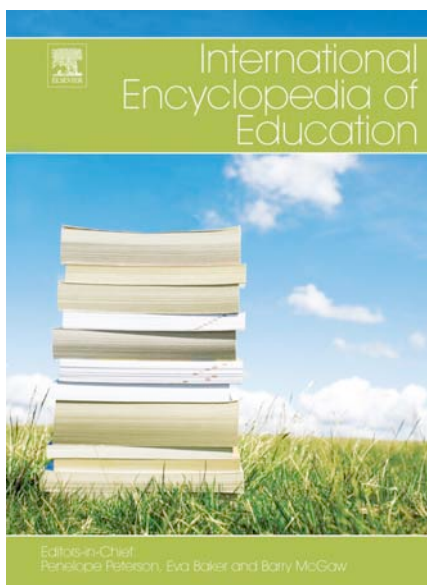


Provided for non-commercial research and educational use.  
Not for reproduction, distribution or commercial use.

This article was originally published in the *International Encyclopedia of Education* published by Elsevier, and the attached copy is provided by Elsevier for the author's benefit and for the benefit of the author's institution, for non-commercial research and educational use including without limitation use in instruction at your institution, sending it to specific colleagues who you know, and providing a copy to your institution's administrator.



All other uses, reproduction and distribution, including without limitation commercial reprints, selling or licensing copies or access, or posting on open internet sites, your personal or institution's website or repository, are prohibited. For exceptions, permission may be sought for such use through Elsevier's permissions site at:

<http://www.elsevier.com/locate/permissionusematerial>

Borko H, Jacobs J and Koellner K (2010), Contemporary Approaches to Teacher Professional Development. In: Penelope Peterson, Eva Baker, Barry McGaw, (Editors), *International Encyclopedia of Education*. volume 7, pp. 548-556. Oxford: Elsevier.

## Contemporary Approaches to Teacher Professional Development

**H Borko**, Stanford University, Stanford, CA, USA

**J Jacobs**, University of Colorado, Boulder, CO, USA

**K Koellner**, University of Colorado, Denver, CO, USA

© 2010 Elsevier Ltd. All rights reserved.

### What Does High-Quality Professional Development Look Like in Theory?

Teacher professional development (PD) has become very tightly connected to many school-improvement efforts around the world. In the past several years, there has been an increasingly urgent, perceived need for more PD opportunities, along with assurance that the programs are high quality and effective. [Guskey \(2000\)](#) argued, “Never before in the history of education has greater importance been attached to the professional development of educators” (p. 3). Indeed, as [Feiman-Nemser \(2001\)](#) and others have claimed, if we want schools to offer more powerful learning opportunities for students, we must offer more powerful learning opportunities for teachers – opportunities that are grounded in a conception of learning to teach as a lifelong endeavor and designed around a continuum of teacher learning. Adopting this expanded view of teacher learning and professional practice, educational reforms in all disciplines and across all grade levels stress the need for educators to take part in PD programs that increase their knowledge, improve their practice, and ultimately foster student learning and achievement gains.

Recent shifts in the prominence of ideas about the nature of cognition, learning, and teaching – from behavioral to cognitive to situative – are, by now, well known. These changes have been accompanied by parallel shifts in ideas about teacher learning and PD. Most experts in the field advocate moving away from an in-service training model, where teachers are expected to learn a clearly defined body of skills through a well-specified process, often delivered in one-shot workshops or courses taught away from the school premises. These traditional approaches are generally viewed as overly fragmented, not connected closely enough to classroom practice, and out of alignment with current theories of learning and school reform. They are being replaced by approaches that are more closely aligned with constructivist and situative theories and reform efforts; specifically they are grounded in classroom practice and involve the formation of professional learning communities.

[Stein et al. \(1999\)](#) provided a clear and concise overview of the contrasts between traditional in-service staff development and what they call the new model of PD. Regarding traditional in-service approaches, they wrote,

“These forms of professional development were designed to support a paradigm of teaching and learning in which students’ roles consisted of practicing and memorizing straightforward facts and skills, and teachers’ roles consisted of demonstrating procedures, assigning tasks, and grading students” (p. 238). By contrast, “The new paradigm for professional development represents a clear departure from the use of workshops to teach ‘techniques’ toward the use of multiple professional development strategies to build teacher capacity to understand subject matter, pedagogy, and student thinking” (p. 263). [Table 1](#) presents Stein, Smith, and Silver’s summary of the traditional and new approaches along four dimensions and illustrates that there are extensive discontinuities in all of the areas considered.

