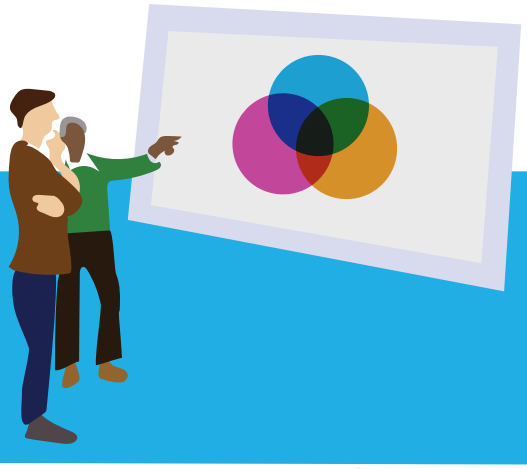
Six Lessons

to Facilitate Deep Ownership of Ambitious Instructional Reforms



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Why this brief?

Strengthening teachers' mathematical content knowledge and students' mathematical problem-solving skills: these are pressing needs[1], and ambitious goals. Since 2014, our organizations have been studying Philadelphia schools' take-up of an instructional reform that has demonstrated positive impacts on teacher knowledge and student learning in math.[2] The Ongoing Assessment Project (OGAP) is designed to deepen teachers' understanding of foundational concepts in math and engage them in regular formative assessment of their students' problem-solving strategies. **Implementing an ambitious educational reform such as this one is notoriously challenging, as project staff, district personnel, and school leaders struggle to move from initial professional development—where so much money is invested—to deep, routine engagement in schools and classrooms.** Teachers' instructional practices are difficult to change, and it is particularly hard to engender reform ownership in contexts full of competing demands.[3]

In our 2019 study of OGAP in Philadelphia,[4] one school's engagement with the project offered key lessons in how to successfully approach such a reform. School faculty and project staff layered supports and distributed leadership in unique ways, and carved out space for teachers to learn, practice, and take ownership of OGAP. **This brief shares six lessons from this school for those who wish to facilitate deep ownership of an ambitious instructional reform, including reform developers/staff, district leaders, and school leaders.** We conclude with tables of questions that readers in each of these roles can ask themselves when designing and/or implementing similar reforms.

Lesson 1: Engage principals in content-specific training to build deep understanding, enthusiasm, and commitment
Lesson 2: Distribute reform leadership
Lesson 3: Get everyone trained. And retrained and retrained…
Lesson 4: Protect "sacred" spaces of professional learning in school
Lesson 5: Give teachers time to collaboratively plan for instruction
Lesson 6: Ensure coherence, and support alignments between the reform and teachers' existing work

Mutually Reinforcing Supports Facilitate Deep Ownership of Reforms

Deep reform ownership comes from enacting these lessons in combination. Reform knowledge and support must be suffused throughout the school and coupled with time and space for teachers to learn, integrate, practice, and adapt the reform. Deep implementation can be threatened if key elements are not enacted in concert (as we learned in two studies of OGAP implementation).[5]

Without the support of a principal trained in the reform (Lesson 1), staff may not receive signals about how important it is and may not get the support they need to prioritize it. If only the principal advocates for the reform—that is, if leadership is not distributed (Lesson 2)—support can easily get pulled in other directions. If teachers are not given significant time to learn the reform (Lessons 3 and 4) and integrate it into their instruction (Lesson 5), or if they do not understand how it aligns with their existing routines and curriculum in the first place (Lesson 6), they are unlikely to sustain their efforts and engagement.

As you read the lessons described on pages 5-12, we encourage you to think about how they can be enacted in conjunction, as mutually reinforcing supports.

What is OGAP?

The Ongoing Assessment Project (OGAP) has been developed and refined over the past 20 years by mathematics educators from Vermont. OGAP is designed to provide targeted instructional responses to improve student learning by combining formative assessment practices—frequently assessing student understanding relative to learning goals—with contemporary research on how students deepen their understanding of important mathematics concepts. The OGAP process facilitates teachers' use of an ongoing cycle of assessing student understanding, analyzing student thinking, and making informed instructional responses. The *assess-analyze-respond* cycle is intended to reflect the ongoing nature of the teaching and learning process.

OGAP training, tools, and resources include:

- *Professional development*, most often through a summer institute and ongoing school-based followup visits throughout the school year. Training is focused on developing knowledge of specific mathematics topics and the related research base on student thinking, as well as training in the use of OGAP materials and strategies.

- *OGAP Frameworks* which synthesize problem contexts, problem structures, and learning trajectories for specific mathematics topics, including a visual representation of the learning trajectory that can be used to analyze evidence in student work and make informed instructional decisions.

- *Electronic item banks* and pre-assessments comprised of formative assessment tasks that are carefully designed to elicit students' developing understandings, common errors, and preconceptions or misconceptions.

- Suggested *routines and associated protocols* for teachers to regularly examine student work together in grade-level meetings, or professional learning communities, and discuss instructional strategies.

- Additional training is provided for a math teacher leader, who is expected to support the use of OGAP at the school.

A rigorous randomized control trial research study of OGAP adoption from 2014-2016 in two Philadelphia-area school districts found that the project positively impacted both teacher knowledge and student learning.

OGAP was first introduced in Philadelphia in 2014. Since 2016, OGAP professional development for schools in Philadelphia has been rooted in an initial weeklong training at a summer institute, held at the conclusion of the school year.

