



Teacher Motivation and Professional Development

A Guide to Resources

MSP — Motivation Assessment Program II

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Teacher Motivation and Professional Development: A Guide to Resources

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In addition to this document, a searchable database is available at:

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MSP-MAP II

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Table of Contents

Abstract	6
Introduction	7
Methodology	8
Search Process	8
Categories and Database Organization	8
Motivation and Teacher PD Resource Categories	9
Achievement and Other Outcomes	9
Beliefs	9
Classroom Characteristics	9
Collaboration	10
Curriculum	10
Emotions	10
Empowerment	11
Grade Level	11
Identity	11
Institution/School Features	12
International Comparisons	12
Motivation	13
Perceptions	13
Policies	14
Program Comparisons	14
Quality of Education	15
Reform and Innovation	16
Research	16
School Administration/Leadership	16
Student Behavior	16
Student Characteristics	16
Subject Domains	18
Teacher Characteristics	19
Technology	19
Testing and Standards	19
Theories	20
General Trends	21
A Look Ahead	22
References Cited	23
Appendix A: Resource Category Definitions and Search Keys	32
Appendix B: Resources and Category Search Keys	36

Abstract

Teacher Motivation and Professional Development: A Guide to Resources provides information on teacher motivation for those planning, conducting, and evaluating PD in math and science. Over 250 resources relevant to teacher motivation and PD were identified and categorized. Categories are described with representative citations, commentaries, and examples to facilitate the search for relevant information. General trends in the literature are noted, including the importance of teacher self-efficacy, the need for collaboration, intrinsic rewards, teacher autonomy, administrative support, and education policy. Given limitations in the existing literature, it was concluded that more research is needed to understand how reforms in curriculum and instruction affect teacher motivation for PD. In addition to the document, a searchable database is available at mspmap.org.

Introduction

Teacher professional development (PD) interventions are designed to increase teacher content knowledge and pedagogical content knowledge. There is considerable consensus (although not necessarily empirical support; see Weiss, 2009) for the features of PD programs that are necessary and sufficient for their success (Darling-Hammond et al., 2009; Guskey, 2003; Hassel, 1999; Hawley & Valli, 1998; Loucks-Horsley et al., 2003; National Commission on Teaching and America's Future, 1996; Weiss & Pasley, 2009). In addition to the focus on teacher knowledge and practices, there are urgent calls to examine the role of teacher motivation in PD. Goldsmith and Schifter (1997), for example, suggested that descriptions of teacher development need to add accounts of individual motivational and dispositional factors.

Similarly, in his more contemporary review, Tittle (2006) concluded that while “[t]here are references [in the literature] to motivation and affective (or dispositional) characteristics as important to teacher learning...[f]ew studies address these areas, areas that are likely to be important for assessments of long-term professional learning and development” (p. 976). Boyd et al. (2003) highlighted the critical role of teacher motivation in PD as one of their four key recommendations: “A primary challenge for large-scale PD projects lies in attracting teachers and sustaining their involvement so that they can receive the full dose of PD” (p. 112). And yet, a recent work on PD in math and science (Weiss & Pasley, 2009) does not explicitly include motivation. Motivational concerns, while often alluded to in passing (e.g., with regard to participation incentives or teacher confidence), remain a critical yet understudied component of teacher PD interventions.



Here we focus specifically on teachers' motivation to (a) participate in PD and (b) to apply the knowledge and skills acquired to their instructional practices. As stated in the study of *Local Systemic Change*, “You have to make every effort to get the teachers there and once you get them there, you have to make sure you have something of high quality that will encourage them to come back” (Boyd et al., 2003, p. 47), which is particularly important for higher education faculty (Zhang et al., 2008). Even for teachers who participate, their degree of engagement can both vary and moderate whether they profit from that experience. PD can influence motivation for teaching math and science in particular (Alexander, 2008; Tittle, 2006) and in general for attempting new instructional practices (e.g., reform math and problem-based science) that incur costs and risks as well as benefits and challenges (De Corte, Greer, & Verschaffel, 1996; Gregoire, 2003; Hargreaves, 1998; Richardson & Placier, 2001; Smith, 2000).

Motivational concerns, while often alluded to in passing...remain a critical yet understudied component of teacher PD interventions.

Fortunately, the recognized importance of teacher motivation in the PD process arises at a time of renewed interest in teacher motivation in general (Watt & Richardson, 2008), thus providing expanded opportunity to apply contemporary motivation theory and research to current and future PD interventions. These approaches include expectancy-value (Watt & Richardson, 2008), achievement goals (Butler & Shibaz, 2008), interest theories (Hidi & Renninger, 2006), self-determination theory (Assor, Kaplan, Feinberg, & Tal, 2009) and new ways to think about emotion and affect (Pekrun, Frenzel, Goetz, & Perry, 2007). Such conceptual frameworks offer a range of constructs and assessment, which are particularly relevant for understanding the role of motivation for PD in math and science.

To date, however, there has been no systematic focus on the factors that influence teachers' motivation for participating in PD, their level of engagement during PD activities, and the degree to which teachers' motivation and engagement in PD influences their classroom instruction. Such research is essential to clarify the connection between teacher and student learning (Kelleher, 2003), to identify the necessary components of comprehensive school reform, and ultimately to facilitate student achievement (Blazer, 2005).

The present document is designed to provide information for those planning, conducting and evaluating PD in math and science about the role of motivation. Resources included (e.g., published journal articles, technical reports, conference proceedings) are those at the intersection of teacher motivation and PD. Examples of the topics identified are: teacher education (Wayne, 2008); education policy (Barrett, 2009); mid-career programs (Berl, 2005); components of teacher motivation (Camilia, 2001); content-specific references (Desimone, Smith, & Phillips, 2007); student achievement outcomes (Blank & de las Alas, 2009; Flecknoe, 2002); effectiveness of programs and enduring change (Guskey, 2002); teacher styles (Kyriakides, Creemers, & Antoniou, 2009); motivation theories (Martin & Dowson, 2009); and addressing the “whole teacher” with regard to attitudes, skills, knowledge, practices, and proficiency within a wide range of domains (Chen, J. & Chang, C., 2006). The information extracted from these and other resources was categorized, indexed and is searchable.

Methodology

Search Process

The following databases were searched to identify resources related to teacher motivation for PD: ERIC CSA, Psych Info, EBSCO, Google Scholar and ISI Web of Science. The search was initiated with the broad terms “teacher motivation” and “professional development” and then restricted by including terms associated with motivational theories such as teacher efficacy, achievement goals, expectancy-value, interest, self-determination, and cost-benefit analysis. There were significantly fewer results from this more limited search. As expected, while there was considerable information about the evaluation and assessment of PD programs during and following teacher participation, *fewer resources were found that addressed teachers’ perceptions and motivation prior to their participation in PD.* For example, the search of teacher efficacy and PD in mathematics education yielded extensive information on mathematics education and the assessment of specific PD programs, but little on teachers’ perceptions and motivation related to their participation or engagement in these programs. It was difficult to identify resources that assessed PD programs regarding participants’ reasons for attending PD, their level of participation, or how these factors influence student achievement outcomes.

There also were few articles that dealt with teachers’ own mastery (a focus on learning and understanding) or performance achievement goals (an emphasis on ability, interpersonal comparisons) but rather those that focused on students or on teachers’ classroom practices. Instead, there was information on teacher characteristics related to their motivation for attending PD, and teacher engagement and participation with a particular PD program. For example, the search terms “expectancy value” and “PD” yielded few relevant resources, and fewer still when combined with “motivation.” Google Scholar identified more articles using “motivation theory” and “PD” than did other databases. If the journal article did not directly focus on math and science, a resource was included if it was judged to contribute to an understanding of motivation and PD across content areas, such as “costs and benefits” and “PD” and related search terms. For example, an article on literacy achievement and PD entitled *Reading Recovery and Evidence-Based Practice* was included since it “provided an excellent model for demonstrating how to plan, promote and implement an intervention across an educational system” (Schwartz, Hobsbaum, Briggs, & Scull, 2009, p. 1), which included a PD program that built teacher trust and motivation to seek out other effective PD interventions.

Examples of articles not in math or science were those focused on teachers’ attitudes toward the arts in education (Oreck, 2004), professional development initiatives focusing on digital age literacy skills (Richardson et al., 2007), factors that influence how teachers change (Smith, Hofer, Gillespie, Solomon, & Rowe, 2003), improvement of school environments and leadership (Basom & Frase, 2004) and positive effects of professional teacher collaboration (Shepard, 2009). Articles in a journal dedicated to PD, *Professional Development in Education*, were only included if deemed relevant to teacher motivation and PD. Finally, articles on math or science were more likely to be included by virtue of the domains themselves. Articles beginning in the 1990s, other than a “classic” or major publication in the field, were included if they were judged potentially relevant to the study of a PD program and the various perceptions that might contribute to that, including personal interest, content knowledge improvement, cultural background, overlap of subject areas, and school level details. Selection of resources also included PD in international contexts, the connection between PD and student outcomes, and school leadership. Using these criteria yielded approximately 250 relevant resources.

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Categories and Database Organization

Resources identified as relevant were categorized according to their relation to teacher motivation for PD. Categories are described in the following section, with representative citations, commentaries, and examples to capture the scope of the information contained therein. Descriptions also highlight salient issues and provide information to help ascertain whether topics are relevant. It should be noted that the categories are not mutually exclusive—resources may be assigned to multiple categories. Appendices provide a searchable database of the identified resources. Appendix A provides a list of the categories, a brief description of the resources in each category, and category keys. These keys can be used to search the resources that are provided in Appendix B. The searchable database is also available online at www.mspmap.org.

Motivation and Teacher PD Resource Categories

Achievement and Related Outcomes

Resources in this category focus on the design of PD programs that can influence teacher motivation to participate and be engaged in PD. They target the effectiveness of PD in demonstrating sustained gains in student performance, along with cost-benefit considerations (Schwartz, Hobsbaum, Briggs, & Scull, 2009). Also included are discussions of the difficulties and possibilities of providing evidence of the impact of PD programs in schools (Flecknoe, 2002), and studies that address concerns about an overreliance on self-report measures and the need to examine alternatives (Fulmer & Frijters, 2009). Authors cite the necessity for increased empirical evidence about what works in PD for mathematics and science education, and the reasons why this knowledge is so limited (Yager, 2005).

Articles also explore the benefits of providing teacher self-assessment tools along with clear standards of teaching as a strategy for improving the effectiveness of PD (Ross & Bruce, 2007), and examine the structural and process features of PD on teachers' practices in Australia and their impact through the assessment of follow-up knowledge and student learning outcomes (Ingvarson, Meiers, & Beavis, 2005). Studies included here draw comparisons between mathematics teachers from low and high-performing school districts who participated in PD, focusing on their subsequent use of mathematics problem solving in their classrooms (Zambo, R. & Zambo, D., 2008). They also investigate relations between students' interest in mathematics and their mathematics performance during the transition to elementary school (Aunola, Leskinen, & Nurmi, 2006) and explore how evidence-based, collaborative PD increases student engagement and learning (Shepard, 2009). Finally, this section offers examples of ways that achievement can be motivated by teachers' and students' desire for increased competence.

Beliefs

This category provides information for a more thorough understanding of teachers' beliefs that are relevant to the design of PD programs and successful educational reform in general. Topics include an analysis of how teachers' subject-matter beliefs may create obstacles to the acceptance and implementation of reform practices that conflict with those beliefs (Gregoire, 2003), a survey that explores the characteristics and variables that best describe teachers who integrate computers into their classrooms and those who do not, with teachers' beliefs playing a large role (Mueller, Wood, Willoughby, Ross, & Specht, 2008), and an investigation of how teachers' participation in PD activities promotes changes in their beliefs about the implementation of reforms (Meirinka, Meijerb, Verloopa, & Bergenc, 2009).

Classroom Characteristics

Several studies provide information about the primary influences on the motivation of teachers in the classroom and their participation in PD. Articles reveal the consensus that motivating teachers to attend PD, and to effectively address their interests in a wide variety of topics, requires that programs offer a broad spectrum of classroom strategies, organizational tips, pedagogical methods, and enhanced subject-specific material. Also examined are the factors that may undermine or enhance teacher motivation. Topics include an examination of the perceptions of teachers regarding their lack of knowledge and efficacy in motivating students in the classroom, and implications for PD (Hardre & Sullivan, 2008), and the effects of different characteristics of PD on teachers' learning and changes in their classroom practices (Garet, Porter, Desimone, Birman, & Yoon, 2001). Additionally, PD programs are examined that focus on discourse patterns in mathematics classrooms (Crockett, Chen, & Zilimu, 2009), and the link between achievement in science and literacy when elementary school teachers are provided the time, instruction, resources and PD to successfully design and implement an inquiry-based science unit in the classroom (Fortino, Gerretson, Button, & Johnson, 2002). Numerous examples are provided for how PD can assist teachers, offering practical solutions for problem solving in the classroom for those educators who have a willingness to engage in new learning and PD opportunities as they become available.

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Collaboration

PD can address isolation by providing peer collaboration and support that enhances teacher motivation to attend PD, which is an important feature of professional learning communities (PLCs). Resources in this section include the evaluation of a collaborative effort in PD in which several themes emerged that contributed to program success. These include a shared vision of PD goals and flexibility in planning and implementation (Hanley, Maringe, & Ratcliffe, 2008), the development of trust in PD projects that build a community of mathematics education teachers and learners (Sztajn, Hackenberg, White, & Allestaht-Snide, 2007), and an examination of a PD program in which a networked learning community was chosen as an approach to support technology integration in science education (Duran, Brunvand, & Fossum, 2009).