[Hargreaves \(2000\)](#) provided a historical perspective on the nature of teaching and PD that complements Stein, Smith and Silver’s analysis. He described the present state of affairs as follows:

In the still emerging age of the collegial professional, there are increasing efforts to build strong professional cultures of collaboration to develop common purpose, to cope with uncertainty and complexity, to respond effectively to rapid change and reform, to create a climate which values risk-taking and continuous improvement, to develop stronger senses of teacher efficacy, and to create ongoing professional learning cultures for teachers that replace patterns of staff development which are individualized, episodic and weakly connected to the priorities of the school. ([Hargreaves, 2000](#), p. 166)

The focus in most of the current PD literature is on providing a long-term, inquiry or learner-centered structure that supports teachers as they collaboratively develop the professional knowledge they need to use in their own context. This new vision of professional learning communities as a structure for PD is closely connected to calls for instructional reform, both generally and in specific content areas. In fact, there is widespread agreement that standards for student learning, instructional practice, and teacher PD should be seen as interrelated components of broad-based educational reform.

Several educational scholars have produced lists of principles or features of high-quality PD, based on literature reviews and accounts of successful PD programs. A comparison of their lists suggests that there is a growing

**Table 1** Characteristics of old versus new paradigms for professional development

<i>Inputs to design process</i>	<i>Traditional in-service staff development</i>	<i>New model of professional development</i>
Strategies	Focus on activities (techniques, ideas, and materials) Dominant formats are workshops, courses, and seminars	Focus on building capacity to understand subject matter and guide students' development of concepts Uses a variety of formats including the provision of in-class support and scaffolding of teacher participation in practice-related efforts (e.g., grade-level meetings, after-school meetings)
	Short duration with bounded personal commitments	Longer duration with more open-ended personal commitments
Knowledge and beliefs	Teacher educator sets the agenda Theories of teacher learning based on the psychology of the individual Translation of new knowledge to classroom is a problem to be solved (usually by the teacher)	Iterative co-construction of agenda by teachers and professional developer over time Theories of learning that include social and organizational factors Challenge is to scaffold learning that is both immediately relevant to practice and builds a more generalized knowledge base
Context	Particularities of context not factored into staff development Takes place away from schools, classrooms, and students	Particularities of context play an important role in shaping professional development Takes place in a variety of locations, at least some of which occur in schools and classrooms
Critical issues	Focus is on developing the teacher (teachers participate as individuals) Leadership training not an issue	Focus is on developing the instructional program and the community in addition to the teacher (teachers participate as an organizationally cohesive unit) Leadership training is a big issue

Reprinted from Stein, M.K., Smith, M.S., and Silver, E.A. (1999). The development of professional developers: Learning to assist teachers in new settings in new ways. *Harvard Educational Review* 69(3), 237–269, with permission from Harvard Education publishing Group.

consensus within the field regarding the central features of PD that are effective in improving teaching practice. Interestingly, this emerging consensus does not mean that the agreed-upon features are broadly defined or few in number. On the contrary, the lists of features are relatively extensive and include specific goals, activities, and practices. As the literature and research bases continue to grow over time, it is reasonable to expect even more specificity in this area. The next section highlights conclusions from several widely cited reports detailing the features of high-quality PD.

### Features of High-Quality PD (in Theory and in Practice)

After reviewing the literature, six reports to focus on for a more extensive discussion and for comparative purposes were selected (Darling-Hammond and McLaughlin 1995; Hawley and Valli 2000; Knapp 2003; Putnam and Borko 1997, 2000; and Wilson and Berne 1999). Reports that considered PD in general, rather than in particular subject areas were selected. In addition, reports that collectively span a relatively long period of time, from early leaders in the field to recent publications that capture much of the current thinking were chosen. There are many other excellent reports in the literature that have been left out, either in the interest of space or because they did not meet

the selection criteria. It is also important to note that, for the most part, these reports do not provide evidence of student learning to support claims about effectiveness. This limitation is addressed later.

Table 2 presents a synthesis of the characteristics of high-quality PD that were noted in at least three of the six reports that were selected. The table is organized in two sections. The first section includes characteristics related to the content of high-quality PD; the second includes characteristics related to the process and structure of high-quality PD. These characteristics are discussed and elaborated in the following.

