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Building Better PL:
How to Strengthen
Teacher Learning

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Introduction

The evidence base around teacher professional learning (PL) has advanced significantly over the past decade. Robust research efforts and recent literature reviews offer new insights into how—and how not—to design PL programs in ways that maximize their potential for improving teacher practice and student experiences. Yet many PL design features are not yet standard across the field. The Research Partnership for Professional Learning (RPPL) wrote an **initial brief in this series** focused on debunking some long-standing myths about effective teacher PL. Here, we turn to emerging evidence on the promising features of PL that support ongoing teacher learning and development.

Our interpretation of the recent literature suggests that several design features characterize PL that more effectively improves instructional practice and student outcomes across classrooms and contexts. Some focus on how PL is delivered (formats) and others on what gets covered (foci). While any given PL experience for teachers reflects a combination of these features, understanding the specific formats and foci that boost teacher and student outcomes across studies is instructive.

For the how of instructional delivery, research suggests the following PL formats can be particularly effective at producing changes in instructional effectiveness: (1) built-in time for **teacher-to-teacher collaboration** around instructional improvement; (2) **one-to-one coaching**, where coaches work to observe and offer feedback on teachers' practice; and (3) **follow-up meetings** to address teachers' questions and fine-tune implementation. For the what, there is growing evidence that PL may be more productive when it focuses on (1) building **subject-specific instructional practices** rather than building content knowledge alone; (2) supporting teachers' instruction with **concrete instructional materials** like curricula or formative assessment items rather than focusing only on general principles, and; (3) explicitly attending to teachers' **relationships with students.**

In this brief, we describe each of these design features, review the existing evidence base supporting its use, and pose questions to guide future research into each area. We also explore why these features appear effective across programs and studies. While research has not answered this definitively, the existing evidence suggests two general principles: (1) effective PL **supports teachers' day-to-day practice,** and (2) effective PL involves **accountability for change and improvement.** In other words, successful PL tends to focus more on improving what teachers do in classrooms. And, it features follow-up from other educators—a kind of social accountability—for instance, a coach who revisits the classroom to check on progress or peers who depend on one another to try out a new instructional technique.

Critically, we note that while many of the design features above can support changes in instructional practice and improve student outcomes, there is little evidence about their impact on educational equity. There are two dimensions to this challenge. First, most research to date has focused on evaluating subject-specific PL, with a smattering of newer studies focused on PL around teacher-student relationships. Many fewer evaluations have focused on PL meant to make classrooms more equitable, by ensuring that each student receives what they need to develop to their full social and academic potential. This gap in the literature leaves us unable to make claims about this critical topic. Second, most causal research on PL tends to focus on whether a specific program worked rather than exploring how it affected different types of teachers and students, and under what conditions it was effective. Thus, we do not have strong evidence about what design features are particularly effective in schools serving large concentrations of students living in poverty or from historically marginalized backgrounds. We revisit this call for more research around equitable practices and impacts on historically marginalized groups in the conclusion.
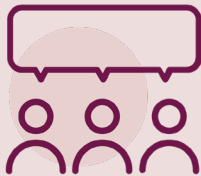
PL Features and Formats (How)

Encourage peer collaboration for improvement

Rely on coaching to get the work done

Add follow-up meetings to address teacher concerns

Content of PL (What)

Target subject-specific instructional practices over content knowledge

Prioritize practice-supportive materials over principles and precepts

Deliver more PL focused on relationships with students

What Works: PL Design Features That Promote Program Success

PL Formats

Encourage peer collaboration for improvement

What: There is growing evidence that well-structured collaboration, formal or informal, can support the ongoing development of teachers' instructional skills.[1] However, "collaboration" is a loaded term. It can mean many things, from discussing personal challenges facing individual students across a grade-level team to coordinating curricular materials across grade levels, to the social supports that help promote teachers' well-being. These types of collaboration may have value for teachers and the school community, potentially improving student outcomes. But, given our focus on how effective PL can improve teacher practice and student outcomes, we emphasize the research on one type of collaboration—what Patrick (2022) calls "collaborating for improvement"—peer-to-peer efforts that center directly on improving instruction.[2] The central question is how to structure such opportunities to support teacher development most effectively so they provide robust support around teachers' day-to-day practice and accountability for change. Such efforts can include direct discussion or rehearsal of instructional practices, as well as activities such as feedback from peer observations or sharing strategies to engage students and families in their learning. They can take many forms, from formal professional learning communities (PLCs) and teacher teams to informal collegial interactions in the school to group work in PL sessions.

