Teacher Professional Learning as the Growth of Social Capital

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Teacher learning can be modeled in a variety of different ways. In this study, an analysis of teacher social capital was used to describe the effects of a school-wide professional development program. Social capital refers to the resources that teachers can access through peer collaboration to support their ongoing learning. Findings indicate that conceptualizing professional development as the growth of shared resources can avoid some of the difficulties that arise when teacher learning is viewed solely as either an individual or social process.

Keywords: professional development, teacher learning, collaboration, social capital

Sfard (1998) identified two metaphors for learning – acquisition of new concepts and participation in new practices. The acquisition metaphor explains how knowledge is transferred from one context to another while the participation metaphor offers new insights into how we learn through social interaction. Sfard warned researchers against making an exclusive commitment to either one of these two metaphors. A great deal of professional development research, however, does just this. As a result, an unnecessary dichotomy has crept into the research field.

Some researchers emphasize the specialized knowledge and skills teachers need in order to deliver effective lessons. Following the acquisition metaphor, they view professional development as a method for providing teachers with this expertise. Other researchers follow the participation metaphor and emphasize the social aspect of teacher learning. They view professional development as a way of strengthening a teacher's professional learning community. We call the first view of professional development the "training model" and the second view the "sociocultural model." Because these two models emphasize separate aspects of teacher learning, it seems that neither one may be able to reveal a complete picture of the effects professional development activities have on teacher learning.

This article explores the process of teacher professional development from a different perspective – one that acknowledges both the individual-cognitive and also the social aspects of teacher learning. We call this the "social capital model." Social capital is defined as the resources teachers can access through peer collaboration to support their ongoing learning. Professional development is viewed as a way to increase the availability of teacher social capital. This can be done either by introducing new resources into the teachers' social network or by improving the teachers' access to the resources that already exist in that network. In other words, both expert knowledge and peer collaboration are seen as important to teacher learning.

Recently, education researchers have begun using this concept to describe the effects of school-wide teacher professional development programs. For example, researchers have shown that an analysis of teachers' social capital can help explain the success or failure of reform initiatives (Penuel, Riel, Krause, & Frank, 2009). Coburn and Russell (2008) demonstrated ways in which administration policies are and are not able to increase

teacher social capital. Baker-Doyle and Yoon (2011) added another level of complexity to the discussion. They argued that social networks with the most social capital contain "a delicate balance of knowledgeable experts, open-minded novices and bridge-builders (p. 90). In other words, the strength of school's professional learning community is not only a function of the total amount of expertise or the total amount of collaboration in the school. Also important is how this expertise is shared.

The goal of this study is two fold: 1) to demonstrate how the concept of social capital can be used to describe the effects of professional development on teacher learning and 2) to determine whether the social capital model can offer a more complete picture of teacher learning than either the training or sociocultural models. In order to do this, data from a multi-year, school-wide professional development program were collected and analyzed using each of the three models. The article begins with an in-depth description of the training, sociocultural, and social capital models of professional development.

The Training Model

According to the training model, professional development consists of specifically designed activities. By participating in these activities, teachers acquire a predetermined set of knowledge and skills. When they return to the classroom, teachers apply what they have learned by making the associated changes to their professional practices. Student learning increases as a result of these improved teaching practices. In the final step, standardized test scores rise to reflect this increase in student learning. Borko (2004), for example, presents a clear agenda for professional development research based on this model.

Much of what is known about effective professional development has come out of research that follows the training model. Researchers have conducted large scale studies, surveying and interviewing hundreds of teachers about their experiences (Cohen & Hill, 2000; Desimone, Porter, Garet, Yoon, & Birman, 2002; Garet, Porter, Desimone, Birman, & Yoon, 2001; Huffman, Thomas, & Lawrenz, 2003; Penuel, Fishman, Yamaguchi, & Gallagher, 2007; Supoitz & Turner, 2000). Research conducted in this vein has succeeded in identifying a broad consensus of the characteristics of high-quality professional development programs (Birman, Desimone, Porter, & Garet, 2000; Borko & Putnam, 1995; Darling-Hammond, Wei, Andree, Richardson, & Orphanos, 2009; Desimone et al., 2002; Elmore & Burney, 1999; Garet et al., 2001; Hawley & Valli, 1999; Kuijpers, Houtveen, & Wubbles, 2010; Little, 1984; Loucks-Horsley, 1999; Pink & Hyde, 1992; Sykes, 1999; Wilson & Berne, 1999). These characteristics include professional development that is: centered on the curriculum, directly connected to teachers' practices, focused on student learning, long-term or ongoing, coherent with other goals of the school

community, and designed to allow for teacher collaboration.

One of the goals of this research was to develop a method for designing consistently effective teacher professional development. But rather than providing a recipe for creating successful programs, the research revealed just how challenging it is to perform meaningful professional development. Specifically, researchers have found it difficult to link individual professional development activities directly to gains in student achievement (Hiebert, 1999; Killion, 1998; Loucks-Horsley, 1999; Fishman, Ronald, Marx, Best, & Tal, 2003; Sykes, 1999; Wilson & Berne, 1999; Yager, 2005). Making such a connection is difficult due to the large number of complicating factors between the two variables (Guskey, 1998; Guskey & Sparks, 1996).

The training model presents a clear research plan: test the students, train the teachers, and then retest the students. Unfortunately, professional development programs rarely provide researchers with ready-made experiments. The problems lie in the hidden assumptions of the training model.

Even after participating in a high-quality professional development program, teachers often resist making changes to their existing practices (Davis, 2003; Johnson, 2006). Teachers who do make a sustained attempt to reinvent their practices may still fail to make the exact changes that the professional developers had in mind. In addition, there is no guarantee that the prescribed changes will ultimately succeed in increasing student learning or that this increased learning will be easy to identify in the standardized test data. A final hidden assumption of the training model is that teacher learning happens on an individual, cognitive basis. This is not, however, necessarily the case.

The Sociocultural Model

From a sociocultural perspective, teacher learning results from their interactions with the professional communities in which they work. Lave and Wenger (1991) argued that professional learning involves not only the acquisition of certain knowledge and skills but also participation in a community of practice. To them, teacher knowledge is not something that is learned in one context, such as a teacher-education program or a professional development workshop, and then brought into the classroom. Instead, teacher learning happens as teachers engage in and then give socially constructed meanings to their professional experiences. All this happens within a school community. The goal of professional development, therefore, should be to strengthen the teachers' professional learning community (Darling-Hammond et al., 2009).

