

Review of Evidence: Professional Learning in Schools

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Executive Summary

Professional Learning that positively affects student achievement and growth:

- Is learner-centered, focusing on individual teachers' strengths and needs.
- Sets specific goals for learning that are based in research on best teaching and learning.
- Focuses on content knowledge, how students learn, instructional goals, and effective strategies
- Links knowledge with practice, and provides opportunities for educators to try new skills, receive feedback, and adjust multiple times.
- Is collaborative with colleagues.
- Uses modeling and internship processes for coaching vs. undefined mentoring.
- Employs two to six modes of active learning, and is embedded in practice.
- Is sustained over 14 hours or more, and deep with follow-up of initial learning over time.
- Balances individual learning needs with collaborative learning at the school, grade, or department level.
- Engages teachers in assessment of students, review of student work, and curricular design.
- Is aligned with and supportive of the larger organizational goals and learning activities, has outcome measures aligned with learning goals of the PL, and includes evaluation over time by the teachers of the effectiveness of implementation of the PL.
- Is supported by leadership through working with teachers and supporting the PL goals.

Professional Learning that may have some impact on teacher knowledge but which has not been shown to affect student outcomes:

- Is short and shallow (e.g., one-time workshops).
- Is motivated primarily by pay or licensure requirements.
- Is not integrated with teachers' professional lives or the improvement goals of the school or district.

Online opportunities for accessing PL resources, connecting with colleagues, and working in professional communities can be effective if well-designed, especially if connected with in-person (hybrid models).

PD works when school leaders trust and support teachers as learners and when districts trust and support schools as learning organizations.

Description

This working paper is a review of nearly 300 sources of research evidence related to the professional learning of P-14 educators. The focus was on understanding whether and how professional learning impacts or interacts with student achievement and growth (both academic and other); the characteristics of professional learning activities that seem to show effects on students or school change; and the support systems and interactions of educators with others that research may indicate are an important part of successful professional learning. The review was conducted with a goal of providing decision-makers in educational practice settings (e.g., school and district leaders, professional learning teams) an understanding of the current research as a “conceptual map” of key issues and concepts. This summary paper is the overview of that conceptual map. Each assertion is based on a synthesis of numerous sources of research judged to be of adequate rigor and quality. This summary working paper will be followed by an extensive systematic review resource, to be posted on the C-PEER website (www.C-PEER.org).

Method

Numerous research sources were consulted, including online databases Academic OneFile, ERIC, Google Scholar, and PsychInfo; online clearinghouses of research available at the Institute of Education Sciences, National Bureau of Economic Research, National Center for Analysis of Longitudinal Data in Education Research (CALDER), National Center for Education Statistics, National Science Foundation, National Staff Development Council, Stanford Center for Opportunity Policy in Education, Wallace Foundation Knowledge Center, and What Works Clearinghouse; and book resources from the National Academies Press and the Prospector statewide system of western states libraries. Key search terms included *human capital*, *human capital development*, *in-service learning (training)*, *induction*, *instructional coaching*, *instructional leadership*, *knowledge management*, *mentoring*, *organizational learning*, *professional development*, *professional learning*, *professional learning community(ies)*, *professional learning teams*, *teacher development*, and *teacher retention*. All articles are from peer-reviewed publications, or in the case of working papers, sponsored by highly reputable, politically-neutral organizations. Books were selected with consideration of author reputation in the field. In some cases, journals were searched systematically, issue-by-issue: these include *American Education Research Journal*, *Educational Administration Quarterly*, *Journal of Teacher Education*, and *Review of Educational Research*.

Disciplines and Levels Represented

Nearly all sources are education-specific, but some informative sources from similar social-service sectors of business, nursing, social work, and medicine were occasionally included. Relevant grade levels represented in the final selection of literature span from early childhood education through secondary, with some post-secondary education-specific references included. Subject areas with some representation in the selected research include early literacy, general elementary education, information/technology literacy, mathematics, reading, science, social studies (and economics), STEM, “21st century skills,” and writing.

