

2012 FOCUS ISSUE:
Differentiation

TEACHER-INITIATED Differentiation

Two classrooms become models
for their large, urban district.

By Jacque Ensign

Elementary school teachers in Seattle, Washington, are encouraged to adapt differentiated instructional practices in math to accommodate the particular students in their own classrooms. Seattle Public Schools is a large, urban district serving 47,000 students who speak over a hundred languages. More than a third receive free or reduced lunch. The Everyday Mathematics curriculum developed by the University of Chicago School Mathematics Project has been the core math program for the district's elementary schools since 2007. During the 2008–2011 school years, the district funded a sizable cadre of school-based math coaches who coordinated with district-based math coaches. Differentiated instructional practices began to spread throughout classrooms in the district, not because the district imposed a predetermined instructional practice but because coaches facilitated teachers in learning from one another's differentiated practices.

Being in classrooms daily, math coaches noticed some effective settings in which students of all achievement levels—including those who traditionally had not been successful—were making great strides in mastering math. The teachers in these classrooms had developed their own strategies for differentiat-

ing math instruction so that every student was supported in progressing from his or her present level of understanding to a much higher level. Because coaches from across the district met regularly to share and learn from one another, news of these teachers spread throughout the coaching cadre and then to teachers in schools that had math coaches.

This article focuses on two classrooms that spurred much of the differentiation throughout the district and how the district supported teachers' efforts.

Strategies at Leschi

Although teachers throughout the district pioneered many exemplary approaches to differentiation, one school became an incubator for some of the most replicated practices. Leschi Elementary School is a Title 1 school that serves 360 K–grade 5 students, 85 percent of whom are students of color, 70 percent of whom receive free or reduced lunch, and 20 percent of whom are English language learners. The school has a 16 percent annual mobility rate, with students entering and leaving the school throughout the year. With encouragement from a new principal, a school-based math coach, and a highly collegial teaching staff, the Leschi teachers received support to learn from one another in developing effective, differentiated teaching strategies.







In 2008 a teacher of a combined grades 4–5 class developed a math workshop that consistently used differentiation strategies, including flexible grouping, ongoing assessment, and a variety of daily math tasks. The math coach at the school that year was so impressed with how well students were learning in this classroom that she brought it to the attention of other coaches, who began bringing teachers to observe. Two years later, a kindergarten teacher at Leschi, working with the advice of Montessori-trained teachers at her school and with her math coach, developed a differentiated math workshop to meet the wide achievement span of students in her classroom. Within two-and-a-half years, every teacher was using some variation of the math workshop to differentiate math instruction.

Upper elementary

Katy Lungren Pence developed a 75-minute math workshop in which her upper elementary school students rotated through math activities each day, working with her in small groups at the same math level as well as with peers at mixed levels. Each day, Pence begins math class with a 15-minute minilesson in which she introduces the math concept and vocabulary for the day, giving students time to write the math objective in their notebooks as well as time to do some initial guided-practice problems. Three rotations follow, each lasting 15–20 minutes. Using pre-unit assessment data, Pence directs students to one of three groups:

1. Readiness, for those needing the most support to meet the standards of this unit
2. At level
3. Enrichment, for those who can be stretched beyond the basics expected for the unit

Because students in the readiness group need the most support before working independently, they always come to Pence first for focused, small-group work on the day's math concept. Meanwhile, the remaining students are in heterogeneous partnerships that facilitate peer teaching and learning. While half those students work in pairs on a math game, practicing the day's math concept, the other half work on practice pages, seated with a partner with whom they are to consult. After all three leveled groups have worked with Pence, have played the game, and have

done the practice pages, the class reconvenes as a whole to review the day's lesson. Review includes an exit problem done by each student individually, which allows the teacher to quickly see who has mastered the day's lesson and who needs more support in the following days.

A sample lesson

During the minilesson introductory time for a lesson on measuring in geometry, students wrote in their notebooks, "I can measure and draw acute angles," and then did a practice problem on their white boards to draw and measure an acute angle and to compare it to what their partner drew and measured.

In the first rotation, Pence methodically had the readiness group tell her what the day's lesson objective was and guided them through a number of examples similar to what they had done during the introductory minilesson, ending with each student explaining to a partner how to do a problem, being sure they used the day's math vocabulary, which had been posted on the



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Explaining problem-solving strategies to peers allows students to cement their own understanding.

board. These students then started their practice pages under Pence's direction so that she could be sure they would know what to do when they had to complete those pages in a later rotation. Meanwhile, half a group of paired students—an at-level student and an enrichment student—played the Everyday Mathematics (EDM) game for the day's lesson. The other half worked on their practice pages. Students were to discuss

the problems and compare their solution strategies. If a student needed assistance, the partner followed the protocol for helping by asking leading questions rather than telling the answer. A minute before the next rotation, Pence told the game-playing group to clean up their games and submit their recording sheets.

