

*How Can Professional Development Impact Teacher Practice
and Student Achievement?: A Literature Review*

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Evaluation, Metrics, and Statistics

Executive Summary

This review examines the elements of professional development that have been shown in quality research to produce changes in teacher behavior and/or increased student achievement.

The following elements have been shown, across studies, to be related to these outcomes:

- Results-driven goals: Programs with clearly articulated goals are more likely to produce desired change.
- Content that provides
 - In-depth, rigorous subject-area content instruction
 - Information on how students learn subject area content
 - Information on teaching strategies specific to the subject area and content
- Learning strategies that
 - Teach teachers with the same strategies they should use with their students (modeling)
 - Incorporate active learning- providing teachers with the means to explore, reflect on, practice and problem-solve using the ideas presented
- Explicitly designing for transfer/ application of learning into the classroom
- Coherence - Creating a larger professional development program rather than single isolated sessions
- Embedded evaluation that assesses progress toward goals

There are various activities that can be offered as part of a development program and various environments in which they can be offered. If these activities and environments follow the ideas above, they can be successful. In other words, it is not so much how or where content is presented, but the methods by which teachers interact with it that is important.

Detailed Findings

The literature base on teacher professional development is vast. There have been hundreds of articles published in scholarly journals over the past five years, and thousands more in the years before that. In addition, there are thousands of observations and anecdotes published on the Internet. Unfortunately, surprisingly few of these measure two important outcomes of professional development: 1) change in teaching practices and 2) student achievement or attitudes. However, with the standards movement that began in the 1990s, student learning outcomes became a key focus. Success of professional development began to be measured based on increased student learning rather than on whether teacher participants were satisfied (Guskey, 2000).

This review focuses on studies that have demonstrated the effectiveness of professional development techniques on teacher practices and/or student achievement. The studies reported here are either 1) reports of published research that examine the effects of professional development on teacher behavior and/or student achievement or 2) reviews of a group of research studies that do the same. In addition, a standard of quality was applied such that the focus of the review is on quantitative research conducted using experimental or quasi-experimental techniques and qualitative research conducted using rigorous analysis procedures.

Goals

Takeaway: *Programs with clearly articulated results-driven goals are more likely to produce desired change.*

The goals of professional development define what the program will be and how success is measured (Guskey, 2000). Since the 1990's it has no longer been sufficient to

deliver highly-rated and well-attended programs; professional development has not done its job until the learning it has offered has been converted into results that matter (Wick et al., 2006). In education, this means change in teacher behavior and gains in student learning (AFT, 2002; Guskey, 2000; Speck & Knipe, 2001). Successful professional development programs are more likely to have clearly articulated goals (Wick et al., 2006; Wong, 2005).

Content

Takeaway: *Content most likely to impact teacher behavior and student outcomes is that which provides*

- *In-depth, rigorous subject-area content instruction*
- *Information on how students learn subject area content*
- *Information on teaching strategies specific to the subject area and content*

Subject matter

The importance of including significant amounts of content information in professional development is included in many lists of standards for professional development (e.g., American Federation of Teachers, 1996; Kent & Lingman (2000); Loucks-Horsley et al. (1996); NSDC (2001)). This is based on the idea that teachers should be experts in their field, as well as the hypothesis that those comfortable with the subject matter may be more able to use different teaching techniques. The inclusion of in-depth coverage of content is supported in the research literature as well.

Snow-Renner & Lauer (2005) reviewed published academic articles relating standards-based professional development to student achievement. They found that professional development that focused on particular curricula resulted in more change in

teacher practice and student achievement than that focused on general learning strategies. AERA (2005) conducted a review of the literature and published a research brief describing the features of professional development that influence student learning. They also found that focusing on the particular curriculum to be taught increases the likelihood that teachers will adopt the practices taught in professional development. One of the major factors related to increased student achievement was professional development that strengthened teachers' knowledge of subject-area content.

Jeanpierre, Oberhauser, & Freeman (2005) report on their efforts to increase science teachers' use of inquiry-based techniques in the classroom. They conducted 2-week long institutes for teachers during which scientists provided instruction in inquiry, with the teachers given time to practice the inquiry methods themselves on difficult science content (field ecology). The evaluation, which included quantitative and qualitative measures, indicated that the use of difficult science content in the professional development was important in changing teacher behavior. Quantitative measures indicated instructors gained in content knowledge over the course of the institute. In qualitative interviews conducted after a semester of teaching, teachers indicated their increased content knowledge made them more comfortable sharing the content, and thus more willing to engage their students in inquiry-based learning.