Halverson (2003) gave advice to school leaders on how this could be done. He claimed that teachers needed to "share their own practices, reflect upon their hard-won instructional expertise, question their own practices, and

accept the suggestions of peers" (p. 22). Each of these suggestions involves teacher collaboration. In the past, similar thinking led reformers to reorganize schools in order to increase the total amount of contact teachers had with each other (Elmore & Burney, 1999; Long, 1996; O'Day, Goertz, & Floden, 1995; Pink & Hyde, 1992). Following their suggestions, many school districts, especially in urban areas, reorganized from subject departments to houses containing multiple subjects. Reformers hoped that these changes would create professional learning communities that would support ongoing teacher learning. Unfortunately, this has not always been the case.

Teachers at reorganized schools often continued to interact primarily within their own subject departments (Scharmann, 2007; Siskin & Little, 1995). Subject departments should not, however, be seen as obstacles to teachers' collaborative learning. Instead, the resilience of the subject department reveals a more complex picture of how teachers collaborate within a school community. Social network data confirms that sub-groups play an important role in determining how teachers work together and what resources are made available through their collaboration (Penuel et al., 2009). As such, it seems overly simplistic to speak only about the total amount of collaboration at a school. Instead, researchers may have to take a closer look at who is working with whom.

Furthermore, the notion that teacher collaboration always supports teacher learning has been called into question by research that takes a closer look at what teachers really do when they interact with each other. Often times, teachers avoid in-depth discussions about how students learn and which instructional approaches are most effective (Hargreaves, 1993; Little, 1991; Sato & Kleinsasser, 2004; Scribner, 2003). Collaboration can even have a negative effect on teacher learning if teachers reinforce each others' poor instructional choices. Other researchers have questioned just how important peer collaboration really is to teachers' daily work. They argue that most decisions are made on the individual level – determined by teachers' personal views and commitments (Diniz-Pereira, 2003; Flores & Day, 2006; Hargreaves, 1993; Hargreaves, 1994; Huberman, 1993; Little, 1991).

The Social Capital Model

The training model relies on a straightforward view of teacher learning in which teachers change their practices after completing a predetermined set of professional development activities. Experience has shown, however, that the teacher learning process is not this simple. The sociocultural model offers a more complex view of teacher learning. It claims that changing a teacher's behavior involves affecting the entire culture in which he or she works. A teacher's school community undoubtedly affects his or her thinking, but analyzing teacher learning on this level can miss the important differences in how the school's culture is experienced by individual teachers. The social capital model offers

researchers a new alternative. It is perhaps best introduced though a consideration of why teachers think and act the way they do.

Throughout their careers, teachers amass a unique, idiosyncratic collection of instructional ideas and practices, what Van Driel, Beijaard, and Verloop (2001) termed their personal practical knowledge. In most cases, teachers make only small, incremental changes to their beliefs and practices as new ideas are built off of older ones (Ball & Cohen, 1999; Borko & Putnam, 1995; Davis, 2003; Huberman, 1992). Ideas must be internalized, tried out, and reflected upon before they are likely to be incorporated into a teachers' thinking (Darling-Hammond & McLaughlin, 1999; Kelly, 2006).

Depending on how it is used, a teachers' personal practical knowledge can either be a source of valuable experiences and ideas or an obstacle to change. Lortie (1975/2002) observed that the way in which teachers learn about their profession does not often "lay the basis for informed assessment of teaching technique or encourage the development of analytic orientations toward the work" (p. 67). As a result, many teachers repeat the same "common sense" instructional decisions over and over without giving them serious thought. Schön (1987) argued that teachers can make the most out of their existing knowledge through an activity he termed "reflective practice." This involves teachers examining their instructional choices and articulating the reasoning behind them.

According to Day (1987), teacher change results from "processes [that] clearly link deliberative reflection and inquiry, self-confrontation, and the sharing of insights gained from this" (p. 215). The final step in this process requires peer collaboration. In other words, reflective practice is perhaps best understood not as one individual's meta-cognitive activity but rather as a social activity in which teachers and their colleagues participate (Hoffman-Kipp, Artiles, & Lopez-Torres, 2003). By viewing reflective practice as a social activity, it can be seen not only as a way to help teachers improve their instruction but also as a way of strengthening their professional learning community.

To summarize, changes in teacher practice come incrementally as teachers consider new ideas and experiment with new instructional activities. Collaboration is essential to this process for two main reasons. First, collaboration forces teachers to put their instructional approach into words. Second, peer collaboration gives teachers a chance to think about new ideas and invites them to consider their instruction from different points of view. Collaboration can be thought of as supplying the air and water that allows a teacher's personal reflections to grow.

The social capital model does not claim that effective instruction always involves peer collaboration but that sustained teacher learning usually does. For example, teachers with sufficient pedagogical and content knowledge

might be able to deliver effective lessons even if isolated from their peers. These teachers might also be able to identify parts of their instruction that need to be improved. But the scope and strength of their reflections would be limited by the walls of their classrooms and the extent of their prior knowledge. Improving teaching and learning throughout a school is a social as well as intellectual process and therefore involves social capital.

When examining the idea of social capital, the term 'capital' specifically refers to the ability of a commodity to be exchanged for other desired assets (Bourdieu, 1986). These transactions are enacted by individuals in order to advance certain interests. For example, Coleman (1988) discusses how the availability of social capital helps teenagers acquire a high school diploma. Although social capital was originally seen as an individual's private property, Coleman also discussed differences in the types of networks connecting these individuals. In other words, social capital could be used to describe the characteristics of social networks. Putnam (1995) took this approach the furthest, using social capital to analyze the social health of an entire country.

Portes (1998), among others, objected to this expanded use of social capital. He cautioned that social capital was not well suited to expressing all the complex effects, both positive and negative, of group membership. In an effort to better define the conceptual usefulness of social capital, researchers investigated the specific ways in which having this capital benefits individuals and groups. In their synthesis of the research literature, Adler and Kwon (2002) found that the effects of social capital "flow from the information, influence, and solidarity it makes available to the actor" (p. 23). By analyzing individuals' access to resources along these lines, researchers can describe the types of social capital available to these individuals and therefore the characteristics of their social network.