Effect of Professional Learning (PL) for Educators on Students

Findings on the relationship of teacher PL to student achievement and growth outcomes have been mixed, at best. This is related to three issues:

- Data representing outcomes have been poorly defined, unavailable, and/or unused, so many studies of PL have had weak or no findings related to student outcomes.
- Studies have often been conducted on new or experimental PL programs, so it is possible that poor outcomes are a function of the content of the PL rather than simply a PL activity. Great PL teaching skills that are not effective with student learning will not demonstrate effects on student outcomes. Yoon et al. note that “[PL] should be based on a carefully constructed and empirically validated theory of teacher learning and change (Ball & Cohen, 1999; Richardson & Placier, 2001; Sprinthall, Reiman, & Thies-Sprinthall, 1996)” (2007, p.4). The National Science Foundation notes that effective PL is informed by best learning theories “that underlie school mathematics reform” applied to teachers learning, including “1) knowledge of mathematics; 2) knowledge about mathematics; 3) useful and personally meaningful theories of mathematics learning; 4) knowledge of students’ development of particular mathematical ideas; 5) ability to plan instruction of this nature; 6) ability to interact effectively with students” (Borasi & Fonzi, 2002, p. 39)
- PL programs are often too short or too shallow to have an effect. It takes time for teachers to understand their own and their students’ needs, learn to substantively adjust practice, and change beliefs that may impact teaching. Loeb & McEwan note that PL programs “on average, have not had positive effects on students. Exceptions to this rule seem to appear only when programs are concentrated and intensive” (p. 162).

Yoon et al. (2007) found that Studies with greater than 14 hours of PL (delivered over time, with follow-ups on original learning), had some positive and significant effect on student achievement. They offer the following conceptualization of how PL plays out in a system that eventually impacts students (Figure 1).

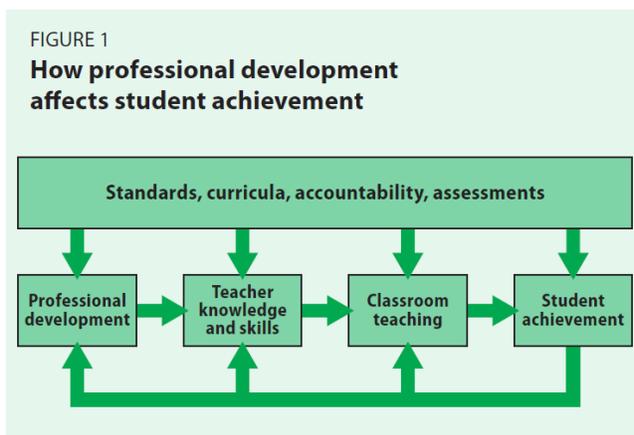


Figure 1. Yoon et al., 2007

While it is important to note that the few meta-analyses found in our literature review had few (9 to 16) studies that met evidence standards related to impact on student achievement outcomes, we did find a growing body of evidence that PL can and does impact student outcomes when appropriately

designed and delivered. A National Staff Development Council report (Darling-Hammond et al., 2009) summarized several key findings, including that sustained and intensive PD for teachers is related to student achievement gains. The USDOE selected eight early childhood educator PD projects that demonstrated both rigor of research method and effects on student growth (Halle & Fennell, 2011) found common traits, including "...linking of "knowledge-focused" and "practice-focused" components... e.g., "the content of the knowledge-focused activities often followed and reinforced by on-site practice-focused activities." Beyond this, the form of the PD projects varied considerably, though they all used a mix of types of active learning, included elements of observation and discussion of actual teaching and learning activities, had components spread over time, and embedded at least part of the learning within practice sites and working with colleagues (p. 4). A meta-analysis in 2009 (CCSSO) found effects of PL on student outcomes were typically small to medium, but statistically significant, with largest effect sizes found for elementary grade levels. Other meta-analyses have noted that where the data used better aligned with specific content and learning goals of the PL program, effects were noticeably stronger.