Included is information on the type of support gained through regular teacher engagement and collaboration as an effective means of connecting PD with the daily challenges faced by teachers, even in the most rural parts of China, when supported by educational institutions, leadership, and teacher initiatives (Sargent & Hannum, 2009). Also noted is the importance of including educators and other major stakeholders in the planning process and the setting of goals for PD, which often results in an improved ability for participants to translate their experiences more effectively in the classroom (Herner-Patnode, 2009).

PD can take many forms, and these articles describe how PLCs create the potential to increase teacher motivation by bringing together school staff in professional planning and collective actions towards improving student learning and positive outcomes for both staff and students.

Teachers' views on PD...will significantly influence their motivation to attend PD...[and will also influence] its implementation, sustainability and success in integrating the curriculum and accompanying strategies into teachers' regular classroom practices....

subsequently its implementation, sustainability and success in integrating the curriculum and accompanying strategies into teachers' regular classroom practices towards school educational reform efforts.

Curriculum

The introduction of revised curricula to address student learning involves a complex interaction between curriculum innovation, teacher motivation, PD, and the characteristics of the teaching, learning, and leadership environment. Articles in this category include evidence that mathematical curriculum materials can be effective without PD support but not for all teachers (Collopy, 2003) and how obstacles to the successful classroom integration of curricular-based initiatives can occur when teachers' perceptions of the goals and motivations for PD and those of their districts are not aligned (Yamagata-Lynch & Haudenschild, 2009).

Several international studies are included, such as one in England that describes recent curriculum changes to increase "scientific literacy" in students' daily lives, as well as science content knowledge, and different forms of PD that might be useful for this purpose (Ratcliffe & Millar, 2009). A study in Ireland examines the critical role of PD in providing a mechanism to introduce a revised national curriculum to schools and teachers (Loxley, Johnston, Murchan, Fitzgerald, & Quinn, 2007).

In general, resources here support the consensus that teachers' views on PD and its contribution to the acceptability, feasibility, and usefulness of a particular curriculum program will significantly influence their motivation to attend PD and

Emotions

Education reform efforts may engender emotions that cause teacher resistance or support for changes in teachers' classroom practices (Kelchtermans, 2005). Evidence indicates that emotions can interfere when teachers' perceptions that their motivation and goals are not congruent with their school districts' (Yamagata-Lynch & Haudenschild, 2009). Articles included here (e.g., Dworkin, 2001) report on teacher burnout as a predictor of teaching efficacy, how PD may improve teacher efficacy, and implications for educational quality (Madden-Szeszko, 2000). Included are approaches to PD, its scope, stakeholders, and economic perspectives that affect the return on investment when designing PD programs (Van-Loo & Rocco, 2006), which address the connection between teacher motivation and emotions, PD, and student learning.

Empowerment

Interest in empowerment has triggered several initiatives to study the influences on teachers' sense of empowerment of such factors as teacher motivation for involvement in PD, self-efficacy, opportunities for professional growth, and leadership support. Resources here present a view of PD as a framework for increasing teacher efficacy and empowerment through a better understanding of the relationship between teacher motivation and active engagement in PD, recognizing the importance of collaboration with other colleagues, and the advantages of teachers' involvement in professional learning networks.

Included is an examination of a collaborative model of PD that examines the relationship between empowerment and efficacy (Henson, 2001), and a micro/macro approach to PD in Malta which takes into account the personal initiatives of the teachers within the educational system and their engagement in additional ongoing PD opportunities (Bezzina & Camilleri, 2001). In addition, a study in Israel focused on the relationship between teacher empowerment and organizational and professional commitment, with evidence that teachers' sense of empowerment is significantly related to their feelings of commitment to the organization (e.g., school and school district) and their profession (Bogler & Somech, 2004). One PD program that evaluated ways to assist teachers in implementing state content standards found that the keys to empowerment and completion of the program were the teachers' active engagement and gaining the support of the school principal (Edwards & Green, 1999).

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Grade Level

Several articles provide information on PD that is specific for particular grade levels, or shared across grade levels. Grade levels reviewed range from early childcare and education through adult education programs, along with different international perspectives. Regarding early childhood education settings, articles consider such concerns as alternatives available to enhance early childhood PD opportunities (Barnett & Kelley, 2006) and the role of the state in Kenya's long history of early childhood education (Adams & Swadener, 2000). For the elementary grade levels, articles provide information that include PD efforts to support and retain experienced teachers (Holloway, 2003), success of PD programs in New Zealand in integrating classroom pedagogical tools to improve student achievement (Higgins & Parsons, 2009), and inadequate attention of state policy makers to improve the quality of PD programs (Corcoran, 1995)

Despite a relative lack of articles specific to middle school education, several are relevant to these grades. These include reports about the relationship between teachers' feelings of isolation and the development of a professional learning community (Grider, 2008), and examine teacher efficacy, learning styles and beliefs, and how these factors influence behavior to motivate and change (Kitchens & Wentz, 2007). There are also a significant number of articles that focus on high school and secondary education. These address educational issues such as teachers' attitudes regarding integrating technological tools in teaching and learning (Govender, D. & Govender, I., 2009), and the lack of occupational motivation among teachers and professional engagement and development (Jesus & Lens, 2005). One study in the Netherlands looks at the way that workplace activities such as PD contribute to changes in teachers' beliefs over time (Meirinka, Meijerb, Verloopa, & Bergenc, 2009).

For higher and adult education, several articles examine the relationship between positive teacher and administrative dynamics and opportunities for PD (Ellett, Hill, Liu, Loup, & Lakshmanan, 1997) and the comparison between different models of PD and identifying the most important factors influencing teacher change (Smith, Hofer, Gillespie, Solomon, & Rowe, 2003). Generally, there are resources that examine the lack of PD programs that include many of the major factors that research has shown to be effective, such as school-wide efforts with follow-up involvement and a supportive administration (Richardson, 2003).

Identity

Implications that result from the existence of multiple identities are highlighted in this section. Recommendations are presented for the design of PD programs to incorporate the identities of teachers and other educational leaders, with due consideration for the impact of identity on teachers' motivation to further their personal and professional growth through PD, as well as to contribute to more effective learning environments for their students.

Professional development can offer teachers the opportunity to explore their identities, for example, as science teachers (Moore, 2008), and can be included in PD programs to increase teacher effectiveness when working with low-income

and culturally diverse students (Tucker et al., 2005). Additionally, the No Child Left Behind (NCLB) legislation in the U.S. is considered by many to be a shift towards a “performance” pedagogical model that has altered the professional identities of teachers differentially depending on whether they are early or late in their careers, with implications for the design of PD opportunities (Barrett, 2009); insights have also been offered regarding the potential of “transformational” PD by examining the relation of self to other identities for urban public school leaders (Jurow, 2009). A significant number of articles acknowledge that emotions (see category on Emotions) need to be considered in teachers’ sense of identity as they face the challenges posed by educational reform directives (Kelchtermans, 2005). The changing identities of teachers amidst education reform have been addressed, as is the potential role of PD to enhance teacher competence and personal growth during the upheaval of educational reform (Pattie, 2009).



Institution/School Features

This category reveals the intricacies of the work environment in schools and provides ways that PD can be offered to reflect the needs of school environments and contexts. The types of schools represented range from elementary through high school, and encompass urban, rural, public and private school systems, and schools with different levels of student achievement. Factors affecting schools such as organizational structures, policies, and institutional development are also considered. Topics include investigation of the characteristics of PD in high- and low-performing schools (Henry-Bell, 2007), teachers’ views about instructional reform through PD (Nielsen, Barry, & Trefz, 2008), analysis of scientifically-based evidence of the effects of PD on improving student achievement (Blank & de las Alas, 2009), engaging teachers in research experiences to enrich their classroom teaching (Klein, 2009), and how the policy environment affects teachers’ choices of PD (Desimone, Smith, & Phillips, 2007).

Additionally, regarding math and science education, articles explore teacher perception before and after PD in increasing their understanding of mathematical content (Feuerborn, Chinn, & Morlan, 2009), study the effect of PD on science teaching and achieving scientific literacy for all students (Khourey-Bowers & Simonis, 2004), and describe scientists’ views that PD should offer science teachers ways to make science fun and exciting for students (Taylor, Jones, Broadwell, & Oppewal, 2008). Further, articles consider the integrative nature of school routine and PD as complementary processes in school reform (Gorodetsky & Barak, 2009).

International Comparisons

Articles in this category highlight the importance of taking into account the role of educational research in PD from an international perspective. There are 31 countries represented in this guide to resources. Research in Australia, for example, has focused on stability, change and the global impact on school principals, leadership and PD (Gamage & Hansson, 2006), as well as on a new curriculum that offers an engineering course in secondary schools (Williams, 2008). The success in China of teacher professional learning communities in resource-constrained schools has also been documented (Sargent & Hannum, 2009), along with the use of PD in providing a mechanism to introduce a national primary curriculum in Ireland (Loxley, Johnston, Murchan, Fitzgerald, & Quinn, 2007). In Jamaica, one study focused on a school-based intervention through PD to prevent student misbehavior (Baker-Henningham & Walker, 2009) and in Hong Kong, researchers looked at educational reform and stress on teachers as a main feature of PD programs (Pattie, 2009). A collection of articles on PD from different regions of the world is available (Day & Sachs, 2005), and researchers have provided international comparisons in mathematics education and its impact on PD (Blömeke & Paine, 2008). Included as well are articles about Israeli research efforts to determine the processes in PD that are necessary to develop teacher expertise in a specific aspect of science education (Harrison, Hofstein, Eylon, & Simon, 2008), researchers in Japan who have made comparisons between teachers’ professional status and student achievement in mathematics (Schoenfeld, 1999), and a study in Tanzania of discourse patterns as an essential feature of PD programs (Crockett, Chen, Namikawa, & Zilimu, 2009).

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Motivation

Resources here directly highlight the factors that affect teachers' decisions to attend PD programs to gain a better understanding of what matters to teachers and how best to motivate them through creating more effective PD designs and partnerships with schools. From the perspective of teachers, articles include such topics as teachers' resistance to change in educational reform (Assor, Kaplan, Feinberg, & Tal, 2009), teachers' motivation and styles in relationship to their progress in PD (Campoy & Hoewisch, 1998) and teachers' ability to implement reform in areas such as mathematics (Manouchehri, 2004). There is evidence that highly motivated teachers are more likely to engage in PD and implement innovative programs to increase student learning (Cave & Mulloy, 2010).

In addition, studies focus on the educational environment, such as research that reports a strong correlation between positive teacher and administrative relationships and opportunities for PD (Ellett, Hill, Liu, Loup, & Lakshmanan, 1997), descriptions of professional learning communities and the results of collective action taken by school staff on behalf of increased learning for students (Hord, 1997), and the effect of Pakistani teachers' feelings of being undervalued by society and working in the least sought after profession (Javaid, 2009).

Numerous studies have shown that teacher efficacy is important for improving student performance and stress the need for PD programs that incorporate this element into their designs.

From the perspective of those involved in designing PD programs, several articles explore the factors that contribute most to motivating teachers to engage in PD, the ways that teachers experience their participation, and how this enhances their learning (Scribner, 1999). Others provide an overview of PD since the 1980s, with a comparison between the US and Japan and an analysis of their similarities and differences (Collinson & Ono, 2001). With the current emphasis on accountability, several articles stress the need for an integrated approach that involves teachers, administrators, policy makers, those in leadership positions, and the designers of PD programs (Leithwood, Steinbach, & Jantzi, 2002).

Teacher self-direction and efficacy have been identified as essential factors in the success of PD. Numerous studies have shown that teacher efficacy is important for improving student performance and stress the need for PD programs to incorporate this dimension in their designs and evaluations. Among these studies, articles explore the potential relationship between teachers' self-efficacy beliefs and the integration of computer technology in teaching and learning through PD (Govender, D. & Govender, I., 2009), examine how the level of teaching self-efficacy of highly regarded teachers influences their experiences in PD (Scribner, 1998), and study the connection between quality PD and teacher self-efficacy and its effect on student performance (Kuskovski, 2008).

Additionally, resources here consider science teaching self-efficacy as a major component in improving science teaching in elementary schools (Ramey-Gassert, Shroyer, & Staver, 1996), address the isolation of teachers by increasing teacher efficacy and successful collaboration efforts through PD (Shepard, 2009), and analyze the shift between teacher efficacy in traditional mathematics education and mathematics reform efforts (Smith, 1996). There also has been a focus on ways that teacher attitudes affect teaching skills, knowledge, and practices. Included here are such issues as the attitudes, motivations, and rewards of English teachers in Malaysia with regard to their use of computers in teaching English in their classrooms (Abdullah, Abidin, Luan, Majid, & Atan, 2006); differences between those K-12 teacher participants in a three-year PD program who persist and who drop out, through assessments of such factors as personal empowerment, satisfaction with teaching, and teacher efficacy (Edwards & Green, 1999); and the relationship between the school professional learning environment and the level of dedication and motivation among teachers (Ellett, Hill, Liu, Loup, & Lakshmanan, 1997). Additional topics include studies affirming that PD programs are most beneficial when teachers maintain input and control in the PD process and are linked to the participants' teaching culture, curricula, and classrooms (Nir & Bogler, 2008).

Included is an examination of mathematics PD programs that focus on content knowledge or pedagogical issues, and their perceived relevance for teacher enthusiasm for participation, with examples of the incorporation of these two approaches in PD models (White, Branca, Mitchelmore, & Maxon, 2004). Further, research identifies the attitudes of those participating towards their engagement in PD and offers insights about ways to take attitudes into consideration for more effective outcomes (Varga-Atkins, Qualter, O'Brien, 2009).