### Content Characteristics of High-Quality PD

Two features stand out as content characteristics of high-quality PD: the content should be situated in practice and it should be focused (at least in part) on students' learning. Situating the PD content in the practice of teaching helps to ensure that what teachers are learning is relevant to their classroom practice. Specifically, high-quality PD engages teachers in inquiry about the concrete tasks of teaching, assessment, observation, and reflection, and provides them with the opportunity to make connections between their learning and their classroom instruction.

Three reports also noted the importance of focusing PD on students' thinking and learning. These reports indicate that PD activities should help teachers learn

how to elicit and interpret their students' ideas, examine student work, and use what they learn about students' ideas and work to inform their instructional decisions and actions. PD that involves teachers' close consideration of student reasoning opens up opportunities for collective inquiry about issues related to subject matter and pedagogy.

### Process and Structure Characteristics of High-Quality PD

There is agreement among the reports that high-quality PD incorporates processes such as modeling preferred instructional strategies, engaging teachers in active learning, and building a professional learning community. When teacher educators model instructional strategies, PD participants have the opportunity to experience these strategies as learners, and then reflect on their learning and on the effectiveness of the strategies from the perspective of teachers. This type of approach is particularly important in times of reform, when teachers frequently are being asked to teach in ways that are substantially different from how they were taught or how they learned to teach.

All six reports included in [Table 2](#) reinforce the argument that the opportunity for teachers to participate actively and collaboratively in professional communities is an essential component of high-quality PD. By engaging teachers as active participants, PD providers acknowledge that learning is an active process wherein learners construct new understandings based on what they already know and believe. PD experiences are particularly effective when teachers participate in developing the learning opportunities, and work collaboratively to inquire and reflect on their practice. Respect and trust are important features of community development, enabling teachers to engage in discussions that are both supportive and challenging, and that maintain a balance between respecting individual community members and critically analyzing issues in their teaching.

Most of the reports specify that, to the extent possible, PD should be school based and integrated with other aspects of school change. High-quality PD experiences can be situated in multiple contexts, both in schools and offsite. Artifacts of practice, such as videotapes of lessons and student work, can be used to bring the classroom to the PD setting.

Finally, PD should consist of activities that are ongoing and sustainable over time, and that provide the opportunity for teachers to engage in cycles of experimentation and reflection. PD models with a cyclic approach might, for example, engage teachers in developing and enacting a lesson plan designed to meet the needs of all students, and then encourage them to individually and collaboratively reflect on their experiences. PD models that provide

teachers with the opportunity for such professional inquiry support their on-going learning and encourage change.

### Research on Effective PD in Practice

Empirical evidence on the effectiveness of PD with these qualities is quite limited. Indeed, as [Knapp \(2003\)](#) cautioned, "The actual benefits of the asserted attributes of good professional development have rarely been examined systematically, either separately or in combination" (p. 120). Although few would argue with assertion of [Hawley and Valli \(2000\)](#) that evaluations of PD programs should incorporate multiple sources of information, both on the processes involved in implementing ideas learned through PD and on the outcomes for students, to date there are few evaluations of this sort. Despite the contemporary press for accountability for student outcomes, most of the research examines the relationship between PD and changes in teacher knowledge and instructional practices. Few research programs have explored the links between teacher learning, classroom practices, and student achievement.

Furthermore, as is true in the broader field of teacher education research, the research on teacher PD has been criticized for its limited scope and lack of scientific rigor. Scholars have run into difficulty when attempting to quantify the principles outlined in the more theoretically based literature. Most research to date consists either of intensive case studies on single programs or of self-report, survey data. In addition, the fields of mathematics and science are more heavily represented than other subject areas or other aspects of classroom practice. Nevertheless, this body of literature is widely read and cited, and it has been a motivating force as educational practitioners and policymakers push for increased PD opportunities.