OGAP at Cedar Elementary

"Cedar" Elementary,[6] a school that almost exclusively serves low-income students of color, first engaged with OGAP in the summer of 2016. Cedar's principal, who has been the school's leader for nearly a decade, attended the training along with many of her teachers. Following her experiences at training, the principal eagerly signed on for continued school-year supports from OGAP.

Over the next three academic years (2016-17 to 2018-19), Cedar participated in many forms of OGAP professional development, including in-school trainer visits; afterschool and school-day workshops with other schools; and principal meetings. During each of those years, Cedar teachers continued to attend summer trainings. Some teachers were new to the school and attending their first OGAP training; others were returning to the school and to OGAP training, interested in learning a new content area in math.

In 2019, at Cedar, more than at any other school in our research, interviewees described OGAP use as institutionalized. OGAP had become "a routine for us…not even a directive anymore as much as it's what we do" (Ms. U, 1st Grade). The principal agreed: "OGAP is like saying our ABCs. It's part of our structure" (Principal Z). While teachers engaged in the project differently from classroom to classroom, baseline OGAP use[7] was widespread, and many teachers regularly incorporated OGAP problems into their classes multiple times per week.

The OGAP trainer who worked closely with Cedar staff confirmed to us that the school engaged deeply with OGAP and supported the project in a "systemic" way. The trainer herself was part of that system; she provided on-demand expertise to the school as it implemented the project. Thus, the supports detailed on the following pages were not enacted by the school alone. We hope that the following lessons from Cedar help reform developers/staff and district leaders—not just school leaders—to think about implications aligned to their roles in systems of support for ambitious instructional reforms.

Lesson 1:

Engage principals in content-specific training to build deep understanding, enthusiasm, and commitment

Principals need opportunities and time to build deep understanding of ambitious instructional reforms. Involving principals in professional development accomplishes several goals.[8] It strengthens content knowledge that principals need as leaders of instruction generally, and as leaders of the specific reform. Given the heavy load of responsibilities principals face, particularly in districts with more demands than resources, time for deep content learning is rare and must be intentionally carved out. Giving principals time to learn the intricacies of the content and pedagogy underpinning the reform can also grow their enthusiasm and commitment, as well as their understanding of how to support the reform in their schools.

Learning Alongside Teachers at Cedar

At Cedar, the principal had profoundly eye-opening experiences at her first OGAP training. At the weeklong professional development session, Principal Z said, she "learned that the way I had learned [math] was all wrong." The training shifted her understanding of how adults and children develop mathematical reasoning, and how teachers can facilitate math learning. She especially appreciated OGAP's emphasis on strengths—rather than just deficits—in students' understanding. The training helped Principal Z to understand how teachers could move students toward greater sophistication of problem-solving strategies by building on what students already knew.

After her initial professional development experience, the principal continued to attend trainings alongside her faculty in order to expand her understanding of the content and pedagogy underlying OGAP and to display her passion for the project:

> I've given up many of my summers…to get the training with them [the teachers], because I think part of my excitement rubs off on them. I'm learning with them; I'm struggling with them; I'm asking the same questions they're asking. I've learned. I feel I've grown a lot as a leader, being there learning with teachers.

The principal's commitment and enthusiasm had an impact on teachers. They frequently mentioned her as one of the project's fundamental supports:

> She gets really, really excited. Like when we do the training, she comes to the trainings with us. She's all in, she's totally invested. It's not like—we don't have one of those atmospheres where the principal says, "Go do this. I want results," and that's it. (Ms. O, K-4th Grades)

The Cedar faculty related that the principal tended to grab hold of new initiatives early, eagerly welcoming professional learning opportunities for her staff. When an initiative appeared to work for teachers and facilitate student learning, she strategically carved out space for it, sending teachers to professional development sessions and bringing trainers and other resources into her school. It was at her initial week of summer training that the Cedar principal began to form relationships with OGAP trainers, including a very close connection to the trainer who provided Cedar with years of ongoing support. This off-site trainer made herself widely available beyond professional development sessions:

> We know we can call her…It's kind of like she built a relationship with the school, they built a relationship that goes further than, "Here's your training. One and done." (Ms. U, 1st Grade)

The principal and her teacher leaders reached out to the trainer regularly for project guidance. Principal Z described working "hand in hand" with this trainer to support OGAP understanding and use at her school. The principal fundamentally believed that a team of people, rather than just herself, drove OGAP's life at Cedar—an approach we discuss in the next section on distributed leadership.

Lesson 2:
Distribute reform leadership

Reform leadership within a school should not rest solely with the principal. Distributing leadership[9] for a reform amongst teacher leaders and others able to play specific leadership roles has several advantages. Ever-busy principals can rely on knowledgeable colleagues to foster enthusiasm and to support understanding and use of the reform. Support can be widespread and on-demand—particularly where there are resources to "fully release" a trained, highly-qualified teacher from teaching responsibilities to serve in a position such as a "math lead teacher."

Lead teachers—especially those with classroom experience in the reform—can answer content-related questions for teachers, set expectations for project use, help teachers to understand pedagogical strategies, and even model how to translate reform recommendations into classroom practice. Other leaders can also include grade-level teachers, who can help to ensure that grade-specific reform supports are in close reach.