In this study, social capital was used to describe the strength of the teachers' professional learning community. Whereas sociologists are interested in how social capital is leveraged in order to maintain the advantage of one group over others, educational researchers need not think in zero-sum terms. Shared use not only makes more resources available to teachers, it can also multiply the value of these resources to teacher learning. Effective teaching requires many different types of resources including specialized knowledge (intellectual capital) and instructional technology (physical capital). Simply by sharing these resources, teachers can improve their instruction. More importantly, these resources can increase the teachers' social capital by initiating critical discussions of the theory or practice of effective instruction.

The training model views teacher learning in terms of the absorption of new information and the adoption of new practices. The sociocultural model views it in terms of enculturation into a community of practice. The social capital model, on the other hand, recognizes that teachers play a more autonomous and conscious role in their own development. Professional development may increase their access to social capital, but teachers decide for themselves if and how this capital will be used.

Method

How will a professional development program look when viewed through the social capital model of professional development? How will this view be different from – maybe even more helpful than – the views offered by the training and sociocultural models? In order to answer these questions, the researchers collected extensive data from teachers engaged in a multi-year professional development program.

Data were collected on several aspects of the teachers' professional development experiences including the characteristics of the meetings they attended, the teachers' reactions to these meetings, how the teachers worked with each other, the teachers' self-assessed learning, and their self-described changes in practice. Ongoing informal conversations were also conducted with the professional developers. In addition, the researchers collected instructional artifacts such as lesson plans and student work. Student learning was assessed though publically available standardized test results.

Site and Participants

The professional development program from which data were collected was a partnership between a state university's graduate school of education and a nearby preK-8 school. Two of the program's goals were to increase the mathematical content knowledge of the school's teachers and promote their use of standards-based instructional practices. The school in question served approximately 450 students in grades preK-8. This school was located in a mid-sized city in the northeastern United States. Compared to state averages, a high percentage of the school's population were minorities (69%), had limited English proficiency (21%), received free or reduced priced lunches (77%), and scored on the lowest range on the state's yearly mathematics exam (53%).

Eighteen of the school's 20 teachers (90%) participated in the program, attending at least 75 hours of professional development during the year. The professional development program contained a variety of different learning opportunities including a four-day content institute during the summer and additional weekend meetings during the school year. Taught by a local expert in mathematics education, these meetings were designed to improve the teachers' knowledge of mathematics and pedagogical skills.

Other weekend meetings were devoted to lesson planning. In these meetings, teachers were introduced to the Four Stages of Lesson Planning (Panasuk, Stone, & Todd, 2002; Panasuk & Todd, 2005). This lesson planning scheme involves writing student learning objectives, constructing a homework assignment matched to the lesson objectives, planning classroom activities to develop the identified concepts, and creating an activator to begin the

lesson. These meetings also gave teachers a chance to practice using what they had learned by working together to plan new lessons for the upcoming week.

The program also included weekly team meetings designed to provide teachers with ongoing collaborative support. These meetings were attended by teachers who taught at the same grade level and were held during their hour-long shared planning period. The team meetings followed a strict format called the Fine Tuning Protocol that divided the teachers' activities into a series of separate tasks (Easton, 2002). Each week, one of the teachers would select a topic for discussion and receive feedback from his or her peers. During some of these meetings, teachers discussed student work. Other times, they presented ideas for classroom activities or developed common assessments.

Two questions worth asking about this program are, "was it collaborative?" and, "was it effective?" As for the first question, parts of the program were collaborative and other parts of it were not. In order to make the comparison between the three models as fair as possible, we did not assume that the collaborative activities would necessarily be any more beneficial than the other parts of the program. Answering the second question was not part of this study. We were not interested in using the three models of professional development to provide three different evaluations of the program. Instead, we attempted to use the program as a laboratory to investigate the models themselves.

Data Collection and Analysis

The data for this study were collected from three sources: meeting observations, post-meeting surveys, and teacher interviews. Using these three methods, the researchers collected data on the teachers' professional development activities, how the teachers felt about these activities, and how the teachers believed these activities affected their professional practice. Special attention was paid to how the teachers worked together. Data were collected during the 2008 – 2009 school year.

Table 1
Interviewed teachers' demographic information

Pseudonym	Grades taught	Teaching assignment	Years of teaching experience	Overall satisfaction with collaborative PD (1-5)
Mary *	K	All subjects	29	4.82
Hannah	2	All subjects	11	4.45
Rachael	2-4	Special education support	10	4.91
Sarah	5-6	Special education support	3	4.18
Abigail	6	Math and science	3	2.63
Julia	7-8	Math	3	4.32
Anne **	7-8	Social studies	8	4.50
Elizabeth	7-8	Science	11	4.55

* did not participate in team meetings
** did not participating in weekend meetings

Over the course of one year, the researchers observed the teachers' meetings and took comprehensive notes. Over 40 hours of teacher meetings were observed. The teachers' activities were coded based on the four categories of teachers' collaborative behaviors identified by Little (1991) – storytelling and scanning, aid and assistance, sharing, and joint work. This allowed for an analysis of the different ways in which teachers worked together throughout the program. In addition, 75 anonymous surveys were collected after teacher meetings. These surveys indicated that, with one or two exceptions, most of the teachers had a high opinion of the meetings. Over half of the returned surveys were identical, listing "strongly agree" for every prompt.

During the second half of the school year, teachers were interviewed and asked to describe the overall characteristics of their collaborative experiences. Of the 18 teachers who participated in the professional development, eight agreed to be interviewed. Demographic information for these teachers is provided in Table 1. Their semi-structured interviews lasted approximately 1 hour and began with an 11 question interview-survey. Each interviewee was then asked follow-up questions based on her answers. This ensured that all the interviews covered the same set of topics and allowed the experiences of one teacher to be contrasted with the experiences of the others. All but one of the interviews took place at the school where these teachers worked after the students had left for the day. The interviewees were each given a $20 gift card to an office supply company for participating. The interviews were recorded and transcribed.

Little (1982) identified seven dimensions of staff interactions: range, focus, inclusivity, reciprocity, relevance, concreteness, and frequency. As part of the interview survey, teachers were asked to rate the extent of their collaboration on each of these seven dimensions on a (1-5) scale. The teachers were then asked four questions about the extent to which the professional development had affected their knowledge and practices. The average value of the responses to these 11 questions was interpreted as a measure of the interviewee's overall satisfaction with the collaborative professional development.