Perceptions

Resources here explore teachers' perceptions of PD in mathematics and science, including those that focus on content learning and opportunities for active collective participation of teachers from the same school (Garet, Porter, Desimone, Birman, & Yoon, 2001). Additionally, a study of science teachers' perceptions indicates that science content knowledge dominates over current science applications in their teaching, reflecting the need for PD that continues over time and of-

fers considerable support through access to teaching materials and school leadership, in order to use relevant and meaningful science applications more effectively in the classroom (Ratcliffe & Millar, 2009).

Several articles highlight the importance of teachers' perceptions of their students in creating more positive learning outcomes, such as investigating the relationship between teachers' perceptions of student motivation before and after PD and the effects of this participation on student motivation (Turner, 2008). Included is an evaluation of teachers' perceptions about a PD intervention designed to increase skills in understanding students' needs and abilities with positive and proactive strategies for improving student behavior and achievement (Baker-Henningham & Walker, 2009). Also described is the importance of teachers' perceptions of the value of PD for establishing a deeper understanding of students' needs, offering positive, proactive strategies for classroom management and teaching (Baker-Henningham & Walker, 2009). Further, there is an analysis of the influence of high school teachers' perceptions of their use of motivation strategies in the classroom, and their need for more PD opportunities that address knowledge and skills for greater teacher effectiveness in motivating students (Hardre & Sullivan, 2008).

Policies

Resources included here focus on ways to improve the connections between PD and early childhood policies, practices and school readiness (Zaslow & Martinez-Beck, 2005). They also focus on ways that school reform policies have contributed to teacher burnout (Dworkin, 2001), and discuss recent educational policy initiatives that emphasize retaining only the best teachers and rewarding them for outstanding performance, as essential to narrowing achievement gaps, with significant implications for PD (Whitcomb & Liston, 2009).

Studies have analyzed PD programs that integrate NCLB policies and the influence of standards in teaching and learning (Snow-Renner & Lauer, 2005). Included are the results of recent nationwide math tests showing that student achievement grew faster during the years before the NCLB law when states had more control over education policy than later when federal law became a stronger force (Dillon, 2009), and evaluated PD initiatives funded by government policymakers to address the need for improved mathematics knowledge for teaching (Hill & Ball, 2004). One report described the U.S. Department of Education establishment of the "What Works Clearinghouse" to determine which education and PD initiatives have scientific research-based evidence of effectiveness, to make this information available to educators and policymakers (Schwartz, Hobsbaum, Briggs, & Scull, 2009). With the continuing demands of NCLB and the recent federal education policies, the importance of finding the PD models most likely to improve teacher practice and student performance has become essential (Desimone, Smith, & Phillips, 2007). This climate of high stakes testing and accountability adds to the complexity of factors that may undermine motivation to attend PD, including when accountability systems are at odds with teachers' own sense of personal responsibility for student outcomes (Lauer & Karabenick, in press; Ryan, 2009).

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Resources included support the view that teacher motivation is a critical factor in creating PD environments that respond effectively to government initiatives and policy reforms. Accordingly, the consideration of teacher motivation and PD should be a high priority in defining policies that attract and develop high quality teachers. Articles suggest ways to effectively and successfully respond to challenging educational reform policies.

Program Comparisons

With increasingly diverse educational environments and rapidly changing demands, the comparative analyses of PD opportunities in this section suggest ways that PD can improve both teacher and student learning. A comparative examination and assessment of teachers' attitudes and motivation in a variety of PD programs is thus crucial to link improved teacher practices with increased student academic performance. Accordingly, articles in this category compare the features of PD models and the important characteristics of PD suggested by members of professional educational organizations. Importantly, one analysis concluded that there is considerable variation and inconsistent research findings, and emphasized the need to seek greater consensus among educators (Guskey, 2003).

Quality of Education

A variety of motivation and PD-related topics report differing paths to increase the quality of education. An example of this is an article that documents efforts that attempt to demonstrate the effectiveness of PD programs that involve science teachers with very different backgrounds, experiences and abilities, and which claim that student outcomes cannot tell the whole story when discussing the best model to advance science teacher quality (Abell, 2009). Studies here report on teacher quality as dependent upon improving teaching skills through PD that address deeper content knowledge, the ability to motivate students, communication skills, flexibility, and general knowledge about many areas of life (Keisa, 2009), and describe an example of video-based mathematics PD designed to raise the quality of mathematics education in low-performing schools (Santagata, 2009).

Additionally, there are numerous articles concerned with demands for higher student outcomes. For example, a study in Sweden reported that PD was a way to help teachers cope more effectively to maintain quality amidst higher demands in a rapidly changing educational environment, and considered the support structures necessary for successful PD (Drakenberg, 2001). Another discusses efforts to use PD to help teachers better manage the negative aspects of their practices by identifying their strengths and how to use them more effectively (Bisplinghoff, 2005). A third focuses on the motivation of school administrators and teachers to take greater ownership of their PD programs to encourage and support lifelong learning opportunities for both teachers and students (European Commission, 2005).

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Reform and Innovation

Articles in this section evaluate the different combinations in which PD programs are being designed in order to most effectively direct educational reform towards improving student performance in the areas most needed. They suggest that teachers' practices can be changed over time with considerable support from PD programs and other learning opportunities and materials, and offer potential solutions to this ongoing challenge for teachers, administrators, designers of PD, and policy makers. Resources include how learning to use technology in Rwanda through PD can serve as a model for teachers in creating change in other ways in the learning environment (Mukama & Andersson, 2008), and science education reform through PD that focuses on concrete tasks that connect teacher's subject-matter knowledge with standards for student performance (Supovitz & Turner, 2000). Included is a study that describes the connection between the meanings that teachers in South Africa attach to a new curriculum and the success of educational reform (Bantwini, 2010), an investigation of how adult education teachers changed after being presented with different models of PD (Smith, Hofer, Gillespie, Solomon, & Rowe, 2003), and an explanation of the factors that contribute to how teachers implement new knowledge and skills gained from PD into their classrooms (Watson & Manning, 2008).

Included are articles that describe a promising preschool classroom intervention that promotes math interest and skills in young children (Arnold, Fisher, Doctoroff, & Dobb, 2002), and a review of *Reading Recovery* as a positive PD model for demonstrating how to implement an intervention across a large educational system (Schwartz, Hobsbaum, Briggs, & Scull, 2009). A meta-analysis at the state and local level examines the effects of teacher PD on student learning, with the goal of widely disseminating the scientifically-based evidence of the study's findings (Blank & de las Alas, 2009), and a discussion of effective PD programs that are in partnership with universities with the goal of enhancing teacher leadership practices (Crawford, Roberts, & Hickmann, 2008).

One study in particular outlines variables that could be used by school districts to determine whether or not students could benefit from a particular innovation in their schools, such as a sufficient willingness on educators' parts and organizational capacity (Fixsen, Blase, Horner, & Sugai, 2009). Also included is an examination of projects in Head Start classrooms to improve early literacy development and promote book reading, language, and vocabulary for young children (Dickinson & Caswell, 2007; Wasik, Bond, & Hindman, 2006). Further, there is an analysis of the impact of the *Local Systematic Change Initiative*, a National Science Foundation program on student achievement in science, mathematics and technology, and the importance of PD as a means of improving student outcomes in these subject areas (Banilower, 2002; Supovitz & Turner, 2000).

Authors have noted that the impact of PD on reform initiatives is strongly influenced by levels of teacher enthusiasm and motivation (Goos, Brown, & Makar, 2008). Resources here provide information that improves the understanding of ways that teacher motivation in PD may more effectively address the variety of challenges that arise through evolving research, innovation, policies, and educational philosophies that support improved student learning.

Research

New directions in PD are creating an increased demand by teachers for PD programs supported by data-driven, evidence-based approaches to reform initiatives. Articles in this category acknowledge that a strong base of research is needed to guide the design and investment in PD for present applications. They offer evidence regarding the specific features in PD that could contribute to more effective educational practices, improved student achievement, and provide possible directions for future studies. Included is a review of the most methodologically sound research on PD, delineating the relationship of teacher attitudes and behaviors towards PD and the need to discern whether or not specific PD practices are meeting the needs of teachers to engage in effective PD to improve their teaching practices and enrich student learning and performance.



Resources included highlight a variety of valued characteristics of PD, according to several professional organizations, with the need to seek consensus on criteria for the effectiveness of PD programs (Guskey, 2003) and address possible reasons why little is known about what teachers learn through their PD opportunities and why knowledge about PD is limited, especially in math and science (Yager, 2005). Additionally, articles describe the relationship between scientists' views of teachers as professionals, with suggestions for alternatives to current practices regarding the practical role that research scientists can play in the PD of science teachers (Schuster & Carlsen, 2009). One PD program described engages high school teachers in meaningful research experiences to encourage them to take these experiences back to their science classrooms (Klein, 2009). According to several authors, there has been insufficient analysis of the professional knowledge actually acquired in PD. These authors express a need for more research on the interrelationship between teacher learning, PD, teacher knowledge, and student learning (Wilson & Berne, 1999).

School Administration/Leadership

Included here are resources that reflect the desires of those in educational leadership positions for PD training to better assist them in meeting continually evolving government mandates in measuring student achievement levels and performance. Resources include research that investigates the perceptions of the PD needs of public school principals to meet the required state and federal accountability measures (Keith, 2008) and that evaluates the consequences of poorly planned PD for teachers with little or no input or support from school leadership, which may perpetuate ineffective teaching practices (Berl, 2005). Articles also explore the responses of teachers and school administrators to government accountability initiatives, and assess which leadership practices influence those responses, implying that some forms of PD could serve as antidotes to negative teacher and administrative responses (Leithwood, Steinbach, & Jantzi, 2002). Studies show that those in educational leadership roles can support teachers in areas such as motivation, reflection, evaluation, recognition, rewards, and improving the work culture (Berl, 2005), with the increasing call for the design of PD that can actively engage and prepare teachers for assuming leadership roles in their present and future positions in schools.

Student Behavior

There has been little focus on student behavior and PD. Articles included here examine PD interventions that expand teachers' knowledge and understanding of students' needs and abilities, offer practical strategies to improve student conduct, and find that teachers' views of the usefulness and feasibility of these types of programs significantly influence successful implementation into their regular practice (Baker-Henningham & Walker, 2009). Additionally, these articles examine the role of interpersonal relationships in students' academic behavior and motivation, establishing a framework that guides specific actions at the student, teacher, classroom, and school levels, with implications for the design of PD (Martin & Dowson, 2009). They also provide information about the benefits that teachers have experienced from participating in PD and curriculum programs that explicitly target the improvement of students' improved social and emotional skills.

Student Characteristics

This section presents conceptual, organizational and planning ideas needed to create PD opportunities for teachers with the objective of increased inclusion of all students' diverse needs, with the concurrent goals of greater teacher efficacy and improved student achievement outcomes. Included are resources that examine the characteristics of PD programs in high-performing and low-performing schools as possibly contributing to the persistence of the achievement gap between underserved students and their higher performing peers in different schools (Henry-Bell, 2007). Others document how

teachers who participated in PD programs that focused on understanding the development of different students' mathematical thinking continue to implement the program long afterwards, signifying meaningful and sustained changes in their teaching practices through this form of PD (Franke, 2001). Teaching practices are also described within the context of gifted students and the role of PD with regard to improving teachers' abilities to differentiate curriculum and instruction for gifted students (Sharfman, 2007). Further, teacher and administrator discussion of issues of inclusion often leads to rethinking and restructuring school programs, which may include PD, to improve the education of all students (Kraayenoord, 2003).

Subject Domains

Among the most important factors that increase teacher motivation for PD are content knowledge and alignment with state or district curriculum developments and standards. With a focus on how teacher knowledge and practice relates to teacher motivation and PD, resources in this category describe research in mathematics education and how the policy environment affects teacher participation in PD (Desimone, Porter, Garet, Yoon, & Birman, 2002), teachers' subject-matter beliefs and educational reform (Gregoire, 2003), and the value and design of video-based PD (Koc, Peker, & Osmanoglu, 2009; Santagata, 2009). Also featured are teachers' experiences in PD as they shift from traditional practices to reform efforts (Smith, 1996; Cohen, 2004), the technique of student-centered learning in math class discussions (Dixon, Egendoerfer, & Clements, 2009), and the evaluation of the effects of PD programs on teacher and classroom problem-solving abilities (Zambo, R. & Zambo, D., 2008).

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Specific resources in science education PD examine the instructional practices that show improved effectiveness in the classroom (Lydon & King, 2009), the range of reasons for science teachers to attend or avoid science-related PD (Schibeci & Hickey, 2004), and the reform of traditional teachers' practices to refocus science education on the more applied learning needs (Ratcliffe & Millar, 2009).

Whereas math and science education represent the vast majority of articles, ten other domains are included as well, which focus on the ways that teacher motivation and PD influence student achievement. These domains include the use of creativity and the arts in general education (Oreck, 2004), similarities in reasons for participating in PD programs for business and general education teachers (Shumack, 2008), and cross-disciplinary collaboration and PD projects (Nelson & Slavitt, 2007). Studies also describe the impact of curricular reforms on physical education programs (McCaughy, Martin, Hodges Kulinna, & Cothran, 2006), and PD program evaluation and literacy achievement (Schwartz, Hobsbaum, Briggs, & Scull, 2009).