Similar findings resulted from Garet et al's (2001) empirical study of the factors related to changing teacher practice. They conducted a national survey as part of the evaluation of the Eisenhower Professional Development Program. They used the results to create a model of the factors related to increased teacher knowledge and changed teacher behavior. A focus on content knowledge had a strong, positive relationship with

changes in teacher knowledge, which in turn strongly influenced changes in teacher behavior.

How students learn subject matter

Standards of professional development also frequently list the importance of providing teachers with information about how students learn (e.g., Abdal-Haqq, 1995; AFT, 2002; Loucks-Horsley et al., 1996; NCTM, 1991). In their review of professional development literature, AERA (2005) emphasized the importance of professional development focusing on how students learn particular subject matter. Having knowledge of how students learn a particular topic led to teacher behavior change (including asking students to do more problem-solving and less basic fact recall) and improved student achievement.

Specific teaching techniques

According to Snow-Renner & Lauer's (2005) review, the body of research suggests that professional development focused on instructional strategies specific to a particular content area and curriculum (rather than general teaching strategies) are more effective at changing teacher practice and influencing student achievement. AERA's (2005) review also emphasized the importance of providing instructional practices directly related to the curriculum and how students understand it.

Kennedy (1998), in a meta-analysis of math and science professional development research, found that programs whose content focused on teachers' behaviors resulted in smaller influences on student learning than those that focused on teachers' knowledge of the subject area, the curriculum, or how students learn the subject.

Learning strategies

Takeaway: *Learning strategies that impact teacher behavior and student outcomes are those which*

- *Teach teachers with the same strategies they should use with their students (modeling)*
- *Incorporate active learning- providing teachers with the means to explore, reflect on, practice and problem-solve using the ideas presented*

There are a variety of activities that can be done as part of professional development, including: observation of expert teachers, observation of own teaching (videotaped or in-person), mentoring, reflection on practices, review of student data, review of research literature, listen to expert lectures, and watching/listening to eLearning material. This raises the question for those developing professional development, which of these is most likely to lead to the desired goals?

Standards for professional development often focus on the importance to two important elements: active/inquiry learning and modeling of effective/relevant pedagogy (Corcoran, 1995; Loucks-Horsley et al., 1996). The National Staff Development Council (2001), a nonprofit association designed to improve student achievement through teacher development, writes in its standards,

No matter the age at which it occurs, human learning is based on a common set of principles. While adults have more life experience to draw on than younger learners and are often clearer about what they want to learn and why it is important, the means by which the learning occurs is remarkably similar. Consequently, it is important that the learning methods used in professional

development mirror as closely as possible the methods teachers are expected to use with their students.

Based on this, they recommend that professional development assist teachers in moving beyond comprehension of the surface features of a new idea or innovation to a deeper understanding of a topic. This typically requires a number of opportunities to interact with a new idea through active learning processes such as discussion and dialogue, writing, demonstrations, practice with feedback, and group problem solving.

Research strongly indicates that people remember what they have learned best when it is linked to existing ideas and knowledge already stored in their long-term memory (Pazzani, 1991; Anderson, 2004). These connections are best made by the teachers themselves, because the prior knowledge of each person is different. Self-generated links are much more powerful than instructor-generated links (Wick et al., 2006). In order to create these links, participants must be given time to reflect on what they have learned, or “actively” engage with the knowledge.

Research is clear that the more teachers are actively involved in activities aimed at increasing their understanding and application of knowledge, the more likely they are to apply what they learn. Garet et al (2001), in their empirical study, found that professional development that includes opportunities for teachers to become actively engaged in discussion, planning, and practice led to greater change in teacher behavior. Similarly, in a longitudinal study using survey data, Desimone et al. (2002) found that professional development in technology that uses active learning techniques has a significant effect increasing teachers’ use of that technology in instruction. The importance of active learning was echoed in Snow-Renner & Lauer’s (2005) review of

multiple studies that found professional development leads to greater change in behavior when it contains active learning, meaning the teachers get a chance to engage in various activities designed to deepen their understanding of the topic and provide opportunities for practice with feedback.

In the Jeanpierre, Oberhauser, & Freeman (2005) research discussed above, teachers noted that being taught by the same methods they were being asked to use with their students was important. In their case, this involved being given numerous opportunities to use the inquiry methods being taught, as their students would in the classroom.

Demonstrate competence

Jeanpierre, Oberhauser, & Freeman (2005) outline the importance of requiring teachers to demonstrate competence in a tangible way. In their case, the teachers using the inquiry-based methods wrote and delivered reports of their methods and findings in a scientific way. The authors believe this process not only held teachers' accountable, but demonstrated their own competence to themselves, increasing their confidence. It should be noted that this demonstration of competence was not a multiple choice test, but an authentic task.