The data collected from the observations, surveys, and interviews were coded using the three models of professional development. Each model emphasizes different types of data. The training model was concerned with evidence of changes in teacher knowledge, teacher practice, and student performance. The sociocultural model was concerned with evidence of changes in how the teachers worked together. The social capital model looked for examples of shared resources that became available as a result of the program. We analyzed the collected data not only to find evidence of teacher learning according to each model, but also to identify possible challenges to the models.

The following is an example of how interview data were coded for this study. Answers to questions such as, "Did you learn any new mathematics during this program?" and "What effect did this program have on your instruction?" typically provided information relevant to the training model. On the other hand, answers to questions such as, "How frequently were you able to collaborate with other teachers?" and "Did you have any additional opportunities to collaborate as a result of the program?" were more relevant to the sociocultural model. Evidence of increased social capital was found in the answers to a variety of different questions, any time a teacher discussed new resources he or she had gained access to through peer collaboration. One example of a question that was likely to lead to this sort of evidence is, "What parts of this program do you think worked best and why?"

Limitations

The most significant limitation of this exploratory case study stems from the small sample size. The conclusions we reached may say more about the characteristics of the participating teachers and their professional development experiences than the nature of professional development in general. Still, by completing this study, we were able to raise important questions for professional development researchers to consider. Providing definitive answers to these questions, however, would require future work that includes a reliable measurement tool for quantifying teacher social capital.

The small same size complicated some of our data collection efforts. Originally, it was hoped that the post-meeting surveys would indicate which of the different kinds of meetings the teachers found most beneficial. But because so many of the surveys were identical, indicating 'strongly agree' for every prompt, they did not prove useful for this purpose. As a result, the teacher surveys did not play a significant role in the data analysis. Instead, the researchers relied on the meeting observations and the teacher interviews.

Choosing how to express the collected data in terms of the training, sociocultural, and social capital models was the main methodological challenge in this study. Although there seemed to be a clear distinction between the training model and the sociocultural model, the teachers' behaviors did not always fall neatly into one category or the other. For example, peer coaches were available to support the teachers during the weekend meetings. The teachers' interactions with these coaches often included aspects of both training and collaboration. As a result, data from the observations were sometimes difficult to code. In order to address this difficulty, we asked the teachers during the interviews to clarify which professional development activities they found most beneficial and why.

Another limitation involves our presentation of the training and sociocultural models of professional

development. The methodology of the study required us to highlight the common elements found among the many different approaches to conceptualizing teachers' professional learning. In so doing, we were able to place much of the recent professional development literature into one of two groups – the training model or the sociocultural model. This categorization was possible even though educational researchers typically adopt more nuanced models of teacher learning than the two we described.

Results

This section explains how the collected data looked when viewed through the three models of professional development. The training model was useful for describing the new concepts teachers learned during the program. The sociocultural model was useful for describing how the program increased collaboration at the school. These two models conceptualized teacher professional learning differently, making a direct comparison between them difficult. Both the training and sociocultural models did, however, have difficulty explaining all of the collected data. The social capital model, on the other hand, allowed for a more complete description of the effects this professional development program had on each teachers' professional learning.

The Training Model

Following the training model, the researchers sought evidence that the teachers had learned new material, changed their practices, and succeeded in raising student test scores. Clear evidence was found that the program achieved the first goal. The situation was more uncertain, however, for the other two goals. Although teachers did change their practices during the program, they did not always do so in the ways the professional developers had envisioned. Test scores did improve during the course of the program, but these gains were not great enough to declare the program a clear success.

At some of the weekend meetings, the teachers heard lectures on topics including place value and absolute value. Teachers described these lectures as extremely helpful. "That was new math for me," Mary exclaimed, "It really was!" During other weekend meetings, the visiting expert challenged the teachers' view of how mathematics should be taught. She showed them how a student's understanding of math concepts could be developed incrementally without relying on algorithms. The expert talked about how certain teaching practices can foster student misconceptions and how this can be avoided. In Rachael's words, "She shook up my programmed way of thinking about mathematics."

But the researchers also found evidence that teachers were having trouble implementing the ideas presented by the professional developers. For example, many of the lessons planned during the weekend meetings were not written in the way prescribed by the visiting expert. The lesson planning method introduced during the program had teachers construct the homework assignment before creating an activity to begin the lesson. This process seemed counterintuitive to some of the teachers because, when the lesson is taught, students see the activator before being asked to complete the homework. Hannah described this method of lesson planning as, "one of the things I had a hard time with . . . which I thought was pretty weird [because] I always planned the homework last."

All of the interviewed teachers reported using the new lesson planning scheme with their students. Only Sarah and Julia, however, talked about lesson planning when asked to describe how the professional development program had affected their instruction. The other teachers mentioned a variety of changes including using a new seating plan, new textbooks, and new teaching props. Each of these teachers described changing her instruction in a different way. Although most of the teachers expressed a preference for professional development activities that led to practical suggestions they could use in the classroom, the teachers had different opinions on which meetings were best able to produce these suggestions.
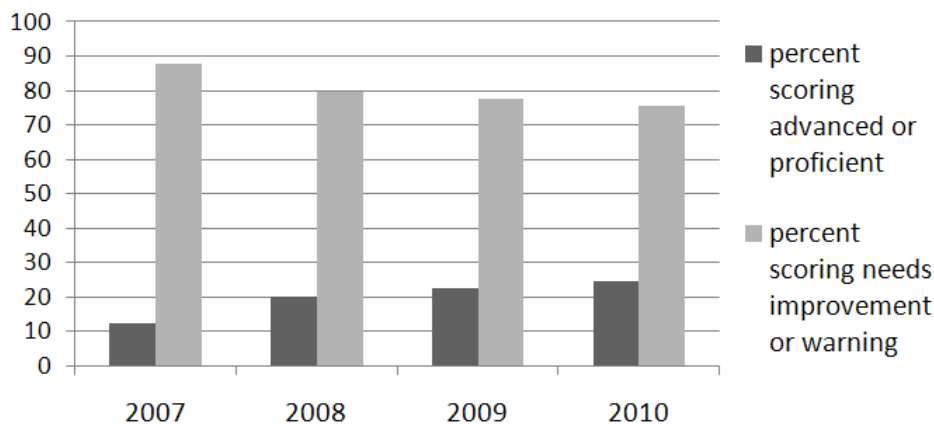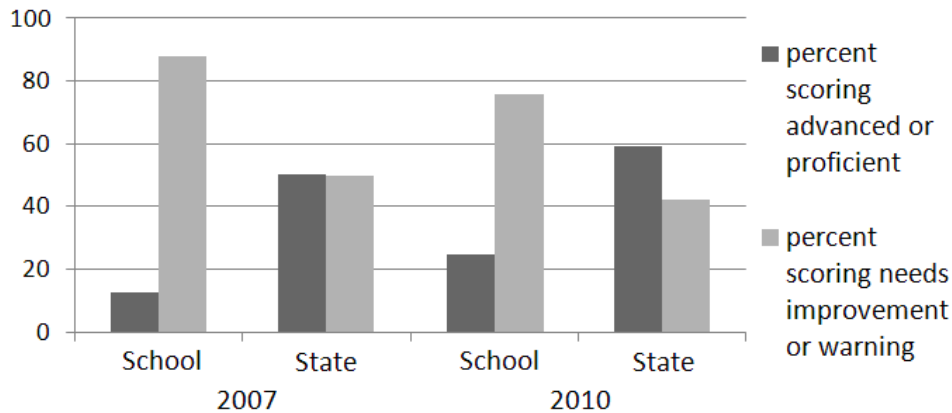