Evidence: There is widespread and rigorous evidence that teachers can and do learn from each other, that teachers improve their practice more in schools that are more collaborative workplaces, and that interventions designed to promote teacher collaboration around instructional practices can improve teacher practice and student outcomes.[3] Many successful teacher PL programs have collaborative components and leverage PLCs to drive ongoing learning.

However, evidence also suggests that collaboration as a simple structural reform does not necessarily pay off. Building teacher team time into the school day is only valuable if that time is well-used. In other words, how collaborative approaches are designed and implemented matters a great deal. While we do not have good causal evidence about the importance of different design features, recent evidence suggests some key elements that likely matter for collaboration to be successful. Little's seminal work in this area suggests that collaborative efforts fall along a continuum from weak to strong, ranging from experiences where teachers share stories and swap practices to those where they jointly and authentically work in an interdependent effort to change instructional practice.[4] Collaboration can have the strongest impact on practice when it embodies joint work around shared and specific goals—for example, working together to adapt, collectively, curricular materials to meet the needs of students in the school, rather than trading preferred instructional approaches or working vaguely on "improving practice."[5]

Research also points to the organizational conditions necessary to support successful collaboration in schools. In Tennessee, Patrick finds that teachers engage in more collaborative work—and they find that work more valuable—when they have dedicated and protected time for learning together, as in a PLC. Echoing other studies, she also finds that teachers rate their collaborations as more valuable in schools that benefit from ongoing and

engaged support from school administrators.[6] Effective principals help align teachers on a common purpose and provide the organizational conditions necessary for success, including strong and supportive cultures that promote ongoing development.[7]

Why It Works: The "egg crate" nature of K-12 schooling, with individual teachers teaching groups of students on their own behind closed doors, has deep roots. There is mounting evidence that broader engagement among teams of teachers can help break down this counterproductive isolation; collaboration is now considered a key feature of effective schools.[8] We also know that learning does not happen in isolation— well-structured collaboration can promote learning in several ways. First, teachers learn directly from each other. While teachers may have a lot to learn from external experts or coaches, teachers in a school have a range of expertise rooted in the specific context of the school, expertise which can be shared. Peers can also provide different and potentially more context-specific feedback to inform ongoing work. Collaborative engagement also means that learning is more likely rooted in day-to-day practice. Second, collaborative structures provide social accountability that encourages teachers to try new practices.If a teacher says they will try out a specific practice and needs to return to the PLC the following week, there is added incentive to test out the practice. Thus, collaboration for improvement is a promising approach to support the ongoing learning and development of teachers.

Next steps for research

Explore which features of collaborative work matter most—for instance, whether it matters more if PLC leaders have substantial expertise in the subject area and in facilitating or that they have developed strong relational trust with teachers, or whether affording teachers more agency over their collaborative time improves teacher learning more.

Better understand how the design of collaborative work can support learning—for instance, the kinds of collaborative structures that are most important to ensuring successful teacher learning.

Understand mechanisms by which collaboration works by varying structures and routines for collaboration—for instance, collaboration can promote learning through sharing practices from peers or by providing social accountability to engage in and refine new practice. Both may be important, but understanding the underlying mechanisms in more detail will help design more effective collaborations.

Rely on coaching to get the work done

What: Coaching is one of the most robust and longest-running forms of teacher PL in the U.S. By one recent estimate, two in five U.S. schools have a reading coach, one in four have a math coach, and about a third have a non-subject-specific coach. [9] We also know that individuals with many different job titles—including teachers, associate principals, and principals—can also serve as coaches. Coaching is thus one of the largest investments the U.S. makes in improving the classroom experiences of its children.