For the second rotation, all the at-level students came to Pence for their focused teaching, going through most of the steps the teacher had used with the readiness group, but at a faster pace. Meanwhile, the enrichment students had switched what they were doing; the half who had done their practice work in the first rotation were now in the games area, and those who had played a game were now in the practice work area. Each enrichment student was paired with a readiness student, giving the latter extra support from a peer while also giving the enrichment students a chance to hone their own understanding by explaining the day's math concepts.

For the third rotation, enrichment students worked with Pence. After a quick review to be sure they understood the day's lesson, Pence worked with them on more challenging extension problems from the lesson. Meanwhile, pairs of at-level and readiness students worked together on whatever they had pending for the day, either the game or the practice work.

At the end of the third rotation period, all students returned to stand behind their desks while volunteers took turns reporting to the class on their own performance on the behavior expectations or complimenting a classmate who had worked with them during the math rotations. Then students sat down to quickly solve an exit problem. Using a document camera, Pence projected the problem and said, "Do this in your notebook. Show me what you know so I know which students got this and who I need to teach again." Once students had done the exit problem, they were to write one of the following self-evaluation statements under the day's objective:

1. I could teach this!
2. I can do this on my own.
3. I can do this with help.
4. I don't get this at all!

Then they were to write a justification for their evaluation by completing the phrase *because I am able to...*

Kindergarten

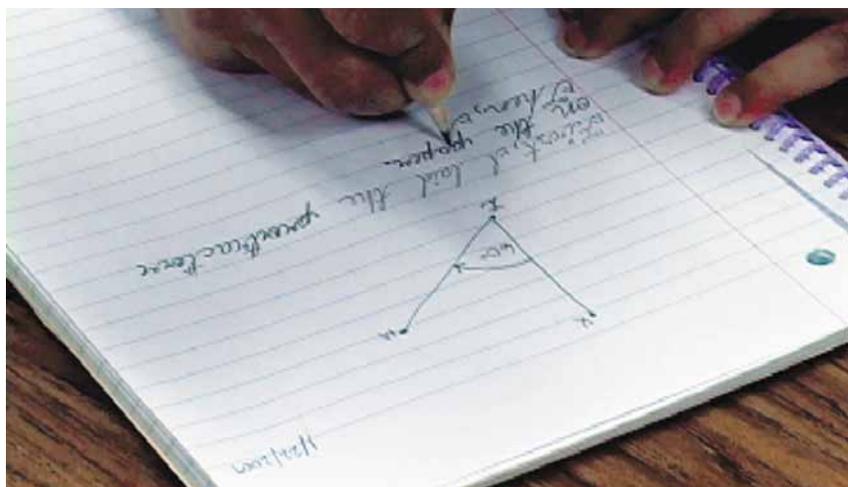
Shannon Gardiner developed a choice system for teaching math so that all her kindergartners were actively engaged with math activities for an hour every day, allowing her to rove the classroom to teach individuals and small groups. As Gardiner observed and conferenced with students who were engaged in a math activity, she also authentically assessed at least five students every day. Inspired by Montessori and programs like the Mathematics Their Way curriculum (Baratta-Lorton 1995), while also honoring the lesson foci of EDM and the state performance standards for kindergarten, Gardiner's approach quickly attracted teachers from across the district to observe and imitate her. When the demand for observations grew to be too much, the district provided intensive trainings (described under the Lessons learned heading on p. 162) for over a hundred teachers.

Like Pence, Gardiner begins each session with a minilesson on the day's math concept. Gathered on the perimeter of the rug, her stu-



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Math games are a fun way for students to apply newly learned concepts.



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dents do a number of math finger plays and chants to focus them before she introduces the math concept and does a brief guided practice. She then demonstrates how students can develop the concept during work time.

Sample activities

Gardiner transitions students to math work time by dismissing a few at a time to chose a math tray and settle into working on it alone or with a partner. Café-size plastic trays contain math games and activities from EDM as well as

An integral part of the math workshop, an exit problem at the end of the day helps the teacher assess each student's mastery of a concept and gauge the level of support needed the next day.