Figure 1. School data for grades 3-8.

Figure 2. Comparison of grades 3-8 scores with state averages.

According to the training model, the ultimate test of any professional development program is its ability to demonstrate increased student achievement. Results from yearly state-mandated tests would, therefore, be of great interest. On these tests, scores were grouped into four categories: advanced, proficient, needs improvement, and warning. Figure 1 shows a slow but steady increase in student scores during the time of the program.

These results show a modest but measurable increase in student achievement. This seems to indicate that the professional development program was successful. A different interpretation is suggested, however, when the scores are compared with state averages during the same time. This is shown in Figure 2.

The percentage increase in those students scoring 'advanced or proficient' at this school (from 13% to 25%) was slightly better than the average gains state wide (from 50% to 59%), but the school's overall performance was still far below state averages. What do these data demonstrate in terms of the training model? Do they indicate that the professional development program described in this study should be used in other schools or not? It seems that a case could be made in either direction.

The Sociocultural Model

Following the sociocultural model, the researchers sought evidence that the program had increased the amount of collaboration at the school and had strengthened the teachers' professional learning community. The teachers all agreed that the program provided them with additional opportunities to work with their colleagues. They enjoyed these opportunities and described them as helpful. The teachers were not so united, however, in their descriptions of the school's professional learning community. Each

teacher seemed to understand the role of collaboration differently. This calls into question the usefulness of the concept of a professional learning community in describing the specific effects of this professional development program.

During the interviews, the teachers explained how the weekend meetings gave them chances to meet with colleagues who worked at different grade levels; colleagues with whom they otherwise had little contact. These meetings gave teachers a better understanding of where their lessons fit into the school's overall mathematics curriculum. The weekend meetings also gave teachers a valuable opportunity to discuss upcoming lessons with tutors and special education teachers.

Teachers also enjoyed the team meetings, especially at the beginning of the year. "Everyone sounds so smart, I love sitting in on these!" Hannah said. "When you're looking at a problem all by yourself it's difficult, you're worrying; so this was very helpful." The team meetings gave teachers a chance to clarify their educational goals. During these meetings, the teachers made frequent reference to the state benchmarks. They all agreed with Rachael that, "Our goal is to get them [the students] to grade level no matter what." But it was not always clear how this could be achieved, especially when dealing with students who had English Language or Special Education needs.

One problem with the sociocultural model is that it can lead to the assumption that every teacher in a school will view the school's culture in a similar way. But the data collected in this study tell a different story. Five of the interviewed teachers believed they had adequate opportunities to collaborate with their colleagues, but Mary,

Abigail, and Sarah did not. Furthermore, the teachers all expressed different reasons for wanting to work with their peers.

The teachers' amount of classroom experience affected what they wished to gain from collaboration. Three of the eight interviewed teachers – Sarah, Abigail, and Julia – were just beginning their careers. They were still developing their professional identities and still searching for the instructional methods that would work best for them. For example, Abigail talked about the difficulty she was having assigning and assessing homework. She was looking for colleagues whose example she could follow. She also wanted classroom management advice.

Hannah, Rachael, and Elizabeth had more educational experience but were currently in the first year of new teaching assignments. These teachers were searching for effective approaches to teaching the new material. Elizabeth observed, "I have three college degrees and really don't need more coursework. Give me some practical suggestions." Each of these teachers specifically mentioned the value of the lesson planning meetings. Teachers left these meetings with lessons ready for the next week. The lesson planning meetings also helped teachers develop the skills needed to plan better lessons in the future.

The final two interviewees had been working in their current assignments for several years. Anne explained how the professional development program had given her a better understanding of how students learn. She was able to use this additional knowledge to better teach all her students, especially those in need of the most help. Mary, who was entering her third decade in the classroom, told us how collaboration helped keep her instruction fresh. "It's never the same. I love changing what I do." She described her colleagues as a source of both new ideas and inspiration.

Following the sociocultural model, professional developers might assume that increased collaboration will always lead to increased teacher learning. But a closer examination of the team meetings showed that this was not the case. At the beginning of the year, the team meetings were very popular with the teachers. Over the winter, however, their opinions began to change. "We do the same thing every single week," Sarah stated. "We look at student work and it gets kind of tedious." At the same time, the teachers were giving very high praise to the weekend meetings presented by the visiting professor even though these meetings included more direct instruction and less time for peer collaboration. In other words, it seems that both collaborative and non-collaborative professional development can be beneficial.

The Social Capital Model

In the previous two sections, the collected data were coded using the training and sociocultural models of professional development. This section reviews the data for evidence of increased social capital – resources that the teachers could access through peer collaboration in order to support their ongoing learning. Identifying and describing these resources was made easier by grouping them into three categories: access to expert knowledge, emotional support from shared commitments, and the ability to analyze instructional practices.

The teachers in this study gained access to several forms of expert knowledge including knowledge of practical classroom activities, classroom management techniques, mathematical content, and the principles of effective instruction. With regard to their emotional support, teachers were able to discuss the school's goals for student learning, learn about the school's mathematics curriculum, and coordinate upcoming lessons with special education teachers and tutors. Teachers were also given tools to help analyze their instructional practices. They practiced using a new lesson planning scheme, critiqued each others' instructional decisions, discussed the progress of individual students, and developed common student assessments.