We know that coaches perform a variety of functions in schools. The most classic—evoked by the name "coach"—is 1:1 work with teachers, observing and offering feedback on instruction. This activity can take many flavors, from quick consultations to elaborate cycles of pre-observation co-planning, modeling, observing, and post-observation feedback. Coaching also varies in its approach to fostering teacher learning, with some coaches relying more heavily on modeling instruction and offering directive feedback and others investing in guiding teacher reflection and planning for improvement. Coaches also differ in the amount of agency and control they provide teachers over the topics and activities discussed during 1:1 meetings.

We also know that coaches perform many other functions in schools. Most lead grade-level or grade-band team meetings, during which time attendees may study student data, analyze curriculum materials, connect over specific students and their needs, and discuss schoolwide policies and improvement efforts.

Coaches spend time planning for these meetings, and also spend time supporting the needs identified in these meetings, such as locating materials for a lesson on chemical reactions or helping specific students access additional services. Finally, we know that many coaches spend a substantial amount of time executing administrative tasks, like filling out paperwork associated with state testing or overseeing new initiatives in the building. [10]

Evidence: The best evidence about coaching comes from a recent meta-analysis by Matt Kraft and David Blazar. [11] These authors defined coaching relatively narrowly—as featuring regular 1:1 work with teachers on specific aspects of their practice over a sustained period —and identified studies that contained this element. They found that across dozens of studies in diverse subjects, programs that included coaching worked to improve both average classroom instructional quality and student outcomes.

We know that successful coaching programs tend to be time intensive. For instance, teachers in Patricia Campbell's study of math coaches worked with their coach for three years, seeing benefits to their students in only the second and third years. My Teaching Partner, a popular coaching program focused on classroom climate and instructional support, typically engages teachers in six to nine coaching cycles over the course of a year. [12] Successful programs featuring less frequent coaching cycles often pair that coaching with other program elements, such as new curriculum materials or narrowly defined instructional practices.

The descriptive literature also provides a sense of how coaches can best use their time. Work by Jenn Russell and Rip Correnti suggests that coaching that includes focused and specific pre-lesson planning can improve teaching. And, focusing on 1:1 coaching as opposed to administrative duties is likely the most effective use of coach resources; many scholars suspect that coaches who spend their time largely engaged in administrative duties are not as effective as those who spend more time in classrooms, observing instruction and facilitating teacher learning. Coaches who work for schools are

more likely to find their time co-opted for administrative duties.[13]

Finally, the selection, training, and support of coaches appear critical. Evidence from TNTP suggests that coaches likely vary in skills and capacity to work with teachers, with some coaches helping their teachers make more gains than others.[14] Some of these differences are likely driven by differences in contexts, including leadership support—principals or district leaders clearing a pathway for coaches to work directly with teachers on instructional improvement—which we know plays a significant role in the success of coaching programs.[15] And some of this effect may be driven by differences in coach style and coach-teacher relationships, which are crucial; in our own experience, poor relationships can limit the number of teachers coaches serve, and also limit teacher engagement and uptake of coach ideas.

Why It Works: Coaching supports teachers' day-to-day practice by starting with existing practice, then working outward from it to integrate new instructional techniques. Coaching can also be personalized to teachers' needs, celebrating areas of excellence and working on areas for improvement. Additionally, many coaching models allow teachers to identify problems of practice jointly with their coach, increasing the relevance of coaching to teachers' personal growth.

Finally, because of its cyclical nature, coaching offers built-in accountability. Teachers know that their coach will return to their classroom to continue their work together, and thus may attend more fully to implementing the content discussed in 1:1 meetings.

Next steps for research

Test different approaches to coaching—for instance, one where coaches are more directive of teachers' actions and one where coaches rely more on structured teacher reflection for growth.

Identify characteristics of and training for successful coaches—for instance, whether relational skills or instructional expertise (or both) characterize the coaches who help teachers make the largest gains, and whether coach training programs can improve upon needed skills.