Environment

Takeaway: *There are many different environments in which professional development can be offered, most of which can be successful if the other principles outlined here are followed.*

There are many ways to offer professional development, including

- Workshop/ Training/ Conference

- Institute (1-2 week intensive experience)
- In-class support
- After-school study sessions
- Resource centers – online or in-person places where teachers can get information and share thoughts and experiences with each other (e.g., in bulletin boards)
- Community of practice/ teacher learning communities

Garet et al (2001) and Desimone et al. (2002) divided environments into traditional versus reform (the authors call them activities). Traditional environments included workshops and conferences while reform environments included things such as communities, in-class support, and resource centers. They found that reform environments tended have activities that occur over a longer time period, which meant active learning was more likely to happen, and through that path teacher behavior was influenced. In other words, the type of environment was significant to the extent that it provided opportunities for active learning. In addition, follow-up experiences with opportunities for interaction appear to be important for creating change in teacher behavior (Jeanpierre et al, 2005).

Boyle et al. (2005) used a survey to ask teachers about their professional development experiences and rate the impact of them on their teaching practices. Teachers who had no long term development activities reported very little change in teaching practice. All teachers who had some long term activity reported change to their teaching practice, with those who had coaching and research/inquiry as their activity reporting the most change. Unfortunately, research/inquiry was not well defined so it is

not clear if this refers to teachers doing action research or teachers reviewing existing research.

In-class support can take the form of coaching or mentoring, both of which generally provide opportunities for reflecting on ideas and how they relate to practice. Many new teachers are often given a “mentor” in name, but little else when they begin teaching. As such, in a survey of new teachers in North Carolina, one out of four teachers said they received poor or no support from their mentors and principals and new teachers rated it as the least effective way to help new teachers (North Carolina Teaching Fellows Commission, 1995). However, when part of a larger, organized plan, mentoring can make a difference in teacher retention (Wong, 2004), which is essential to creating expertise necessary to improve student achievement.

Another, related, in-class support technique is coaching, either by peers or experts. Ross (1992), in research on implementation of a new history curriculum, found that student achievement was higher in classrooms of teachers who had more contact with expert coaches. The coaches used an existing coaching model, the In-School Resource Coaching Model that progresses from analyzing program expectations, observing classroom practice, planning changes, and giving feedback. A review of teacher coaching research suggests that when teachers are provided with the opportunity to meet with peer coaches or expert coaches to discuss implementation, they are more likely to implement strategies and to adapt strategies to their needs (Joyce & Showers, 2002).

After-school study sessions, resource centers, and communities of practice are all ways designed to get teachers together to review ideas, data, and research, often in a

collaborative environment. Resource centers have a greater aim on providing information (e.g., www.tappedin.org), while communities of practice put more emphasis on creating the collaborative environment in which teachers work together to improve student achievement. Professional learning communities have gained in popularity in the past ten to fifteen years, so they will be reviewed in slightly more detail.

Communities of practice, or professional learning communities have gained favor since 1990, particularly with movement towards school improvement. Professional learning communities can be defined in many ways, but a definition that includes most elements is a place, *“in which the teachers in a school and its administrators continuously seek and share learning, and act on their learning. The goal of their actions is to enhance their effectiveness as professionals for the students’ benefit; thus, this arrangement may also be termed communities of continuous inquiry and improvement”* (Bolam et al., 2005). This definition focuses on the concept of learning communities as taking an already existing group of teachers in a given school and creating a learning community from them. Research around this type of learning community suggests there may be some benefit from the teacher learning that arises from teachers’ sense of collective responsibility for student outcomes (Lee & Smith, 1996). In general, schools with positive teaching communities focused on reflecting on practice have higher student achievement (Butler et al., 2004; Louis & Marks, 1998).

However, when researchers or others attempt to create communities out of groups of teachers who do not already exist as a group (or identify themselves as such), further challenges arise. A group running and researching a very large online resource center/ community (www.tappedin.org) notes in a recent book chapter that they question whether

they have really developed a community and whether participants have changed their behavior outside of the environment (Schlager & Fusco, 2004). Analyses of discourse in another on-line community indicated that interactions were not as in-depth and analytic as researchers had hoped, despite the use of moderators to help shape the discussion (Yang & Liu, 2004). It appears that there are many challenges in creating community, or a community identity where an identified group does not already exist. There is currently little evidence that these efforts have led to teacher behavior change or improved student outcomes.

