# Evaluation of the California Subject Matter Project

California Mathematics Project
Case Study

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# California Mathematics Project and Bellevue Union Elementary School District

## Introduction

In 2001, the North Bay Mathematics Project (NBMP) and Bellevue Union Elementary District (Bellevue) began working to improve mathematics instruction through "lesson study." Entering its ninth year in 2010–11, the longevity of this partnership is remarkable for professional development focused on building teachers' skills at instructional analysis and collaborative reflection—both of which, at the surface, appear distant from student test scores. Yet the partnership has expanded, evolved, and become institutionalized in Bellevue because of evidence that it has led to improvements in teacher practice and student achievement. Improved measurable outcomes and positive professional experiences for teachers led to a broad base of support for the lesson study work. Various stakeholders in turn always managed to find the necessary funds and garner requisite support to continue the work.

This case first describes the beginnings of the partnership and how lesson study was conducted in Bellevue. The case then traces the development of the partnership, describing how grassroots engagement led what began as a small, voluntary enterprise into a comprehensive district-wide program. The closing sections describe the range of outcomes of the partnership from the perspective of various stakeholders, and how this diverse group of supporters combined to institutionalize components of lesson study in Bellevue.

## Development and Early Work of the Partnership

One of the most striking features of the partnership between Bellevue and NBMP is the extent to which it developed organically (see exhibits 1 and 2 for descriptions of Bellevue and NBMP). It began with a small group of teachers who had attended a summer professional development event. Because these sixteen teachers felt empowered by the initial partnership work, the program expanded through word of mouth to most of the teachers in the district, an extraordinary level of participation for a voluntary program. Additionally, the empowering aspects of the program supported teachers and the district in using lesson study as a strategy for a sustained instructional improvement effort. Finally, lesson study was a springboard for teachers to take on a range of professional roles, thereby building capacity in the district.

**Exhibit 1. North Bay Mathematics Project**

The North Bay Mathematics Project (NBMP), which opened in 2000, is hosted by Sonoma State University. NBMP has always involved close collaboration between the university and the Sonoma County Office of Education (SCOE). Each organization contributes certain strengths to the partnership. Sonoma State has access to mathematicians and education professors, who are counted on for their academic expertise. SCOE is part of the K-12 educational structure and contributes expert mathematics teachers highly knowledgeable about the local context and a built-in capacity to recruit educators for events and generate support from schools and districts.

From its origins in the fall of 2000 to the present day, much of the funding that NBMP receives goes to SCOE to co-host professional development. Both mathematics and education professors from Sonoma State play critical roles collaborating with SCOE staff and other educators to design and deliver NBMP professional development.

**The partnership's origins were informal, based on the interest of project leaders and a small group of teachers.**

The partnership has its origins in the 2001 summer Mathematics Professional Development Institute (MPDI),[1] offered by the North Bay Mathematics Project[2]. Teachers attended the MPDI from several districts including Bellevue, a district in the midst of a rapid influx of ELLs that was struggling to meet state goals for student achievement. NBMP leaders had been offering both stand-alone workshops and more intensive professional development opportunities (like the MPDI), but were searching for a more sustained, intensive strategy for supporting deep instructional change in mathematics instruction.

One of the leaders of the MPDI program from NBMP had learned about a process called lesson study, which garnered attention in the United States in the wake of the Third International Mathematics and Science Study (TIMSS).[3] (See Exhibit 3 on the next page for an explanation of lesson study.) The TIMSS study included videos of instruction from multiple countries, including Japan, where teachers did ongoing planning and professional development using a lesson study process. Evidence from TIMSS and, in this country, Steigler and Herbert's work on Lesson Lab as well as research by Catherine Lewis, engaged the NBMP leaders' interest in the lesson study model as a strategy for improving instruction and student learning in Bellevue.[4]

**Exhibit 2. Bellevue Union Elementary District**

Bellevue UED, a four-school elementary district located in Santa Rosa, has historically served lower-middle income students. Beginning in the mid-1990s the district experienced a major demographic transition, growing from serving approximately 1350 students in 1994–95 to 1750 students in 2004–05. In that time period the proportion of English language learners (ELLs) increased from approximately 25% to 70%, remaining largely stable since 2005. To accommodate an overall increase in student population, Bellevue UED added a fourth school in 2008-09.

The district has faced strong accountability pressures in recent years. Student API ranking in all schools is typically in the bottom half in the state. In 2009, no schools in the district made Adequate Yearly Progress (AYP), and the school with the lowest test scores failed to make AYP for the fourth year in a row. District and school participation in several accountability-related programs brought funding, significant pressure for improvement, and varying areas of focus for professional development.

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1 The Mathematics Professional Development Initiative (MPDI) was funded from 2001–04.

2 While this case study references the "NBMP's" partnership with Bellevue, readers should be aware that NBMP and SCOE are indistinguishable in some aspects of the work as some individuals play key roles in both organizations.

3 TIMSS is ongoing and is now called Trends in International Mathematics and Science Study (TIMSS).

4 The following two works were the most influential for Bellevue teachers: *A Lesson is Like a Swiftly Flowing River* by Catherine Lewis http://www.lessonresearch.net/resources1.html; and *The Teaching Gap: Best Ideas from the World's Teachers for Improving Education in the Classroom* by James Stigler and James Hiebert, Free Press, 1999.

