

Essential Information for Education Policy

Research Points

Teaching Teachers: Professional Development To Improve Student Achievement

Good teachers form the foundation of good schools, and improving teachers' skills and knowledge is one of the most important investments of time and money that local, state, and national leaders make in education. Yet with the wide variety of professional development options available, which methods have the most impact on student learning?

Research on professional development is scattered throughout subject areas, with its focus ranging from classroom processes and structures to teachers' personal traits.¹ We have limited our review to learning opportunities for teachers that are explicitly aimed at increasing student achievement.

What Are Teachers Learning?

FOCUS ON TEACHING SKILLS

Research on the links between teacher learning and student achievement is divided into two waves. The first wave, beginning in the 1960s, focused primarily on "generic" teaching skills, such as allocating class time, providing clear classroom demonstrations, assessing student comprehension during lectures, maintaining attention, and grouping students.

These studies showed small to moderate positive effects on students' basic skills,² such as phonetic decoding and arithmetic opera-

tions; in a few cases, reasoning skills also improved. For example, in an experimental study of fourth-grade mathematics in urban schools serving primarily low-income families, student achievement was greater when teachers emphasized active whole-class instruction — giving information, questioning students, and providing feedback — and more frequent reviews, among other measures. Student achievement also was enhanced when teachers learned to follow the presentation of new material with "guided practice" — asking questions and supervising exercises.³

FOCUS ON SUBJECT MATTER AND STUDENT LEARNING

In the 1990s, a second wave of research delved deeper into student learning, focusing on students' reasoning and problem-solving potentials rather than only on basic skills.⁴ It suggested that professional development can influence teachers' classroom



practices significantly and lead to improved student achievement when it focuses on (1) how students learn particular subject matter; (2) instructional practices that are specifically related to the subject matter and how students understand it; and (3) strengthening teachers' knowledge of specific subject-matter content. Close alignment of professional development with actual classroom conditions also is key.

In one study, Thomas Carpenter and colleagues randomly placed first-grade teachers either in a month-long workshop that familiarized them with research on how students understand addition and subtraction word problems or in professional development that focused on mathematical problem-solving strategies but not on how students learn.⁵ Teachers who participated in the student learning workshop more often posed complex problems to students, listened to the processes students used to solve those problems, and encouraged them to seek different methods of finding answers. By contrast, teachers who were not in the workshop emphasized basic fact recall, getting answers quickly, and working alone rather than in groups.

Student achievement was consistently higher and growth in students' basic and advanced reasoning and problem-solving skills was greatest when their teachers' professional development focused on how students learn and how to gauge that learning effectively. This suggests that professional development that is rooted in subject matter and focused on student learning can have a significant impact on student achievement.

In another study, Paul Cobb and colleagues provided opportunities for teachers to examine new curriculum materials, solve mathematics problems that they would teach to students, and then study student learning.⁶ At the end of the school year, these teachers' students did better on conceptual understanding and maintained their basic (computational) skills.

Although research in teacher professional development is dominated by mathematics studies, good examples of such research also exist in other subjects including science,⁷ literacy,⁸ and basic reading skills.

In reading, Deborah McCutchen and colleagues studied two groups of kindergarten and first-grade teachers.⁹ One group received professional development that improved their knowledge of word sounds and structure, whereas the other group had no addi-

tional training. Students' reading performance then was tracked over the course of a year. Teachers who got the extra training spent more time explicitly teaching the building blocks of words and language, and their students did better on tests of word reading, spelling, and in first grade, comprehension.

LINKING PROFESSIONAL LEARNING TO TEACHERS' REAL WORK

To be effective, professional development must provide teachers with a way to directly apply what they learn to their teaching. Research shows that professional development leads to better instruction and improved student learning when it connects to the curriculum materials that teachers use, the district and state academic standards that guide their work, and the assessment and accountability measures that evaluate their success.

Two recent studies that support focusing professional development on curriculum have implications for states striving to connect education policy to instruction. David Cohen and Heather Hill found that teachers whose learning focused directly on the curriculum they would be teaching were the ones who adopted the practices taught in their professional development.¹⁰ These teachers embraced new curriculum materials when they were supported by training and, in some cases, workshops about the new state-required student assessment. The study also showed that students of teachers who participated in this kind of curriculum-focused professional development did well on assessments. Unfortunately, most teachers received less effective forms of training.

In another study, Michael Garet and colleagues surveyed a nationally representative sample of teachers who, in the late 1990s, participated in the Eisenhower Professional Development Program, which emphasized mathematics and science.¹¹ The study found that teachers were more likely to change their instructional practices and gain greater subject knowledge and improved teaching skills when their professional development linked directly to their daily experiences and aligned with standards and assessments.

How Much Professional Development Is Enough, and How Well Is It Working?

Studies suggest that the more time teachers spend on professional development, the more significantly they