At the same time, many educational scholars are committed to conducting research that will move the field forward. [Borko \(2004\)](#) suggested a three-phase research agenda for designing, implementing, and investigating scalable models of PD. This agenda provides a framework for guiding purposeful decisions about PD research. Phase 1 research projects take place at a single site and provide initial evidence that a PD program is feasible and can have positive impact on teacher learning. Typically, these proof-of-concept studies are relatively small; both qualitative and quantitative research methodologies are employed to document the design process and to study the impact on teachers' knowledge and practice. Phase 2 research projects build on and extend Phase 1 projects to determine whether a particular PD model is a scalable model. During Phase 2, researchers might study the implementation of a PD program in different settings or by different PD providers. They also might work with

**Table 2** Characteristics of effective professional development<sup>a</sup>

<i>Characteristics of effective PD</i>	<i>Darling-Hammond and McLaughlin (1995)</i>	<i>Hawley and Valli (2000)</i>	<i>Knapp (2003)</i>	<i>Putnam and Borko (1997, 2000<sup>b</sup>)</i>	<i>Wilson and Berne (1999)</i>
<i>Content</i>					
PD content is situated in practice; addresses problems of practice.	PD engages teachers in concrete tasks of teaching, assessment, observation, and reflection that illuminate the processes of learning and development.		Content builds on teachers' pedagogical content knowledge (PCK).	Mantra: Situate teacher education in classroom practice. Ground teacher learning experiences in their own practice.	
Content of PD is focused on students' learning.	PD is connected to and derived from teachers' work with their students.	Content is focused on what students are to learn and how to support student learning; PD addresses impediments to and facilitators of student learning.	Specifically focused on high standards for students.		
<i>Process / structure</i>					
Preferred instructional practices modeled in PD.	Supported by modeling, coaching, and the collective solving of specific problems of practice.		Model preferred instructional practices (e.g., active learning), both in classrooms and in adult learning situations.	Mantra: Teacher educators should treat teachers as they expect teachers to treat students.	
Active teacher learning; teacher inquiry.	Grounded in inquiry, reflection, and experimentation that are participant-driven.	Teachers identify what they need to learn and, when possible, participate in the development of the learning opportunity and/or process to be used.		Mantra: Treat teachers as active learners who construct their own understandings. Empower teachers and treat them as professionals.	Teacher learning is activated, rather than bound and delivered; engage teachers as learners in areas their students will learn, but at a level more suitable to their learning.
Professional learning communities; collaborative learning environments.	PD is collaborative, involving sharing of knowledge among educators and a focus on communities of practice rather than on individual teachers.	PD provides learning opportunities that relate to individual needs but are, for the most part, organized around collaborative problem solving.	Collaborative and collegial learning environments.	Teachers need opportunities to participate in supportive professional learning/discourse communities in order to be successful in constructing new roles or changing their practice.	Communities of teacher learners who are redefining teaching practice; privilege teachers' interactions with one another, build trust and community while creating professional discourse that includes critique.

Continued

**Table 2** Continued

<i>Characteristics of effective PD</i>	<i>Darling-Hammond and McLaughlin (1995)</i>	<i>Hawley and Valli (2000)</i>	<i>Knapp (2003)</i>	<i>Putnam and Borko (1997, 2000<sup>b</sup>)</i>	<i>Wilson and Berne (1999)</i>
PD settings are appropriate to goals, often school based.	PD is connected to other aspects of school change.	PD is school based and integral to school-based operations. PD is integrated with a comprehensive change process.	School based when possible.	Mantra: Situate teacher education in classroom practice. PD experiences are situated in multiple contexts based on the goals of the PD.	
PD opportunities or models are ongoing and sustainable	PD is sustained, ongoing and intensive.	PD is continuous and ongoing, with follow-up and support for further learning. PD includes support from external sources to provide resources and outside perspectives	Rigorous cumulative opportunities for learning over time.		

<sup>a</sup>We use general terminology to describe characteristics of effective PD (i.e., cells in the first column), whereas we have attempted to use the language of the specific authors within the other cells to capture their voice and meaning.

<sup>b</sup>The 1997 chapter and 2000 journal article by Putnam and Borko both address teacher learning through professional development, but with somewhat different foci. Entries in this column represent a combination of ideas from the two papers.

nonvolunteer teachers or examine student achievement. Successful results from a Phase 2 program of research thus provide evidence that a full scale-up of the PD program would be useful to the field. Phase 3 research projects involve a comparison of multiple, well-defined PD programs, each enacted at multiple sites. Central research issues in these large-scale studies include comparing the resource requirements for the PD programs and their impact on teacher and student learning.

Below we provide examples of Phase 1 research on the PD of mathematics teachers, and of Phase 2 research on the PD of writing teachers. These examples illustrate key features of each research phase. To the best of our knowledge, no Phase 3, full-scale comparative studies of PD models have been conducted to date. However, there is another category of research that entails larger-scale analyses of multiple approaches to PD (but without detailed information about program characteristics or resource requirements); the literature in that area is discussed as well. Some emerging uses of technology in PD are also addressed.