Design for Application/ Transfer into the Classroom

Takeaway: *Professional development should be explicitly designed for transfer and application of learning into the classroom.*

A number of researchers have attempted to quantify the number so people who apply what they learn in professional development to their everyday work. Reported ranges for the percent of participants who report they applied something they have learned range from 15 to 40 (Wick et al., 2006). The exact number is likely dependent on the type of development provided, however the general trend of less than 50% of participants applying anything from trainings to practice is clear. Wick et al (2006) undertook an analysis to determine the reasons that people don't follow through. Using survey methodology, they proposed the following reasons:

1. Environment

- a. Conflicting priorities and time pressure – there is so much work to do that implementing new ideas falls to the bottom

- b. Lack of support – participants see a lack of support, or at least active encouragement, from school and principals

2. Participants

- a. Lack of commitment
- b. Lack of understanding of impact
- c. Fear
- d. Resistance to change

3. Follow-through Process

- a. Lack of goals or plan to implement them
- b. Lack of accountability, rewards, or consequences

In order to overcome these barriers, systems must be put in place to “tip the balance” in favor of change. The following techniques are things that have been shown to relate to increased classroom application:

Inclusion of authentic materials. Rather than creating examples of teacher or student work, the use of actual instructor videos and lesson plans and student work products allows teachers to see the application of the material as it would be in a classroom.

Goals and Plan. Have teacher participants write specific goals for their application of the material in the classroom. It is a well-accepted psychological principal that creating goals increases likelihood that an outcome will happen (Umstot, Bell, & Mitchell, 1976). In addition to goals, a plan for how the goals will be achieved is important. This might involve breaking a large goal down into short-term objectives. It should also involve helping participants think through what they will need to do to accomplish their goals/objectives (Wick et al., 2006) and how they will overcome potential obstacles.

Provide reminders. There are constant reminders in a teacher's day of obligations and things that need to be done. Implementing new instructional methods is likely to fall by the wayside without reminders of their goals. Research suggests there is a small opportunity after training for change to be implemented before participants quickly slip back into an old routine (Ibarra, 2004). In general, a first reminder should be sent a week following the course (Wick et al., 2006). Reminders can be in the form of mail, email, telephone calls, or some other method but they should get attention and occur often enough to serve as a cue (Levinson & Greider, 1998). It should be noted that not all people like reminders, but even for those who do not like them, they are likely to produce behavioral change (Plotnikoff et al., 2005).

Follow-up with coaching. As discussed in the environments section, providing coaching to help teachers overcome obstacles can significantly impact their classroom practices (Joyce & Showers, 2002). It is mentioned again here because it is an activity that can be directly aimed at facilitating transfer of material from the professional development environment into the classroom.

Duration

Takeaway: *The duration of the professional development program is less important than the activities employed.*

Snow-Rener & Lauer's (2005) review indicates that significant behavior change may require 80 or more hours of professional development. Garet et al (2001) found that both the duration of professional development (spread across weeks or months) and the number of contact hours were important to the extent that longer development led to more opportunities for active learning. Similarly, Kennedy (1998), in a meta-analysis of

published research, found that total contact time was not as important as the content taught. There was mixed evidence on whether distributing the development over time was more effective than a concentrated professional development schedule.

Coherence

Takeaway: *Professional development that is tied into a larger plan for professional development is more likely to be successful in producing change.*

Garet et al (2001) found that professional development activities that were part of a larger program of professional development, rather than single stand-alone sessions were more successful at increasing teacher knowledge and changing behavior. In addition, coherence with state and national standards was also important for positive outcomes.

Bringing it together

Speck & Knipe (2001) have created a picture of the elements of successful professional development. Their book, “Why Can’t We Get it Right? Professional Development in Our Schools” focuses on designing professional development to improve school achievement. Although not all of their recommendations are based on research that directly links them to student achievement, they are based on research about learning and professional development. Their model is reproduced below as an example of an attempt to model the factors needed to design professional development that will lead to improved student achievement.

FOCUSES ON IMPROVING STUDENT LEARNING

ASSESSES NEED AND ESTABLISHES GOALS

- Emerges from teachers' expressed needs
- Uses data to inform practice and make decisions
- Aligns plans systematically with school and district change efforts and goals
- Bases professional development on a foundation of standards and accountability

CENTERS ON THE LEARNER

- Engages teachers in planning, implementing, reviewing and revising
- Embeds in real work of the teachers
- Offers choices and levels of learning
- Employs effective teaching and learning strategies
- Has content specific to teaching and assessment of subject matter
- Uses inquiry, dialogue, and reflection to inform practice

SUSTAINS GROWTH

- Supports learning around practice
- Is sustained and intensive
- Expands on knowledge
- Builds on shared knowledge

REQUIRES RESOURCES

- Requires administrative support, leadership and available resources

EVALUATES TO GOALS

- Evaluates progress and impact on student learning using data

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