During a lunchtime break at the MPDI event, the NBMP leader announced she would show a portion of the TIMSS video. After watching the video on lesson study, several teachers from one elementary school mentioned they would be interested in participating in a pilot lesson study program. The leader got the support of the teachers' principal to pilot the lesson study program, and a 9-year partnership focused on lesson study in mathematics began. While the partnership work included several types of professional development activities (e.g., MPDI, attending state Mathematics conferences), the core of the work has consistently remained lesson study.

**Exhibit 3. Bellevue's Lesson Study Process**

In lesson study, a group of teachers identifies a question for inquiry and enters into an iterative process of collaboratively designing, implementing, and reflecting on the lesson. The lesson being studied is designed to be a window into instruction more generally. By focusing on the lesson and what students learn through the lesson, teachers learn to use formative assessment to plan and deliver instruction. By analyzing instruction instead of evaluating teaching, teachers also build a supportive professional culture. This, in turn, builds the deeper levels of trust needed to support teachers as they improve their instruction (Lewis & Perry, 2010. Interview)

Bellevue's lesson study follows a set protocol through which the lesson study group agrees on the focus of their inquiry, develops a lesson, and analyzes the lesson's effectiveness.

- **Choose a research question** (e.g., Does academic discourse improve student learning?) and a **research topic** (e.g., perimeter, comparing fractions) specific to the particular lesson. Research topics are typically determined by each lesson study group, based on aspects of mathematics with which students were struggling. Beginning in 2003–04, each lesson study group selected a research question aligned with a district "high-priority need" for lesson study.
- **Plan a lesson.** Teachers collaboratively develop a lesson to address the learning difficulty. The plan should anticipate where students will struggle and prepare to support students overcoming this struggle. The plan should also attend to the many details of a complex lesson.
- **Conduct a pre-conference.** Prior to teaching the lesson for the first time, the group reexamines the lesson from the perspective of someone going to teach it. This examination supports the teacher in planning the final details of lesson implementation. Observers also review their role, namely collecting evidence, not opinions or "I would haves…" and norms for not interacting with students. The classroom teacher identifies students about whom she would like the observers to collect evidence about.
- **Observe the first teaching of the lesson.** Observers take notes on how students are interacting with the lesson—what students say and do. Students are advised that the observers are researchers during this time and not instructors.
- **Conduct a post-conference, possible revision.** The focus is on evidence about what students learned and what aspects of the lesson should be modified to help the lesson better support students meeting learning goals. Teachers then revise the lesson based on the evidence.
- **Conduct a pre-conference for a re-teaching.**
- **Observe another teaching of the lesson.**
- **Conduct a post-conference.**

**The partnership grew both in terms of numbers of participating teachers and the depth of the lesson-study-related work from 2001–02 through 2007–08.**

In 2001–02, the first year of the partnership, 16 teachers (from three grades in one Bellevue elementary school) participated in three groups piloting a lesson study process.[5] When teachers first began participating, most knew little about this strategy for professional development. Reflecting on her participation in the first round of lesson study, one teacher recalled:

> We could choose to participate. And I think everybody on our [grade-level] team decided to participate… It was a very different kind of professional development. I didn't really know how good it was going to be. But I knew we were going to collaborate on developing a lesson and do some research to see how our kids learn. You know it's primarily a focus on how children learn, but it's also a way to evaluate our teaching practices. That's definitely a big part of it.

In the first year, the initial group of 16 teachers became familiar with the lesson study process and started talking with others at the school about their experiences. Teachers in other grades went to the principal and asked whether they could participate in lesson study as well. The principal and NBMP worked to expand the program so that, in 2002–03, 28 teachers (28% of district teachers) across all grades and schools in the district participated in a total of nine lesson study groups.

The partnerships third year, 2003–04, marked two major steps in the development of Bellevue's lesson study program. In addition to offering 10 lesson study groups for 37 teachers (39% of teachers in the district), the program started to be seen as a strategy for district-wide reform. The district selected a general research focus—addressing ELLs' vocabulary needs in mathematics instruction—that all lesson study groups needed to address. In the years that followed, the district selected a broad topic for the research focus, typically a strategy for providing more effective instruction for ELLs (including such things as the use of graphic organizers, mathematical representations, academic discourse, etc.).

Additionally in 2003–04, the partnership began to present Bellevue's lesson study work to external audiences, hosting their first, annual lesson study conference and presenting at professional conferences.[6] The annual lesson study conferences, made possible by the NBMP's connections to leaders in the mathematics education community, were an important part of the partnership work beginning in 2003–04. At these conferences, Bellevue Lesson Study participants made their lesson study work public by opening their teaching of the focus lesson to conference attendees. This was an important departure from previous rounds of the lesson study conference as live lessons taught to Bellevue students provided participants a window into an occurrence of the lesson study process. Through the California Mathematics Project's professional network (as well as other professional connections) the annual conference was able to attract a star-studded list of participants including lesson study experts (e.g., Catherine Lewis

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5 This number represented 16% of all teachers in Bellevue at that time.

