the plan was continual professional development for teachers.

Curriculum

Although Bellevue is a largely affluent, suburban community with a high number of academically successful students, the superintendent realized that not all students were receiving the same education—what he calls education for “America’s elite class.” In response, the superintendent led the district in designing a new curriculum program with the goal of giving every student in Bellevue a first-rate, college-preparatory education—one that would prepare students not just to be admitted to college, but also to graduate from college. In Bellevue, the operational definition of an elite education is the trajectory that leads to college readiness no later than the end of twelfth grade.

The first step in developing the new program was to choose a common high school curriculum. In spring 1997, high school mathematics teachers piloted five mathematics programs approved by the National Science Foundation in their sixth-period classes. The programs they piloted were the Interactive Mathematics Program (IMP), SIMMS Integrated Mathematics, Math Connections, Mathematics: Modeling Our World, and Contemporary Mathematics in Context (Core-Plus).

The teachers met to discuss what they liked and disliked about each program. They all agreed that they wanted to focus more on problem solving and contextual problems, so they decided to use Core-Plus, knowing they could supplement the program with procedural mathematics

tasks that it lacked. At this point, some high school teachers left the district because they felt the new centralized curriculum approach was a mistake; some did not agree with the curriculum choice, while others did not like having to conform to a standardized program at all. However, many of the middle schools were already using a standardized program—Connected Mathematics—and the teachers who stayed felt that students familiar with that curriculum could easily transition to Core-Plus for high school mathematics.

With the standardized mathematics program, Bellevue has essentially taken curriculum development out of teachers' hands, allowing teachers to focus on teaching rather than spending all their time developing materials. Since curriculum and assessment materials are adopted or developed centrally by district mathematics leaders, teachers have common resources for every unit of every course.

Bellevue did not stop at choosing a standardized curriculum. The district has partnered with college and university faculty to develop an aligned set of K–16 learning standards. These partnerships with higher education faculty are helping the district discover the gaps in their own curriculum frameworks and refine their curriculum so that it is coherent and articulated across the K–12 continuum. The partnerships also help Bellevue align with the local higher education institutions that serve the majority of graduating Bellevue students. Additionally, Bellevue partners with outside education consultants. For instance, Bellevue was the first district to have its curriculum audited by David Conley's Standards for Success, a nationwide study to determine what college faculty expect entering freshman to know to be successful in college courses.

Bellevue is also in the process of moving all students into honors-level mathematics courses starting in middle school. The district has been slowly advancing more and more middle school students into honors mathematics since 1996. Within the last few years, only 25% of students, mostly racial or ethnic minorities, were enrolled in non-honors mathematics courses. These students likely would have been tracked into non-honors mathematics courses in high school, never having the chance to catch up academically. With the majority of middle school students now in honors mathematics courses, Bellevue's mathematics curriculum coordinator has begun to remove most non-honors mathematics courses from the middle school curriculum and find ways to get all students better prepared for the higher-level mathematics they will encounter in high school and college.

The dismantling of non-honors mathematics courses in middle school began in 2003–2004. The district stopped their practice of tracking students beginning in grade 6 and instead began finding ways to provide extra support to those who needed it. Now, students needing extra help are offered a second period of mathematics. This second period is not always taught by the same teacher who taught the students' regular mathematics course. In these additional mathematics courses, teachers

- pre-teach the material to students,
- reteach material most challenging to students,
- provide skill-building mathematics experiences,

- help students with their homework, and
- help strengthen students' study skills (such as ensuring homework is done and helping students understand test schedules and prepare for tests).

In the new, increasingly “untracked” system, the percentage of failing grades in middle school mathematics has actually decreased, affirming the district’s hope that all students appropriately supported in mathematics could be successful. Bellevue believes that its students now feel academically challenged to perform well, with teachers and students modeling for one another what good mathematics teaching and learning looks like.

A continuing issue in Bellevue, however, is that even though K–8 students are now untracked, students can choose less rigorous math classes in high school. District and school staff report anecdotally that some students still choose less rigorous mathematics courses in high school because they want to stay with their peers who are not as academically successful, or because they do not feel they can be successful in high school math, even with high grades in middle school mathematics.