Identify school conditions that support coaching—for instance, the specific kinds of support from leadership teams that enable and sustain 1:1 coaching.

Test ways to engage more teachers in coaching—for instance, whether relationship-building exercises or low-lift mini-cycles can bring more teachers into the experience.

Explore whether coaching dosage matters—for instance, whether the number or density of coaching cycles affects coaching outcomes.
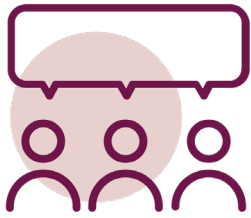
Add follow-up meetings to address teacher concerns

What: Many successful PL efforts share a low-cost feature following the initial program launch: teacher-driven follow-up sessions. During these sessions, teachers share their experiences putting the program into practice and receive feedback from both peers and program staff. These sessions are typically not long—often whatever fits in after school hours or in a brief classroom visit—and usually occur within a month or two after initial implementation.

Follow-up of this kind can occur in varied settings, from program-wide meetings to grade-level teams to 1:1 coaching. For instance, teachers implementing a cognitive tutoring program were visited by program staff who provided feedback on teachers' use of the program and helped teachers solve problems they were having with the curricula.[16] In another example, middle school teachers implementing a new earth science curriculum unit initially learned about that unit in a three-day professional development program, then teleconferenced with the curriculum designers and researchers every two weeks after implementation.[17] These sessions can also occur as a portion of regular PL meetings by reserving time to surface teacher concerns with the changes brought by new curriculum materials, new classroom routines, or new instructional practices.

Evidence: Interventions that rely on teacher PL, particularly to enhance the implementation of new curricula, technology, and SEL programs, often include post-implementation follow-up meetings. A recent review of STEM instructional improvement programs found that the presence of such meetings boosted overall program effectiveness.[18]

Why It Works: Opportunities for teachers to have their questions about implementation answered by peers or program staff may work for several reasons. First, they are based on teachers' problems of practice—the parts of new programs that teachers find challenging or opaque. Many of these meetings are intentionally collaborative—teachers share ideas with one another with the goal of enhancing program implementation. In doing so, teachers may learn from one another and even adapt and improve the program in subtle, yet important ways, such as by customizing the program to the needs of their students or school. Program staff can provide advice that enhances implementation fidelity.

Finally, follow-up sessions may serve as a powerful accountability lever: teachers are more likely to have program implementation at the front of their minds when they know they will need to report on how it went to peers and program staff. That increases the likelihood a new program will make it into classrooms.

Next steps for research

Identify the kinds of follow-up that are most effective—for instance, whether a quick 1:1 meeting with a program coach or a grade-level team meeting produces better outcomes for teaching and learning.

Use planned variation in follow-up meetings to better understand how they work—for instance, by emphasizing social accountability more than support for day-to-day practice in some, and vice versa in others.

Content of PL

Next, we shift to teacher professional learning content—specifically, the topics that PL is designed to help teachers learn. Where content for students might include fractions or punctuation, content for teachers similarly includes a variety of topics, from general classroom management to how to use a new curriculum to working with multilingual learners. So what foci increase the likelihood of PL program success?

Target subject–specific instructional practices over content knowledge

What: Over the past two decades, teacher PL has taken two main approaches to improving instruction and student outcomes. One focuses on building teachers' subject matter knowledge, with the hope that ensuring teachers have a firm grounding in mathematics, science, phonics, or how language works would lead to gains for students.[19] Another approach focuses more on practice—getting teachers to deploy new instructional methods in their classroom, often by providing detailed modeling, analysis, and even rehearsals of those new methods. [20]