### **An Example of Phase 1 Research on the PD of Mathematics Teachers**

Early phases of development and research on PD models often use a design experiment approach to document the processes of the PD and the impacts on teacher learning. In general, these types of projects have focused

on implementation of a PD program by the designer at a single site, typically with motivated volunteers (Fishman *et al.*, 2003). Our own research – involving the development and implementation of a model of mathematics PD called the problem-solving cycle (PSC) – provides an example of Phase 1 activities.

The PSC model is an iterative, long-term approach to PD, with the goals of increasing teachers' knowledge of mathematics for teaching, improving their instructional practices, and fostering student achievement gains (Koellner *et al.*, 2007). Each iteration of the PSC consists of three interconnected workshops organized around a rich mathematical task. This common experience provides a structure within which the teachers can build a supportive community that encourages reflection on selected mathematical concepts, student thinking, and instructional practices. Central activities for participants include collaboratively solving the mathematical task; teaching it to their students; and exploring the teachers' instructional strategies and their students' mathematical reasoning. Video from the lessons and other artifacts of practice are used to situate the teachers' learning opportunities in the context of their work. The PSC is intended to be implemented by a knowledgeable facilitator, who helps to promote a professional community that supports the individual and collective growth of participating teachers.

Our research utilized a design experiment approach, with a group of eight to ten middle school teachers over



2.5 years. We documented the processes involved in developing and implementing the PSC model, as well as its substantial impact on teachers' knowledge and instructional practices. Our analyses revealed changes in patterns of participation in the workshops over time and suggested connections between teachers' experiences in the workshops and their professional learning. For example, analysis of workshop discussions revealed that over time, teachers talked in an increasingly focused, in-depth, and analytical manner about specific issues related to teaching and learning. On an assessment of algebra knowledge, significant increases in both the number of correct answers and the number of solution strategies used by each teacher were found. In addition, changes in classroom mathematics instruction over the duration of the project were observed. These changes reflected pedagogical topics, such as improving group dynamics and using more effective questioning strategies, emphasized in the PSC workshops. Thus, the findings indicate that, under ideal conditions (i.e., when implemented by the designer, with motivated volunteers), the PD model is feasible and can have a positive impact on teacher learning.

### An Example of Phase 2 Research on the PD of Writing Teachers

After initial design research on a PD program many additional questions about the intervention must be answered before it is reasonable to allocate resources to a full scale-up evaluation. Such questions include: (1) What is the impact on student achievement? (2) Is it feasible on a larger scale (e.g., an entire school district) and with nonvolunteer teachers? (3) Can it be adapted to meet the needs and conditions of the local sites? (4) Are the PD materials and resources sufficient to ensure that multiple facilitators can implement the model while maintaining integrity with the designers' intentions? There is not one correct next-step in this phase of program development and research; rather there are multiple paths that can be explored in the ongoing study of a PD program.

Over the past three decades, various investigations of the National Writing Project (NWP) have explored several of these paths. Lieberman and Wood (2003) described the NWP as "arguably the most successful K-12 professional development project ever in the United States" (p. 187). The NWP has had a far-reaching influence on teachers and schools across the United States, where there is a steadily growing NWP network of nearly 200 university- and college-based sites. Initiated in the mid-1970s as the Bay Area Writing Project, as of 2003 the NWP had served approximately 3.5 million teachers. In partnership with schools or school districts, NWP sites host a 5-week summer institute for teachers in all grade levels and disciplines. During the following academic year, many of

these teachers become teacher consultants and facilitate workshops for their colleagues.

A core set of practices undergirds the NWP summer institutes. Designed to situate the teachers' learning in their own writing and classroom practices, these tasks guide teachers in demonstrating their writing instructional activities, studying theory and research about writing instruction, and immersing themselves in writing. However, by design, the focus of the institutes changes over time to meet the evolving needs of teachers and their students. Thus, a number of early institutes focused on prewriting; later ones addressed the use of rubrics; and more recent topics have included standardized assessments, writing with special populations, and technology. In addition, although the NWP sites share a national program model, their design and delivery vary according to local needs, reform priorities, school conditions, and research contexts. Thus, while there has been an ongoing, wide-ranging, and comprehensive evaluation effort, this effort is constrained by the intentionally flexible nature of the NWP.