We highlight the developing consensus about key elements of effective PL in the next section. After that we offer some investigation into the relationship of teachers as learners to PL. One challenge for practitioners and researchers considering PL effectiveness is that it is not uncommon to find PL that is "well-designed" but does not impact teachers' practice; or conversely, short one-shot workshops that somehow do seem to impact. We cite Opfer & Pedder who articulate this issue, consistent with the topic points we present in the remainder of this review:

"...teacher learning tends to be constituted simultaneously in the activity of autonomous entities (teachers), collectives (such as grade level and subject groups), and subsystems within grander unities (schools within school systems within sociopolitical educational contexts). These systems and subsystems associated with teacher learning are interdependent and reciprocally influential. As a result, to explain teacher professional learning, one must consider what sort of local knowledge, problems, routines, and aspirations shape and are shaped by individual practices and beliefs. How are these then framed by the other systems involved? ... In this way, teacher learning is intimately connected to learning at other levels of the system." (Opfer & Pedder, 2011, p. 379)

Key Elements of Effective PL Activities

Effective PL is planned as a coherent part of a larger organizational improvement strategy, and supported as such. It involves examining and addressing values, assumptions, and beliefs that underlie both individual and collective practices. As background, we highlight Darling-Hammond, Wei, & Andree in their assessment of "how high-achieving countries develop great teachers," which includes "mentoring for all beginners, coupled with a reduced teaching load and shared planning time, extensive opportunities for ongoing professional learning, embedded in substantial planning and collaboration time at school, [and] teacher involvement in curriculum and assessment development and decision making" (2010, p. 1). These elements are consistent across the studies of PL activities that affect student achievement and growth.

Elements of PL design that demonstrate effect on student outcomes

A fairly large body of evidence¹ comprised of rigorous studies that investigated the effects of PL on student achievement outcomes identify the following important elements of effective PL:

- **It is learner-centered** (the teacher being the learner), **building on individual teachers' strengths and needs.** Content of PL should not be generic, but grounded in teachers' discipline and/or grade level (for elementary). It should be appropriate to the teacher's change needs and current level of skill, so that implementing the PL content is not unreasonable.
- **It sets specific goals for learning, and addresses important content knowledge.** Learning focuses on helping teachers “improve their knowledge of how students learn in the specific subject area, how to teach the subject with effective strategies, and the important connections between the subject content and appropriate pedagogy so that students will best learn” (CCSSO, 2009, p. 21). Learning goals and PL activities are informed by the best learning theories and focused on what educators will teach and/or how they will work with learners.
- **It provides opportunities to test their understanding, try out new skills, receive feedback, reflect, and try again.** Effective PL activities are active learning, with time for instructional planning, discussion, and consideration of underlying principles driving the PL content and proposed changes to practice.
- **It occurs within a collaborative environment, with collective participation of groups of educators from a school, discipline, or grade level** (for elementary).
- **It includes supports from mentoring, coaching, or engaging in a form of internship.** Modeling of new skills and specific feedback to learners as they try these out is important.
- **It includes multiple modes of activities over time, often 2 to 6 different types.** Examples include observation and discussion, conference sessions, classroom mentoring, professional networks, study groups, coursework or initial in-service seminar, leading a discussion group, reviewing student work, committee work (focused on active group learning and product development), coaching or mentoring, and internship.
- **The duration is significant, ongoing, allows time for teachers to learn new strategies and grapple with implementation.** It is matched to the complexity of the content being conveyed.
- **It includes preparing teachers to review and interpret student work, including developing or conducting assessments and other data.** These actions are to set goals for PL that are specific to teachers' needs, as well as to actively involve teachers in monitoring the progress and effects.
- **It is appropriate for the larger organizational context, aligned with school and district goals and standards for practice, and connected/coherent with other school initiatives.**

¹ The following sources contributed to this list: Ball & Cohen, 1999; Borasi & Fonzi, 2002; Bransford, Brown & Cocking, 1999; Bredeson, 2003; Center for Public Education, 2013; CCSSO, 2009; Darling-Hammond et al., 2010; Diamond, et al., 2013; Garet et al., 2001; Guskey, 2003; Loucks-Horsley, Hewson, Love, & Stiles, 1998; Penuel et al., 2007; Porter et al., 2001; Richardson & Placier, 2001; Sprinthall, Reiman, & Thies-Sprinthall, 1996; Supovitz, 2001; What Works Clearinghouse, 2008; Wilson & Berne, 1999; Yoon et al., 2007; Zaslow et al., 2010

Online and hybrid designs

In recent years, online and hybrid (part online, part in-person) options have become increasingly feasible and popular, as these offer solutions to issues of time, access. Educators can reach PL resources and even collaborate with others at more convenient times, and even asynchronously where activities (such as collaborative curriculum improvement) may permit team members to work independently at times convenient for them. While there are a limited number of rigorous studies in this area due to its relative newness, findings are consistent:

- Online resources and activities (anchored by constructive learning activities, such as collaborative review of curriculum, design of new assessments, or critical-thinking discussions), when linked with classroom practice and in-person elements, provide an effective way to improve PL.
- There are few differences between totally online and totally face-to-face PL activities, *provided that each is designed to incorporate the key features of effective PD.*
- Well-designed virtual resources and PL activities, including collaboration communities, can help alleviate issues of time, access, and challenging scheduling to facilitate in-person work.
- The writing and thinking components required by online interaction may actually encourage deeper work by participants, and the virtual aspect may help to connect educators in different sites, permitting them to benefit from a broader range of perspectives and approaches to teaching.
- Leaders can learn effectively in online environments as well, with limited studies showing similar or better effects of hybrid models compared to in-person, including ability to change and deepen leadership thinking and perspectives on complex topics.
- Limited research exploring digital badging, or microcredentials specific to mastering defined sets of skills and knowledge, have been effective with educators, allowing them to better customize PL for their own workplace needs.
- Success in online environments relies heavily on the learner's self-motivation and ability to set and regulate clear goals. This may mean that online PL options should be linked with coaching and goal setting supports to ensure better effect for more educators.

Teachers' Learning and Motivation

Understanding teachers' motivations for participation in PL is important for design and successful outcomes of PL activities. There are two sides to this issue that interact and must balance. Teachers tend to focus on "procedural knowledge directly applicable to practice" (Scribner, 1999, p. 9), which unfortunately implies a tendency for making relatively minor adjustments to current practices. If that is acceptable, then PL can be found adequate, but if PL is intended to foster deeper change (and make an impact on student outcomes), it is important to move teachers beyond "nuggets" of information and "tips and tricks of the trade." Many of the elements of effective PL listed above are important in moving teachers deeper. Research indicates that intrinsic motivations for teachers to participate in PL include content knowledge needs (especially at the secondary level); pedagogical skill deficits; challenges to classroom management; and gaps in knowledge about their students (Scribner, 1999). Some studies have found teachers motivated by concern for lack of student

achievement and motivation—a sense of “moral obligation.” It is also important to understand the “interwoven nature of experience gained within a range of professional contexts, including classroom, school, local [district settings], and national [options]” (Poulson & Avramidis, 2002, p. 533). We appreciate Poulson & Avramidis’ description capturing this issue:

“[data] indicate the importance of the affective and personal dimensions within longer-term professional development, and also the creative interplay between autonomy and collegiality. The non-linear, and often long-term, nature of career development is also emphasized...”
(p. 533)

It is likely that the need to help individual teachers recognize their own needs and opportunities for change through PL that is deeper than quick “tips” to benefit their current practices is the reason that connecting PL work with student work, assessments, and data seems to be important (Argyris, 1993; Argyris & Schon, 1978; Deal, 1984; Huberman & Miles, 1984; Senge, 1990). More on this topic is presented below.

Important Leadership Supports for Effective PL

The Wallace Foundation notes that “principals are uniquely positioned to ensure that excellent teaching and learning spreads beyond single classrooms” and that “high-performing schools with strong achievement gains tend to have a high degree of ‘collective leadership’... principals are most effective when they [work collaboratively] towards clear, common goals with district personnel, other principals, and teachers” (2011, p.4). This is consistent with findings about common elements of effective PL, which indicate the following are essential:

- active participation of the principal in setting clear goals for improvement (working *with* teachers),
- facilitating key points in the PL activities, and
- ensuring key resources such as time, scheduling, and appropriate uses of data to set PL goals and monitor PL impact—again *with* teachers.

With regard to coaches and mentors, the literature indicates that it is important to frame expectations, PL for the coach or mentor, and the process of teachers working with a coach or mentor relative to the expected outcomes. For example

- Coaches meant to support system-wide reforms who received training framed as coaching individual learning tended to focus on being responsive to individual needs, “often at the expense of school and district goals” (Mangin & Dunsmore, 2014, p.2).
- The CCSSO (2009) found that PL with some sort of internship process (i.e., working alongside PD provider, coach, or colleague) were positive while undefined mentoring was mixed (sometimes positive, sometimes negative effect). Coaching should be an extension of varied PL activities, as the combination is most effective (e.g., Gallucci et al., 2010; Neuman & Cunningham, 2009)
- Programs that required developing assessments and/or reviewing student work showed a positive effect, where PD programs not requiring this had a negative effect relative to student outcomes (CCSSO, 2009).