Evidence: In science and mathematics, where the research base is expansive enough to understand which pathway is most likely to benefit students, the evidence clearly favors programs that improve teachers' instructional practice. In a recent synthesis of 37 studies, Gonzalez and colleagues (2022) find that program-induced changes in teachers' instructional practice correlate positively with changes in student

outcomes, whereas program-induced changes in teacher knowledge do not.[21] Mary Kennedy's synthetic review of PL programs found that those focused on new instructional strategies—and why they work—tended to have larger effects than programs that focused on conveying a body of knowledge to teachers.[22] And, a recent study by Roth and colleagues directly compared content-deepening elementary science PL to PL focused on video-based lesson analysis.[23] The content-deepening PL focused on helping teachers make sense of scientific ideas, with the goal that teachers would use this knowledge to plan and teach lessons. Although teachers spent the same amount of time in both PL experiences, students of teachers in the lesson analysis PL outperformed students of teachers in the content-deepening PL by a whopping 20 percentile points on a researcher-developed assessment. A more detailed analysis in this paper suggests that this effect worked via changes in teacher practice rather than changes in teacher content knowledge or pedagogical content knowledge. All of this suggests that a practice focus seems to change a practice more than a focus on knowledge changes practice.

Some nuance exists in these findings. A few scholars hypothesize that teacher content knowledge may matter when connected to the curriculum materials teachers use in their classrooms. [24] That is, teachers need to learn the curriculum's specific definitions, representations, procedures, and examples. Although this idea has not been rigorously tested, we view it as highly plausible. Further, Gonzalez found that PL opportunities that improved teachers' knowledge of how students learn particular subject matter content—not content knowledge per se, but a type of pedagogical content knowledge—appear beneficial for student learning.[25] Finally, these findings may be limited to only STEM, as similar analyses do not exist in ELA.

Why It Works: We can think of two reasons why content-only focused PL may not move the needle on classroom instruction and student outcomes. One is that teachers may not learn enough subject matter content to make a difference in classrooms. Most PL is limited in duration, meaning that radically deepening

teachers' understanding of a subject matter is difficult. However, a second reason is that, by focusing on building knowledge, these programs often fail to offer much support for teachers' day-to-day practice. In fact, PL focused on topics like number systems or key ideas in science may simply be hard to translate to practice, because teachers must connect that learning to the curriculum materials or lesson plans they already use. In some cases, the representations of subject matter content in the PL may conflict with those used in curriculum materials, or those materials may require adaptation in order to deploy the content contained in the subject matter PL. That increases teachers' work to translate PL learning to practice and may explain the lack of efficacy of programs that produce gains in teachers' subject matter knowledge.

By contrast, PL focused on subject-specific instructional practices more clearly delineates what teachers must do in classrooms to enact new ideas. In the Roth study described above, teachers analyzed videos of classroom instruction with an eye to specific instructional strategies—eliciting student thinking, engaging students in reasoning about data—and then returned to their classroom with project-developed lessons that directly supported these instructional strategies. The PL thus provided teachers with support for their day-to-day practice by identifying and analyzing key instructional moves and provided teachers with materials for carrying those out in classrooms.

Next steps for research

Generate more rigorous and causal tests of PL focused on instructional practice vs. content—as well as determining whether there might be an optimal balance between the two.

Test whether focusing on instructional practices also works outside of subject-specific instructional practices—for instance, whether PL designed to promote students' socio-emotional learning also works better if it focuses on practices or if it needs to build relevant content knowledge first.

Explore whether certain kinds of content knowledge can make a difference to student learning—for instance, whether building knowledge of the specific content embedded in curriculum materials is more effective than focusing on more abstract forms of content knowledge.

Understand why content-focused PL does not produce the gains we had hoped— for instance, through qualitative work examining the translation of this knowledge to classroom practice.

Prioritize practice–supportive materials over principles and precepts

What: PL varies in the degree to which its theory of action bets on practice-supportive materials—curricula, lessons, assessment items—versus training teachers in more generalizable principles and precepts. Practice-supportive materials have the advantage of providing teachers with concrete ways to reach PL goals, but may leave teachers without an understanding of the philosophy behind new instructional approaches, thus limiting changes in classrooms to the specific materials provided. PL that emphasizes more general principles may leave room for broader and more lasting instructional changes, but may also leave teachers with the task of integrating those changes into existing lessons, materials, and assessments. As an example of these two approaches, PL could focus on helping teachers learn how to use a bank of formative assessment items in their classroom, or PL could focus on helping teachers learn design principles for creating new formative assessment items. The former is more concrete and would provide teachers with specific assessment items to use in their classroom, but they would not necessarily learn general principles for generating formative assessments, limiting the impact of PL when teachers shift content areas or grade levels, and when adapting aspects of the program to local conditions or needs.