A number of studies have investigated the impact of the NWP on teachers and students. In their review of this research, Pritchard and Honeycutt (2005) concluded that the positive effects on teachers' instructional practices have been well established. For example, several studies involving classroom observations of NWP-trained teachers indicate that the teachers gained new teaching strategies, used a greater variety of strategies, and devoted more time to writing instruction. Self-report data from teachers who participated in the NWP institutes suggest that they developed a valuable professional network, changed their philosophies about teaching writing, and acquired knowledge and skills related to teaching writing effectively. Of the published studies examining student work, central findings also favor the NWP approach over traditional approaches.

### Larger-Scale Analyses of Effective PD

Although we are not aware of any studies that fit Borko's (2004) description of a Phase 3 project, a few researchers have looked across multiple PD programs to ascertain their effectiveness. As one example, Garet *et al.* (2001) surveyed a nationally representative sample of teachers who attended mathematics and science PD programs that received funding from the Eisenhower Professional Development Program. Although their survey covered a relatively large number and wide variety of PD programs, only a few teachers were sampled from each program; also, information about program effectiveness was based solely on teachers' self-reported increases in knowledge and skills and changes in classroom practice. Analyses examined three structural and three core features of the PD programs – features that the researchers identified through a literature review as best practices in teacher PD. The structural

features were form (e.g., study group, workshop), duration (e.g., number of hours, time span), and participation (e.g., collectively from the same school or grade, or individually). The core features were degree of content focus, active learning opportunities, and promotion of coherence (e.g., alignment with state standards).

The researchers found that all six features were related to teachers' self-reported changes in knowledge, skills, and classroom practices. These results support the notion that to be effective, PD models should take into account the array of features identified in the literature as best practices. However, the data revealed that many of the PD programs studied did not incorporate features of high-quality PD. Other analyses of the Eisenhower program have produced complementary findings.

### Uses of New Technology in PD

Recent technological trends are having a strong impact on the field of teacher PD. Many new PD models are incorporating various technology-related components, including digital libraries, web-based virtual learning environments, and online and electronic conferencing features. Various forms of online discussion forums are particularly popular. In synchronous conversations, such as chat rooms, participants are present at the same time and respond electronically in real-time to one another. Virtual learning environments that feature asynchronous interactive tools, such as bulletin boards, enable teachers to participate in discussions anytime, anyplace.

Particularly as PD programs seek to scale-up or enter [Borko's \(2004\)](#) Phase 2 as described above, developers are increasingly turning to these contemporary, innovative technologies. As [Goldman \(2001\)](#) argued, "Many forms of electronic technology can overcome time and place constraints and provide the means to reach large numbers of individuals, potentially at costs lower than those associated with the physical presence of professional development personnel" (p. 21). PD that incorporates these technologies can draw upon resources not available locally, provide just-in-time work-embedded support, and accommodate individual teachers' busy schedules.

Currently, a broad array of online PD programs is serving large numbers of teachers. These programs are diverse in their purposes and goals, content areas, pedagogical approaches, and delivery methods. Many incorporate technology-related components that support content and process characteristics of high-quality PD—for example, collaborative virtual learning communities, interactive media to facilitate active teacher participation, video cases that address problems of practice, and digitized work samples to foster exploration of student thinking. Hybrid PD models that feature both online communication

(either asynchronous or synchronous) and face-to-face components are also gaining in popularity.

As one example, the PBS TeacherLine site offers over 100 online PD courses to preK-12 teachers in the fields of mathematics, reading/language arts, science, instructional technology, and instructional sciences. These relatively short courses (6–10 weeks) were developed with input from K-12 educational leaders and research experts and include online discussions with trained facilitators who have backgrounds in the subject matter. Designed to tie to classroom practice and link content to local and national standards, many of the courses feature streaming video of classrooms and digitized versions of student work. Research on TeacherLine includes formative and summative evaluations based on self-report data from participants and facilitators, expert-panel review of selected courses, and an assessment of the quality of online discussion board communications. Results indicate that facilitator quality related directly to participants' ability to apply course content to their classroom practice, and to their satisfaction with the course ([Ramsdell et al., 2006](#)).