"Living and Breathing" Distributed Leadership at Cedar

Cedar's principal described herself as "living and breathing" distributed leadership. "I have an amazing staff," she said, and "I trust their leadership in my absence. There is no doubt that if I'm not here, my building will run." She entrusted a good deal of responsibility for the day-to-day support of math instruction to a math lead teacher who was released from teaching students. This math lead had the time to tailor supports to individual teachers' needs and provide on-demand help. Teachers appreciated the math lead's responsiveness:

> If I have a question about something, I know I can call her or email her, and she'll be right on top of it. (Ms. A, Grade K)

> If she sees we need support with something, or if we go to her and we need support with something, she's there to help us out. (Ms. U, 1st Grade)

> She'll come in and help, or give ideas, or whatever you need. (Ms. I, 1st Grade)

If you have taught, you know how rare it is to have someone who can provide you with "whatever you need" when it comes to instructional support. Fully releasing a teacher typically involves district and school leaders

making strategic decisions about how to prioritize scarce resources, or school leaders making their own allocation decisions. In this case, Cedar's principal carved out resources to release her math lead, and in doing so strongly facilitated OGAP use. The math lead had previously taught using OGAP, and she was enthusiastic about the project. A teacher described her as "really effective in really trying to push the OGAP thinking" (Ms. M, 4th Grade).

To help sustain OGAP use at Cedar, the math lead facilitated OGAP-focused Professional Learning Community meetings (see Lesson 4), helped teachers to choose OGAP materials, modeled instruction, and set specific expectations for teachers' OGAP use. Several teachers noted that these expectations helped to sustain their use of the project. Rounding out the team of in-school OGAP leaders were grade-level leaders and other OGAP enthusiasts—"OGAP queens," as the principal called them. These individuals helped to provide a network of OGAP knowledge and experience for the faculty to draw upon and supported fellow teachers' understanding and use of OGAP. Next, we turn to another factor that facilitates these elements: intensive, recurring professional development opportunities for staff who are learning and engaging in the project.

Lesson 3:

Get everyone trained. And retrained and retrained...

Professional learning opportunities for teachers and leaders need to be ongoing.[10] Professional development that has a shot at changing teaching practice cannot be a single event, but must be part of a process of continued learning. Ongoing professional development allows participants to deepen their knowledge and bring job-embedded problems of practice back to trainers and peers, to brainstorm solutions.

On-site trainings offer several advantages, including that they allow reform staff to learn school contexts and teachers to remain in their buildings. It takes deliberate planning to arrange in-school and off-site training opportunities, and conscious efforts to encourage attendance when trainings are not mandatory.

Ensuring that everyone possible is exposed to the reform ideas—including through repeated "backfilling" for teachers who missed the initial training or for new faculty—facilitates a widespread foundation of project understanding and helps to distribute reform leadership. Building a culture of ongoing professional learning is labor-intensive but necessary work—work that is made easier when trainings are engaging and profoundly instructive.

Training at Cedar: "It's Constant Here"

OGAP professional development for Cedars' teachers and leaders involved a week of summer training as well as school-year workshops and related in-school supports from OGAP trainers. In the words of one teacher, training "is not just a one-time thing. It's constant here" (Ms. K, 2nd Grade). The ongoing nature of training helped teachers to deepen their practice over time and to seek answers to questions that arose during their use of OGAP in their classrooms.

It also helped that teachers did not have to travel when attending on-site professional development sessions; trainers brought their supports directly to the school. In-school professional development days, co-planned by the OGAP trainer and school leaders, allowed trainers to develop an understanding of the school context, see teachers in their classrooms, and even model instruction for teachers.

Cedar's principal and math lead took pains to ensure that as many teachers were OGAP-trained as possible. Though attendance at OGAP summer training was not mandatory, teachers got the message that they were strongly encouraged to attend. According to the principal, "I needed to get everyone to go through the program. I think I did a pretty good job of getting most of us through there." In arranging trainings, the principal and trainers ensured that there were opportunities for backfill: that teachers who missed summer training could learn about the program during the school year. Both school leaders and teachers emphasized that having a mass of OGAP-trained teachers helped to suffuse project understanding and peer-to-peer project support throughout the school.

Leaders and teachers also noted that they enjoyed OGAP trainings. Faculty described trainings as "really engaging" (Ms. M, 4th grade); "the presenters made it really fun. So time flew by" (Ms. A, Grade K). Trainings were also "really informative" (Ms. A). Professional development exposed participants to core content knowledge, research on student learning, and pedagogical strategies. The design and length of the summer intensive training sessions gave teachers space and time for epiphanies about their own approaches to learning math. In the words of Cedar's math lead,

> I feel like [the trainers] are very good at having the adults in the room as teachers have "ah-ha" moments about their own learning. I think the value of having it all week is awesome. (Ms. Q, Math lead teacher)

This teacher leader noted that staff at Cedar generally had "a pretty positive mindset with professional learning," and the principal agreed. In fact, the principal said that in hiring, she screened for staff who would be willing to go above and beyond their teaching duties to take advantage of professional learning opportunities. She passed over candidates who did not appear interested in such opportunities and "built the culture here at [Cedar] where we take all the learning we can get" (Principal Z). Learning happened not only in trainings from OGAP but also in school-based meetings that brought teachers of the same grade together to practice and extend their professional learning: meetings discussed in the following section.