Evidence: Current evidence favors focusing PL on practice-supportive materials over general principles. Two recent meta-analyses—one of programs that contain coaching and one of STEM instructional improvement programs—find that when PL opportunities focus on curriculum materials, they yield larger effects on student outcomes than PL programs that do not.[26] Teachers studying student data do not typically move the needle on student outcomes, but PL opportunities seem more successful when that data is linked to materials that provide specific next steps in the classroom. [27] And, at least two successful formative assessment programs provide teachers with item banks to use regularly in their classroom; a formative assessment program focused on general principles failed, in fact depressing student achievement versus a no-treatment control.[28]

Practice-supportive PL may vary substantially in how it looks on the ground. In the Lynch et al. study on STEM instructional improvement programs, some PL accompanying new curriculum materials was relatively brief. Resendez and Azin, for instance, describe 16 hours of PL over a several-month period to help teachers learn to use a new math curriculum. [29] Such PL programs primarily focus on a well-developed intervention and are intended to facilitate and deepen implementation. Other programs supply lessons or materials to supplement and support other foci. For instance, Roth and colleagues' PL has lesson analysis at its heart, but also supplies lessons for teachers to learn from and use. Lesson study, in its instantiations in both the U.S. and Norway, does the same.[30]

Why It Works: Why might the evidence favor PL programs that offer practice-supportive materials over PL focused more on general principles? Such PL provides teachers with support for their day-to-day practice, while PL focused on broader principles requires teachers to do additional work to integrate those principles into their instruction. For instance, it is far easier to begin to elicit and use student contributions when the PL focused on materials that support this practice. Rather than having to adapt their curricula or existing assessments, or find new material on the internet, teachers can draw on materials developed or provided by PL designers. Supportive materials likely also increase uptake of the program and may improve the quality of implementation.

Next steps for research

Generate more rigorous and causal tests of PL focused on materials vs. PL focused on general principles—for instance, can ensure all students' participation in learning rigorous content best be accomplished via focusing on specific instructional practices, or providing broader principles and changing mindsets around this topic.

Test whether practice–supportive materials are more successful than principles and precepts in topics other than ELA and STEM, where most studies have been conducted— for instance, whether providing broad principles for designing culturally responsive lessons results in more and better-quality lessons than providing teachers with curriculum that embodies these design principles.

Understand whether there are aspects of principle–focused PL that can augment materials–based PL—for instance, emphasizing the "why" behind a key program design element.

Deliver more PL focused on relationships with students

What: For decades, the consensus among scholars held that teachers require subject-specific PL to meet the demands of standards-based reforms and improve student achievement.[31] Yet teachers are never working on only one thing (e.g., teaching math) but instead are working on many things simultaneously, including fostering productive learning environments, engaging students, and meeting individual students' needs. Relationships with students are critical to this work. And, new evidence suggests that improving teacher-student relationships may be as important as improving subject-matter instruction—and potentially easier to address.

Correlational studies involving classroom observation rubrics and student surveys often find that classroom climate predicts the amount of learning that occurs among students.[32] More positive climates—where teachers and students enjoy being with one another, treat one another with respect, and interact warmly— appear to yield more student learning. Likewise, friction between teachers and their students can result in less instructional time, more disciplinary referrals, and less overall learning. Thus, decades of descriptive research suggest that a pathway to improved learning may lie in improving how students and teachers interact with each other.