Another, quite different, example is Tapped In, an online environment for educational professionals that is designed to promote a community of practice. Drawing on rapidly expanding technological advances, Tapped In enables a professional online community that extends beyond local sites. Synchronous and asynchronous discussions, coupled with support tools, such as white boards, sticky notes, and web page viewers, allow teachers to work and learn with a diverse group of colleagues and experts. [Schlager and Fusco \(2003\)](#) argued, "Tapped In has been quite successful in achieving its original goal of bringing together and forging new relationships among education practitioners, providers, and researchers from around the world on a daily basis. Thousands of different people log in each month to engage in activities that include course and workshop sessions, group meetings, and public discussions spanning a wide range of K-12 topics" (p. 204). As of July 2006 there were 20 000 Tapped In members, and the monthly log-in rate was approximately 10–20% of the membership. The developers have documented their conceptual framework and design strategy in detail, and have begun to collect and analyze data on the impact of participants' Tapped In experiences on their professional lives.

[Dede et al. \(2006\)](#) reviewed nearly 400 empirical studies of online, face-to-face, and hybrid PD programs. Most of the literature reports program evaluations focused on the effects of program design, delivery, and use on the formation of teacher learning communities, discourse patterns, and levels of participation. Few studies examined changes in teachers' knowledge or skills, and even fewer addressed the impact on student learning. This conclusion supports [Borko's \(2004\)](#) premise that the research on contemporary PD (whether involving new technology or not)



falls mostly in the Phase 1 category. Dede and other leaders in the field have identified the need for more well-designed empirical research studies, and we expect to find a good deal of movement in this regard in the near future.

## Conclusion

The field of PD is moving forward at a relatively fast pace. A majority of teachers in the United States are engaging in PD, and there is a push for more PD opportunities across the country. Similar increases in the level of interest and support for teacher PD can be seen throughout the world. Research in this field offers a relatively focused and agreed-upon direction for PD, which is consistent with prevailing theories about the nature of learning and cognition. At this point, much of the focus has shifted from creating theories of high-quality PD, to considering issues related to the design of PD programs based on current theories. Presently, a number of PD programs based on the current theories have been implemented, but few have been expanded beyond the proof-of-concept phase. Only a small research base exists on the impact of contemporary approaches to PD on teachers' learning and classroom practices, and the research base on student achievement is even smaller. However, with steady advances in the design, implementation, and evaluation of PD programs, and the expanding use of new technology, the research base in this field is likely to expand dramatically over the next several years.

See also: Professional Development of Teacher Educators.

## Bibliography

- Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher* **33**(8), 3–15.
- Darling-Hammond, L. and McLaughlin, M. W. (1995). Policies that support professional development in an era of reform. *Phi Delta Kappan* **76**(8), 597–604.
- Feiman-Nemser, S. (2001). From preparation to practice: Designing a continuum to strengthen and sustain teaching. *Teachers College Record* **103**, 1013–1055.
- Fishman, B. J., Marx, R. W., Best, S., and Tal, R. T. (2003). Linking teacher and student learning to improve professional development in systemic reform. *Teaching and Teacher Education* **19**, 643–658.
- Garet, M. S., Porter, A. C., Desimone, L., Birman, B., and Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal* **38**(4), 915–945.
- Goldman, S. R. (2001). Professional development in a digital age: Issues and challenges for standards-based reform. *Interactive Educational Media* **2**, 19–46.
- Guskey, T. R. (2000). *Evaluating Professional Development*. Thousand Oaks, CA: Corwin.
- Hargreaves, A. (2000). Four ages of professionalism and professional learning. *Teachers and Teaching* **6**(2), 151–182.
- Hawley, W. D. and Valli, L. (2000). Learner-centered professional development. *Phi Delta Kappa Center for Evaluation, Development, and Research*. Research Bulletin Number 27.
- Knapp, M. S. (2003). Professional development as policy pathway. *Review of Research in Education* **27**(1), 109–157.
- Koellner, K., Jacobs, J., Borko, H., et al. (2007). The problem-solving cycle: A model to support the development of teachers' professional knowledge. *Mathematical Thinking and Learning* **9**(3), 271–300.
- Lieberman, A. and Wood, D. (2003). *Inside the National Writing Project*. New York: Teachers College Press.
- Pritchard, R. J. and Honeycutt, R. L. (2005). The process approach to writing instruction: Examining its effectiveness. In MacArthur, C. A., Graham, S., and Fitzgerald, J. (eds.) *Handbook of Writing Research*, pp 275–290. New York: Guilford Press.
- Putnam, R. and Borko, H. (1997). Teacher learning: Implications of new views of cognition. In Biddle, B. J., Good, T. L., and Goodson, L. F. (eds.) *The International Handbook of Teachers and Teaching*, pp 1223–1296. Dordrecht: Kluwer.
- Putnam, R. and Borko, H. (2000). What do new views of knowledge and thinking have to say about research on teacher learning? *Educational Researcher* **29**(1), 4–15.
- Ramsdell, R., Rose, R., and Kadera, M. (2006). PBS Teacherline and Concord Consortium's Seeing Math Secondary: Scaling up a national professional development program. In Dede, C. (ed.) *Online Professional Development for Teachers: Emerging Models and Methods*, pp 69–88. Cambridge, MA: Harvard Education Press.
- Stein, M. K., Smith, M. S., and Silver, E. A. (1999). The development of professional developers: Learning to assist teachers in new settings in new ways. *Harvard Educational Review* **69**(3), 237–269.
- Wilson, S. M. and Berne, J. (1999). Teacher learning and the acquisition of professional knowledge: An examination of research on contemporary professional development. In Iran-Nejad, A. and Pearson, P. D. (eds.) *Review of Research in Education*, vol. 24, pp 173–209. Washington, DC: American Educational Research Association.