Lesson 4:

Protect "sacred" spaces of professional learning in school

Teachers need protected time to form Professional Learning Communities[11] where they can engage in and reflect on the reform's ideas and their implications. These "sacred" spaces grow teachers' comfort with the instructional reform, offering them unique opportunities to closely examine student work and exchange ideas about instructional responses. Such exchanges can even lead to profound shifts in mindset—shifts toward understanding the concepts underlying the reform better, as well as ways to enhance student learning.

Time for Professional Learning Community meetings must be fiercely protected—as a school leader, "you really have to have a grip on your PLC time" to ensure that meetings aren't cancelled when the inevitable conflicts of the school day arise (Principal Z). Teacher leaders (or other teachers trained to lead) can facilitate Professional Learning Community meetings—and when the principal attends these meetings, it can send strong signals about the importance of these spaces for professional learning. Protecting these meetings can also send signals that a given content area is important; if literacy typically reigns supreme in professional development and instructional attention, math-focused Professional Learning Community meetings can be a way of stressing the importance of a less-attended-to subject.

"Sacred Spaces" at Cedar

Roughly once a month, teachers at Cedar came together with their grade-level colleagues for OGAP-focused Professional Learning Community meetings. They brought student work on OGAP problems and sorted it using the OGAP frameworks that detailed different levels of problem-solving sophistication. They looked for patterns in students' strategies, strengths, and misconceptions, and they spoke about next instructional steps to address those patterns.

OGAP-focused Professional Learning Community meetings grew teachers' understanding of and comfort with the project. Of significant value to teachers at Cedar was that these meetings allowed them to *learn from their peers*, who brought different perspectives on their students' work—and even on their students' learning potential:

> My colleagues will point out something about one of my students that I'll go back and I'll say, "Oh my gosh, you're right. I didn't notice that." So that's pretty cool too. (Ms. E, 2nd Grade)

> Sometimes we don't see something somebody else does…Analyzing and seeing the different outlook that teachers have towards the students' abilities, whether [students] can do it or not…I always looked; I thought automatically, "Oh they can't do it." I didn't realize, "You know what? They can." (Ms. C, 3rd Grade)

One fundamental goal of OGAP is to help teachers shift away from understanding their students' abilities as fixed; for Ms. C, Professional Learning Community meetings provided a space to engage in this shift in mindset. For the principal—who was deeply invested in the notion that all children can learn, and who expected her teachers to share this view—this time for professional learning was "sacred." Practically, Professional Learning Community meetings were also an accountability mechanism; teachers knew they had to give students OGAP problems in advance of OGAP-focused meetings, which ensured at least baseline use of the project in their classrooms.

It was difficult to protect time for OGAP-focused Professional Learning Community meetings. Teacher absences or the need to discuss other issues could easily impinge on the meetings. Yet the principal and math lead at Cedar fought to prioritize these meetings, given how valuable they were:

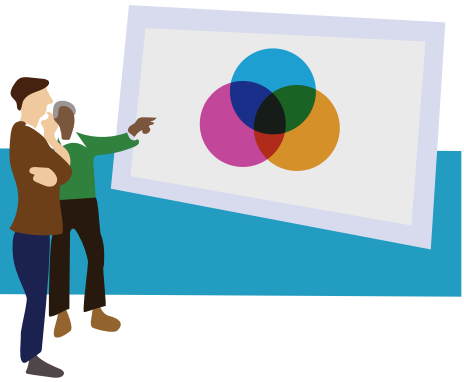
> You really have to have a grip on your PLC time. You really have to respect that. You have to have that time; no matter what's happening out here, this PLC has to happen. It's a matter of commitment to that time…I would say to the principals, you've got to respect that time no matter what happens. (Principal Z)

To signal the importance of Professional Learning Community meetings, the principal arranged teacher coverages to ensure the meetings could happen as scheduled, and sometimes sat in on them herself. In addition, the math lead frequently facilitated OGAP-focused Professional Learning Community meetings, lending these professional learning opportunities structure, expectations, and content expertise.

Professional Learning Community meetings focused on math helped teachers to prioritize the subject area, and some individual teachers also mentioned that they fiercely protected their "math block" (instructional time for math in the classroom). In a district where elementary teachers tended to feel that literacy dominated,[12] leaders and teachers at Cedar made conscious efforts to protect opportunities for math learning and instruction. They also made space for math instructional *planning*, as we discuss next.

Lesson 5:

Give teachers time to collaboratively plan for instruction



Professional Learning Community meetings are typically not the place where teachers craft the nitty-gritty elements of their daily instruction. Giving teachers separate time to engage in collaborative planning[13] can further facilitate deep ownership of an instructional reform. Teachers benefit from working with grade-level colleagues on the details of how and when to integrate reform-related materials and routines into their classes.

Sharing the work of planning deepens reform understanding and lessens the burden on individual teachers, who can rotate the responsibility for fleshing out and distributing lessons. Teachers emphasize that once they receive collaboratively-planned lessons, they need to have the freedom to adapt them to address the strengths and needs of the students in their individual classrooms.