Teacher Characteristics

Here we focus on teacher factors that contribute to their participation in PD. Topics include teacher persistence in PD (Edwards & Green, 1999), entrance and exit motivations in the teaching profession (Watt & Richardson, 2007), self-reported positive effects of PD (Garet, Porter, Desimone, Birman, & Yoon, 2001), and teachers' inclusion of information technology in the classroom (Wu, Chang, & Guo, 2008; Mushayikwa & Lubben, 2009). Included as well are issues such as teachers' strengths as a positive force to counteract negatives in the teaching climate (Bisplinghoff, 2005), organizational and professional commitment and the feeling of empowerment (Bogler & Somech, 2004), best and worst incentives for PD (Chaney, 2004), and teacher reform (Boyd, Banilower, Pasley, & Weiss, 2003). A more thorough understanding of the association between teacher motivation and participation in PD can guide educators and policy makers in seeking effective ways to encourage teachers to enthusiastically engage in PD activities. In general, the articles are relevant for a wide variety of issues that affect teachers, administrators, policy makers, and designers of teacher PD programs in formulating PD that leads to quality teaching and learning at the school level.

Technology

There is increased attention to the perceptions of teachers' competence with computers and their corresponding attitudes toward technology application in the classroom, with implications for how PD can best address these learning and teaching challenges (Govender, D. & Govender, I., 2009). Research has also studied variables that may distinguish between high and low computer integration in the classroom, such as positive expectations, comfort level, beliefs, training, and support (Mueller, Wood, Willoughby, Ross, & Specht, 2008). Especially relevant are studies that have examined the factors that influence teachers' decisions to participate in PD focused on digital age literacy skills and the level of implementation of

the ideas gained through their participation (Richardson et al., 2007). Others have focused on the need for alternative PD models that offer teachers opportunities to communicate with each other and have access to quality resources, with an example of an online mathematics support network (Dalgarno & Colgan, 2007), as well as the participation of mathematics teachers in an online content-based mentoring program and the value of this type of active engagement for professional growth and development (McAleer, 2009). Indicated is that the demand for PD in the use of technology may outpace the abilities of school districts to meet this need, which will require new methods to provide satisfactory technical training to teachers.

Testing and Standards

School districts are increasingly compelled to provide more effective PD to meet the demand from teacher accountability in meeting standards (Kelleher, 2003). To meet this need the National Science Education Standards (NSES) lists the best professional opportunities for science teachers in staff development programs (Coskie & Place, 2008). With the increased expectations for student learning outcomes, these resources highlight the challenge and importance of understanding how best to motivate teachers to engage in PD, and hold promise for improving teacher practice to help students learn.

Thus, there is relevance for studies that assess the quality of PD and standards-based reform efforts in relation to what students learn as a result of changed teaching practices (Fishman, Marx, Besta, & Talb, 2003). For example, teachers in experimental preschool classrooms used math-relevant activities in their daily routines that significantly increased students' standardized math test scores compared to students in regular classrooms (Arnold, Fisher, Doctoroff, & Dobb, 2002). There is also the acknowledgement that the emphasis being placed on high-stakes testing, with its rewards and punishments, can be informative but also come with unintended negative consequences with implications for PD programs (Ryan & Weinstein, 2009), and a thorough examination of formal PD and other professional learning opportunities that may increase teachers' knowledge and change classroom practices to better meet federal requirements regarding student performance in the U.S. (Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009).

A more thorough understanding of the association between teacher motivation and participation in PD can guide educators and policy makers in seeking effective ways to encourage teachers to enthusiastically engage in PD activities.

Theories

Motivational theories provide important guides and perspectives on teachers' and other educators' motivation and engagement in PD and the design of optimal PD programs. Included here are achievement goal theory, expectancy-value theory, and self-determination theory.

Articles on achievement goal theory include how teachers' mastery, ability-approach, ability-avoidance, and work avoidance goals are related their help-seeking orientations (Butler, 2007) and thus their likelihood of PD participation. Includes as well is the relationship between teachers' and students' achievement goals (Robustelli, 2007), and an analysis of achievement motivation and competence as an organizing framework (Elliot & Dweck, 2005), which is relevant for PD program design. Expectancy-value theory provides a framework for understanding teachers' motivation for choosing teaching as a career, with implications for PD, academic institutions, and policy decisions (Watt & Richardson, 2007), and a study of the extent to which the expectancy-value model can explain teacher beliefs and practices related to computer technology (Wozney, Venkatesh, & Abrami, 2006), and thus participation in technology-related PD.

Articles discuss such topics as the usefulness of self-determination theory as a factor in promoting educational reform (Assor, Kaplan, Feinberg, & Tal, 2009), an investigation of how self-determination theory can be used to better understand why teachers attend PD and how school administration can contribute to the likelihood that teachers will implement PD content (Grove, Dixon, & Pop, 2009), and the role of self-determination theory in supplying an explanation of unintended negative consequences from high-stakes testing such as the potential for undermining both students and teachers (Ryan & Weinstein, 2009). The literature makes clear how incorporating resources that address possible theoretical approaches to teacher motivation and PD can be useful as guides to the design of PD programs and interventions as a means of attaining improved educational quality and student academic achievement.

General Trends

Several themes in the literature that are especially relevant to motivation and PD deserve mention. These include:

- *Teacher Self-efficacy* — Numerous articles report that teachers' self-efficacy (i.e., beliefs they are capable of achieving instructional goals) influences student performance, and they stress the importance of PD programs that attend to teacher self-efficacy in their PD designs and evaluations.
- *Teacher Isolation* — The feeling of isolation that many teachers experience has motivational implications, and suggests that PD programs be designed to address such concerns.
- *Collaboration* — The call from teachers for PD opportunities to be offered in a variety of ways is being answered through the creation of alliances between teachers, administrators, and researchers in developing innovative initiatives such as collaborative professional learning communities, teacher support groups and improved traditional PD programs.
- *Intrinsic Rewards* — PD should attend to expected intrinsic rewards, such as the impact of teachers' sense of self-worth and accomplishment in developing positive attitudes and motivation toward their participation in and anticipation of successful implementation of PD promoted practices.
- *Autonomy* — There is considerable consensus that PD programs are most beneficial when teachers maintain input and control over the PD process, for which self-determination theory is especially relevant. The inclusion of educators in the design, planning process, setting of goals, and implementation of PD has often been shown to improve the ability for participants to translate their experiences more effectively into the classroom.
- *Supportive Administrative Context* — There is a strong correlation between positive teacher-administrative relationships and opportunities for PD. Studies demonstrate that those in educational leadership positions can improve the work culture by supporting teacher motivation as well as teacher reflection, evaluation, and recognition.
- *Existing Beliefs, Practices and Change* — Evidence indicates that the acknowledgment of teachers' existing beliefs and practices is a major factor in their motivation to participate and be engaged in PD, and that it plays a critical role in facilitating change. It is vital that PD programs recognize that while change can be important and enlightening, it can also be threatening.
- *Education Policy* — There is increasing recognition that understanding teacher motivation for PD must take the broader educational policy climate into consideration, in particular the current educational environment with its emphasis on education standards, high-stakes testing, and student achievement, which has resulted in the need for school districts to offer more effective PD for teachers in ways that promote teacher participation and engagement.

A Look Ahead

Recent comprehensive reviews of PD in the U.S. (Wei, Darling-Hammond, Andree, Richardson, & Orphanos, 2009) provide new insights and evidence regarding the kinds of professional learning opportunities that are more likely to improve teacher knowledge and student achievement. This includes the need for PD to be intensive, embedded in teachers' daily work in schools and directly related to their work with students. It is also essential that PD provides teachers with active engagement in learning how to teach content, and offers structured methods to regularly participate in collaborative solutions in local professional learning communities to improve teaching practices.

The evidence included here is consistent with the new definition of effective development, which according to Wei, et al. (2009), involves a "cycle of continuous improvement" in which teams of educators analyze data and determine student and adult learning goals, and develop strategies with coaches who support improved classroom instruction and provide assessments of how the teamwork has affected student achievement. The new model mandates professional learning as a regular part of every workday.

Clearly, the cycle of improvement approach to PD, which shares features in common with such approaches as Japanese Lesson Study (Fernandez, 2002) that was introduced in the U.S. in the 1980s, and professional learning communities, has implications for the role of motivation. Such approaches suggest the need to construe PD more generally by incorporat-

ing teachers' overall motivation for teaching into consideration in addition to focusing on PD as a discrete activity that is relatively discontinuous with other aspects of teachers' role-related activities.

Such recommendations are consistent with the evidence provided in this guide to resources. Despite new research on professional learning opportunities for teaching practice and outcomes, however, there has been virtually no mention of teacher motivation and teachers' decisions to attend or to engage in PD, only that more effective teachers may positively affect the motivation and effort of less effective teachers.

Although there is a growing body of literature to date, it is thus evident that the systematic examination of teacher motivation and PD has only begun, and that more research is needed to understand how education reforms affect teacher motivation in general, and motivation for PD in particular. Studies with an increased focus on the assessment of factors such as teacher autonomy and teacher efficacy, for example, would better enable researchers to identify the differences in participants who continue with or drop out of PD programs. Finally, there is a critical need for studies that examine teachers' beliefs about their responsibility for student outcomes (Lauermann & Karabenick, in press) that may have important consequences for their motivation to engage in PD in the pursuit of those goals.

The future of research on teacher motivation and PD, and the ability of teachers and schools to successfully bridge the demands of policy requirements and improved student learning experiences and outcomes, will be determined by the extent to which these programs weave together ideas from a wide array of fields of study, practices and theory that have previously existed separately from each other. The present guide to resources was designed with that goal in mind.

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Appendix A

Resource Category Definitions and Search Keys

Key	Description
AO	<p>Achievement and Related Outcomes</p> <p>Articles in this category consider the ways in which the design and implementation of PD programs affect student achievement outcomes, offer examples in which achievement can be motivated by the desire to experience competence by both teachers and students, and gives a foundation for future research and PD opportunities.</p>
BL	<p>Beliefs</p> <p>This section offers information which contributes to a more thorough understanding of the influence of teachers' beliefs, relevant to the design of PD programs and educational reform. In trying to resolve hindrances to the implementation of educational reform efforts, educators have examined how to take into account teachers' beliefs about these reforms and how best to support them in adopting changes in their teaching practices.</p>
CC	<p>Classroom Characteristics</p> <p>This section contains resources describing the main influences on the day-to-day motivation for teachers in the classroom and with regard to their participation in PD. Articles focus on the factors which may undermine or enhance teacher motivation in these types of situations and experiences, and offer examples of practical solutions for problem-solving in the classroom for those educators who have a willingness to engage in new learning and PD opportunities as they become available.</p>
CL	<p>Collaboration</p> <p>Topics in this section consider teacher collaboration as an effective means of connecting PD with the daily challenges faced by teachers. Research has shown that the inclusion of educators and other major stakeholders in the planning process and setting of goals for their PD often results in an improved ability for participants to translate their experiences more effectively in the classroom.</p>
CR	<p>Curriculum</p> <p>This is a diverse collection of articles describing new PD approaches to using curriculum in school reform efforts to increase student achievement. These resources convey a widespread agreement that teachers' views on the acceptability and usefulness of a particular curriculum program will significantly influence its implementation and success in integrating the curriculum into regular classroom practices towards school educational reform efforts. Several international studies are included.</p>
EM	<p>Emotions</p> <p>In studies of emotion in educational contexts, sources in this category have shown that school reform has involved a reconstruction of teachers' professional understanding of themselves and their beliefs. School reform may lead to intense feelings that cause teacher resistance or support in changing working conditions in schools and in teachers' classroom practices, and articles in this section address the connection between teacher emotions, PD and student learning.</p>
EP	<p>Empowerment</p> <p>The resources in this category provide a current view of PD as a framework within which educators can develop greater efficacy and empowerment through active engagement, in collaboration with colleagues, and involving an ongoing continuum of professional learning networks, with implications for teachers, principals, education leaders, and policy makers.</p>
GL	<p>Grade Level</p> <p>The resources in this category cover grade levels that range from early childhood education through adult education programs, along with different international perspectives. These articles provide information on teaching concerns belonging to a particular grade level, as well as those that are shared across grade levels.</p>

ID	<p>Identity</p> <p>An individual's or group's identity may be defined by race, ethnicity or gender, along with other criteria factors such as economic status, age, religion, and professional self-understanding and perception. Implications which result from the existence of multiple identities are highlighted in this section, with recommendations for the design of PD programs which incorporate the identity of teachers and other educational leaders in furthering their personal and professional growth as well as contributing to more effective learning environments for their students.</p>
IN	<p>Institution/School Features</p> <p>Resources in this category suggest the many ways that PD can be offered to reflect the needs of the individual school environments and contexts. The types of schools represented range from elementary through high school, and encompass urban, rural, public and private school systems, and schools with different levels of student achievement.</p>
IS	<p>International Comparisons</p> <p>There are 31 countries represented in this literature review. The articles in this section highlight the importance of taking into account the role of educational research in PD in many different contexts. A collection of articles from different regions of the world is available.</p>
MV	<p>Motivation</p> <p>Articles are included from the perspective of teachers, as well as from those involved in designing PD programs, which explore the factors that contribute most to motivating teachers to engage in PD, the ways that teachers experience their participation, and how this enhances teacher and student learning.</p>
PE	<p>Perceptions</p> <p>The resources in this section offer information regarding the ways that teachers' perceptions of their own needs interact with the types of support that are necessary to sustain successful pedagogical implementation of new practices through the educational system and PD programs. Articles in this category address the roles that intrinsic rewards, such as a sense of self-worth and accomplishment, have in developing positive attitudes and motivation to engage in PD programs.</p>
PL	<p>Policies</p> <p>The No Child Left Behind (NCLB) legislation established by the previous Bush administration, and the policies of the Obama administration have changed the way education is being discussed in the U.S. and throughout the world, and the articles in this category reflect this, highlighting the importance of finding the PD models most likely to improve teacher practice and student performance.</p>
PR	<p>Program Comparisons</p> <p>This category offers articles that address the spectrum of PD models in a comparative manner, relating to characteristics of individual PD programs, and also from an international perspective. Comparative analyses included here evaluate the most significant characteristics of PD suggested by members of professional educational organizations as part of effective PD programs.</p>
QE	<p>Quality of Education</p> <p>In this section, a variety of topics are covered that report differing paths taken to increase the quality of education. Additionally, there are a significant number of resources concerned with greater expectations being placed on teachers for higher student outcomes and potential solutions which demonstrate effectiveness in advancing educational quality and increasing student achievement.</p>
RI	<p>Reform and Innovation</p> <p>The articles in this section evaluate the different combinations in which PD programs are being designed in order to most effectively direct educational reform towards improving student performance in the areas most needed. Several international studies are included. These resources highlight some specific reform programs that seem to be effective and discuss which factors may be responsible for this progress.</p>