The above list of teacher resources – or social capital – shows some of the effects that the professional development program had. Importantly, the social capital model does not assume that every teacher had equal access to these resources. Instead, the teachers' access to resources was influenced by the sub-groups in which they worked. Furthermore, not every teacher would find these resources equally useful. This explains why different teachers responded to the professional development activities in such different ways. The real strength of the social capital model, however, can be expressed by taking a closer look at examples where the professional development program worked best. Three of these 'success stories' are included below. They involve a team meeting, a response to the lesson planning scheme, and a new look at the student test scores. For these examples, the concept of social capital provides a more coherent explanation of what was happening than either the training or sociocultural models.

In one team meeting, Julia asked for advice concerning an English Language Learner who was studying linear equations. She distributed photocopies of the student's written explanation of how to calculate the slope of a line. Everyone at the meeting agreed that the student understood the mathematical concepts but was unable to express her understanding in written English. The teachers discussed how to evaluate the work, what accommodations were appropriate, and how a similar answer would be scored on the upcoming state test. This led to a broader discussion of the instructional goals for English Language Learners. The teachers also discussed possible instructional strategies such as having the student's classmates peer-edit the assignment, having the student memorize math vocabulary words, and minimizing the language issue in order to focus on the student's mathematical ability. At the

end of the meeting, Julia seemed pleased with what she had heard. She nodded and said, "Lots of good input."

In the preceding example, the teacher faced difficult instructional decisions. The comments from her peers gave her a better understanding of the situation and information that could help her improve her instruction. In other words, the team meetings helped give her access to the expert knowledge she needed. Much of this knowledge came from her colleagues explaining what they had done in similar situations. This meeting provided a way to access the knowledge stored in her colleagues' combined experience. It provided greater access to a resource already present within the teachers' social network – it increased their social capital.

The results of this meeting would not be easy to describe using the training model of professional development. Julia did not receive any formal training; she was not going to adopt any new practices because she was told they were the right ones to use. Julia did, however, receive helpful suggestions from professionals with uniquely relevant experience. These suggestions could help her critically reflect on and improve her current practices.

The second example concerns how the teachers responded to the lesson planning method introduced during the program. The sociocultural model would have a difficult time expressing the benefits of these meetings because planning lessons had been, and will likely remain, mostly an individual activity at this school. Also, the new planning scheme was not developed on-site but brought in

by a visiting expert. For these reasons, it seems like the training model is better suited to explaining this part of the teachers' professional development. The training model might not, however, be able to tell the whole story.

By following the planning format, some of the teachers in this study began to take a step-by-step approach to developing their students' conceptual understanding of mathematics. Hannah explained, "It has really made me go through and really read through the lesson and think about what it is I want them to learn." In other words, the new approach to lesson planning supported her reflexive practice. It was an approach to lesson planning that other teachers had learned about too. This is important because reflective practice is understood to be a social as well as an individual activity. The lesson planning format, therefore, became a source of social capital because it provided a shared model of high-quality instruction that could facilitate the teachers' discussions.

The third example of how the social capital model explained the teachers' professional development experiences involves a reexamination of student test scores. Unlike the training model, the social capital model does not view student data primarily as a way of evaluating the success or failure of a professional development program. Instead, this data is seen as a way of helping professional developers understand how the school's resources are being used. For example, the test scores showed a noticeable difference between student performance by grade level. This is shown in Figures 3 and 4.
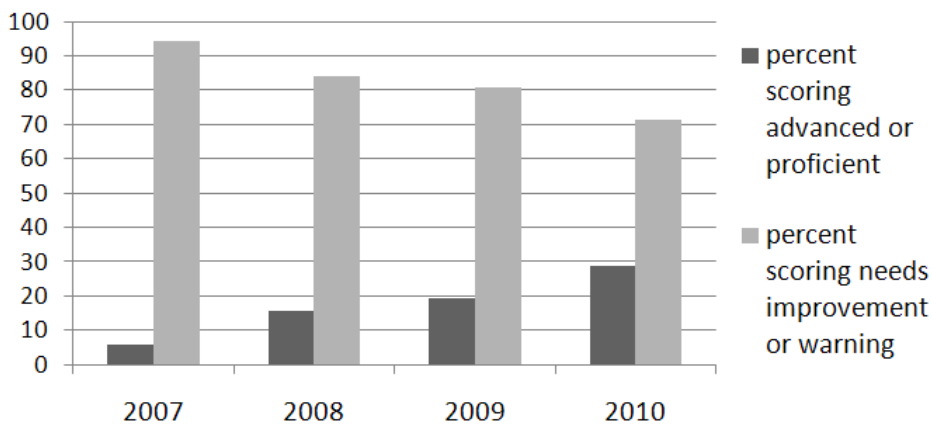

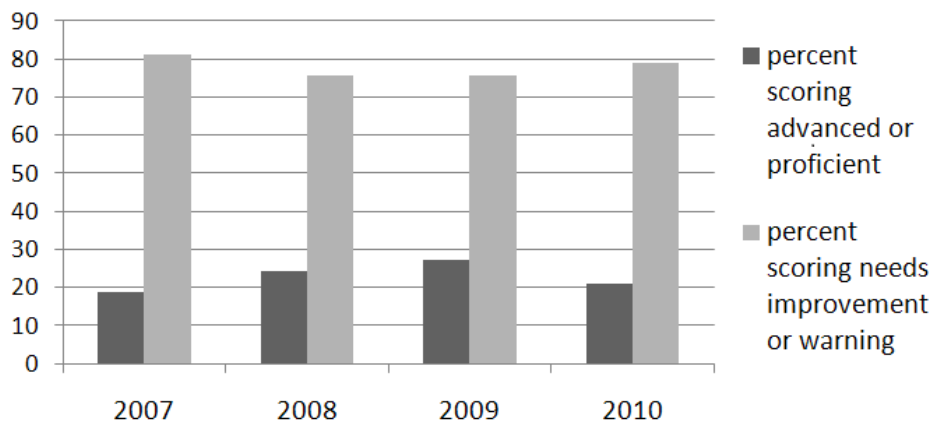*Figure 3.* School data for grades 3, 4, & 5.

Figure 4. School data for grades 6, 7, & 8.