"Working as a Team" at Cedar

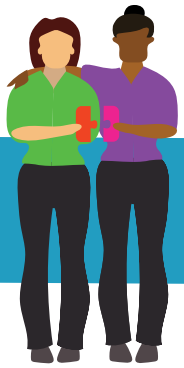
At Cedar, teachers came together weekly with grade-team colleagues to collaboratively plan instruction. *In general*, this routine allowed colleagues to learn from one another and saved individuals time. Because teachers are chronically stretched thin, time-saving measures are critical. *Specific to OGAP*, Cedar teachers indicated that their use of the project was facilitated by collaborating about which OGAP math problems they should integrate into their instruction (or, by having one person take the lead on choosing problems for the week). As a formative assessment system intended to be woven throughout existing instruction, OGAP can feel to some teachers like an added burden, but collaborative planning at Cedar reduced the feeling of being overwhelmed:

> Some other people might think of [OGAP] as just something extra that they have to add, but if they used it the way that we use it, where we incorporate it into our actual lesson plan on a weekly basis, then it wouldn't feel like it's an added thing that we have to do, you know? It would be more of just a useful tool to have in your classroom.
>
> …Right after I trained I kind of felt overwhelmed with it because, again, I felt like "Oh my gosh, it's just another thing to add to the list of everything else that we were supposed to be doing." But after planning with my grade group, it doesn't seem to be such a hassle. I guess you could say, it's more of just, it's just included into our planning. (Ms. W, 3rd Grade)

A second-grade colleague agreed that collaborative lesson planning reduced stress and facilitated OGAP use:

> Just being able to have each other to help pick the problems and review the problems is good …I think a lot of the reasons [teachers at other schools] get stressed out is because there's so much going on and so many different expectations. It's like, well, when? But because we work as a team …That's why I think we're able to do it every other day and be consistent with it. It is in our lesson plans. (Ms. S, 2nd Grade)

While having OGAP problems included in planning was helpful, teachers were not required to use those specific problems. They needed the flexibility to be able to adapt what they were given to meet their own classes' pacing and students' needs. As one teacher described, if an OGAP problem "doesn't work for your class or it's not something you wanted to do, then you can go find your own" (Ms. K, 2nd Grade). ELL instructors also described changing which problems students solved and changing the format of problems, which included adding images to aid in student comprehension. The balance of having the ability to adapt the project to make it their own *and* being able to save time planning by working collaboratively seemed essential to Cedar teachers' success in using OGAP. We revisit a related theme of the need for a degree of autonomy at the end of our final lesson below.



Lesson 6:

Ensure coherence, and support alignments between the reform and teachers' existing work

For feasibility, new reforms must be woven into existing demands. Given all the instructional routines, concepts, materials, and even programs that teachers often need to address within a subject area, the reform should cohere[14] with teachers' existing routines and curricula. Developers can support these efforts by creating tools that align elements of the reform to teachers' existing work, and district and school leaders can also support alignments.

Making it All Cohere at Cedar

At Cedar, OGAP aligned to existing routines in a few ways, including professional learning structures. Cedar teachers engaged in Professional Learning Communities before OGAP came to the school, and the principal credited this familiarity with helping the project to take root: "I do believe that as a school we PLC, and because we PLC, OGAP fits that model."

There was also coherence between OGAP's focus on student-driven conversations about math and the district's emphasis on student "number talks", or short discussions with students about how to solve math problems:

> I don't really have a problem fitting OGAP in. My school wants us to implement number talks, so that has to be in our math block…so basically, we trade off. So one day we'll do a number talk and one day we'll do OGAP. (Ms. E, 2nd Grade)

> We're not really even thinking about it. 'Cause we have to do some kind of warm up, number talks, anyway. So, it kind of fits right in. Slides right in there and it takes them out of the [curriculum] book… We've always tried to do something to get the kids moving. We never opened up a book and said, "Okay, we're just going to do this today." (Ms. U, 1st Grade)

In terms of alignments between project work and existing curricula, there were initial challenges with OGAP that needed to be addressed. We tracked the take-up of OGAP in Philadelphia schools and noted that teachers struggled to understand how and where to fit OGAP problems into their math instruction. Our CPRE colleagues developed an online tool ("OGAP Connections") that matched OGAP problems to specific points in the math curriculum widely-used in Philadelphia schools. Cedar teachers took advantage of the tool:

> I like how OGAP has collaborated where they synced together some of the prompts with what we're teaching at the time. So, we looked at the standards for the second quarter, and then I like how the OGAP has been more aligned to the standards that we're teaching. (Ms. A, Grade K)

Curricular alignment is critical. Teachers in our research who thought OGAP did not "go with" their curriculum (or who framed it as some kind of competing curriculum) rarely engaged with the project. Even at Cedar, one teacher noted, "in the past…I don't know that we understood they could kind of go together" (Ms. U, 1st Grade). Through deep, ongoing training and supports; in-school professional learning and planning opportunities; and the Connections tool, Cedar teachers eventually came to understand and take advantage of the alignment between OGAP and their math program. As Ms. S (2nd Grade) said, "you can definitely find that connection between the problems. It makes it all coherent."