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groups for the day's math skills. Using Pence's rotating groups workshop design, the second-grade team planned every lesson, alternating who prepared the practice work and math games for both classrooms. The teacher of a combined grades 3–4 class devised a math workshop that concluded with a daily review in which pairs of third and fourth graders explained their day's lesson to their partner well enough that the partner could explain to the whole class what the other grade had learned that day. One result of this review was that student achievement in both grades accelerated.

Lessons learned

Between 2008 and 2011, under the supportive leadership of district math director Anna-Maria de la Fuente, funds were allocated for professional development for math coaches as well as for elementary school teachers throughout the district. Monthly math coach meetings focused on learning such new techniques as number talks to take back into the schools as well as time to share successes and challenges. During the 2008–2009 meetings, Leschi Elementary School's math coach, Fran Partridge, brought Pence's work to the attention of other coaches in the district, spurring observations and filming of Pence and other teachers. A variety of model teachers were filmed, allowing coaches, starting in 2009–2010, to do professional development for an entire school, or a grade-level team to introduce models of differentiated math teaching (see the bibliography). Once teachers saw the films, they were usually eager to observe the classrooms. Using staggered planning times and professional development release time that provided substitute teachers, coaches invited teachers to observe one another's practices within their school or across schools and then to debrief with the model teacher and coach. Through the district math department, teachers received professional development clock hours for working with a coach to observe, implement, and reflect on differentiation strategies in their own classrooms. After one or two teachers in a school tried the math workshop, they usually extolled its advantages to colleagues: how they loved teaching small groups and how well all their students were learning. More teachers began asking coaches to help them begin using the math workshop.

One tray game has students use snap cubes to help them develop their understanding of measuring length.



other sources, all tied to helping students master the state math standards for kindergarten and beyond. As long as some students in the classroom have not yet mastered a standard, activity trays for it continue to be available throughout the year. For instance, at mid-year, one of twenty trays had an EDM math graphing game, Roll and Record, that uses numbers 1–6 or 2–12; another had an Empty the Cup game that involves higher combinations of numbers; and a third tray held activities that involve measuring lengths. A sticker on each tray indicates how many students may work on it together. Occasionally a student needs guidance in selecting an appropriate tray, but in general, students naturally select trays that either help them begin to learn a math standard or reinforce a standard they are mastering. Just as in Montessori, students are trained to build stamina, working on a tray until they have completed the math activity or game. They then quietly return the tray and select another one. This allows the teacher to spend focused differentiated teaching time with individuals or a small group and to record ongoing standards performance assessments as she observes students doing the math work.

Offshoots for other grades

At the beginning of the 2010–2011 school year, every grade-level team at Leschi set a goal that included using the math workshop. By the middle of that year, every teacher was using some variation of the math workshop to differentiate math instruction. First grade teachers used a hybrid of the kindergarten model and leveled



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Students have time to self-select from a variety of math games organized in trays.

When it became apparent in early 2011 that kindergarten teachers across the district wanted focused professional development on how to differentiate math lessons, the district supplied substitutes to cover classrooms so teachers could attend two all-day intensive training sessions on differentiation. With a month between sessions to “try-on” what they had learned in the first session, teachers came to the second one ready to report on their successes and challenges and to learn more that would help them successfully provide differentiated math instruction in their classrooms. The 105 teachers who attended the kindergarten training sessions included classroom teachers, special education and English language learner teachers, and instructional assistants who support kindergartners in math. At the end of the sessions, every teacher was implementing differentiation strategies. A group of teachers had already formed a book club to dig deeper into *Growing Mathematical Ideas in Kindergarten* (Dacey and Eston 1999), a book they had received at training. The power of this training came from coaches facilitating sessions during which two model classroom teachers used films of their classrooms to demonstrate strategies, shared their math materials and differentiation logistics, and answered questions about their practice.

By the end of the three years during which the district funded a sizable cadre of school-based coaches in high-poverty, low-achieving

schools, the crucial role of coaches in propelling instructional change became obvious. Almost all classroom teachers who had implemented differentiated instruction in the math workshops were teaching in the schools that had school-based coaches. The few exceptions were unusually innovative teachers who were in schools that had occasional district coach support.

Budget cuts for 2011–2012 eliminated school-based coaches and left the work to a few district coaches, slowing progress in spreading differentiated math practices. However, Seattle Public School personnel have demonstrated how teacher practices in a large, urban district can change when teachers share their strategies with one another and the district funds school-based math coaches to monitor and support the teachers’ continual honing of differentiated math instruction.

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