

Practices Worthy of Attention
Mathematics Teacher Leaders
Portland Public Schools
Portland, Oregon

Summary of the Practice. Portland Public Schools established and supports a Secondary Math Leaders group that includes math teachers from all middle and high schools in the district. Focused on increasing student achievement and closing achievement gaps, the group is organized into four subgroups that function as professional learning communities, each working on a different area of need but with a shared vision of teaching and learning.

Need. Portland Public Schools knew that mathematics leadership and expertise varied across schools and that students were receiving mathematics education of varying quality, depending on what school they attended.

Goals. Portland’s goal is to increase teacher capacity at each school to provide better and more consistent mathematics teaching so that students have equal opportunities for mathematics achievement, regardless of which school or classroom they are assigned to.

Demographics

Portland Public Schools serves grades K–12. Enrollment has decreased by about 4,500 students in the last few years, from more than 51,500 students in 2001–2002 to just over 47,000 students in 2004–2005 (see Table 1). The dropout rate decreased over those same years. Demographic data for Portland Public Schools were available only for 2005–2006, during which the majority of students were white (56.9%) followed by black (16%), Hispanic (13.4%), Asian American (10.8%), and Native American (2.1%). Almost half (46%) of students are classified as economically disadvantaged.

Table 1. Portland Public Schools Enrollment and Dropout Data

Academic Year	Enrollment	Percentage Dropping Out
2001–2002	51,654	10.1
2002–2003	48,344	9.8
2003–2004	46,674	9.3
2004–2005	47,089	7.0

Description of the Practice

Portland Public Schools received a National Science Foundation Urban Systemic Program grant in 2001. The goals of the grant were to raise achievement for all students in mathematics and science and close achievement gaps. The district employed three primary strategies to

attain the goals: (1) develop teacher leaders in each school who would establish professional learning communities in mathematics and science focused on improving student learning; (2) provide direct support to identified students; and (3) more effectively connect with families and the community. Teacher leaders from each school were trained by the Teachers Development Group to use protocols in building collective norms and values, examining data, and analyzing artifacts of practice, and then they were asked to replicate the activities at their school site with the mathematics and/or science teams.

Before the 2001 grant that provided training for a new group of teacher leaders, another group made up of two committees—a middle school mathematics committee and a high school mathematics committee—had been operating for a number of years on district business pertaining to mathematics education. Unfortunately, the new teacher leaders and the previously existing group rarely worked together and had separate agendas. This sometimes led to competing issues at school-level department meetings. Thus, the district decided to bring the competing mathematics leadership groups together. The collective group, called Secondary Math Leaders, began working together in 2005–2006.

In this merged configuration, the district mathematics specialists, who are mathematics teachers on special assignment, decided that teachers who wanted to be part of the group as teacher leaders should be allowed to be. In the past, mathematics department heads and district mathematics specialists were the only ones involved in the district committee meetings. The district mathematics specialists realized it was important to change their own roles if a new, changed view of leadership was to come to fruition. In this collective Secondary Math Leaders group, district mathematics specialists decided to shift from a train-the-trainers model to a co-inquiry model.

In the old trainer-of-trainers model, specialists would train teacher leaders in methods the specialists had chosen, and teacher leaders went back to their schools not necessarily buying in to the training or intending to implement it. The new co-inquiry model focused on collectively identifying problems of practice and generating with teacher leaders promising solutions to the many challenges of teaching and learning mathematics. The district math specialists hoped that the teacher leaders would feel a greater degree of control over what they were asked to implement, becoming empowered to impact decision making within their schools as well as at the district level, to improve teaching and student learning, and to close achievement gaps. Given that all teachers were invited to participate, not just department heads, the new mathematics team has promise to build a larger teacher capacity base.

The Secondary Math Leaders group members developed subgroups to focus on different ways of approaching mathematics education improvement, and in the smaller groups, they could work with more focus on their specific concerns and issues. During 2005–2006, these subgroups worked on issues such as determining the content for a new third year of high school mathematics graduation requirement, developing and piloting districtwide common formative assessments in grades 6–8, and supporting the transition of students from eighth grade to high school mathematics.

At the beginning of 2006–2007, the Secondary Math Leaders reallocated themselves into different subgroups based on the pressing issues for that year. Two subgroups had the same

focus as they had the previous year: determining the content for a new third year of high school mathematics graduation requirement, and supporting the transition of students from eighth grade to high school math. Two new subgroups were to focus on implementing the College Preparatory Mathematics program and using technology in mathematics classrooms.

The subgroups have goals and specific tasks to accomplish, determined jointly by the group members. Each subgroup meets separately on a monthly basis for two hours after school. Four times during the year, the whole Secondary Math Leaders group meets for two hours after school to share their work and consider implications for mathematics learning and teaching. Each middle and high school has at least one mathematics teacher involved in one of these four subgroups, although not all 6–12 mathematics teachers are involved. Some schools have up to four participants in a subgroup. Districtwide, 36% of Portland’s 6–12 mathematics teachers are involved in a mathematics leadership subgroup. The district mathematics specialists believe that developing local leaders at each site as agents of change is the most effective way to sustain a common set of mathematics goals across the district.