continued on page 4

Changing How Teachers Teach

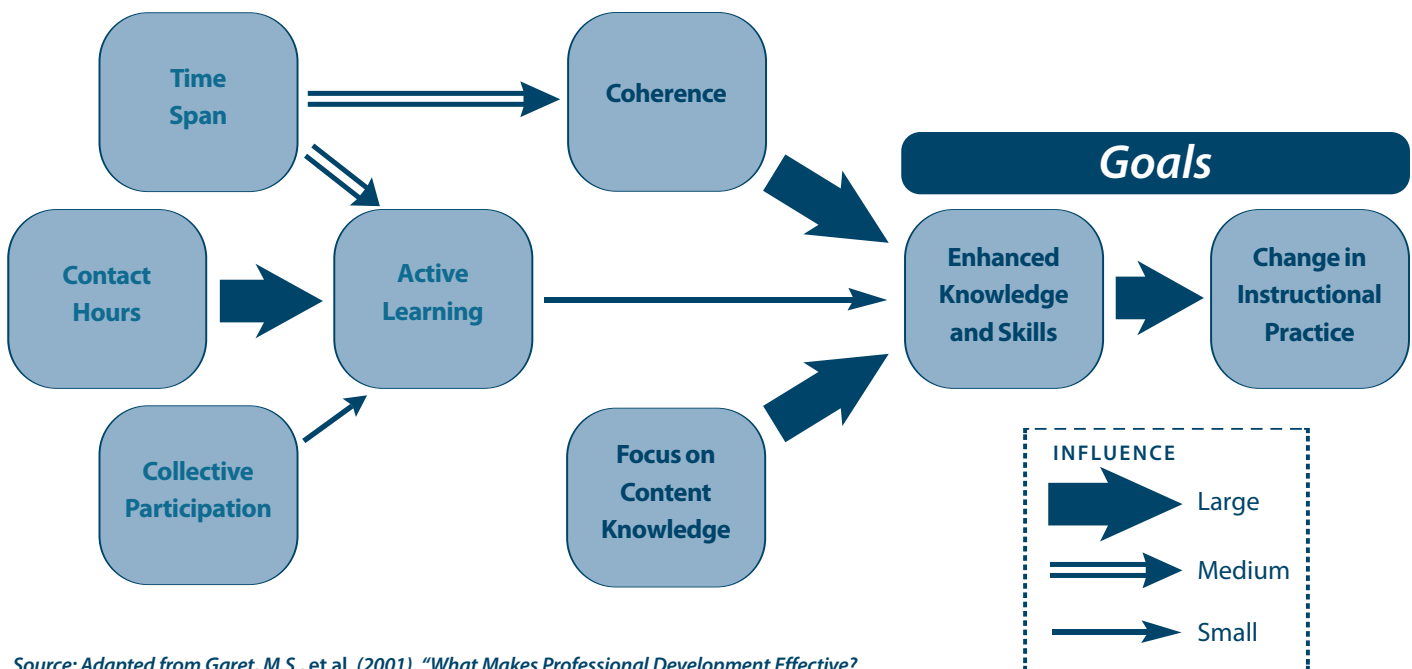
In a study of a federal program supporting professional development, teachers reported that a **focus on content knowledge** was one of two elements that had the greatest effect on their knowledge and skills and led to changes in instructional practice. The other element was **coherence**, which includes building on what teachers already have learned, aligning professional development with state and district standards and assessment, and encouraging communication among teachers who are striving to reform their instruction in similar ways.

Other things that mattered but had less impact were time span (how long the training lasted over time) and contact hours (the number of hours spent in professional development).

Therefore, professional development is likely to be more effective if it is sustained over time and involves a significant number of hours.

Collective participation, which involves professional development designed for groups of teachers from the same school, department, or grade level, tended to create more active learning (e.g., observing and being observed while teaching; planning for classroom use of what was learned in professional development; reviewing student work; and giving presentations, leading discussions, and producing written work), and this had some effect on teacher knowledge and skills.

Aspects of Teacher Professional Development and Their Relationship to Better Instruction



Source: Adapted from Garet, M.S., et al. (2001). "What Makes Professional Development Effective? Results from a National Sample of Teachers." *American Educational Research Journal*, Vol. 38, No. 4 (winter), pp. 915–945. Figure 1.

Facts at a Glance

► Teachers are more likely to change their teaching practices when professional development is directly linked to the program they are teaching and the standards and assessments that they use.

► Teacher professional development can improve student achievement when it focuses on teachers' knowledge of the subject matter and how students understand and learn it.

What Should Policymakers Do?

change their practices^{12, 13} and that participating in professional learning communities optimizes the time spent on professional development.^{14, 15}

Therefore, it is striking that one national survey found that in nine of 10 content areas, most teachers said that they spent one day or less on professional development during the previous year.¹⁶

While adequate time for professional development is essential, studies also show that by itself, more time does not guarantee success. If the sessions do not focus on the subject-matter content that research has shown to be effective, then the duration will do little to change teachers' practices and improve student learning.

Most states and school districts do not know how much money they are spending on professional development for teachers or what benefit they are actually getting from their outlays because they do not systematically evaluate how well the additional training works. An effective evaluation includes an examination of actual classroom practices, the training's impact on teacher behavior, and its effect on student learning. Evaluation should be an ongoing process that starts in the earliest stages of program planning and continues beyond the end of the program.

Conclusion

Our changing goals for learning, coupled with shifts in curriculum emphasis and a deeper understanding of teacher learning and student thinking, have led to new findings about the impact of teacher professional development and how best to sharpen teachers' skills and knowledge.

What matters most is what teachers learn. Professional development should improve teachers' knowledge of the subject matter that they are teaching, and it should enhance their understanding of student thinking in that subject matter. Aligning substantive training with the curriculum and teachers' actual work experiences also is vital.

The time teachers spend in professional development makes a difference as well, but only when the activities focus on high-quality subject-matter content. Extended opportunities to better understand student learning, curriculum materials and instruction, and subject-matter content can boost the performance of both teachers and students.

First, make sure that professional development focuses on the subject matter teachers will be teaching.

Second, align teachers' learning opportunities with their real work experiences, using actual curriculum materials and assessments.

Third, provide adequate time for professional development and ensure that the extended opportunities to learn emphasize observing and analyzing students' understanding of the subject matter.

Fourth, ensure that school districts have reliable systems for evaluating the impact of professional development on teachers' practices and student learning.

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