6 The lesson study conference began in 2001 and from 2001–03 was solely sponsored by the MPDI (SCOE was included in planning) and took place in Burlingame. The conference consisted of presenters – both researchers (e.g., Elizabeth Stage, Catherine Lewis, Clea Fernandez, Jim Stigler, Deborah Ball, Ruth Cossey, Liping Ma) and teachers trying to grapple with how to implement this process, "Of making teaching and learning visible." (Elizabeth Stage).

and Rebecca Perry), nationally renowned mathematics educators (e.g., Liping Ma and Deborah Ball), Japanese educators familiar with lesson study, and educators and policymakers from throughout California. The conferences were important to the partnership because they provided a venue for experts in mathematics education to collaborate with participating teachers to move the work forward. One participant who now helps lead the partnership explained, "Every year [an outside expert affiliated with the Mathematics Project]… would come in with a set of questions that we would look at for next year. And then the next conference we would kind of reflect on those questions and cast a new set of questions." Additionally, the conference played an important symbolic role in helping teachers in a struggling district find a spotlight to highlight their strengths and hard work, somewhat counterbalancing the negative attention the district was receiving from accountability policies.

In addition to hosting the first Sonoma lesson study conference in 2003–04, several partnership teachers began extending their range of professional responsibilities by presenting at statewide professional conferences and authoring articles on the lesson study work. These activities represented new professional roles for several Bellevue teachers.

Another step in the progression towards lesson study as a vehicle for teachers to assume leadership roles came in 2005–06 when, in response to increased demand for lesson study groups, the first facilitator training was offered to 8 Bellevue teachers. The initial training was relatively brief—a separate session at the Lesson Study conference—with ongoing support in the summer and throughout the following year as participants began facilitating lesson study groups for the district. But the training and ongoing support helped expand the pool of leaders able to facilitate lesson study in the district. With a new cadre of facilitators, the district was able offer 10 lesson study groups during the 2005–06 year, serving 63 teachers (67% of teachers in the district).

The following year (2006–07), a minor adaptation of the lesson study protocol took the work substantially deeper. An outside consultant from the California Mathematics Project gave a presentation on lesson study, likening it to the television series CSI. He developed the CSI metaphor, explaining that the key to lesson study was focusing on "evidence" as opposed to judgment. In CSI, the investigators do not arrive at a scene and say, "I liked that scene. What a creative crime." Similarly, lesson study participants should reserve preferences or dislikes about a particular lesson (e.g., "That was a great way of responding when students call out answers") and instead focus on gathering evidence about what students learned through the lesson. To gather more evidence on student learning, Bellevue teachers initiated a student interview process as part of the lesson study protocol. In the revised lesson study process, a teacher was videotaped interviewing a few students before the lesson to surface misconceptions about the content and again after the lesson to precisely assess student learning. Students generally enjoyed helping their teachers in this way, and teachers were able to analyze and reanalyze evidence of student learning needs and ways in which the demonstration lesson did or did not address them. As a result, the interviews helped increase the focus on how the lesson supported student learning of mathematical content.

In 2007–08, the district hired a new superintendent. In spite of the leadership transition, the lesson study work continued throughout the year with few major changes, enticing somewhere between one-half to two-thirds of the teachers in the district to participate.

**Lesson study entered a new phase in 2008–09, with less focus on Bellevue's typical lesson study model, but with core components of the work leveraged district-wide.**

In 2008–09, there was no formal lesson study program; however, teachers participated in the adoption of a new mathematics textbook series. The first year of using the new textbook, 2009–10, marked a major departure from the prior trajectory of the lesson study program. In that year, teachers were required to participate in 80 hours of professional development aligned with the new adoption. The district assembled lesson study groups, let groups and facilitators choose the most convenient times for participants, and provided substitute teachers to free teachers to watch the studied lessons. While teachers could decline lesson study participation as the way to achieve their state-required curricular-aligned professional development hours, they would then need to locate and pay for alternative professional development. This strong incentive led almost every teacher in the district to participate in the lesson study around the new curriculum.

The district's use of lesson study to support the new adoption led to a few key changes in the program. First, participating teachers did not design the lesson in 2009–10, instead selecting a lesson from the newly adopted textbook series. The deep look at the new curriculum provided by lesson study enabled teachers to analyze the strengths and gaps of their new adopted materials. However, participants reported missing the creativity afforded by the collaborative lesson design in prior years.

The second main difference was that some teachers who otherwise might avoid lesson study opted into it. This turned out to be a mixed blessing. On the one hand, lesson study reached almost the entire district, offering even reluctant teachers the chance to have deeper conversations about the adopted curriculum. Teachers reported some positive outcomes of broad participation, for example, one mentioned the benefits of increased collaboration across schools, especially in a district as small as Bellevue. On the other hand, some of the more reluctant participants reportedly arrived at meetings without the commitment necessary for deep, collaborative work. As a result, some facilitators struggled to a degree not seen in prior years with the task of creating a collegial atmosphere conducive to conversations about student learning and instruction.

Finally, partially for budgetary reasons, SCOE was unable to host a lesson study conference for those outside of the district. Instead, the district used one of its staff development days to host a "Sharecase," where each of the lesson study teams presented on their lesson study and what they learned for their co-workers. While the impetus for this change was largely financial, most people found that this format provided a beneficial opportunity for collegial interactions across the district, with teachers district-wide learning from each other.

Looking across the 9 years of the partnership, a pattern of constant evolution emerges. The partnership started small, began to be used by the district as a way to focus on effective instruction for English language learners, and over time grew to include most teachers in the district. The nature of teacher participation in professional development also varied, providing differentiated professional growth opportunities for participants.

## Reported Outcomes of Bellevue's Lesson Study Partnership

The core reason that Bellevue's lesson study partnership will enter its ninth year in 2010–11 is that it is seen as valuable by a wide range of constituents. This section describes four positive outcomes from the work—intrinsic benefits for teachers, support of teacher professionalism, improvements in instructional practices, and improvements in student achievement—that built a broad base of support for lesson study work. It then briefly discusses how key champions were able to sustain the work over time.