Evidence: Experimental evidence shows that programs that work to improve teacher-student relationships see benefits in terms of enhanced student outcomes. My Teaching Partner emphasizes teachers' regard for

students and the creation of emotionally supportive environments and produces both gains in student achievement and reductions in racial disparities in classroom discipline.[33] Some successful social-emotional learning programs contain elements meant to improve teacher-student relationships.[34] Recent work by Jason Okonofua at Berkeley suggests that a brief empathy-based intervention for teachers can cut their disciplinary referrals, especially among at-risk students. Notably, Okonofua's program (along with similar work by Hunter Gehlbach, in which teachers imagined the possible perspectives of their most perplexing students) took only a few hours, rather than days or weeks, of teacher time.[35]

Importantly, as noted above, some PL that improves teacher-student relationships seems also to close gaps in disciplinary referrals. The suspension rate for Black students is three times that of white students.[36] Given that in 2020, students lost 11 million instructional days to suspensions, such disparities may drive differences in students' well-being and achievement outcomes.[37] Closing such gaps is critical to achieving more equitable schooling outcomes.

Why It Works: Improvements to teacher-student relationships may enhance learning in several ways. By cutting down on classroom disruptions and disciplinary referrals, students are simply exposed to more instruction. Warm, caring interactions may encourage student engagement during lessons and enable more sophisticated academic work that relies on students taking risks in front of their teachers and peers, such as solving challenging math problems or discussing personal interpretations of a text.

Next steps for research

Understand whether the PL features that appear to boost teacher practice in STEM and ELA translate to efforts to improve student–teacher relationships—for instance, test rigorously whether coaching, collaboration, and supportive curricula also work to support teachers' development of skills in building strong and trusting relationships with students.

Understand the interaction between relationships and improved instruction—for instance, learning whether supporting teachers in improving relationships also enhances the impact of PL related to content-specific instructional practices.

Explore how individual and contextual factors affect relationship development—for instance, learning how PL can support a diverse set of teachers in building relationships with a diverse set of students across a wide variety of contexts, and how teachers' and students' identities affect relationship development.

Examine the mechanisms behind this improvement process—for instance, identifying which aspects of classrooms change first, and how these changes might enable other changes in building strong relationships.

Conclusion

This report describes six key design features that recent evidence suggests are likely to improve teacher practice and student outcomes. Two core themes connect these features: **PL appears more effective when it couples robust support for teachers' day-to-day practice with genuine teacher-level accountability for change and improvement**.

The first theme isn't entirely new. For the last two decades, observers have urged that teacher learning be "situated in practice"—meaning focused on specific instructional practices and, often, artifacts like classroom video, curriculum, student work, or student assessments and the resulting data.[38] The important distinction we make here is to emphasize that successful PL focuses more on improving what teachers do in classrooms. That is, evidence suggests that successful PL programs start from problems of practice—in teachers' existing instruction, in district-adopted instructional approaches, or teacher-identified puzzles to solve—rather than from abstract ideals. The evidence further suggests that pairing this grounding in practice with concrete supports, like curriculum materials or items and routines for formative assessment, can promote PL's success. Without concrete supports for new practice, PL is likely to fall short, because integrating new knowledge and approaches into one's classroom takes both cognitive resources and time focused directly on improving practice.

Accountability is a more novel idea in the context of teacher professional learning. When policymakers talk about accountability, most mean narrowly focused accountability that incentivizes teachers to improve student performance on state assessments or teacher evaluation systems. In fact, the literature is very mixed on whether such systems improve student outcomes. However, the teacher PL literature suggests that more relational, socially-based accountability can be quite helpful in supporting changes in outcomes.[39] Teachers are more likely to engage with change when there's follow-up from other educators—from the coach who revisits the classroom to check on progress or from peers who depend on you to try out a new instructional technique or analyze a lesson. This kind of social accountability increases the possibility that teachers will try—and stick with—both the improved practices and the work of improvement itself.

These themes flow through the formats and foci that we highlighted as likely having an impact on instructional practice and student outcomes. However, one of RPPL's goals over the next several years is to continue to build the evidence base in the field, using rigorous empirical approaches to learn about the effectiveness of specific PL design features at scale and across contexts. We hope the field takes up this challenge as well.