## Further Reading

- Ball, D. L. and Cohen, D. K. (1999). Developing practice, developing practitioners: Toward a practice-based theory of professional education. In Darling-Hammond, L. and Sykes, G. (eds.) *Teaching as the Learning Profession: Handbook of Policy and Practice*, pp 3–32. San Francisco, CA: Jossey-Bass.
- Darling-Hammond, L. and Sykes, G. (eds.) (1999). *Teaching as the Learning Profession: Handbook of Policy and Practice*. San Francisco, CA: Jossey Bass.
- Day, C. and Sachs, J. (2004). *International Handbook on the Continuing Professional Development of Teachers*. Maidenhead: Open University Press.
- Dede, C. (ed.) (2006). *Online Professional Development for Teachers: Emerging Models and Methods*. Cambridge, MA: Harvard Education Press.
- Elmore, R. F. (2002). *Bridging the Gap between Standards and Achievement: The Imperative for Professional Development in Education*. Washington, DC: Albert Shanker Institute.
- Guskey, T. R. and Huberman, M. (eds.) (1995). *Professional Development in Education: New Paradigms and Practices*. New York: Teachers College Press.
- Little, J. W. (1993). Teachers' professional development in a climate of educational reform. *Educational Evaluation and Policy Analysis* **15**(2), 129–151.
- OECD (Organization for Economic Cooperation and Development) (1998). *Staying Ahead: In-Service Training and Teacher Professional Development*. Paris: OECD.
- Schlager, M. and Fusco, J. (2004). Teacher professional development, technology, and communities of practice: Are we putting the cart before the horse? In Barab, S., Kling, R., and Gray, J. (eds.) *Designing for Virtual Communities in the Service of Learning*, pp 120–153. Cambridge, UK: Cambridge University Press.
- Sparks, D. (2002). *Designing Powerful Professional Development for Teachers and Principals*. Oxford, OH: National Staff Development Council.

- Tisher, R. P. and Wideen, M. F. (1990). *Research in Teacher Education: International Perspectives*. Bristol, PA: Falmer Press.
- Villegas-Reimers, E. (2003). *Teacher Professional Development: An International Review of the Literature*. UNESCO: International Institute for Educational Planning.
- Yoon, K. S., Duncan, T., Lee, S.W.-Y., Scarloss, B., and Shapley, K. (2007). Reviewing the evidence on how teacher professional development affects student achievement (Issues and Answers Report, REL 2007-033). Washington, DC: U.S. Department of Education, Institute of Education Science, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southwest.

## Relevant Websites

- [www.nwp.org](http://www.nwp.org) – National Writing Project. Improving writing and learning in the Nation's Schools.
- [www.teacherline.pbs.org](http://www.teacherline.pbs.org) – Professional development for PreK-12 educators. A service of PBS Teachers.
- [www.colorado.edu](http://www.colorado.edu) – Supporting the Transition from Arithmetic to Algebraic Reasoning at the University of Colorado–Boulder.
- [www.tappedin.org](http://www.tappedin.org) – The online workplace of an international community of education professionals.