The 2006–2007 academic year will see the first class of untracked students enter ninth grade, and to ensure that untracking all students proves a successful practice, Bellevue has asked leading mathematics education researcher William Schmidt to conduct a study on how this cohort of students differs from those in the past. To ensure that these students continue to receive support in high school, Bellevue is piloting a second math period in some of its high schools, much like the additional math period they offer in middle school.

Currently, 55% of Bellevue students are taking Advanced Placement (AP) Calculus or International Baccalaureate (IB) mathematics before graduating from high school. Bellevue has decided to set a goal of having all students take and pass Precalculus before graduating high school. To prepare students for this level of mathematics, their mathematics coordinators back-map content with required district curriculum to delineate a coherent progression of mathematics knowledge and skills all the way down to kindergarten. Bellevue now offers pre-AP institutes for teachers so that teachers in all grades (including elementary and middle school teachers) can see what is expected of students at the higher grade levels. In addition, the University of Washington and Bellevue Community College assist with developing an articulated K–12 curriculum that aligns with post-secondary courses.

Teacher Performance

Transforming Bellevue so it could provide an “elite” education for all required an effort to change the attitudes of those who felt that offering everyone upper-level mathematics was simply unrealistic. The superintendent thought it was important for teachers to have a voice in decisions regarding curriculum changes, but he was careful to focus the discussions on objective measures (e.g., looking at test data and seeing student improvement) rather than on personal feelings.

With the change in curriculum came a change in expectations for teachers. When the district assigned a full-time mathematics leader to develop the curriculum, the initial response from

many teachers was a defensive one, and some called the mathematics leader the “curriculum cop.” Part of the superintendent’s goal was to “get rid of walls of classrooms” and build a culture of openness and sharing among teachers and curriculum coaches. As the mathematics curriculum coaches observed classrooms, learned what teachers were doing successfully, shared the successful practices with all mathematics teachers, and helped teachers with their concerns and challenges, the district’s classroom culture began to open up. Teachers realized they could learn more by sharing, especially when working together toward the same goals.

In fact, administering assessments, scoring students’ work, and posting results on Bellevue’s intranet are required activities. Bellevue continues to develop common assessments for every unit at every grade level, a practice that allows teachers to share and analyze the resulting data since they are all administering the same assessments. With assessment results accessible to the entire professional community in Bellevue, the hope is that teachers will seek out and share best practices with each other in the ongoing effort to improve work with students.

Some teachers were initially reluctant to have such information made public, fearing it would be used to evaluate them instead of to evaluate the success of curriculum implementation and classroom practices. Bellevue administrators realized that such data could be misused to evaluate teachers, so they have tried to reassure teachers with the district policy that teachers will not be evaluated based on their students’ assessment results. Teachers are much more comfortable now sharing a districtwide curriculum and a focus on building successful practices.

Not only are the classrooms more open, but the operations and results of teacher practice are available to greater numbers of people, including parents. For instance, in 2005–2006, the district required all teachers to have a classroom website that included the course syllabus and/or grade-level goals and expectations. The website also included online access to grades, which were made available to students, parents, counselors, and administrators.

Apart from providing ongoing support for daily classroom issues, frequent classroom observations by administrators, and lots of peer observation and coaching, the district also provides a variety of professional development opportunities for teachers, such as:

- Curriculum workshops at the campus and district level to discuss alignment updates and encourage teachers to communicate across grade levels, as well as more deeply examine different aspects of the curriculum.
- Lesson studies that focus on thoroughly reviewing and understanding a specific lesson and ways it can be modified and improved.
- Small-group and individual assistance from technology or curriculum coaches and other district personnel.
- Professional learning communities like the Summer Leadership Institute, described below.

The professional culture in Bellevue School District encourages teachers to grow and learn, but it is always the teacher's choice about which, if any, professional development activities he or she will engage in. According to district staff, most teachers choose to regularly participate in the district's professional development opportunities, all of which are continually focused on the district's main objective—improving student learning.