While coherence between a project and a curriculum is key, so too is curricular flexibility. Teachers should be encouraged to exercise professional autonomy in using their existing curriculum, since asking them to stick to prescribed pacing and activities *and* layer in an additional project (particularly one built on responsiveness to students' needs) is likely to feel overwhelming (and potentially contradictory). Above, we shared that Ms. U said, *"We never opened up a [curriculum] book and said, 'Okay, we're just going to do this today.'"* Teachers at Cedar did not feel their curriculum had to dictate every moment of their math instruction. The school, according to the principal, should be "using [the curriculum] wisely. Picking and choosing what we want to use…It's a resource." Principal Z came to this view in part because it was not working for her teachers to stick to lessons, activities, and pacing as prescribed—this approach did not allow her teachers to "go deep" with concepts and address students' in-the-moment needs. The school's flexible approach to the curriculum offers another example of alignment: this time with the project's core tenets. Cedar teachers were familiar with the notion that they might need to pause regular instruction to respond differently-than-planned, in order to address student needs. This responsiveness is at the heart of OGAP's approach to math teaching and learning.

Conclusion

Ambitious instructional reforms like OGAP are central to efforts to enhance the quality of education, to better prepare students for college and careers. These reforms challenge teachers not only to learn and apply new teaching techniques, but also to learn how students develop their understanding of subject matter concepts and infuse this knowledge into lesson designs and classroom decision-making. Further, these reforms ask school leaders to organize supports for teachers in ways that provide sustained opportunities for teachers to engage with the new ideas. These efforts take a collective community effort to succeed.

This brief highlights six lessons for school faculty, working in conjunction with district leaders and reform developers/staff, to build deep ownership of ambitious instructional reforms. First, principals need to lead their school's commitment by learning, advocating, supporting, and prioritizing the reform. Second, the principal cannot do it alone, and must develop additional formal and informal leadership amongst faculty. Third, teachers need ample time to learn the reform ideas. In urban contexts particularly (where staff turnover is frequently a problem), this means multiple training opportunities. Fourth, professional learning involves ongoing, regular time built into the school day for teachers to interact and deepen their understanding and appreciation for the central and powerful ideas of ambitious instructional reforms. Fifth, and relatedly, this means teachers collaborating together—which often has implications for school scheduling. Sixth, this cannot mean an additional layer of work for already-stretched school faculty, and therefore requires careful attention to the alignment and coherence of new demands with existing work. As the experience of Cedar Elementary shows, these efforts can lead to rewarding experiences for educators and deeper learning for students.

Questions for Stakeholders

The lessons detailed above, enacted simultaneously at Cedar as elements in a mutually reinforcing system, helped the school to "own" OGAP. We conclude on pages 13-15 with tables of questions that reform developers/staff, district leaders, and school leaders can ask themselves as they strive to enact supports in conjunction and cultivate deep reform ownership.

Questions for Reform Developers/Staff

RELEVANT LESSONS	QUESTIONS FOR REFORM DEVELOPERS/STAFF
1. Principal Training	■ Is it an expectation of the reform that principals will receive professional development alongside their teachers? What additional training opportunities will be offered to school leaders?
2. Distributed Leadership	■ How and when will developers/trainers build relationships with school leaders, and what ongoing supports will they offer these leaders? ■ Does the reform include recommendations about how project leadership can be distributed within a school building?
3. Ongoing Professional Development	■ Is professional development designed to be intensive and ongoing? Engaging? Aligned to adult learning theory? ■ Is it mandated/recommended that as many teachers attend as possible? ■ What opportunities exist for teachers to be retrained?
4. Learning Communities	■ Does the reform include recommendations about how teachers should engage in professional learning at their schools? ■ Does the reform offer guidance around how Professional Learning Community meetings should be structured? ■ Are principals and other school leaders encouraged to engage with their teachers in Professional Learning Community meetings?
6. Alignment to Existing Routines/ Curricula	■ Does the reform align with teachers' existing routines and instructional requirements? ■ What can you do (e.g., what tools can you create) to help teachers understand the alignments that exist? ■ If you anticipate that teachers will feel a sense of incoherence when incorporating the reform, what can you do to address that sense of incoherence?

Questions for District Leaders

RELEVANT LESSONS	QUESTIONS FOR DISTRICT LEADERS
1. Principal Training	■ How can you support principals so that they can learn about the reform, help teachers to implement it, and distribute leadership for it? ■ Will principals be given the time and resources to attend professional development alongside their staff, as well as additional training opportunities? ■ How will you communicate about what principals and their teams need to support the reform on the ground? How will you address those needs?
2. Distributed Leadership	■ Are there resources for schools to release teacher leaders from teaching responsibilities, so that they can provide on-demand supports for teachers? If not, how will reform leadership be distributed beyond principals?
3. Ongoing Professional Development	■ How can you ensure that teachers are able to take advantage of intensive, ongoing professional development opportunities? ■ What supports will they/their schools need to make this possible?
4. Learning Communities	■ Are teachers in the district given time and support to engage in Professional Learning Communities at their schools? ■ Do principals and other school leaders have time and resources to engage with their teachers in Professional Learning Community meetings?
6. Alignment to Existing Routines/ Curricula	■ How does the reform fit in with schools' existing routines and instructional requirements? ■ What supports might schools need in order to understand how this reform fits in? ■ What kind of time will they need in order to incorporate the reform into their instruction? ■ If teachers are already navigating many competing instructional demands, is there something that has to give in order for this reform to be integrated? ■ If this reform seems at odds with another pedagogical approach that teachers are being asked to employ, how can the district work to address that dissonance?