### Intrinsic Benefits of Participating

**Participation provided teachers with intrinsic benefits that countered the pressure and external scrutiny in the district.**

The overall context of Bellevue was an important backdrop to the lesson study work. Accountability policies put substantial pressures on teachers, implicitly blaming staff and students alike for failing to meet state goals. As was described earlier (see exhibit 2), the district was dealing with an increasingly English learner student population and relatively low student performance. Most teachers interviewed mentioned the effects of these contextual factors on what it meant to teach in the district. One teacher described their involvement in multiple accountability-related programs in this way:

> We started with IIUSP and then went into DAIT and SAIT. And I think we've been under these programs for about 7 or 8 years…Personally, it's been really difficult. I think it's probably bothered me more than most people … But I can see that everybody's feeling the pressure and feeling defeated. It's kind of narrowed the focus, which is important. Our kids are high percentage of second language learners. They need good English skills and good reading skills to get through their education. But it's taken away the creativity. For me there's less of a satisfaction of a job well done. And for me that's been really hard… There are so many new things. In the process of being in these programs, we've had agencies come into coach us, to introduce things. We've had lots of great trainings. But…it's been overwhelming.

Lesson study provided a contrasting perspective to the way this teacher perceived many of the required, accountability-related programs. The most important contrast was that a central principle of lesson study is that teachers have existing knowledge and skills that can serve as the foundation for improvement. The voluntary nature of lesson study also contrasted sharply with the slew of mandatory professional development events the teacher attended. Another teacher's comments highlight how the voluntary nature of the professional development was critical to building lesson study groups where participants all brought the buy-in necessary for sustained work on improving instruction.

> That's the nature. It has to be voluntary to be a true lesson study. You have to be doing it because you want to…because of the commitment [lesson study requires]. I think you really have to have an interest in improving your practice…That's why I think it's a good match for our district, because we have huge challenges due to our student populations… It allows us to delve a little deeper into what works.

Due to the pressure and external scrutiny teachers were under, many teachers interviewed described the lesson study work as a professional sanctuary—a space for them to conduct ongoing, satisfying work that leveraged their collective strengths to improve their instruction. While providing teachers a venue for professional rejuvenation has merit in its own rights, the

types of collegial interactions central to lesson study also made it a lever for expanding teacher professionalism in the district.

### Strategy for Expanding Teacher Professionalism

Historically, teaching has been a relatively isolated profession. As standards for student performance have increased, people have begun to reconceptualize the roles and responsibilities teachers must assume to support ongoing improvement. Teachers are increasingly expected to work collegially, collaboratively analyzing student learning and instructional practices to support school-wide improvement. Additionally, some teachers are assuming leadership roles formerly reserved for researchers or administrators. Bellevue's lesson study program supported teachers in assuming these diverse roles and responsibilities.

**Through lesson study teachers learned how to collaborate and how to analyze instruction.**

Lesson study became an inroad for addressing some negative aspects of the district professional culture. Although he did not work in Bellevue at the start of the lesson study project, the superintendent hired in 2007 became a strong supporter of the project. He explained the strengths and challenges of the district—namely that the accountability-induced instructional environment had restricted skilled teachers' professional judgment—and why lesson study was a good strategy for building the shared understanding of student learning and instructional practice necessary to improve instruction in the district.

> [One] strength of the district was that there had been a lot of really good, effective professional development—targeted, high-quality professional development—that teachers had participated in. What I saw, though, was a lack of opportunity for teachers to work collaboratively with the tacit or overt approval or support to make instructional decisions. I don't believe that they felt confident that they had permission to really be innovative and to use their professional judgment. They were in this highly scripted environment and [felt that] if they deviated from the script, someone would instantly know and would do something about it in a punitive way.
>
> But now… more than ever, teachers need to have that skill set to be able to make confident decisions, but based on good data and based in collaboration. You can't have 30 teachers on a site doing 30 things. It needs to be focused and intentional, [using] their professional judgment and decision-making…We believe in the [lesson study] process as a district. Culturally it's highly valued. Teachers and administrators understand how important it is for teachers to gather together to develop the common shared understanding of what it means for students to be proficient…other than just relying on a CST score once a year. To know it [when you see it in front of you], that's important.

The ability to analyze instruction developed over multiple experiences with lesson study. One of the facilitators explained that the first time a teacher participates in lesson study they frequently are focused on learning the protocols and processes of lesson study and they look at the classroom in general. As teachers participate in additional rounds of lesson study, they become facile with the protocols and work more deeply on analyzing instruction and, in the case of lesson study in mathematics, mathematical content. One leader in the partnership saw evidence of this in the way teachers' conversations in lesson study groups evolved over time:

> It was surprisingly difficult at the beginning to get teachers to talk about anything other than classroom management and behavior issues. And then, after they went through some of the lesson study cycles, they got really quick at looking for mathematical ideas or

> mathematical struggles. They started to think about really detailed choices that they might make. For example a teacher might say, "This student seems to be struggling with this issue. What could I say or ask to move them along?"

The collaborative analyses in lesson study increased teachers' capacity to analyze student learning and discuss an array of instructional responses.