Scores in the lower grades increased every year while scores in the higher grades did not. An analysis of the teachers' social capital might help professional developers understand why. Perhaps the teachers in grades 3, 4, & 5 were been better able to employ the resources made available by the professional development program. If this is the case, an analysis of the middle school teachers' social capital could help identify the additional resources they need.

Conclusions

Following the training model, we were able to find some evidence of teacher learning. There was less evidence, however, of the changes in teacher instruction and student achievement that the program had hoped to bring about. Following the sociocultural model, we were able to find evidence of increased teacher collaboration. There was less evidence, however, that the program had established a strong professional learning community among all teachers. The social capital model, on the other hand, was able to offer a more congruous description of the collected data. Specifically, the social capital model was better able to accommodate the fact that different teachers responded to their professional development experiences in unique and unpredictable ways.

Under the training model, researchers ask, what don't these teachers know and what aren't they doing? The sociocultural model leads to the question, how can these teachers work together more effectively? In the social capital model, the questions are: what resources are available to the teachers and how are these resources being used? This is the crucial difference between the social capital model and the other two. Viewing professional development in terms of resource building invites questions about how these resources are being used. As a result, the social capital model can lead to suggestions for how a professional development program could be improved that would not be obvious from either of the other models.

The professional development program described in this paper gave teachers a wide variety of different learning opportunities. In terms of social capital, many different resources were added to the teachers' social network. At times, however, these resources were used in an uncoordinated way. Specifically, ideas about lesson planning from the weekend meetings were not often referenced during the weekly team meetings. The teachers at these meetings relied on their own practical knowledge instead of analyzing instructional decisions based on the model of effective instruction presented in the program. The professional developers could make small changes to the weekly team meetings in order to address this lack of coordination. Team meetings could focus on the teachers' lessons instead of their individual questions. Teachers could use the lesson planning technique introduced in the program to analyze each others' lessons and suggest possible improvements. The team meetings would thus become a vehicle for disseminating not just the teachers' personal practical knowledge but also the expert pedagogical knowledge introduced during the program.

Implications

The social capital model is certainly not the first attempt to unify the cognitive and social aspects of teacher learning. Other attempts often start with either a cognitive or a sociocultural framework and then incorporate additional considerations into that framework. In so doing, these studies may acknowledge different views of where teacher learning comes from – either from experts in workshops or from peers through collaboration – but they often ignore the fundamental differences in what teacher learning is according to the two models. This fact is nicely demonstrated by the two examples below. Both of these

studies discuss the cognitive and social sides of teachers' reflections, but they do so from very different points of view.

Kuijpers et al. (2010) present a model for teacher professional learning that integrates "top-down" strategies for teacher training with "bottom-up" strategies for encouraging teachers' reflections. The researchers remain committed, however, to the training model of professional development. They were looking for a template that could be used to design consistently effective programs. The template they describe includes collaboration with peer coaches because the researchers believe this to be an effective way to help teachers adopt new instructional practices. In other words, they see collaborative professional development as a good way to transmit knowledge to teachers for use in the classroom.

In another recent example, Ovens and Tinning (2009) investigated the effects a pre-service training program had on the reflections of beginning teachers. The pedagogical concepts presented in this program were seen as important but only insofar as the teachers were able to use these ideas to further their own reflections. Ovens and Tinning were committed to a sociocultural view of teacher learning in which the beginning teachers were actively constructing their professional identities. In this view, teacher knowledge loses nearly all its meaning when separated from the contexts in which it is practiced.

Unlike these two examples, the concept of social capital allows for a more seamless weaving together of the cognitive and social aspects of teacher learning. Pedagogical concepts and structured conversations can both be used to support teachers' reflections. Both are potential sources of social capital. Professional development is seen as resource building. The resources are shared, but how they are used depends on the individual teachers.

Different models for professional development may be appropriate for different research goals. If, for example, a researcher wished to evaluate the effectiveness of a reform initiative, the training model might be a sensible choice. If, instead, a researcher wished to examine the formation of expert teachers, the sociocultural model might be appropriate. But if the researcher was interested in improving the professional development at a particular school in order to better serve both teachers and students, the social capital model is worth considering.

Darling-Hammond et al. (2009) and others have called for professional development programs that support teachers' ongoing professional learning. A familiarity with the concept of social capital may help educators meet this goal. This study demonstrated how the social capital model can lead to practical suggestions for improving teachers' professional development – suggestions that acknowledge the role of both expert knowledge and peer collaboration in supporting teachers' reflections. In addition, the social capital model may be able to avoid some of the difficulties associated with the training and sociocultural models.

References

Adler, P. S., & Kwon, S. (2002) Social capital: Prospects for a new concept. *Academy of Management Review*, *27*(1)*,* 17-40.

Baker-Doyle, K. J., & Yoon, S. A. (2011). In search of practitioner-based social capital: A social network analysis tool for understanding and facilitating teacher collaboration in the US-based STEM professional development program. *Professional development in Education*, *37*(1), 75-93.

Ball, D. L., & Cohen, D. K. (1999). Developing practice, developing practitioners: Toward a practice-based theory of professional education. In L. Darling-Hammond and G. Sykes (Eds.), *Teaching as the learning profession* (pp. 3-32). San Francisco: Jossey-Bass.

Birman, B. F., Desimone, L., Porter, A. C., & Garet, M. S. (2000). Designing professional development that works. *Educational Leadership, 57*(8), 28-33.

Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher, 33*(8), 3-15.

Borko, H., & Putnam, R. T. (1995). Expanding a teacher's knowledge base: A cognitive psychological perspective on professional development. In T. R. Guskey and M. Huberman (Eds.), *Professional Development in education: New paradigms & practices* (pp. 35-65). New York: Teachers College Press.

Bourdieu, P. (1986). The forms of capital. In J. F. Richardson (Ed.), *Handbook of theory and research for the sociology of education* (pp. 241-258). New York: Greenwood.

Coburn, C. E., & Russell, J. L. (2008). District policy and teachers' social networks. *Educational Evaluation and Policy Analysis*, *30*(3), 203-235.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American Journal of Sociology*,

94(Suppl.), 95-120.

Cohen, D. K., & Hill, H. C. (2000). Instructional policy and classroom performance: The mathematics reform in California. *Teachers College Record, 102*(2), 294-343.

Darling-Hammond, L., & McLaughlin, M. W. (1999). Investing in teaching as a learning profession: Policy problems and prospects. In L. Darling-Hammond and G. Sykes (Eds.), *Teaching as the learning profession* (pp. 376-411). San Francisco: Jossey-Bass.