Questions for School Leaders

RELEVANT LESSONS	■ QUESTIONS FOR SCHOOL LEADERS
1. Principal Training	■ Will you attend professional development alongside staff, to deeply learn the reform's content and approach; to think thorough the on-the-ground supports the reform requires; and to signal the importance of the reform to your staff?
2. Distributed Leadership	■ How and when can you build strong relationships with reform developers/trainers, or with other personnel who can help you to understand and support the project? ■ Who comprises your reform leadership team? Can you release a teacher leader from teaching responsibilities, so that they can provide on-demand reform supports for teachers? If not, how will you distribute reform leadership beyond yourself? ■ Who sets expectations at the school around engagement with the reform, and who monitors use?
3. Ongoing Professional Development	■ How will you support teachers so that they can take advantage of intensive, ongoing professional development opportunities? What supports will they need to make this possible? ■ How can you build a culture of thirst for professional learning in your school?
4. Learning Communities	■ Are teachers in your school given time and support to engage in Professional Learning Community meetings? ■ Will you and other school leaders carve out time and resources to engage with teachers in Professional Learning Community meetings? How will you protect these meetings from getting cancelled when the inevitable conflicts of the school day arise? ■ How will Professional Learning Community meetings be structured? Who will facilitate these meetings? What supports will your team provide to address questions that arise in Professional Learning Community meetings?
5. Collaborative Planning	■ Are teachers in your school given time and support to engage in collaborative instructional planning? Is there an expectation that some of that time will be used to integrate the reform into their instruction? What supports will teachers receive around collaborative instructional planning?
6. Alignment to Existing Routines/ Curricula	■ How does the reform fit in with your school's existing routines and instructional requirements? What supports might teachers need in order to understand how this reform fits in? What kind of time will they need in order to incorporate this reform into their instruction? ■ If teachers are already navigating many competing instructional demands, is there something that has to give in order for this reform to be integrated? If this reform seems at odds with another pedagogical approach that teachers are being asked to employ, how can you work to address that dissonance?

Endnotes

1 Ball, D. L., Thames, M. H., & Phelps, G. (2008). Content knowledge for teaching: What makes it special? *Journal of Teacher Education*, 59(5), 389-407; Conference Board of the Mathematical Sciences (2012). *The mathematical education of teachers II*. Providence RI and Washington DC: American Mathematical Society and Mathematical Association of America. Retrieved from https://www.cbmsweb.org/archive/MET2/met2.pdf; National Center for Education Statistics. (2019). *The nation's report card*. Washington, DC: Institute of Education Sciences, U.S. Department of Education. Retrieved from https://www.nationsreportcard.gov/mathematics/nation/achievement/?grade=4; https://www.nationsreportcard.gov/mathematics/nation/achievement/?grade=8

2 This research was supported by a National Science Foundation award (Grant #1621333). Opinions in this paper reflect those of the authors and do not necessarily reflect those of the granting agency.

3 See Berman, P. & McLaughlin, M. W. (1978). *Federal programs supporting educational change: Volume VIII: Implementing and sustaining innovations*. R-1589/8-HEW. RAND; Payne, C. M. (2008). *So much reform, so little change: the persistence of failure in urban schools*. Cambridge, MA: Harvard Education Press; Tyack, D. and Cuban, L. (1995). *Tinkering toward utopia: a century of public school reform*. Cambridge, MA: Harvard University Press.

4 During the 2018-2019 academic year, we conducted interviews with 55 School District of Philadelphia teachers and school leaders (from 15 schools) about their continuing use of OGAP beyond the first-year implementation period. We inquired into teachers' and leaders' interpretations of OGAP; teachers' use of the project; how beliefs and practices changed as a result of OGAP; and individual and institutional factors that facilitated project use. This brief draws data from 14 of those interviews conducted with Cedar teachers and leaders; an additional interview with the principal from 2017; and two informal interviews with OGAP trainers in 2018-2019. Findings are drafted in Flack, A., Hess, B., Pierce, J. & Brown, T. (2019). *A report on persistence: Teachers' engagements with OGAP beyond the first year of implementation*. Unpublished manuscript

5 Flack, A., Morrison, K. K., Hess, B. L., Koluch, C. A., & Pierce, J. C. (2019). *OGAP implementation in five Philadelphia K-8 schools: How teachers and leaders engaged with customized implementation supports*. Paper prepared for the Annual Meeting of the American Educational Research Association, Toronto, Canada,
April 2019; Flack, A., Hess, B., Pierce, J. & Brown, T. (2019). *A report on persistence: Teachers' engagements with OGAP beyond the first year of implementation*. Unpublished manuscript

6 The school's name and interviewees' names are pseudonyms.

7 Defined here as giving an OGAP problem to students in advance of a Professional Learning Community meeting and bringing student work on the problem to the meeting for analysis.