- Mentoring was supportive of teacher retention in a school, but not changes in teacher practice or positive impacts on student outcomes; additionally, within-school pairs for mentoring seemed strongest, indicating that school-specific knowledge was a focus.

Finally, it seems clear that coaching and mentoring needs to be actively two-way in order to be effective. Teachers being coached/mentored must be prepared to be active “consumers,” in particular knowing how to reflect on their own practice and request specific assistance in response to coaching feedback (e.g., Yopp et al., 2011).

Guided by critically thoughtful work with data, student work, curricula, and planning

In their review of evidence for an IES Practice Guide related to “Turning around Chronically Low-Performing Schools,” the What Works Clearinghouse identifies several actions of schools that “beat the odds” which are consistent with this review of professional learning, namely using data analyses to set goals; targeting professional development, teacher collaboration for instruction and planning, and reviews of curricula to meet change goals; and teachers working in teams with student work, assessment data, and curricula to plan their changed instruction and professional development (WWC, 2008, p. 9). We note that the principal and other leaders are active facilitators of these efforts. Other sources find that it is important to use “self-evaluation as a way of promoting learning” (citing MacBeath, 1999; MacBeath & Mortimore, 2001; MacGilchrist, Myers, & Reed, 2004; Rosenholtz, Bassler, & Hoover-Dempsey, 1986) and to “[create] systems of knowledge management that leverage resources, core capabilities, and expertise of staff and pupils” (citing Hargraeves, 1999; Leithwood, Leonard, & Sharratt, 1998; Marks, Louis, & Printy, 2000; Nickols, 2000; Nonaka & Takeuchi, 1995; Pedder, 2006; Rosenholtz et al., 1986; Zack, 2000) (Opfer & Pedder, 2011, p. 391).

Professional learning community collaboration

In addition to collective participation in PL being a consistent element for effect on student outcomes, research finds that teachers’ participation in PL can be motivated in part by wanting to provide more help to colleagues, and that teachers who had participated in PL were more likely to help other teachers (Sun, et al., 2007). A National Staff Development Council report (Darling-Hammond et al., 2009) found that collaborative approaches can promote school-wide changes impacting student achievement and other outcomes.

Teachers learn from each other, and the effectiveness of the teaching body as a whole has an effect on student outcomes. One study found that peer quality explains as much as twenty percent of a “teacher’s own” effect in longitudinal student outcomes, and that “spillovers” of effective teachers are strongest for less-experienced teachers (Kirabo Jackson & Bruegmann, 2009).

A more subtle interaction effect among teachers may impact the effectiveness of PL in important ways. Smylie (1988) found interactions among a teacher’s “personal certainty of practice” (how confident they were), participation in PL, concentration of low-achieving students, and personal teaching efficacy. These trends have been supported by additional research on individual and collective efficacy as well as the need for sustaining a learning environment across all levels (Barth, 1986; Hopkins, West, & Ainscow, 1996; Senge, 1990), leading us to conclude that:

- Teachers with some confidence in their teaching, and in a supportive environment, are more willing and able to engage in PL and make substantive changes in response to PL activities.
- Teachers views of PL and their ability to make changes (and thus their willingness to try) are impacted by the community of practitioners with whom they work as well as the needs of their students.
- As with students' learning, it is important to target PL for a teacher's "zone of feasible improvement;" asking too much for a particular individual or collective group, with too little support, will result in ineffective PL.

Adequate resources

Resources for effective PL models include cost of teacher time (in and out of class, during academic year and summer); training and coaching expenses; time for administration (organizing as well as active participation when appropriate); materials, equipment, and facilities used in PL; travel and transportation; tuition and conference fees; and technical support for online resources and activities. Studies have variously classified these resource expenditures related to:

- Individuals, including pre-service preparation (e.g., residency partnerships, Professional Development Schools), induction/mentoring, continuing education, remediation, and teacher leadership development; and
- Organizational, including restructuring planning and design; school improvement planning; curriculum, content, and instruction changes; specialized programs within schools; and support of special populations of students (special education, English learners, gifted).