The district mathematics specialists are co-facilitators of the mathematics leadership groups, working to increase mathematics leadership capacity within Portland so teachers have a voice in how mathematics teaching and learning is improved within and across the district. The role of the district mathematics specialists is key to the mathematics leadership groups. As co-facilitators, the mathematics specialists support the development of a culture in which teacher leaders can share and explore new ideas. Each of the four leadership subgroups is thus developing a professional learning community that meets monthly. The subgroups generate guidelines for interaction so that they can successfully support individual voices and develop a clear set of steps to meet their goals. Meeting agendas and co-facilitators for the next meeting are often set by the group at the end of the current meeting. The mathematics specialists help teacher leaders who have volunteered to facilitate plan the specifics of the agenda for the monthly meetings, so teachers feel supported in their new role as teacher leaders. Mathematics specialists also model for teacher leaders collegial discussions about mathematics pedagogy, helping focus the conversations about mathematics instruction and learning in the monthly meetings. Mathematics specialists basically provide support, coaching, resources, and tools for teacher leaders’ professional development through the monthly professional learning communities of the four teacher leadership meetings.

The subgroup focusing on students’ transition from eighth grade to high school mathematics consists of 15 teachers across the K–12 grade span. This is the first subgroup examining mathematics across all grades. Specifically, this subgroup is looking at curriculum alignment across the grades to learn about the knowledge and skills students need to be best prepared for Algebra I. The group worked first to develop an understanding of the goals of the Algebra I course, and then they aligned algebraic concepts in early grades to the Algebra I course. They are tracing the trajectory of specific mathematical ideas through the three main curriculum programs used in the district to understand the specific models and vocabulary employed by each set of materials. The group has already worked on how to help students access prior knowledge using a common vocabulary at various grade levels and developed common assessments to be used across the district.

The College Preparatory Mathematics (CPM) subgroup consists of both middle school and high school mathematics teachers, whose focus is on supporting teachers in the first year of implementing the CPM curriculum. In 2004–2005, a team of teacher leaders, two from each high school along with 10 middle school leaders, investigated and piloted several programs before recommending CPM for adoption. In the spring and summer of 2006, teachers were trained by CPM consultants to use the new curriculum. The district began using the curriculum in all middle and high schools in 2006–2007. The teacher leaders in the current CPM subgroup are largely the same people who investigated and recommended CPM for the district.

In the CPM subgroup, the role of high school teacher leaders is different than the role of middle school teacher leaders. If there is more than one leader in a high school, each leader focuses on a specific course (Algebra, Geometry, or Advanced Algebra). High school CPM teacher leaders work collaboratively with teacher leaders from other schools at the district meetings to find ways to implement the new program with fidelity. They take the work they do at the district level back to their schools and facilitate implementation. The CPM leaders devised a weekly planning meeting to plan lessons with teachers, address pacing issues, implement and revise common assessments generated by the CPM leaders, and analyze student work. Having a common curriculum allows teachers to talk about their challenges and successes with CPM, unifying teachers' thinking about mathematics teaching and learning. Middle school CPM teacher leaders serve a different purpose. They are frequently the only algebra teacher in their school, or one of two. Their role has become one of a districtwide support team, where the work consists of collaboratively planning and facilitating districtwide meetings for all middle school algebra teachers who would otherwise have little support or be unable to collaborate at their schools.

The third-year mathematics subgroup focuses on the district's requirement that students take three years of mathematics for high school graduation. This subgroup deals with issues of equity and access and thinks about the supports and resources students need to successfully master three years of high-quality mathematics in high school. The subgroup has spent time analyzing district-level data and learning about the research on secondary mathematics courses.

The technology subgroup focuses on the ways technology can be used to enhance learning in mathematics classrooms. For instance, TI-84 calculators are key technological tools regularly used throughout the district. This subgroup helps teachers learn to use these as part of their lessons and devises ways teachers can help students better understand different mathematical ideas using the calculators. The technology subgroup's work includes ways to integrate the use of calculators into the curriculum, connecting use of technology to specific lessons and concepts.

Results

Table 2 shows the percentage of students passing the mathematics section of the Oregon state assessment in grades 6, 7, 8, and 10. In general, mathematics scores vary across the years, with only eighth grade showing steady growth. Students have the highest performance in sixth

grade, while the percentage passing in subsequent years continues to decrease, with fewer than half of all students passing in tenth grade.

Table 2. Percentage of Portland Public Schools Students Meeting Benchmarks on the Oregon State Assessment Mathematics Exam, by Grade Level

Academic Year	Percentage Meeting Benchmarks			
	Grade 6	Grade 7	Grade 8	Grade 10
2001–2002	77	69	59	44
2002–2003	78	72	65	45
2003–2004	80	70	66	48
2004–2005	76	74	67	49
2005–2006	79	75	70	47

Source: Portland Public Schools Research and Evaluation Department.

Table 3 lists the results for Portland on the mathematics portion of the state assessment in grades 8 and 10 for 2004–2005 and 2005–2006. Asian American and white students were the highest performers in both eighth and tenth grades, while black and Hispanic students were the lowest-performing racial/ethnic subgroups.