**Bellevue leveraged teacher skills built through lesson study for other initiatives and developed a culture where teacher collaboration was valued.**

Lesson study enabled the district to build a growing cadre of teachers who had strategies for analyzing student learning and collaborating on instruction within lesson study. These teachers were also able to take these strategies into other district initiatives. For example, when the district initiated "Professional Learning Communities" (PLCs—time set aside for teachers to collaborate around instruction), participating teachers already had a shared understanding of how to analyze instruction. But while participating teachers reported enjoying the opportunity to collaborate within lesson study and other initiatives like PLCs, they ranged in the extent to which they reported that participation made them more likely to collaborate regularly with colleagues. One teacher who had participated several times seems to exemplify the challenges of changing the norms of collaboration from sporadic to regular collegial interaction around instruction with the following comment:

> I think this kind of collaboration with colleagues at your [school] site (I'm more interested in working at my site because these are the folks I'm working with) where we want to help each other— I want to see it be not so formalized. [Right now it's like], "we're going to do a lesson study now. And we're going to have these 5 days to plan a lesson." [I'd like it to move from that] to where it's really part of our school culture. And some people might say it is part of the school culture. But I don't think it is because I don't think we really have enough time to talk about our practices and what our students are doing.

She went on to describe how, depending on individual personalities of teachers at her grade level, the amount of collegial planning and instructional analysis she has done has varied from year to year as personnel shifted. It seems that, in terms of teacher collaboration, lesson study gave several teachers we interviewed a vision for how powerful a more collaborative school environment might be. However, no one reported their schools had fully realized that vision.

This teacher's sentiments reflect not only work left to be done but also a positive outcome for the district in terms of teachers' increased demand for opportunities for collegial work. Catherine Lewis, an expert on lesson study, explained why collaboration is important for teachers and how it can support ongoing instructional improvement:

> Emotional support is incredibly important…When a problem comes up, instead of dealing with it on my own, I have a system of support. I have people to go to…It's interesting that there's a lot of work on students in school communities that meet kids' need for competence, autonomy, and belonging—they become more bonded to school and they are more willing to persist. Teachers are similar. They need motivation to keep their hard work up. Teachers get that motivation from feeling supported and from feeling—in the positive sense—accountability. You are part of this web of people who are expecting you to do well, and you are expecting them to do well.

While teachers who conceptualize their profession as an isolated, independent endeavor might eschew collaboration, developing collaborative habits through lesson study can support a culture of ongoing improvement.

**Lesson study became a vehicle for teachers to assume leadership in the teaching profession and in the district.**

Lesson study also became a vehicle for teachers to assume a range of teacher leadership roles and responsibilities. Teachers' presentations of their lessons at the Conference snowballed into other opportunities for teachers to share their expertise. Some teachers presented at the California Council of Teachers of Mathematics conference and other state conferences. One teacher authored an article on lesson study, which was published in a mathematics education journal. Others became lesson study facilitators, led other types of professional development, and assumed roles as teachers on special assignment. These extensions of teachers' typical roles are part of the NBMP's strategy for developing teacher leaders. The site director explained:

> They've [the grants that supported Bellevue's lesson study and other NBMP programs] have been very good at giving leadership roles to a fairly large cadre of teachers who have come through the various Math Project programs…I think that a big part of what we provide is a way for teachers to advance professionally without leaving the classroom. I think one of the biggest frustrations with the structure of education is that advancing means leaving the classroom. So the best people are always leaving. And I think that, for some people, we have given them leadership opportunities to help them feel like they're advancing and also make them some money without going into administration.[7] Through lesson study, Bellevue developed a group of teacher leaders to tap to lead lesson study and other district initiatives.

### Improving Instructional Practice

For a district needing to improve student performance, a key reason to continue to support lesson study would be if it had led to improvements in instructional practice. And indeed, every teacher interviewed reported that participation had improved his or her practice in some way. The most interesting aspect of these teacher reports was that teachers reported different affects, reflecting perhaps the diverse learning needs that they brought into lesson study and the ability of lesson study to respond to varied participants.

**Lesson study provided participants basic access to their colleagues' practice, giving participants new ideas to take back to their own classrooms.**

As described earlier, Bellevue had pretty traditional norms of private instructional practice when lesson study began. A first step to helping teachers improve their own practice through collaboration was to open classroom doors so teachers could observe each other teach. One teacher reported on why she found lesson study valuable, "Having the opportunity to step into a classroom and see. That's just so valuable. I always see things around the room that I don't have up…I see teachers' pacing [and] tone of voice." Several participants reported getting new ideas from observing their peers.

[7] Some additional roles, like providing professional development, are stipended, and thus increase teachers' income.

**Other teachers described ways in which they approached mathematics instruction differently as a result of lesson study.**

Others reported that lesson study led them to at least experiment with new practices in mathematics instruction. For example, one reported using more open-ended problems that had multiple solutions in her mathematics instruction. This statement corroborates reports by leaders of the lesson study program who reported an increase in teachers' awareness of the difference between computational skills and conceptual understanding among Bellevue teachers. Another source of evidence of Bellevue's lesson study leading to changes in mathematics instruction came from a study conducted as part of a grant in which some teachers from Bellevue and surrounding districts participated (see exhibit 4).

**Exhibit 4.**
**Increasing the Rigor of Mathematical Content Required by Teacher Questions**

As described earlier, Bellevue's student population has a high proportion of ELLs. In learning mathematics, ELLs may face additional challenges beyond those faced by English proficient students in terms of learning from and participating in classroom discourse. Given the imperative to improve ELLs' access to mathematics, NBMP wrote and won a 3-year grant that included six districts to focus on increasing the rigor of mathematical discourse in classrooms. While Bellevue was not a participating district, some Bellevue teachers were involved in the grant as lesson study facilitators.