8 See literature on the role of principals in instruction and instructional reforms, including: Berman, P. & McLaughlin, M. W. (1978). *Federal programs supporting educational change: Volume VIII: Implementing and sustaining innovations*. R-1589/8-HEW. RAND ("The active support of the principal was vital to the project's implementation as especially to its continuation…Involvement of the principal in staff training provided the information and skills needed to help teacher implement the project and sustain project activities in the face of eventual staff attrition. More important, it signaled the staff that their efforts were supported and valued" (p. 30)); Coburn, C. E. (2006). Framing the problem of reading instruction: Using frame analysis to uncover the micro processes of policy implementation. *American Educational Research Journal*, 43, 343-349; Matsumura, L. C., Sartoris, M., DiPrima Bickel, D., & Garnier, H. E. (2009). Leadership for literacy coaching: The principal's role in launching a new coaching program. *Educational Administration Quarterly*, 45(5), 655-693; McLaughlin, M. W. (1990). The RAND change agent study revisited: Macro perspectives and micro realities. Educational Researcher, 19(9), 11-16; Sebring, P. B., & Bryk, A. S. (2000). *School Leadership and the Bottom Line in Chicago*. Chicago: Consortium on Chicago School Research. Retrieved from https://consortium.uchicago.edu/sites/default/files/2018-10/SchoolLeadershipAndTheBottomLine.pdf; Supovitz, J., Sirinides, P., & May, H. (2010). How principals and peers influence teaching and learning. *Educational Administration Quarterly*, 46(1), 31-56.

9 See Camburn, E., Rowan, B., & Taylor, J. E. (2003). Distributed leadership in schools: The case of elementary schools adopting comprehensive school reform models. *Educational Evaluation and Policy Analysis*, *25*(4), 347–373; Diamond, J. B. & Spillane, J. P. (2016). School leadership and management from a distributed perspective: A 2016 retrospective and prospective. Management in Education, 30 (4), 147–154; Halverson, R. & Clifford, M. (2013). Distributed instructional leadership in high schools. *Journal of School Leadership*, 23, 389-419; Harris, A. (2008). Distributed leadership: According to the evidence. *Journal of Educational Administration*, 46(2), 172-188; Heck, R. H. & Hallinger, P. (2009). Assessing the contribution of distributed leadership to school improvement and growth in math achievement. *American Educational Research Journal*, *46*(3), 659–689; Spillane, J. P. (2012). *Distributed leadership*. San Francisco, CA: John Wiley & Sons; Supovitz, J., D'Auria, J., & Spillane, J. (2019). *Meaningful & Sustainable School Improvement with Distributed Leadership* (#RR 2019–2). Consortium for Policy Research in Education, University of Pennsylvania. Retrieved from https://repository.upenn.edu/cpre_researchreports/112/

10 Literature that describes this and other features of effective professional development includes: Darling-Hammond, L., Hyler, M. E., and Gardner, M. (2017). *Effective teacher professional development.* Palo Alto, CA: Learning Policy Institute. Retrieved from https://learningpolicyinstitute.org/sites/default/files/product-files/Effective_Teacher_Professional_Development_REPORT.pdf; Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational Researcher, 38*(3), 181-199.

11 For discussions of Professional Learning Communities in schools, see: Harris, A., & Jones, M. (2010). Professional learning communities and system improvement. *Improving Schools, 13*, 172–181; Hord, S. (2009). Professional learning communities: Educators work together toward a shared purpose––improved student learning. *Journal of Staff Development, 30*(1), 40-43; Jones, C. M. & Thessin, R. A. (2017). Sustaining Continuous Improvement through Professional Learning Communities in a Secondary School. *Journal of School Leadership, 27*, 214-241; Mindich, D. & Lieberman, A. (2012). Building a learning community: a tale of two schools. Stanford, CA: Stanford Center for Opportunity Policy in Education. Retrieved from https://edpolicy.stanford.edu/sites/default/files/publications/building-learning-community-tale-two-schools.pdf; Shim, S. (2019). Five years of collaborative inquiry in a high school professional learning community for improving science instruction. (Doctoral Dissertation). Retrieved from ProQuest. (13886420); Stoll, L., Bolam, R., McMahon, A., Wallace, M., & Thomas, S. (2006). Professional learning communities: A review of the literature. *Journal of Educational Change, 7*, 221–258. doi: 10.1007/s/10833-006-0001-8; Voelkel, R. H. & Chrispeels, J. H. (2017). Within-school differences in professional learning community effectiveness: Implications for leadership. *Journal of School Leadership, 27*, 424-453; Wells, C. M. & Feun, L. (2013). Educational change and professional learning communities: a study of two districts. *Journal of Educational Change, 14*, 233-257. doi 10.1007/s10833-012-9202-5

12 See Flack, A., Morrison, K. K., Hess, B. L., Koluch, C. A., & Pierce, J. C. (2019). *OGAP implementation in five Philadelphia K-8 schools: How teachers and leaders engaged with customized implementation supports*. Paper prepared for the Annual Meeting of the American Educational Research Association, Toronto, Canada, April 2019; Flack, A., Hess, B., Pierce, J. & Brown, T. (2019). *A report on persistence: Teachers' engagements with OGAP beyond the first year of implementation*. Unpublished manuscript.

13 Literature on collaborative instructional planning includes: Darling-Hammond, L. (2010). *The flat world and education: how America's commitment to equity will determine our future*. New York, NY: Teachers College Press; Darling-Hammond, L., Wei, R. C. & Andree, A. (2010). *How high achieving countries develop great teachers*. Stanford, CA: Stanford Center for Opportunity Policy in Education, Stanford University. Retrieved from https://edpolicy.stanford.edu/sites/default/files/publications/how-high-achieving-countries-develop-great-teachers.pdf; Wei, R. C., Darling-Hammond, L., Andree, A., Richardson, N., Orphanos, S. (2009). *Professional learning in the learning profession: A status report on teacher development in the United States and abroad*. Dallas, TX. National Staff Development Council.

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