Table 3. Percentage of Portland Public Schools Eighth-Grade and Tenth-Grade Students Meeting Benchmarks on the Oregon State Assessment Mathematics Exam, by Subgroup

Demographics	Academic Year	Percentage Meeting Benchmarks	
		Grade 8	Grade 10
All Students	2004–2005	66.5	49.3
	2005–2006	69.6	47.1
Asian American	2004–2005	78.9	54.3
	2005–2006	81.0	59.5
Black	2004–2005	40.3	17.8
	2005–2006	44.1	17.7
Hispanic	2004–2005	46.0	22.1
	2005–2006	50.1	25.6
White	2004–2005	75.9	61.0
	2005–2006	79.0	56.3
Native American	2004–2005	52.7	34.4
	2005–2006	65.2	21.0
Limited English Proficient	2004–2005	37.7	17.1
	2005–2006	42.4	15.8
Economically Disadvantaged	2004–2005	49.9	29.2
	2005–2006	54.4	28.5

Source: Oregon Department of Education.

Table 4 shows the performance by race/ethnicity of students on the eighth-grade Oregon state mathematics exam. (Disaggregated analyses for other grades were not available.) For all subgroups, a higher percentage of students passed the mathematics exam in 2005–2006 than in 2000–2001. The largest gains were for Asian American students, with 81% passing in 2005–2006 compared to 62% in 2000–2001. Although black and Hispanic students were also improving, the gap was not closing. For instance, a higher percentage of Asian American and white students were passing the eighth-grade mathematics OSA in 2000–2001 than black and Hispanic students. Although all subgroups have improved, in 2005–2006, there was still a significantly larger percentage of Asian American and white students passing (about 80%) compared to black students and Hispanic students (44% and 50%, respectively).

Table 4. Percentage of Portland Public Schools Eighth-Grade Students Meeting Benchmarks on the Oregon State Assessment Mathematics Exam, by Ethnicity

Academic Year	Asian American	Black	Hispanic	White
2000–2001	62	30	37	67
2001–2002	68	25	38	69
2002–2003	68	35	39	72
2003–2004	74	40	40	74
2004–2005	79	40	46	76
2005–2006	81	44	50	79

Source: Oregon Department of Education

Table 5 shows that enrollment in higher-level mathematics courses (Advanced Algebra and higher) has steadily increased for racial/ethnic minorities since the mathematics leadership groups began. There were significantly more eleventh-grade black students in higher-level mathematics courses in 2005–2006 (41%) than in 2001–2001 (18%). There was a similar increase in Hispanic eleventh-graders enrolled in higher-level mathematics in 2005–2006 (37%) compared to 2000–2001 (10%). For Hispanic twelfth-graders, enrollment in higher-level mathematics was also higher in 2005–2006—30%, up from 13% in 2000–2001.

Table 5. Percentage of Portland Public Schools Students Enrolled in Higher-Level Mathematics Courses, by Ethnicity

Academic Year	Black		Hispanic	
	Grade 11	Grade 12	Grade 11	Grade 12
2000–2001	18	22	10	13
2001–2002	20	25	13	15
2002–2003	28	30	17	26
2003–2004	27	22	17	21
2004–2005	35	35	28	28
2005–2006	41	34	37	30

As of the beginning of 2006–2007, district administrators began looking to secondary mathematics leadership subgroups as a model for how to support teachers in terms of curriculum and instruction. Since the other subject areas used the trainer-of-trainers model unsuccessfully as well, other district content specialists are now trying to learn how to develop leadership groups that have as much buy-in, energy, and excitement as the mathematics leadership subgroups have.

Mathematics teacher leaders are invested in participating in their monthly meetings, enjoying the time spent with other teachers across the district and no longer working in isolation. The teacher leader attrition rate appears to be low. Along with the low turnover of teachers in Portland, having a steady group of teacher leaders provides consistent leadership at each school site.

Five teachers were asked by the district math specialists to share information about their perspectives on the mathematics leadership subgroups. One of the teachers indicated that the teachers involved in these groups are highly dedicated, working evenings and weekends to ensure better teaching for their students. The groups change shape as the responsibilities and needs of teachers change. Since teacher leaders know what is most pressing at their school sites, they control the focus of the planned next steps. All five teachers indicated that the bottom-up approach, where teachers lead the agenda of activities, is most important for the buy-in and success of these groups. Teachers want to feel they have the power to make a difference, and leading these groups is a way for them to be directly involved in district improvement in student mathematics learning.

Conclusions

Portland has found a unique solution for providing mathematics expertise and leadership to each school site. The mathematics leadership subgroups serve as professional learning communities for the teacher leaders involved. The groups have provided focused attention to the immediate mathematics needs of the districts and have heavy buy-in from the teacher leaders, since they serve as a voice for the schools they represent. As with any successful professional learning community, finding a common vision and set of goals is key, and by focusing teachers on different aspects of curriculum, teaching, and technology, Portland has found a way to attend to and measure the district goal of closing the achievement gap in mathematics.

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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