Each year, participating teachers attended a weeklong summer institute and Saturday seminars every other month during the school year, which included conducting lesson studies. During each of the first two years of the grant, each teacher videotaped one lesson of mathematics instruction that was later transcribed. As part of the professional development, teachers developed a taxonomy for questions and student responses, similar to Bloom's hierarchy though specific to mathematics, to use to categorize mathematical discourse. The taxonomy of question types was confirm (e.g., agree/disagree), recall, explain, justify, and generalize. The question types represent communication about increasingly rigorous mathematical work. The lesson transcripts from years 1 and 2 were coded both for the type of teacher question and the nature of student response using the taxonomy. Results show that mathematical discourse in grant participants' classrooms—both in terms of teacher questions and student responses—increased in mathematical rigor over the course of the study. It. therefore, provides important evidence linking lesson study not only to changes in teacher practice but also to improved student outcomes (Easterday, 2009).

**For a smaller group of teachers, lesson study led to a reexamination of fundamental beliefs about teaching and learning.**

A few teachers reported that lesson study was a transformational experience. One veteran teacher in particular reported that lesson study, especially the use of evidence of student learning brought into Bellevue's lesson study work in 2006, fundamentally altered her teaching. She described how lesson study helped reveal teachers' false assumptions about student understandings of content. She described the use of student interviews after the lessons. In some cases, "high" students could calculate an answer but did not demonstrate conceptual understanding. In contrast, some "low" students shared deep and accurate insights into the mathematical content of the lesson. Because lesson study helped her see how easy it was for teachers to have false assumptions about what students know and have learned she explained,

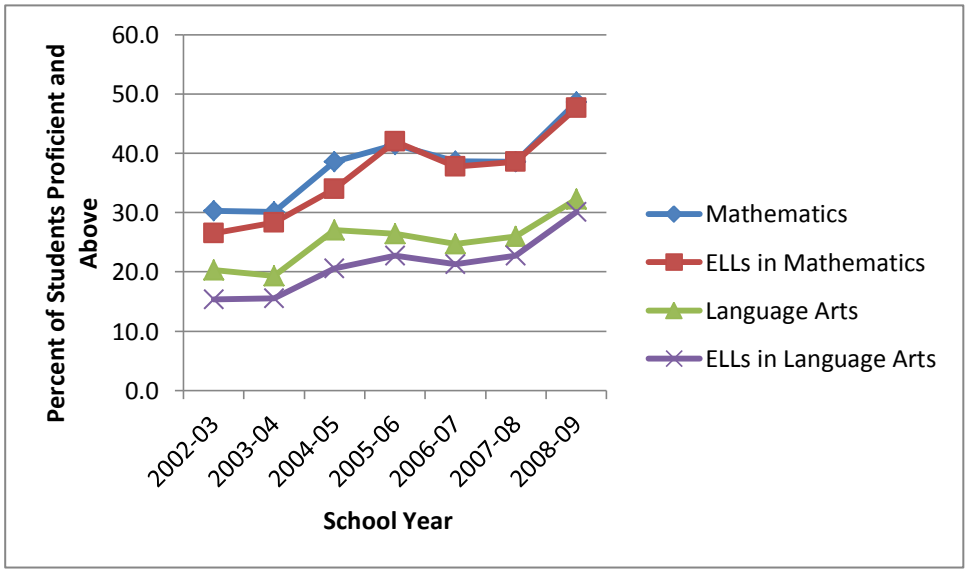
> I make fewer assumptions about what's being learned than I used to. It's tempting to think I taught it they learned it. And, I don't know if this is entirely through lesson study, but I see a lot more value in re-teaching than I ever did before…for everybody who's not proficient…That's daunting, but it's a reality…Those observations about student learning are so important, because, that's like flipping a switch for a teacher to know that stuff. Once you know that, you can't put the toothpaste back in the tube. Once you know that that's happening, that changes the way you teach unless you don't have a conscience.

This teacher reports integrating much more formative assessment into her instruction so that she has accurate data on which aspects of her teaching students are understanding and which aspects she needs to re-teach. She also described a substantial change in pedagogical approach. Prior to lesson study, she spent most of her time at the front of the room presenting teacher-led lessons. Now, she moves around the room more and has increased opportunities for students to learn from each other during her instruction.

### Improving Student Outcomes

Given the vast pressure Bellevue was under to improve student achievement, evidence of improved test scores was an important outcome of the lesson study work. No methodologically rigorous studies have been conducted to show that lesson study was the direct cause of improved student performance in mathematics. However, there is widespread awareness in Bellevue of the consistent improvement in mathematics performance since lesson study began. Exhibit 5 presents general data on the percentage of all students and English language learners who achieved at least proficiency from 2002–03 (the year AYP was initiated) to 2008–09 (the most recent year available) in mathematics and language arts.

**Exhibit 5**
**Percentage of All Students and English Language Learners Proficient in Language Arts and Mathematics**




Source: http://www.ed-data.k12.ca.us/Navigation/fsTwoPanel.asp?bottom=%2Fprofile.asp%3Flevel%3D06%26reportNumber%3D16.