Most of the resource expense for elements of effective PL relates to time. Studies estimate that it takes 20 instances of practice, on average, for a teacher to master a new skill (more if very complex). Generally, this translates to about 50 hours of PL—instruction in the skill, practice, and coaching—before mastery. The lowest number of hours of PL found effective in the meta-analyses reviewed was 14, for a fairly specific and limited change in teaching (technology use), up to 100 hours across a 15-month period. To put this in perspective, Darling-Hammond et al. (2010) note that “highly effective countries” such as Singapore, Sweden, and Netherlands require at least 100 hours per year, beyond many hours in “collegial planning and inquiry” (p. 5), but Birman et al. (2007) found mathematics teachers averaged less than 14 hours of PD in 2003/04 and summer of 2004 combined. Only 9 percent of elementary teachers participated for more than 24 hours during that period, and only 10 percent of secondary mathematics teachers spent more than 24 hours on PD. (in Yoon, et al., 2007, p. 2).

District Support Roles

Regarding district leadership, evidence suggests that districts effectively supporting school improvement and reform are able to strike a good balance between providing a clear focus for improving student outcomes with support for school-level leadership to set specific actions that are right for that school's population of students and teachers. This is supported by support from the district in creating and implementing a “customized school improvement agenda within a district improvement framework” supported by “high-quality data that link student achievement to school

and classroom practices” and assistance to schools to use data effectively (SREB, 2009, p. 4). Districts invest heavily in PL for *both* leaders and teachers.

Districts provide a range of supports for effective PL, focused mainly on “resolving fragmentation” of views of curriculum and student outcome goals through policies, resources, and PL focused on improving instruction; selecting deeper curriculum with more detailed resources (including how to teach, what to expect from students when teaching); communicating compelling rationales for reforms that clearly link to PL goals so that teachers can personally align their goals; providing good data and modeling its use for guiding PL; and working with school-level leadership to differentiate supports for PL and school progress (Chuon et al., 2008; Elfers & Stritikus, 2014; Grossman & Thompson, 2004; SREB, 2009).

Studies of districts’ support for PL show that districts spend considerable amounts to provide teacher time for professional development, but this is a relatively small (2 to 5 percent) of the operating budget. More concerning is that most have inadequate plans for monitoring how their funds are spent. Miles et al. (2004) note that districts typically target most resources toward school-level capacity building, but with few “formal strategies for coordinating or integrating these investments” (p. 16). Compounding this is the finding that districts often rely on outside sources of funding for as much as half of PL resourcing, which “serves to divert the initiative for improvement outside as well. Districts beholden to outside agendas may have more difficulty sustaining a coherent and integrated [PL] strategy as they may get sidetracked with the influx of new funding attached to outside priorities” (p. 20).

An interesting side note: A study of school board members’ participation in professional learning related to their leadership role found that states requiring PL received overall ratings of B or C from *Education Week Quality Counts 2009*, while those not requiring PL received a C or D (Roberts & Sampson, 2011).

Sustaining the Effects of PL

Researchers (Aydin et al., 2013; Franke et al., 2001; Giles & Hargreaves, 2006; Schechter & Atarchi, 2014; Schechter & Qadach, 2012; Silins, Mulford & Zarins, 2002; Starkey et al., 2008; Zehetmeier & Krainer, 2011) have investigated how schools can maintain as learning organizations, which includes efforts to sustain positive effects of PL over time, as teachers and leaders change positions and new requirements pressure changes that may or may not be suitable for the school. Several elements seem to be important:

- A climate of trust and open communication (related to collective efficacy as well) leading to the ability to take initiatives and risks.
- Clear, continued communication between district, school, and classroom levels about status and progress (including good distribution of information among teachers, students, and parents), and goals (a “shared and monitored mission” Silins et al., p. 618).
- An active “collective leadership” model that involves formal leaders, teacher leaders, and teachers and support staff in goal setting, monitoring of progress, curriculum review/revision, assessment/data use, and active participation in on-going intensive PL for continuous improvement.