Administrators and teacher leaders kick off the academic year with the Summer Leadership Institute, a five-day institute for all Bellevue staff to reflect on the previous year and refine their planning for the next year. In the 2006 summer institute, the opening question from the superintendent was “How can we be smarter as a district?” He realizes that trying harder, working more hours, and being passionate is not enough. In setting a target, he emphasizes the need to look for evidence of change and growth and stresses that data is the key to understanding where they are. Staff are provided opportunities to respond to goals and objectives and general questions the superintendent poses. During the last two hours of every day of the institute, teachers and teacher leaders meet in small groups to review their student data and their previous years' goals and discuss their next steps, refining what they need to do in different areas to improve student learning.

Results

Department of Education researcher Clifford Adelman writes that “The single biggest predictor of college success is the quality of a student's high school curriculum” (2006). In fact, he indicates that college graduation rates can be predicted by the number of AP courses students take in high school. Students not taking AP courses have a 33% college graduation rate, while those taking one AP course have a 59% graduation rate, and those taking two AP courses have a 76% graduation rate. Nationally, the percentage of high school students completing a college-preparatory curriculum varies by ethnicity, with 46% of Asian American students, 39% of white students, 25% of black students, and 22% of Hispanic students completing college-preparatory curricula.

Bellevue decided to encourage setting rigorous academic goals, including four years of high school mathematics. In 2006, 74% of the graduating class had taken four years of math, compared to 68% in 2005 and 66% in 2004. In addition, 85% of the 2006 graduating class had taken Precalculus or higher, compared to 80% in 2005 and 74% in 2004. Over half of students are currently completing AP/IB mathematics courses: 55% in 2006, 50% in 2005, and 52% in 2004. In general, more students are completing higher levels of mathematics each year.

Students, including those considered to be at-risk, have been successful at meeting the academic challenges. The dropout rate plummeted from 18% to 8% at the same time enrollment of economically disadvantaged students in AP and IB classes climbed to 60%. In addition, the percentage of African American students, Hispanic students, and students with limited English proficiency enrolled in AP and IB classes rose to 67%, 57%, and 60%, respectively.

Bellevue School District is among the best in the nation in terms of participating in advanced courses (College Board, 2006; Mathews, 2005). Mathews developed the Challenge Index to show how well school systems were doing in opening the doors to AP courses for greater

numbers of students. The index is not a scientific rating scale. It merely compares the number of AP and IB tests taken to the number of graduates in a high school to determine an average number of AP/IB tests per graduate. Mathews argues that the ratio should be at least one-to-one, that is, at least one test for every graduate. Bellevue agrees with Mathews and is seeing dramatic progress in their efforts to encourage all populations to take advanced courses. In fact, one-third of Bellevue's middle school students earn high school credit through taking high school-level courses in middle school, while more than a quarter of tenth-graders pass at least one AP exam, which can result in college credit, depending on the rules governing AP scores at the college/university they attend.

Currently, all middle school students in Bellevue are on track to complete Precalculus before graduating high school, with the majority of students prepared to complete AP Calculus. In addition, from 1996 to 2005, AP/IB test-taking rates in Bellevue increased dramatically, from 174 to 3,678. And while the national AP/IB average pass rate is 60%, Bellevue's pass rate in 2005–2006 was 65%. In May of 2006, *Newsweek* included all five of Bellevue's high schools in their list of the 1,000 top-ranked U.S. high schools, with the schools ranking 37, 44, 49, 57, and 186 (Kantrowitz & Wingert, 2006).

On the state-mandated exam, the Washington Assessment of Student Learning (WASL), the biggest gains for Bellevue have been in mathematics. In 1997–1998, 36% of students passed the mathematics portion of the WASL in seventh grade, compared to almost 70% in 2005–2006. Tenth-grade students showed a similar improvement—59% of tenth-grade students in 1998–1999 passed the mathematics portion of the WASL, compared to almost 70% in 2005–2006. It appears that the pass rates in 2004–2005 were higher than the general trend of data across years (see Table 4). The data also reveal that a much higher percentage of Asian American and white students are passing the mathematics exam than black and Hispanic students.

Table 4 also lists recent mathematics WASL results for economically disadvantaged students and students with limited English proficiency in grades 7 and 10. Performance of students with limited English proficiency is considerably behind all students in grade 7; scores of students with limited English proficiency are about 40 percentage points lower than those of all students. This is undoubtedly because students with limited English proficiency are struggling with language acquisition, and the WASL is a language-laden test. Economically disadvantaged students are performing better than students with limited English proficiency in both grades, but their scores have only slightly improved and they trail all students by about 30 percentage points.