Respondents frequently mentioned the improvement in mathematics performance over time, the overall higher performance in mathematics (where all schools met AYP goals in 2008–09) compared to language arts (where only one school met AYP goals in 2008–09), or the fact that Bellevue has no performance gap between ELLs and the population as a whole in mathematics as evidence of the success of lesson study.[8] Additionally, a professor from Sonoma State had her statistics class do a project on whether lesson study had a positive effect on student outcomes in Bellevue from 2002 to 2006. They presented findings to the district which showed that mathematics scores were "increasing at a greater rate than both the county and the state" and "ELL students are becoming proficient at a greater rate than fluent students," and, that there was "a correlation between the shrinking gap (between ELLs and fluent students) and professional development" (as cited in Easterday, 2009[9]). Interviews suggest both broad awareness of the improvements in mathematics performance in the district that can be seen in exhibit 5, as well as the attribution of lesson study as a key cause of the improvement in mathematics performance. The final section describes how various stakeholders, who believed lesson study was having important, positive effects on the district, worked together to grow and sustain the project over time.

## Sustaining Bellevue's Lesson Study

Over time Bellevue's lesson study has been sustained by a wide range of stakeholders, including teachers, district leaders, and program leaders who were attracted to many aspects of the lesson study program. The wide-ranging group of stakeholders played varied and complementary roles in sustaining the lesson study work over almost a decade, through economic recessions, changes in district leadership, and the introduction of several waves of other reform efforts.

### Teachers formed a core constituency in sustaining lesson study work.

Teachers played several important roles in Bellevue's lesson study work. First, their curiosity about the work led a small group to pilot the program. The initial participants discussed their experiences with colleagues, who in turn requested access to the lesson study process, driving the initial expansion of the program. When school board members questioned the efficacy of lesson study, teachers attended school board meetings to advocate for continued funding. Finally, over time, as teachers became facilitators (most remaining as classroom teachers but some assuming TOSA or COE positions), they began to actually run much of the lesson study work themselves. Increased teacher capacity enables teachers to transfer the knowledge acquired through lesson study to other endeavors, embedding key aspects of the work throughout the district. Teacher support and involvement in the program as participants, leaders, and advocates is thus central to the institutionalization of lesson study in the district.

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[8] These data are somewhat challenging to interpret because such a high proportion of students are classified as ELLs (70% in 2008–09) and Hispanic (75% in 2008–09) that these groups dominate the district-wide average. There is a gap between the performance of ELLs (and also Hispanics, which are largely overlapping subgroups in Bellevue) and White (not of Hispanic origin) students in Bellevue. In 2008–09, the difference in percentage proficient or above between the White subgroup and the ELL and Hispanic subgroups was slightly greater than 8%. We present exhibit 5 data in this way because they are accurate and represent the way district staff reported their performance trends.

[9] Easterday, J. (2009). *Local existence proof: The impact of a research theme on teaching and learning.* Paper presented at the American Education Research Association Conference. San Diego, April 2009.

**District leaders saw value in teachers' lesson study work, supporting its growth and evolution.**

Various district leaders supported lesson study from inception to the present. The principal of the first school to do lesson study and the district administrator in charge of curriculum and programs are both long-term supporters of the work. In their positions, they became quickly aware of changes in the nature of teachers' informal conversations when they participated in lesson study. Participants became less likely to use conversations in the teachers' lounge to vent frustration and more likely to share what students were saying and doing. The steady support of these two individuals was key to sustaining lesson study through turnover in the superintendency.

An important increase in leadership support for lesson study occurred a few years ago with the arrival of a new superintendent. Lesson study was a good fit with the new superintendent's core values (e.g., valuing teachers as professionals to motivate them to achieve their best) and management style (e.g., trusting teachers to make instructional decisions).

> When I came to the district and got to know more about lesson study, I became really excited by the structure and the opportunities for teachers to learn from one another. "Deprivatizing," that's a critical element. As a teacher myself, I closed the door and flew by the seat of my pants…There were no mentors, no models to work with for many years. It doesn't seem to be a thoughtful way to enculturate someone. Having the opportunity for teachers to observe each other and ask questions about practice. It only makes sense…We improve through that social interaction and that reflective practice. No matter how bright or intuitive you are, you aren't as strong as you would be with three to four colleagues.

He was also persuaded that lesson study was achieving desired effects on student achievement,

> Shortly after I came, [a professor] showed me some longitudinal data he had put together…What his data showed was that as more teachers became involved in lesson study, there was this incremental increase in student performance in math. And then, all of a sudden in one year, when it went from about 30 to 35% teachers participating to I'm not sure if it was around 70% or 80%…there was an even larger increase in student performance in math.

Under the superintendent's watch, lesson study has been adapted (e.g., used as a strategy for district-wide professional development on a newly adopted mathematics textbook series). Additionally, core elements have been borrowed and transferred to other initiatives (e.g., language arts), potentially broadening the reach of the lesson study methodology across disciplines and throughout the district's culture.

**The partnership leadership team, including individuals representing Bellevue, SCOE, and NBMP, sustained a consistent vision and resources.**

The final piece in sustaining lesson study has been a team of consistent leaders who have guided the program's development and implementation and ensured consistent funding from a variety of sources. A core team has led the lesson study work from inception to the present. This team bridges all three organizations—Bellevue, NBMP, and SCOE—that supported the work. The fact that these organizations partnered seamlessly for many years is in itself remarkable given that partnerships between schools and outside experts can be fraught with tension and conflicts.