RS	<p>Research</p> <p>The articles in this category acknowledge that a strong base of research is needed to guide the design and investment in PD for present applications, and offer evidence regarding the specific features in PD that could contribute to more effective educational practices, improved student achievement, and possible directions for future studies.</p>
SA	<p>School Administration/Leadership</p> <p>The articles in this section reflect the desires of those in educational leadership positions for PD training to better assist them in meeting continually evolving government mandates in measuring student achievement levels and performance. Studies show an increasing call for the design of PD that can actively engage and prepare teachers for assuming leadership roles in their present and future positions in schools.</p>
SB	<p>Student Behavior</p> <p>Resources in this section explore teachers' perceptions of PD interventions which deepen teachers' knowledge and understanding of students' needs and abilities, offer practical strategies to improve student conduct, and suggest that teachers' views of the usefulness and feasibility of these types of PD programs significantly influence successful implementation into their regular classroom practice.</p>
SC	<p>Student Characteristics</p> <p>This category includes articles which investigate the characteristics of PD programs in high-performing and low-performing schools, and document how teachers who participated in PD programs which focused on understanding the development of students' thinking continue to implement the programs long afterwards, signifying meaningful and sustained changes in their teaching practices through this kind of PD.</p>
SD	<p>Subject Domains</p> <p>Math and science education represent the vast majority of articles in this category, however ten other domains are included as well which focus on the variety of ways that teacher motivation and PD influence student achievement.</p>
TC	<p>Teacher Characteristics</p> <p>This category focuses on contexts, perceptions and motivations that contribute to teachers' participation in PD, along with the outcomes resulting from their application of what was learned and gained through this engagement. The articles are relevant for a wide variety of issues that affect teachers, administrators, policy makers and designers of teacher PD programs.</p>
TN	<p>Technology</p> <p>Resources in this category illustrate the growing wealth of information which provides guidance in facilitating the integration of technology into the educational process. For educators who seek innovative approaches to adapting technological advances into positive educational initiatives, the research findings from the articles in this section may be used to assist in designing PD that promotes good teaching, learning and creative thinking practices.</p>
TS	<p>Testing and Standards</p> <p>New standards require new approaches to educating students, and resources in this section evaluate several different options for improving student achievement by enhancing the capacity of teachers and schools through PD to more successfully bridge the demands of students' learning experiences and the demands of the federally mandated standards movement.</p>
TX	<p>Theories</p> <p>The motivational theories mentioned in these articles, such as achievement goal theory, expectancy-value theory and self-determination theory, have been looked at in the context of PD programs and their implications for educational practice in light of these theoretical perspectives. Resources that suggest possible theoretical approaches to teacher motivation and PD could be useful to educators in guiding the design of PD programs and interventions.</p>

Appendix B

Resources and Category Search Keys

Key	Resource
IN MV PE SD TN	Abdullah, N. A., Abidin, M. J. Z., Luan, W. S., Majid, O., & Atan, H. (2006). The attitude and motivation of English language teachers towards the use of computers. <i>Malaysian Online Journal of Instructional Technology (MOJIT) Theory and Research in Education</i> , 3(1), 57-67.
AO QE SD	Abell, S. (2009). <i>A model for evaluating science teacher professional development projects</i> . Paper presented at the European Science Education Research Association (ESERA) conference. Retrieved from http://www.pdeval.missouri.edu/docs/products/esera%2009%20abell%20paper%208509.pdf
CL MV RI	Abrami, P. C., Poulsen, C., & Chambers, B. (2004). Teacher motivation to implement an educational innovation: Factors differentiating users and non-users of cooperative learning. <i>Educational Psychology</i> , 24(2), 201-216.
GL IS PL RI	Adams, D., & Swadener, B. B. (2000). Early childhood education and teacher development in Kenya: Lessons learned. <i>Child and Youth Care Forum</i> , 29(6), 18.
MV TC	Arbaugh, F. (2003). Study groups as a form of professional development for secondary mathematics teachers. <i>Journal of Mathematics Teacher Education</i> , 6(2), 139-163.
GL RI SC TS	Arnold, D. H., Fisher, P. H., Doctoroff, G. L., & Dobb, J. (2002). Accelerating math development in head start classrooms. <i>Journal of Educational Psychology</i> , 94(4), 762-770.
MV PE PL RI TX	Assor, A., Kaplan, H., Feinberg, O., & Tal, K. (2009). Combining vision with voice: A learning and implementation structure promoting teachers' internalization of practices based on self-determination theory. <i>Theory and Research in Education</i> , 7(2), 234-243.
AO RS	Au, W. (2007). High-stakes testing and curricular control: A qualitative metasynthesis. <i>Educational Researcher</i> , 36(5), 258-267.
AO IN MV	Aunola, K., Leskinen, E., & Nurmi, J. E. (2006). Developmental dynamics between mathematical performance, task motivation, and teachers' goals during the transition to primary school. <i>British Journal of Educational Psychology</i> , 76(1), 21-40.

RS	Avalos, B. (2010). Teacher professional development in <i>Teaching and Teacher Education</i> over ten years. <i>Teaching and Teacher Education</i> , 27(1), 10-20.
GL MV SD	Backhaus, K. (2009). Desire for professional development among adjunct business faculty. <i>Journal of Faculty Development</i> , 23(1), 40-47.
CR IS MV PE RI SB TC	Baker-Henningham, H., & Walker, S. (2009). A qualitative study of teacher's perceptions of an intervention to prevent conduct problems in Jamaican pre-schools. <i>Child Care Health and Development</i> , 35(5), 632-642.
AO RI	Banilower, E. R. (2002). <i>Results of the 2001-2002 study of the impact of the local systemic change initiative on student achievement in science</i> . Chapel Hill, NC: Horizon Research.
CR GL IS PE RI	Bantwini, B. D. (2010). How teachers perceive the new curriculum reform: Lessons from a school district in the Eastern Cape Province, South Africa. <i>International Journal of Educational Development</i> , 30(1), 83-90.
GL QE	Barnett, W. S., & Kelley, P. J. (2006). A framework for cost-benefit analysis of professional development in early care and education. In M. E. Zaslow & I. E. Martinez-Beck (Eds.), <i>Critical issues in early childhood professional development</i> (pp. 313-337): Baltimore, MD, US: Paul H Brookes Publishing.
ID PL	Barrett, B. D. (2009). No child left behind and the assault on teachers' professional practices and identities. <i>Teaching and Teacher Education</i> , 25(8), 1018-1025.
AO GL MV	Barsby, C. E. (2008). Reading calibration: Quantitative study exploring the extent calibration affects teachers' motivation to pursue professional development. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 68(9-A).
IN MV	Basom, M. R., & Frase, L. (2004). Creating optimal work environments: Exploring teacher flow experiences. <i>Mentoring & Tutoring: Partnership in Learning</i> , 12(2), 241-258.
GL TC	Beard, G. V. (2008). The adult learner, professional development, and the literacy coach: An effective professional development model proposal. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 68(8-A), 96.
IN MV SA SD	Berl, P. S. (2005). Developing early to mid career teachers. <i>Exchange: The Early Childhood Leaders' Magazine Since 1978</i> , NA(162), 6-10.

EP IS	Bezzina, C., & Camilleri, A. (2001). The professional development of teachers in Malta. <i>European Journal of Teacher Education</i> , 24(2), 14.
CC SD TX	Bikner-Ahsbals, A. (2003). <i>A social extension of a psychological interest theory</i> . Honolulu, HI: International Group for the Psychology of Mathematics Education.
MV QE TC	Bisplinghoff, B. (2005). Taking time to tend to the “good”. <i>Educational Horizons</i> , 48(1), 35-38.
IN RI SD	Blank, R. K., & de las Alas, N. (2009). <i>Effects of teacher professional development on gains in student achievement: How meta analysis provides scientific evidence useful to education leaders</i> . Washington, D.C.: Council of Chief State School Officers.
AO RI TC	Blazer, C. (2005). <i>Literature review on professional development for teachers</i> . Miami, FL: Miami-Dade County Public Schools.
AO MV	Blazevski, J. L. (2007). Teacher efficacy for supporting student motivation. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 67(7-A), 2460.
ID IS PR TC	Blömeke, S., & Paine, L. (2008). Getting the fish out of the water: Considering benefits and problems of doing research on teacher education at an international level. <i>Teaching and Teacher Education</i> , 24(8), 2027-2037.
IN IS MV TC	Bogler, R., & Somech, A. (2004). Influence of teacher empowerment on teachers’ organizational commitment, professional commitment and organizational citizenship behavior in schools. <i>Teaching and Teacher Education</i> , 20(3), 277-289.
AO RI	Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. <i>Educational Researcher</i> , 33(8), 3-15.
EP IN RI TC	Boyd, S. E., Banilower, E. R., Pasley, J. D., & Weiss, I. R. (2003). <i>Progress and pitfalls: A cross-site look at local systemic change through teacher enhancement</i> . Chapel Hill, NC: Horizon Research Inc.

CC GL IN MV TC	Bozack, A. R. (2008). Growing new teachers: The relationship among professional development, efficacy beliefs, and classroom practices. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 69(2-A).
AO MV	Bray-Clark, N., & Bates, R. (2003). Self-efficacy beliefs and teacher effectiveness: Implications for professional development. <i>Professional Educator</i> , 26(1), 13-22.
AO	Brett, K., & Mathews, C. (1996). Building an evaluative climate in continuing professional development--The NPDP: SA experience. <i>Australian Journal of Adult and Community Education</i> , 36(3), 181-192
IS QE TC	Brighouse, T. (2008). Putting professional development centre stage. <i>Oxford Review of Education</i> , 34(3), 313-323.
CC CL MV	Bruce, C. D., & Ross, J. A. (2008). A model for increasing reform implementation and teacher efficacy: Teacher peer coaching in grades 3 and 6 mathematics. <i>Canadian Journal of Education</i> , 31(2), 346-370.
IS	Buckler, A. (in press). Reconsidering the evidence base, considering the rural: Aiming for a better understanding of the education and training needs of Sub-Saharan African teachers. <i>International Journal of Educational Development</i> .
CL TC	Butler, D. L., Lauscher, H. N., Jarvis-Selinger, S., & Beckingham, B. (2004). Collaboration and self-regulation in teachers' professional development. <i>Teaching and Teacher Education</i> , 20(6), 435-455.
AO IN MV TC	Butler, R. (2007). Teachers' achievement goal orientations and associations with teachers' help seeking: Examination of a novel approach to teacher motivation. <i>Journal of Educational Psychology</i> , 99(2), 241-252.
CC IS MV	Buumlmen, N. T. (2009). Possible effects of professional development on Turkish teachers' self-efficacy and classroom practice. <i>Professional Development in Education</i> , 35(2), 261-278.
AO CL IN TX	Cabrera, A., & Cabrera, E. (2002). Knowledge-sharing dilemmas. <i>Organization Studies</i> , 23(5), 687-710.
GL MV QE	Camilia, A. (2001). Maintaining teacher motivation. <i>Suite101.com</i> , from http://www.suite101.com/article.cfm/effective_teacher/62074/1

BL GL MV	Campoy, R. W., & Hoewisch, A. (1998). Moral and instructional influences of teachers in professional development schools. <i>Professional Educator</i> , 20(3), 7-23.
IN MV	Cave, A., & Mulloy, M. (2010). How do cognitive and motivational factors influence teachers' degree of program implementation?: A qualitative examination of teacher perspectives. <i>National Forum of Educational Administration and Supervision Journal</i> , 27(4).
MV TC	Chaney, S. (2004). Six best and worst incentives for professional development. <i>The Delta Kappa Gamma Bulletin</i> , 70(2), 10-14.
GL MV TC	Chen, J.-Q., & Chang, C. (2006). Testing the whole teacher approach to professional development: A study of enhancing early childhood teachers' technology proficiency. <i>Early Childhood Research & Practice (ECRP)</i> , 8(1).
IN	Clement, M., & Vandenberghe, R. (2000). Teachers' professional development: A solitary or collegial (ad) venture? <i>Teaching and Teacher Education</i> , 16(1), 81-101.
IN SD	Cohen, S. (2004). <i>Teachers' professional development and the elementary mathematics classroom: Bringing understandings to light</i> . Mahwah, New Jersey: Lawrence Erlbaum Associates.
MV PR QE	Collinson, V., & Ono, Y. (2001). The professional development of teachers in the United States and Japan. <i>European Journal of Teacher Education</i> , 24(2), 26.
CR GL TC	Collopy, R. (2003). Curriculum materials as a professional development tool: How a mathematics textbook affected two teachers' learning. <i>The Elementary School Journal</i> , 103(3), 287-311.
GL IN RI	Corcoran, T. C. (1995). <i>Transforming professional development for teachers: A guide for state policymakers</i> . Washington, DC: National Governors' Association.
CC IN MV SD TS	Coskie, T. L., & Place, N. A. (2008). The National Board certification process as professional development: The potential for changed literacy practice. <i>Teaching and Teacher Education</i> , 24(7), 1893-1906.
GL IS SD	Courtney, J. (2007). What are effective components of in-service teacher training? A study examining teacher trainers' perceptions of the components of a training programme in mathematics education in Cambodia. <i>Journal of In-service Education</i> , 33(3), 19.
RI SA	Crawford, P. A., Roberts, S. K., & Hickmann, R. (2008). All together now: Authentic university-school partnerships for professional development. <i>Childhood Education</i> , 85(2), 6.