Table 4. Bellevue School District Mathematics WASL Results

Demographics	Academic Year	Percentage Met/Exceeded Standard	
		Grade 7	Grade 10
All Students	2002–2003	55.4	64.9
	2003–2004	65.8	65.7
	2004–2005	72.8	72.1
	2005–2006	69.6	69.4
Asian American	2002–2003	68.2	74.5
	2003–2004	73.3	81.3
	2004–2005	82.4	83.5
	2005–2006	79.3	82.7
Black	2002–2003	22.2	27.8
	2003–2004	14.3	22.6
	2004–2005	40.0	32.3
	2005–2006	18.8	24.5
Hispanic	2002–2003	20.4	24.7
	2003–2004	26.2	20.3
	2004–2005	31.2	20.0
	2005–2006	23.1	29.4
White	2002–2003	57.1	67.7
	2003–2004	69.6	68.7
	2004–2005	76.3	76.9
	2005–2006	74.1	71.9
Limited English Proficient	2002–2003	11.3	36.6
	2003–2004	17.4	35.9
	2004–2005	23.1	31.8
	2005–2006	28.3	28.7
Economically Disadvantaged	2002–2003	5.4	*
	2003–2004	29.8	39.9
	2004–2005	38.9	42.4
	2005–2006	38.4	42.1

Note: The asterisk (*) notes that data were not compiled for this year.

In general, Bellevue teachers try to target specific groups of students (e.g., students underrepresented in colleges, first-generation college attendees, students enrolled in special education study skills classes) with the goal of increasing their enrollment in rigorous courses and teaching them the organizational, study, and self-advocacy skills needed to facilitate academic success in rigorous coursework. Data on the success of these specific practices was not available when this report was written.

Conclusions

Bellevue's continued focus on improving mathematics curriculum alignment and teacher professional development is impressive in the way it continues to build on the original goal—providing a high-quality education for all students. Bellevue's practices indicate that educators can set high standards and goals for all students, as long as they understand and do what needs to be done to help teachers and students achieve these goals. Having a consistent vision with measurable steps, along with partners to advise and collaborate, has helped Bellevue shape itself into a district that models a high-functioning, coherent, and successful educational system.

References

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About *Practices Worthy of Attention: Local Innovations in Strengthening Secondary Mathematics*

Practices Worthy of Attention is a joint initiative of Achieve, Inc. (www.achieve.org), and the Charles A. Dana Center at The University of Texas at Austin (www.utdanacenter.org). The initiative is led by Pamela L. Paek, a research associate at the Dana Center, who, in 2006, examined 22 program, school, and district practices that showed promise—based on early evidence and observation—of strengthening secondary mathematics teaching and learning.

Our goal was to document practitioners' descriptions of *what is really happening* in the field to strengthen secondary mathematics education around the country. Thus, while the practice highlighted may be common, the specific structures and strategies used to implement the practice are worthy of attention. These initial investigations set out to mark these practices for future rigorous scientific inquiry by Dana Center and other researchers.

Ultimately, we hope to create a community of inquiry made up of university researchers working with administrators and teachers from featured schools and districts to more rigorously research how effectively these practices improve secondary mathematics learning for all students.

Reports and practice profiles. An executive summary details the methods for this initiative and analyzes themes. Two cross-case analyses discuss specific strategies for raising student achievement and building teacher capacity. Brief profiles describe each practice. All of these publications are available on our website at www.utdanacenter.org.

Data. In all cases, data about the practice were provided by the program, school, or district studied as part of a description of their practice. We did not independently analyze data gathered through a consistent assessment tool, and we did not evaluate their uses of data for measuring effectiveness. Thus, the data in the practice profiles are intended not to prove the practice's effectiveness from a research perspective, but to paint a detailed picture of the practice and what data were used by the program, school, or district to gauge how well it was working.

Theoretical frameworks. In some cases, district staff mentioned specific literature on theory or practice that they used when they developed the practice we highlight. In those cases, we cite that literature in our discussion of the practice.

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