Specifically, we see three specific areas for further inquiry, related to the limitations of our review and the existing evidence base.

First, this report identifies a series of next steps for research into the specific features described above. As noted, it is important to acknowledge that the evidence base for these features remains relatively tentative and is largely correlational in nature. Thus, **we need continued research to understand whether these PL formats and foci are effective in producing teacher and student learning.** However, we do not mean to imply that these should be the only areas of focus in a research agenda on professional learning. Indeed, RPPL has articulated a broader **learning agenda** that lays out what we see as valuable areas of inquiry to move the field forward.

Second, we need to not only build a stronger body of evidence about the impact of these design features on teacher practice and student learning, but also **explore the reasons why they work, for whom they work, and the conditions necessary to make them more successful.** For example, we know that coaching can support teacher learning, but improving teacher PL at

scale requires us to understand why coaching matters, what features are most important, and what conditions are necessary for coaching to be most effective. It also requires us to understand whether these lessons apply to teachers and schools serving students living in poverty and those from historically marginalized groups.

Finally, much of the research reviewed here comes from research in STEM fields and ELA. While the findings from these studies may generalize to teacher learning more broadly, we do not know that they do. **A critical area of inquiry in this regard centers on efforts to make classrooms more equitable.** We know little about the best ways to improve equitable instruction and how to support educators in developing culturally responsive teaching practices. These questions are critical ones that RPPL plans to take up in the coming years.

Given the tremendous adaptive challenges in teaching produced by the pandemic and the dramatic need to change how instruction happens—particularly for students from historically marginalized groups—this report serves as a call to reflect on our field's ongoing professional learning practices and to continue to build a robust evidence base about how to best support teachers' ongoing development.

Methodology for this Review

To identify the PL format and foci described in this brief, we drew directly from recent reviews and meta-analyses of teacher professional learning as well as recent rigorous studies on the topic. In doing so we relied largely on studies that identified a causal impact of PL on teaching and learning to increase our confidence in the lessons this literature holds for PL design features. However, in the case of the meta-analyses, relying on causal studies does not mean the findings are themselves causal. That is, we do not know with certainty that the program formats and content described here are truly the driving elements behind successful programs, because these formats and content may co-occur with other factors that actually drive success. Thus, we see this brief as an attempt to document our best understanding of effective practices suggested by recent research evidence, not as a definitive statement that professional learning designed around these practices and principles will be effective. We also included descriptive studies when they helped illuminate when and why specific design features are particularly effective. Careful descriptive research can illuminate mechanisms and suggest the optimal conditions for success of the PL features we identify.

Any attempt to describe "what works" faces important challenges. First, most rigorously-evaluated PL focuses on "boutique" programs, often developed by scholars or researchers, implemented with volunteer teachers, and characterized by generous resources that enable extended teacher learning. Whether we would see the same lessons from a body of work drawn from more typical PL is an open question. Next, context matters. While in the aggregate the studies we review explore teacher professional learning in a range of settings, most individual studies take place in only one or two districts, making it hard to understand the extent to which local context plays into program success or failure.

We focused heavily in this review on PL meant to improve teachers' skill and instructional practice. However, PL also may work through other mechanisms

we do not examine. Sharing information about students during peer-to-peer collaboration, for instance, can help teachers best address the needs of specific students. Collaborative or curriculum-focused PL may also increase instructional coherence among teachers within and across grades, making student learning more efficient as they progress through school. While important mechanisms by which PL activities may work, our focus on PL meant to improve individual teachers' skill and practice means we left these issues aside for this review.

Finally, we are limited in the level of detail we can provide about PL features associated with success. We do not know, for instance, whether providing teachers choice in what to study, engaging teachers in reflection, or providing concrete models of practice make PL more efficient and effective. Here, the field continues to need more research. One of RPPL's goals over the next several years is to continue to build the evidence base in the field, using rigorous empirical approaches to learn about the effectiveness of specific PL design features at scale and across contexts.

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