AO CC ID IS SD	Crockett, M. D., Chen, C.-H., Namikawa, T., & Zilimu, J. (2009). Exploring discourse-based assessment practice and its role in mathematics professional development. <i>Professional Development in Education</i> , 35(4), 677-680.
GL SD TN	Dalgarno, N., & Colgan, L. (2007). Supporting novice elementary mathematics teachers' induction in professional communities and providing innovative forms of pedagogical content knowledge development through information and communication technology. <i>Teaching and Teacher Education</i> , 23(7), 1051-1065.
EM ID RI TC	Darby, A. (2008). Teachers' emotions in the reconstruction of professional self-understanding. <i>Teaching and Teacher Education</i> , 24(5), 1160-1172.
IS TX	Day, C., & Sachs, J. (2005). <i>International handbook on the continuing professional development of teachers</i> . United Kingdom: Open University Press, McGraw-Hill companies.
IN MV SD	Desimone, L., Smith, T. M., & Phillips, K. J. R. (2007). Does policy influence mathematics and science teachers' participation in professional development? <i>Teachers College Record</i> , 109(5), 1086-1122.
AO RI	Desimone, L. M., Porter, A. C., Garet, M. S., Yoon, K. S., & Birman, B. F. (2002). Effects of professional development on teachers' instruction: Results from a three-year longitudinal study. <i>Educational Evaluation and Policy Analysis</i> , 24(2), 81-112.
CC GL RI SD	Dickinson, D., & Caswell, L. (2007). Building support for language and early literacy in preschool classrooms through in-service professional development: Effects of the Literacy Environment Enrichment Program (LEEP). <i>Early Childhood Research Quarterly</i> , 22, 243-260.
AO PL	Dillon, S. (2009, October 14, 2009). Sluggish results seen in math scores. <i>New York Times online</i> . Retrieved from http://www.nytimes.com/2009/10/15/education/15math.html?_r=1&scp=1&sq=sluggish%20results%20seen%20in%20math%20scores&st=cse
CC GL SD	Dixon, J. K., Egendoerfer, L. A., & Clements, T. (2009). Do they really need to raise their hands? Challenging a traditional social norm in a second grade mathematics classroom. <i>Teaching and Teacher Education</i> , 25(8), 1067-1076.
IS QE	Drakenberg, M. (2001). The professional development of teachers in Sweden. <i>European Journal of Teacher Education</i> , 24(2), 10.
CL TN	Duncan-Howell, J. (2010). Teachers making connections: Online communities as a source of professional learning. <i>British Journal of Educational Technology</i> , 41(2), 324-340.

CL GL MV SD TN	Duran, M., Brunvand, S., & Fossum, P. R. (2009). Preparing science teachers to teach with technology: Exploring a K-16 networked learning community approach. <i>Turkish Online Journal of Educational Technology</i> , 8(4), 21-42.
PL RI	Dworkin, A. G. (2001). Perspectives on teacher burnout and school reform. <i>International Education Journal</i> , 2(2), 69-78.
RI	Ebert, E. K., & Crippen, K. J. (2010). Applying a cognitive-affective model of conceptual change to professional development. <i>Journal of Science Teacher Education</i> , 21(3), 371-388.
RI TX	Eccles, J. S. (1994). Understanding women's educational and occupational choices. <i>Psychology of Women Quarterly</i> , 18(4), 585-609.
EP GL MV	Edwards, J. L., & Green, K. E. (1999). <i>Persisters versus nonpersisters: Characteristics of teachers who stay in a professional development program</i> . Paper presented at the Annual Meeting of the American Educational Research Association. Retrieved from http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/16/1a/5c.pdf
GL MV TC	Ellett, C. D., Hill, F. H., Liu, X., Loup, K. S., & Lakshmanan, A. (1997). <i>Professional learning environment and human caring correlates of teacher efficacy</i> . (No. Report: ED411206. 30pp. Mar 1997): Paper presented at the Annual Meeting of the American Educational Research Association (Chicago, IL, March 24-28, 1997).
AO MV SC TX	Elliot, A. J., & Dweck, C. S. (2005). <i>Handbook of competence and motivation</i> . New York: Guilford Press.
CR SC	Epstein, A. S. (2009). The HighScope preschool curriculum and dimensions of preschool curriculum decision-making. <i>Early Childhood Services: An Interdisciplinary Journal of Effectiveness</i> , 3(3), 193-208.
IN IS PL QE	European Commission, & Culture, D. G. f. E. a. (2005). <i>CPD for teachers and trainers</i> . Dublin, Ireland.
SD	Evans, L. (2010). <i>New theoretical perspectives on job satisfaction and motivation: Challenging Herzberg and linking with professional development</i> . Paper presented at the European Conference on Educational Research, University of Helsinki, August 26th, 2010, within the symposium, <i>Job Satisfaction and Motivation amongst European Education Professionals: Developing Theory and Theoretical Perspectives</i> .
IS PR	Fernandez, C. (2002). Learning from Japanese approaches to professional development. <i>Journal of Teacher Education</i> , 53(5), 393-405.
IN SD	Feuerborn, L. L., Chinn, D., & Morlan, G. (2009). Improving mathematics teachers' content knowledge via brief in-service: a US case study. <i>Professional Development in Education</i> , 35(4), 531-545.
RI	Fishman, B. J., Marx, R. W., Besta, S., & Talb, R. T. (2003). Linking teacher and student learning to improve professional development in systemic reform. <i>Teaching and Teacher Education</i> , 19(6), 643-658.

RI	Fixsen, D. L., Blase, K. A., Horner, R., & Sugai, G. (2009). <i>Readiness for change</i> . In State Implementation & Scaling-up of Evidence-based Practices, FPG Child Development Institute (Eds.), (Vol. 3). Chapel Hill, NC: The University of North Carolina.
AO SB	Flecknoe, M. (2002). Measuring the impact of teacher professional development: can it be done. <i>European Journal of Teacher Education</i> , 25(2/3), 16.
AO CC GL TC	Fortino, C., Gerretson, H., Button, L. J., & Johnson, S. (2002). <i>Using literacy integration for communicating scientifically: Research results on teacher efficacy and student achievement</i> . University of Northern Colorado. Adams Twelve Five Star School District.
TC TN	Fowler, E. L. (2008). Teacher use and integration of technology in Alabama K--12 public school classrooms: Influences and barriers. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 68(7-A), 109.
CC SC SD	Franke, M. L. (2001). Capturing teachers' generative change: A follow-up study of professional development in mathematics. <i>American Educational Research Journal</i> , 38(3), 653-689.
IS	Fraser, C., Kennedy, A., Reid, L., & Mckinney, S. (2007). Teachers' continuing professional development: contested concepts, understandings and models. <i>Journal of In-service Education</i> , 33(2), 17.
RS TC	Fukkink, R. G., & Lont, A. (2007). Does training matter? A meta-analysis and review of caregiver training studies. <i>Early Childhood Research Quarterly</i> , 22, 294-311.
AO GL MV RS SC	Fulmer, S. M., & Frijters, J. C. (2009). A review of self-report and alternative approaches in the measurement of student motivation. [Journal]. <i>Educational Psychology Review</i> , 21(3), 219-246.
IN IS RI SA	Gamage, D., & Hansson, P. (2006). A comparative study of profiles and perspectives on professional development of school leaders in Australia and Sweden. <i>Education and Society</i> , 24(3), 61-81.
CC PE TC	Garet, M. S., Porter, A. C., Desimone, L., Birman, B. F., & Yoon, K. S. (2001). What makes professional development effective? Results from a national sample of teachers. <i>American Educational Research Journal</i> , 38(4), 915-945.
RI	Glazerman, S., & Seifullah, A. (2010). <i>An evaluation of the Teacher Advancement Program (TAP) in Chicago: Year Two Impact Report</i> . Princeton, NJ: Mathematica Policy Research, Inc.
GL SD	Goebel, C. A., Umoja, A., & DeHaan, R. L. (2009). Providing undergraduate science partners for elementary teachers: Benefits and challenges. <i>CBE - Life Sciences Education</i> , 8(3), 239-251.

IN MV SD TC	Goos, M., Brown, R., & Makar, K. (2008, June 28-July 1, 2008). <i>Navigating currents and charting directions. Proceedings of the annual conference of the Mathematics Education Research Group of Australasia (31st, Brisbane, Queensland, Australia, June 28-July 1, 2008). Volumes 1 and 2.</i> Paper presented at the Annual Conference of the Mathematics Education Research Group of Australasia, Queensland, Australia.
IN RI	Gorodetsky, M., & Barak, J. (2009). Back to schooling: Challenging implicit routines and change. <i>Professional Development in Education, 35</i> (4), 585-600.
GL MV PE TN	Govender, D., & Govender, I. (2009). The relationship between Information and Communications Technology (ICT) integration and teachers' self-efficacy beliefs about ICT. <i>Education as Change, 13</i> (1), 153-165.
BL CC RI SD	Gregoire, M. (2003). Is it a challenge or a threat? A dual-process model of teachers' cognition and appraisal processes during conceptual change. <i>Educational Psychology Review, 15</i> (2), 147-179.
CL GL MV PE	Grider, A. T. (2008). Elementary, middle, and high school teachers' perceptions of professional learning community and sense of efficacy. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences, 69</i> (4-A).
CC RI TC	Grierson, A. L., & Gallagher, T. L. (2009). Seeing is believing: Creating a catalyst for teacher change through a demonstration classroom professional development initiative. <i>Professional Development in Education, 35</i> (4), 567-584.
MV TX	Grove, C. M. (2009). The importance of values-alignment within a role-hierarchy to foster teachers' motivation for implementing professional development. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences, 69</i> (7A).
CC GL RI RS SD	Grove, C. M., Dixon, P. J., & Pop, M. M. (2009). Research experiences for teachers: Influences related to expectancy and value of changes to practice in the American classroom. <i>Professional Development in Education, 35</i> (2), 247-260.
SD TC	Guskey, T. R. (2000). <i>Evaluating professional development.</i> Thousand Oaks, Calif.: Corwin Press.
MV	Guskey, T. R. (2002). Professional development and teacher change. <i>Teachers and Teaching: Theory and Practice, 8</i> (3/4), 381-391.
PR RI RS	Guskey, T. R. (2003). What makes professional development effective? <i>Phi Delta Kappan, 84</i> (10).

CL	Hadar, L., & Brody, D. (2010). From isolation to symphonic harmony: Building a professional development community among teacher educators. <i>Teaching and Teacher Education</i> , 26(8), 1641-1651.
CL QE RI SD	Hanley, P., Maringe, F., & Ratcliffe, M. (2008). Evaluation of professional development: Deploying a process-focused model. <i>International Journal of Science Education</i> , 30(5), 711-725.
IS	Hansen, A., & Simonsen, B. (2001). Mentor, master and mother: the professional development of teachers in Norway. <i>European Journal of Teacher Education</i> , 24(2), 12.
CC IN MV PE SC	Hardre, P. L., & Sullivan, D. W. (2008). Teacher perceptions and individual differences: How they influence rural teachers' motivating strategies. <i>Teaching and Teacher Education</i> , 24(8), 2059-2075.
AO MV TC TX	Hardre, P. L. B. (2003). The effects of instructional design professional development on teaching performance, perceived competence, self-efficacy, and effectiveness. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 63(12-A).
IS RI	Harris, A., & Jones, M. (2010). Professional learning communities and system improvement. <i>Improving Schools</i> , 13, 172.
GL IS MV SD	Harrison, C., Hofstein, A., Eylon, B.S., & Simon, S. (2008). Evidence-based professional development of science teachers in two countries. <i>International Journal of Science Education</i> , 30(5), 577-591.
IN MV TC	Harvey, P., Sinclair, C., & Dowson, M. (2005). Teacher motivations for postgraduate study: Development of a psychometric scale for Christian higher education. <i>Christian Higher Education</i> , 4(4), 241-264.
ID IN MV SC	Henry-Bell, M. R. (2007). Professional development in high- and low-performing elementary schools serving large numbers of African American, Latino, and low-socioeconomic students. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 68(3-A).
EP IN	Henson, R. K. (2000). The effects of participation in teacher research on teacher efficacy and empowerment. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , Vol 61(1-A), Jul, 2000. pp. 82., 61(1-A).
EP MV	Henson, R. K. (2001). The effects of participation in teacher research on teacher efficacy. <i>Teaching and Teacher Education</i> , 17(7), 819-836.