From their various positions, lesson study leaders have been able to access expertise of mathematics leaders in the state, write grants to find outside sources of support for lesson study-related work, and use district categorical funds to ensure that resources met the demand for lesson study. Over the years, the district has used federal categorical funds (especially funds that, due to low performance, were mandated as set-asides for teacher professional development), state textbook adoption funding, and competitive state and federal grants to support lesson study work. The fact that the core vision of using lesson study to support teachers, expand teacher professionalism, improve teachers' content knowledge and practice, and increase student achievement has remained unchanged is a testament to the leaders' commitment to lesson study. The mosaic of funding sources is evidence of the ingenuity of leaders in their service to that vision.

**For 2010–11 and beyond, core elements of lesson study will remain in Bellevue, seeping into other initiatives and into neighboring districts.**

It is impossible to predict the future of lesson study in Bellevue; however, its imprint remains in several ongoing initiatives. First, while the district is not supporting a formal lesson study program in mathematics in 2010–11, it is instituting "focus groups" for language arts—a slightly shorter version of lesson study.

The district is leveraging teachers' skills at collaboratively analyzing instruction in the Professional Learning Community initiative. The district will also be building on lesson study in 2010–11 when they institute "instructional rounds," a practice where educators tour others' classrooms focusing on a particular aspect of instruction. One leader of the lesson study work noted:

> We are still working to get it to be not just lesson study, but a way that we operate in their PLC. You know, [teachers are] thinking of lesson study being a time they get together. Well, you can ask those same questions every week when you have release time in PLCs. You can look at the data…You can have the research question. Or your "problem of practice" if you're doing instructional rounds. Those seem to dovetail nicely…[We're] trying to use lesson study as a vehicle for bringing it all together.

The deprivatization of teachers' practice under lesson study, opening up teacher practice in a collaborative environment, as well as teachers' increased understanding on how to describe and analyze student learning and instruction laid the groundwork for implementing these initiatives.

Finally, NBMP, in partnership with several districts, won a California Mathematics and Sciences Partnership (MSP) grant to provide interested teachers with three years of summer mathematics professional development with ongoing support throughout the year. [10] While the conditions of the grant included that it had to be a "new" type of work (and so lesson study could not be proposed in its current form), the work will have a focus on collaborative instructional analysis and deepening teachers' mathematics content knowledge. A key difference in the work compared to previous lesson study work in Bellevue is that teachers will videotape lessons. This will enable teachers to have lesson-study types of conversation about student responses to teaching outside of instructional hours, thus reducing some of the logistical challenges of lesson study work. Additionally, the videotapes and other web-based aspects of the grant will enable

[10] NBMP is not the fiscal agent of the grant; however, the work is led collaboratively through NBMP and SCOE, as Bellevue's lesson study was.

teachers to compile artifacts of their implementation of ideas learned in the professional development and opportunities to reflect on instruction. In this sense, the grant is another way lesson study work is broadened (to a larger pool of participants) and deepened (to get closer to teachers' instructional practices).

## Conclusion

Bellevue's partnership with NBMP began based on the interest of a small handful of educators. As teachers entered lesson study groups with varying needs, they found that lesson study could meet them where they were and offered a collaborative process for supporting improvement. Teachers and leaders alike appreciated the intrinsic supports stemming from the nature of the process itself. The supportive aspects of the lesson study process seemed especially important given the potentially demoralizing side effects of the waves of improvement initiatives spurred by state accountability policies.

Over the first few years of the partnership, Bellevue's lesson study grew organically. Given the range of positive outcomes associated with lesson study, partnership champions succeeded in garnering resources from varied funding streams to support the work. Then as district needs and leadership evolved, district leaders took key aspects of the work and harnessed it to changing district needs and priorities. Requirements of various funding streams also spurred changes in Bellevue's lesson study.

Looking back over the partnership and ahead towards the future, one sees both consistency and constant evolution. The team of NBMP and district leaders who brought lesson study to Bellevue remains in place and will continue to look for opportunities and funding for lesson study. Another continuing force is the ever-growing cadre of teacher participants and teacher leaders who are familiar with the process. They report that their instructional and professional practices have been shaped by the work, thus institutionalizing some components of lesson study in the very fabric of the district. Yet lesson study continues to evolve as well. With no district-sponsored mathematics lesson study groups planned for 2010–11, "lesson study" in Bellevue will occur formally only in a shortened version for language arts and in a modified form for the 14 teachers (along with an additional 8 facilitators from Bellevue) participating in the NBMP MSP grant.

While the future of Bellevue's lesson study cannot be fully predicted, the partnership is notable for two things. The first is its many successes, described above. The second, the longevity of the partnership, is notable given that reform attempts are frequently short-lived. In an accountability-rich environment like Bellevue's, substantial institutional support was required to sustain the initiative through waves of accountability pressure. With the MSP grant and the superintendent's initiatives it appears that Bellevue's lesson study, in various forms, will enter its second decade in the summer of 2011.

The institutionalization of Bellevue's partnership with NBMP stands in strong contrast to the many professional development efforts Bellevue entered under accountability policies during the same time period. These brought a diverse group of instructional strategies and technical assistance teams (some of which were well-regarded in the district), but the often contradictory ideas for rapidly turning around the district have faded from prominence. Teachers perceived the 'quick fix' strategies as fads to survive or adapt rather than professional norms and practices to adopt. Lesson study does not promise rapid reform, rather a journey of continuous professional

learning. For struggling schools this journey is the road less travelled, but the process built a broad base of support from teachers and administrators alike. As a result, lesson study and its footprint will likely be visible in Bellevue for years to come.