CL RI SC	Herner-Patnode, L. (2009). Educator study groups: A professional development tool to enhance inclusion. <i>Intervention in School and Clinic, 45</i> (1), 24-30.
GL IS RI SD	Higgins, J., & Parsons, R. (2009). A successful professional development model in mathematics: A system-wide New Zealand case. <i>Journal of Teacher Education, 60</i> (3), 231-242 .
ID	Hildebrandt, S. A., & Eom, M. (in press). Teacher professionalization: Motivational factors and the influence of age. <i>Teaching and Teacher Education</i> .
GL PL TC	Hill, H. C., & Ball, D. L. (2004). Learning mathematics for teaching: Results from California's Mathematics Professional Development Institutes. <i>Journal for Research in Mathematics Education. Washington: Nov 2004. Vol. 35, Iss. 5; pg. 330, 35</i> (5).
CL SD	Hofman, R. H., & Dijkstra, B. J. (2010). Effective teacher professionalization in networks? <i>Teaching and Teacher Education, 26</i> (4), 1031-1040.
GL IN MV TC	Holloway, J. H. (2003). Sustaining experienced teachers. <i>Educational Leadership, 60</i> (8), 87-89.
CL GL MV SA	Hord, S. M. (1997). <i>Professional learning communities: Communities of continuous inquiry and improvement</i> . Austin, TX: Southwest Educational Development Laboratory.
RI SD	Horizon Research, I. (2001). <i>What have we learned? Local systemic change initiatives share lessons from the field</i> . Retrieved from http://lscnet.terc.edu/do.cfm/conference_material/7058/show/use_set-lessons_00
IN MV PE	Hoy, A. W., & Spero, R. B. (2005). Changes in teacher efficacy during the early years of teaching: A comparison of four measures. <i>Teaching and Teacher Education, 21</i> (4), 343-356.
AO PL RI	Hursh, D. (2007). Assessing No child left behind and the rise of neoliberal education policies. <i>American Educational Research Journal, 44</i> (3), 493-518.
AO ID IS	Hynds, A., & McDonald, L. (2010). Motivating teachers to improve learning for culturally diverse students in New Zealand: Promoting Maori and Pacific Islands student achievement. <i>Professional Development in Education, 36</i> (3), 525-540.
AO TC	Ingvarson, L., Meiers, M., & Beavis, A. (2005). Factors affecting the impact of professional development programs on teachers' knowledge, practice, student outcomes & efficacy. <i>Education Policy Analysis Archives, 13</i> (10), 1-28.

MV SD	Jansen, D. J. (2008). Validation of an instrument for mathematics enhancement teaching efficacy of Pacific Northwest agricultural educators. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 69(1-A), 71.
IS MV	Javaid, N. (2009). Teacher motivation – an area of neglect. Canadian International Development Program (CIDA) Pakistan Programme.
GL MV TC TX	Jesus, S. N. d., & Lens, W. (2005). An integrated model for the study of teacher motivation. <i>Applied Psychology: An International Review</i> , 54(1), 1-147.
EM RI	Johnson, C. C. (2010). Making the case for school-based systemic reform in science education. <i>Journal of Science Teacher Education</i> , 21(3), 279-282.
GL SC SD	Johnson, C. C., & Fargo, J. D. (2010). Urban school reform enabled by transformative professional development: Impact on teacher change and student learning of science. <i>Urban Education</i> , 45(1), 4-29.
IS TC	Joldoshalieva, R. (2007). Continuing teacher professional development in post-Soviet Kyrgyzstan. <i>Journal of In-service Education</i> , 33(3), 14.
GL IN SD	Jones, E., Hampton, E. M., Brown, E. M., & Leinenbach, M. T. (2009). Impacting teacher mathematical knowledge and attitudes with grade-appropriate methods. <i>Professional Development in Education</i> , 35(2), 279-283.
ID IN RI SA	Jurow, S. (2009). Cultivating self in the context of transformative professional development. <i>Journal of Teacher Education</i> , 60(3), 277-290.
BL GL TN	Kao, C. P., Wu, Y. T., & Tsai, C. C. (in press). Elementary school teachers' motivation toward web-based professional development, and the relationship with Internet self-efficacy and belief about web-based learning. <i>Teaching and Teacher Education</i> .
MV RS	Kaplan, A., Karabenick, S. A., & de Groot, E. (2009). <i>Culture, self, and motivation: Essays in honor of Martin L. Maehr</i> . Information Age Publisher.
IS TN	Karagiorgi, Y., & Lymbouridou, C. (2009). The story of an online teacher community in Cyprus. <i>Professional Development in Education</i> , 35(1), 119-138.
IS QE RI TC	Keisa, V. (2009). <i>Analysis of teacher's professional development</i> . Paper presented at the International Scientific Conference on Society, Integration, Education. Rezekne, Latvia, Feb 27-28, 2009.
SA	Keith, D. L. (2008). Principal desirability for professional development. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 69(4-A).

EM ID IN RI	Kelchtermans, G. (2005). Teachers' emotions in educational reforms: Self-understanding, vulnerable commitment and micropolitical literacy. <i>Teaching and Teacher Education, 21</i> (8), 995–1006.
CC SC TS	Kelleher, J. (2003). A model for assessment-driven professional develop. <i>Phi Delta Kappan. Bloomington, 84</i> (10).
IS PR	Kennedy, A. (2005). Models of continuing professional development: A framework for analysis. <i>Journal of In-service Education, 31</i> (2), 16.
AO IN MV SD	Khourey-Bowers, C., & Simonis, D. G. (2004). Longitudinal study of middle grades chemistry professional development: Enhancement of personal science teaching self-efficacy and outcome expectancy. <i>Journal of Science Teacher Education, 15</i> (3), 175-195.
IS TC	Killeavy, M. (2001). Teacher education in Ireland: the induction and continuing professional development of primary teachers. <i>European Journal of Teacher Education, 24</i> (2), 18.
GL MV SD	Kitchens, A. N., & Wenta, R. G. (2007). Merging invitational theory with mathematics education: A workshop for teachers. <i>Journal of Invitational Theory and Practice, 13</i> , 34-46.
GL ID IS MV RS	Klassen, R. M., Chong, W. H., Huan, V. S., Wong, I., Kates, A., & Hannok, W. (2008). Motivation beliefs of secondary school teachers in Canada and Singapore: A mixed methods study. <i>Teaching and Teacher Education, 24</i> (7), 1919-1934.
IN RS SD TC	Klein, S. S. (2009). Effective STEM professional development: A biomedical engineering RET site project. <i>International Journal of Engineering Education, 25</i> (3), 523-533.
IN	Knight, P. (2002). A systemic approach to professional development: learning as practice. <i>Teaching and Teacher Education, 18</i> (3), 229-241.
SD TC	Koc, Y., Peker, D., & Osmanoglu, A. (2009). Supporting teacher professional development through online video case study discussions: An assemblage of preservice and inservice teachers and the case teacher. <i>Teaching and Teacher Education, 25</i> (8), 1158-1168.
CC CL SC TC	Kraayenoord, C. (2003). The task of professional development. <i>International Journal of Disability, Development & Education, 50</i> (4), 3.

CL GL IN TC	Krečić, M. J., & Grmek, M. I. (2008). Cooperative learning and team culture in schools: Conditions for teachers' professional development. <i>Teaching and Teacher Education</i> , 24(1), 59-68.
IS	Krull, E. (2001). Teacher professional development in Estonia: theory and practice. <i>European Journal of Teacher Education</i> , 24(2), 15.
RS	Kuo, L. H. (2009). A study of the in-service hot spot and attendance model of professional development. <i>WSEAS Transactions on Mathematics</i> , 8(11), 645-656.
IS MV	Kuskovski, V. D. (2008). Relationship between professional development and teacher efficacy in teachers of international schools in Switzerland. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 69(2-A).
RS TC	Kwakman, K. (2003). Factors affecting teachers' participation in previous professional learning activities. <i>Teaching and Teacher Education</i> , 19(2), 149-170.
AO RS TC	Kyriakides, L., Creemers, B. P. M., & Antoniou, P. (2009). Teacher behaviour and student outcomes: Suggestions for research on teacher training and professional development. <i>Teaching and Teacher Education</i> , 25(1), 12-23.
MV RI SA	Leithwood, K., Steinbach, R., & Jantzi, D. (2002). School leadership and teachers' motivation to implement accountability policies. <i>Educational Administration Quarterly</i> , 38(1), 94-119.
IS	Ling, L. M., & MacKenzie, N. (2001). The professional development of teachers in Australia. <i>European Journal of Teacher Education</i> , 24(2), 12.
IS	Livingston, K., & Robertson, J. (2001). The coherent system and the empowered individual: continuing professional development for teachers in Scotland. <i>European Journal of Teacher Education</i> , 24(2), 12.
MV TC	Lohman, M. C. (2006). Factors influencing teachers' engagement in informal learning activities. <i>Journal of Workplace Learning</i> , 18(3), 141-156.
CR GL IN IS	Loxley, A., Johnston, K., Murchan, D., Fitzgerald, H., & Quinn, M. (2007). The role of whole-school contexts in shaping the experiences and outcomes associated with professional development. <i>Journal of In-service Education</i> , 33(3), 21.
SD	Lydon, S., & King, C. (2009). Can a single, short continuing professional development workshop cause change in the classroom? <i>Professional Development in Education</i> , 35(1), 63-82.
MV TC	Madden-Szeszko, G. M. (2000). Variables contributing to teacher efficacy: An examination of burnout, affect, demographic variables, and general self-efficacy. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , Vol 61 (3-A), Sep, 2000. pp. 881., 61(3-A).
GL IN MV RI TC	Manouchehri, A. (2004). Implementing mathematics reform in urban schools: A study of the effect of teachers' motivation style. <i>Urban Education</i> 2004, 39(5), 472-508.

MV SB TX	Martin, A. J., & Dowson, M. (2009). Interpersonal relationships, motivation, engagement, and achievement: Yields for theory, current issues, and educational practice. <i>Review of Educational Research</i> , 79(1), 327-365.
TC TN	McAlear, S. D. (2009). Professional growth through mentoring: A study of experienced mathematics teachers participating in a content-based online mentoring and induction program. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 69(8-A).
RI SD TC	McCaughtry, N., Martin, J., Hodges Kulinna, P., & Cothran, D. (2006). What makes teacher professional development work? The influence of instructional resources on change in physical education. <i>Journal of In-service Education</i> , 32(2), 15.
RS	McNally, J., & Blake, A. (Eds.). (2010). <i>Improved learning in a professional context: A research perspective on the new teacher in school</i> . New York: Routledge.
BL GL RI TC	Meirinka, J. A., Meijerb, P. C., Verloopa, N., & Bergenc, T. C. M. (2009). Understanding teacher learning in secondary education: The relations of teacher activities to changed beliefs about teaching and learning. <i>Teaching and Teacher Education</i> , 25(1), 89-100.
AO SA	Meister, D. G. (2010). Experienced secondary teachers' perceptions of engagement and effectiveness: A guide for professional development. <i>Qualitative Report</i> , 15(4), 880-898.
MV TC	Mizell, H. (2009, 10/14/09). Teachers must take responsibility for their own learning. Retrieved 10/14/09, from http://www.nsd.org/learningBlog/post.cfm/teachers-must-take-responsibility-for-their-own-learning
GL ID SD	Moore, F. M. (2008). Positional identity and science teacher professional development. <i>Journal of Research in Science Teaching</i> , 45(6), 684-710.
CC MV TC	Morgan, M., Kitching, K., & O'Leary, M. (2007). <i>The psychic rewards of teaching: Examining global, national and local influences on teacher motivation</i> . Online Submission; Paper presented at the Annual Meeting of the American Educational Research Association (Chicago, IL, Apr 10, 2007).
CL RI	Morris, M., Chrispeels, J., & Burke, P. (2003). The power of two: Linking external with internal teachers' professional development. <i>Phi Delta Kappan</i> , 84(10).
BL MV TC TN	Mueller, J., Wood, E., Willoughby, T. T., Ross, C., & Specht, J. (2008). Identifying discriminating variables between teachers who fully integrate computers and teachers with limited integration. <i>Computers & Education</i> , 51(4), 1523-1537.
RI TN	Mukama, E., & Andersson, S. B. (2008). Coping with change in ICT-based learning environments: Newly qualified Rwandan teachers' reflections. <i>Journal of Computer Assisted Learning</i> , 24(2), 156-166.
MV TC	Muller, K., Alliata, R., & Benninghoff, F. (2009). Attracting and retaining teachers: A question of motivation. <i>Educational Management Administration & Leadership</i> , 37(5), 574-599.

MV TC TX	Mushayikwa, E., & Lubben, F. (2009). Self-directed professional development – Hope for teachers working in deprived environments? <i>Teaching and Teacher Education</i> , 25(3), 375–382.
CL IN SD	Nelson, T. H., & Slavit, D. (2007). Collaborative inquiry among science and mathematics teachers in the USA: professional learning experiences through cross-grade, cross-discipline dialogue. <i>Journal of In-service Education</i> , 33(1), 17.
SC SD	Neumann, S. B., & Cunningham, L. (2009). The impact of professional development and coaching on early language and literacy instructional practices. <i>American Educational Research Journal</i> , 46(2), 532-566.
GL IN IS SA	Nicolaidou, M. (2010). Do primary school teachers in Cypriot schools see themselves as leaders? Echoing practitioners' voices on levers and barriers. <i>Teacher Development</i> , 14(2), 225-239.
IN MV RI RS SD	Nielsen, D. C., Barry, A. L., & Trefz, S. P. (2008). Teachers' reflections of professional change during a literacy-reform initiative. <i>Teaching and Teacher Education</i> , 24(5), 1288-1303.
MV RS TC	Nir, A. E., & Bogler, R. (2008). The antecedents of teacher satisfaction with professional development programs. <i>Teaching and Teacher Education</i> , 24(2), 377-386.
GL MV SD	Oreck, B. (2004). The artistic and professional development of teachers - A study of teachers' attitudes toward and use of the arts in teaching. <i>Journal of Teacher Education</i> , 55(1), 55-69.
IS SD	Ostermeier, C., Prenzel, M., & Duit, R. (2010). Improving science and mathematics instruction: The SINUS Project as an example for reform as teacher professional development. <i>International Journal of Science Education</i> , 32(3), 303-327.
CL GL IS	Parker, G. (2010). <i>MoLeNET Mobile Learning Conference 2009: Research Papers</i> . London: Learning and Skills Network.
AO GL IS MV	Pasternak, R. (2005). Choice of institutions of higher education and academic expectations: The impact of cost-benefit factors. <i>Teaching in Higher Education</i> , 10(2), 189-201.

ID IN IS RI TC	Pattie, L. F. Y. Y. (2009). Teachers' stress and a teachers' development course in Hong Kong: Turning 'deficits' into 'opportunities'. <i>Professional Development in Education</i> , 35(4), 613-634.
MV SC	Payne, P. M. (2008). Learning contracts: Personalized professional development to strengthen teacher efficacy within the construct of the gifted cluster model. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 68(12-A), 5037.
AO IS MV TC TX	Perry, C. A. (2007). Motivation and attitude of preservice elementary teachers toward mathematics: Is rural relevant? <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 68(5-A).
CC GL PE RI SD	Perry, P. D., Chapman, D. W., & Snyder, Jr., Conrad W. (1995). Quality of teacher worklife and classroom practices in Botswana. <i>International Journal of Educational Development</i> , 15(2), 115-125.
RS TC	Ponte, P. (2005). A critically constructed concept of action research as a tool for the professional development of teachers. <i>Journal of In-service Education</i> , 31(2), 24.
BL GL	Pop, M. M., Dixon, P., & Grove, C. M. (2010). Research experiences for teachers (RET): Motivation, expectations, and changes to teaching practices due to professional program involvement. <i>Journal of Science Teacher Education</i> , 21(2), 127-147.
RI SD TC	Porter, A. C., Birman, B. F., & Garet, M. S. (2000a). <i>Does professional development change teaching practice? Results from a three-year study</i> (No. DOC #2000-04). U.S. Department of Education, Office of the Under Secretary.
RI SD TC	Porter, A. C., Birman, B. F., & Garet, M. S. (2000b). <i>Executive summary: Does professional development change teaching practice? Results from a three-year study</i> . U.S. Department of Education, Office of the Under Secretary.
GL	Powell, D., Diamond, K. E., Burchinal, M. R., & Koehler, M. J. (2010). Effects of an early literacy professional development intervention on Head Start teachers and children. <i>Journal of Educational Psychology</i> , 102, 299-312.
GL IS MV TC	Pozo, M. R. d., Martinez-Aznar, M., Rodrigo, M., & Varela, P. (2004). A comparative study of the professional and curricular conceptions of the secondary education science teacher in Spain. <i>European Journal of Teacher Education</i> , 27(2), 193-213.

AO IN MV SD	Ramey-Gassert, L., Shroyer, M. G., & Staver, J. R. (1996). A qualitative study of factors influencing science teaching self-efficacy of elementary level teachers. <i>Science Education</i> , 80(3), 283-315.
AO CR GL IS PE RI SD	Ratcliffe, M., & Millar, R. (2009). Teaching for understanding of science in context: Evidence from the pilot trials of the twenty first century science courses. <i>Journal of Research in Science Teaching</i> , 46(8), 945-959.
IN IS SA	Rhodes, C., & Brundrett, M. (2009). Growing the leadership talent pool: Perceptions of heads, middle leaders and classroom teachers about professional development and leadership succession planning within their own schools. <i>Professional Development in Education</i> , 35(3), 381-398.
MV TN TX	Richard, V. (2007). Technology incentives: Motivating teachers to attend professional development training. <i>Learning & Leading with Technology</i> , 35(2), 24-27.
CL MV TN	Richardson, J. C., Ertmer, P. A., Aagard, H., Ottenbreit, A., Yang, D., & Mack, N. (2007). The digital age literacy professional development initiative: Factors influencing teachers' implementation of skills and strategies. <i>Teacher Education and Practice</i> , 20(3), 239-262.
GL RI	Richardson, V. (2003). The dilemmas of professional development. <i>Phi Delta Kappan</i> . Bloomington, 84(5).
AO CL	Roberts, S. M., & Pruitt, E.Z. (2009). <i>Schools as professional learning communities: Collaborative activities and strategies for professional development</i> (2nd ed.). Thousand Oaks, CA: Corwin Press.
GL IS RI TC	Robottom, I., & Walker, R. (1995). The UK/Australia science teacher fellowship program: A journey in professional development. <i>School Science Review</i> , 77(278), 21-29.
AO TX	Robustelli, S. L. (2007). There's more than one yellow brick road: Examining revised achievement goal theory and its efficacy in explaining teachers' goals, students' goals, and achievement. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , Vol 67(11-A), 4097.
IS RI SD	Rodrigues, S. (Ed.). (2005). <i>International Perspectives on Teacher Professional Education</i> : New York: Nova Science Publishers, Inc.
TC	Ross, J., & Bruce, C. (2007). Professional development effects on teacher efficacy: Results of a randomized field trial. <i>Journal of Educational Research</i> , 101(1), 50-60.

AO MV	Ross, J. A., & Bruce, C. D. (2007). Teacher self-assessment: A mechanism for facilitating professional growth. <i>Teaching and Teacher Education</i> , 23(2), 146-159.
RI TS TX	Ryan, R. M., & Weinstein, N. (2009). Undermining quality teaching and learning: A self-determination theory perspective on high-stakes testing. <i>Theory and Research in Education</i> , 7(2), 224-233.
GL IN QE SD	Santagata, R. (2009). Designing video-based professional development for mathematics teachers in low-performing schools. <i>Journal of Teacher Education</i> , 60(1), 38-51.
CL IN IS PL	Sargent, T. C., & Hannum, E. (2009). Doing more with less: teacher professional learning communities in resource-constrained primary schools in rural China. <i>Journal of Teacher Education</i> , 60(3), 258-276.
AO MV RS	Sawchuk, S. (2008). Darling-Hammond outlines professional development ideas. <i>Education Week</i> , (12/08/08). Retrieved from http://blogs.edweek.org/edweek/teacherbeat/2008/12/linda_darlinghammond_with_arti.html
GL MV SD	Schibeci, R. A., & Hickey, R. L. (2004). Dimensions of autonomy: primary teachers' decisions about involvement in science professional development. <i>Science Education</i> , 88(1), 119-145.
IS RS SD TC	Schoenfeld, A. H. (1999). Looking toward the 21st century: Challenges of educational theory and practice. <i>Educational Researcher</i> , 28(7), 4-14.
CC GL RI RS SD	Schuster, D. A., & Carlsen, W. S. (2009). Scientists' teaching orientations in the context of teacher professional development. <i>Science Education</i> , 93(4), 635-655.
AO EM MV RI	Schutz, P. A., & Pekrun, R. (Eds.). (2007). <i>Emotion in education</i> : Academic Press.

AO RI SD	Schwartz, R. M., Hobsbaum, A., Briggs, C., & Scull, J. (2009). Reading recovery and evidence-based practice: A response to Reynolds and Wheldall (2007). <i>International Journal of Disability, Development and Education</i> , 56(1), 5-15.
IN MV RI TC	Scribner, J. P. (1998). <i>Teacher efficacy and teacher professional learning: What school leaders should know</i> . Paper presented at the Annual Convention of the University Council for Educational Administration Retrieved from http://www.eric.ed.gov/ERICDocs/data/ericdocs2sql/content_storage_01/0000019b/80/17/45/37.pdf
MV	Scribner, J. P. (1999). Professional development: Untangling the influence of work context on teacher learning. <i>Educational Administration Quarterly</i> , 35(2), 238-266.
MV SC	Sharfman, B. (2007). The relationship between teachers' perceived efficacy and attendance in a professional development seminar focusing on curriculum and instruction for gifted learners. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 67(9-A).
MV	Shearn, N. W. (2008). Sources of efficacy for first-year teachers. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 68(11-A).
AO MV SC	Shepard, M. (2009). From a culture of isolation to collegiality: Professional development using evidence of student learning to increase teacher efficacy and student achievement. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 69(10-A).
MV TC TS	Shumack, K. A. (2008). Professional development in business education: Status, needs, motivators, and impact on instruction. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 69(1-A), 187.
AO GL RI	Slade, V. C. (2008). The impact of the professional development component of comprehensive school reform on the mathematics achievement of third- and fifth-grade students attending selected Title I schools in Virginia. <i>Dissertation Abstracts International Section A: Humanities and Social Sciences</i> , 69(1-A).
GL RI	Smith, C., & Gillespie, M. (2007). Research on professional development and teacher change: Implications for adult basic education. In J. Comings, B. Garner & C. Smith (Eds.), <i>Review of adult learning and literacy: Connecting research, policy, and practice</i> (Vol. 7, pp. 205-244). Mahwah, NJ: Lawrence Erlbaum Associates.
GL RI	Smith, C., Hofer, J., Gillespie, M., Solomon, M., & Rowe, K. (2003). <i>How teachers change: A study of professional development in adult education</i> . (Report No. 25a). Cambridge, MA: National Center for the Study of Adult Learning and Literacy.
CC RI SD	Smith, J. P. (1996). Efficacy and teaching mathematics by telling: A challenge for reform. <i>Journal for Research in Mathematics Education</i> , 27(4), 387-402.
PL TS	Snow-Renner, R., & Lauer, P. A. (2005). Professional development analysis. 24. Retrieved from http://www.mcrel.org/PDF/ProfessionalDevelopment/5051IR_Prof_dvlpmt_analysis.pdf
MV RI	Starkey, L., Yates, A., Meyer, L. H., Hall, C., Taylor, M., Stevens, S., et al. (2009). Professional development design: Embedding educational reform in New Zealand. <i>Teaching and Teacher Education</i> , 25(1), 181-189.
TC	Stiles, K. E., Mundry, S., Hewson, P. W., Loucks-Horsley, S., & Love, N. (Eds.). (2009). <i>Designing Professional Development for Teachers of Science and Mathematics</i> : SAGE Publications, 2009.

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EP	Stolk, M. J., Bulte, A. M. W., de Jong, O., & Pilot, A. (2009). Strategies for a professional development programme: empowering teachers for context-based chemistry education. <i>Chemistry Education Research and Practice</i> , 10(2), 154-163.
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RI	Supovitz, J. A., & Turner, H. M. (2000). The effects of professional development on science teaching practices. <i>Journal of Research in Science Teaching</i> , 37(9), 963-980.
GL	Sweeney, A. E. (2003). Articulating the relationships between theory and practice in science teaching: A model for teacher professional development. <i>Teachers and Teaching</i> , 9(2), 107-132.
SD	
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GL	Sztajn, P., Hackenberg, A. J., White, D. Y., & Allexaht-Snide, M. (2007). Mathematics professional development for elementary teachers: Building trust within a school-based mathematics education community. <i>Teaching and Teacher Education</i> , 23(6), 970-984.
PE	
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IN	Taylor, A. R., Jones, M. G., Broadwell, B., & Oppewal, T. (2008). Creativity, inquiry, or accountability? Scientists' and teachers' perceptions of science education. <i>Science Education</i> , 92(6), 1058-1075.
PE	
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SA	Taylor, M., Yates, A., Meyer, L. H., & Kinsella, P. (2010). Teacher professional leadership in support of teacher professional development. <i>Teaching and Teacher Education</i> , 27(1), 85-94.
SD	
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IN	Torres, S. S. (2005-06). <i>K-5 Science Program Evaluation Report</i> . Columbia Public Schools.
SD	
ID	Tucker, C. M., Porter, T., Reinke, W. M., Herman, K. C., Ivery, P. D., Mack, C. E., & Jackson, E. S. (2005). Promoting teacher efficacy for working with culturally diverse students. <i>Preventing School Failure</i> , 50(1), 29 - 34.
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GL	Ushie, B. C. (2009). Partnership learning: an imperative for the continuing professional development of primary school teachers in Nigeria. <i>Professional Development in Education</i> , Volume 35, Issue 2 June 2009, pages 285 - 287 35(2), 285-287.
IS	

AO GL PL	Valli, L., & Buese, D. (2007). The changing roles of teachers in an era of high-stakes accountability. <i>American Educational Research Journal</i> , 44(3), 519-558.
RI SD	VanDriel, J. H., Beijaard, D., & Verloop, N. (2001). Professional development and reform in science education: The role of teachers' practical knowledge. <i>Journal of Research in Science Teaching</i> , 38(2), 137-158.
AO	VanLoo, J. B., & Rocco, T. S. (2006). Differentiating CPE from training: Reconsidering terms, boundaries, and economic factors. <i>Human Resource Development Review</i> , 5(2), 202-227.
IN IS MV PR	Varga-Atkins, T., Qualter, A., & O'Brien, M. (2009). School professionals' attitudes to professional development in a networked context: Developing the model of 'believers, seekers and sceptics'. <i>Professional Development in Education</i> , 35(3), 321-340.
RI SB SD TX	Velicer, W. F., Prochaska, J. O., Fava, J. L., Norman, G. J., & Redding, C. A. (1998). <i>Transtheoretical model: Detailed overview of the transtheoretical model</i> . Cancer Prevention Research Center.
GL TN	Ward, L., & Parr, J. M. (2010). Revisiting and reframing use: Implications for the integration of ICT. <i>Computers & Education</i> , 54(1), 113-122.
GL RI SD	Wasik, B. A., Bond, M. A., & Hindman, A. (2006). The effects of a language and literacy intervention on Head Start children and teachers. <i>Journal of Educational Psychology</i> , 98, 63-74.
CC PE RI TC	Watson, R., & Manning, A. (2008). Factors influencing the transformation of new teaching approaches from a programme of professional development to the classroom. <i>International Journal of Science Education</i> , 30(5), 689-709.
MV TC	Watt, H. M. G., & Richardson, P. W. (2007). Motivational factors influencing teaching as a career choice: Development and validation of the FIT-Choice Scale. <i>Journal of Experimental Education</i> , 75(3), 167-202.
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