Darling-Hammond, L., Wei, R. C., Andree, A., Richardson, N., & Orphanos, S. (2009). *Professional learning in the learning profession: A status report on teacher development in the United States and abroad.* Dallas, TX. National Staff Development Council.

Davis, K. S. (2003). "Change is hard": What science teachers are telling us about reform and teacher learning of innovative practices. *Science Education, 87*(1), 3-30.

Day, C. (1987). Professional learning through collaborative in-service activity. In J. Smyth (Ed.), *Educating teachers: Changing the nature of pedagogical knowledge* (pp. 207-222). New York: Falmer Press.

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. *Educational Evaluation and Policy Analysis, 24*(2), 81-112.

Diniz-Pereira, E. J. (2003). *The social construction of teachers' individualism: How to transcend traditional boundaries of teachers' identity?* (ERIC Document Reproduction Service No. ED 471 561)

Easton, L. B. (2002). How the tuning protocol works. *Educational Leadership*, *59*(6), 28-30.

Elmore, R. F., & Burney, D. (1999). Investing in teacher learning: Staff development and instructional improvement. In L. Darling-Hammond and G. Sykes (Eds.), *Teaching as the learning profession* (pp. 263-291). San Francisco: Jossey-Bass.

Fishman, B. J., Marx, R. W., Best, S., & Tal, R. T. (2003). Linking teacher and student learning to improve professional development in systemic reform. *Teaching and Teacher Education*, *19*(6), 643-658.

Flores, M. A., & Day, C. (2006). Context which shape and reshape new teachers' identities: A multi-perspective study. *Teaching and Teacher Education*, *22*(2), 219-232.

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. *American Educational Research Journal, 38*(4), 915-945.

Guskey, T. R. (1998). The age of our accountability. *Journal of Staff Development, 19*(4), 36-44.

Guskey, T. R., & Sparks, D. (1996). Exploring the relationship between staff development and improvements in student learning. *Journal of Staff Development, 17*(4), 34-38.

Halverson, R. R. (2003). Systems of practice: How leaders use artifacts to create professional community in schools. *Educational Policy Analysis Archives*, *11*(37), 1-35.

Hargreaves, A. (1993). Individualism and individuality: Reinterpreting the teacher culture. In J. W. Little and M. W. McLaughlin (Eds.), *Teachers' work: Individuals, colleagues, and contexts* (pp. 51-76). New York: Teachers College Press.

Hargreaves, A. (1994). *Changing teachers, changing times: Teachers' work and culture in the postmodern age*. New York: Teachers College Press.

Hawley, W. D., & Valli, L. (1999). The essentials of effective professional development: A new consensus. In L. Darling-Hammond and G. Sykes (Eds.), *Teaching as the learning profession* (pp. 127-150). San Francisco: Jossey-Bass.

Hiebert, J. (1999). Relationships between research and the NCTM standards. *Journal for Research in Mathematics Education, 30*(1), 3-19.

Hoffman-Kipp, P., Artiles, A., & Lopez-Torres, L. (2003). Beyond reflection: Teacher learning as praxis. *Theory into Practice, 42*(3), 248-254.

Huberman, M. (1992). Teacher development and instructional mastery. In A. Hargreaves and M. G. Fullan (Eds.), *Understanding teacher development* (pp. 122-142). New York: Teachers College Press.

Huberman, M. (1993). The model of the independent artisan in teachers' professional relations. In J. W. Little and M. W. McLaughlin (Eds.), *Teachers' work: Individuals, colleagues, and contexts* (pp. 11-50). New York: Teachers College Press.

Huffman, D., Thomas, K., & Lawrenz, F. (2003). Relationship between professional development, teachers' instructional practices, and the achievement of students in science and mathematics. *School Science and Mathematics, 103*(8), 378-387.

Johnson, C. C. (2006). Effective professional development and change in practice: Barriers science teachers encounter and implications for reform. *School Science and Mathematics*, *106*(3), 150-161.

Kelly, P. (2006). What is teacher learning? A socio-cultural perspective. *Oxford Review of Education, 32*(4), 505-519.

Killion, J. (1998). Scaling the elusive summit. *Journal of Staff Development, 19*(4), 12-16.

Kuijpers, J. M., Houtveen, A. A. M., & Wubbels, Th. (2010). An integrated professional development model for effective teaching. *Teaching and Teacher Education*, *26*(8), 1687-1694.

Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. Cambridge: University of Cambridge Press.

Little, J. W. (1982). Norms of collegiality and experimentation: Workplace conditions of school success. *American Educational Research Journal, 19*(3), 325-340.

Little, J. W. (1984). Seductive images and organizational realities in professional development. *Teachers College Record*, *86*(1), 84-102.

Little, J. W. (1991). The persistence of privacy: Autonomy

and initiative in teachers' professional relations. *Teachers College Record, 91*(4), 509-536.

Long, M. J. (1996). Systemic Reform: A new mantra for professional development. *Mathematics Teacher, 89*(7), 584-587.

Lortie, D. (1975/2002). *Schoolteacher*. Chicago: University of Chicago Press.

Loucks-Horsley, S. (1999). Research on professional development for teachers of mathematics and science: The state of the scene. *School Science and Mathematics*, *99*(5), 258-271.

O'Day, J. A., Goertz, M. E., & Floden, R. E. (1995). *Building capacity for education reform* (CPRE Research Briefs Series, RB-18-12/95). New Brunswick, NJ: Consortium for Policy Research in Education.

Ovens, A., & Tinning, R. (2009). Reflections as situated practice: A memory-work study of lived experience in teacher education. *Teaching and Teacher Education*, *25*(8), 1125-1131.

Panasuk, R., Stone, W., & Todd, J. (2002). Lesson planning strategy for effective mathematics teaching. *Education*, *122*(4), 808-827.

Panasuk, R., & Todd, J. (2005). Effectiveness of lesson planning: Factor analysis. *Journal of Instructional Psychology*, *32*(3), 215-233.

Penuel, W. R., Fishman, B. J., Yamaguchi, R., & Gallagher, L. P. (2007). What makes professional development effective? Strategies that foster curriculum implementation. *American Educational Research Journal*, *44*(4), 921-958.

Penuel, W., Riel, M., Krause, A., & Frank, K. (2009). Analyzing teachers' professional interactions in a school as social capital: A social network approach. *Teachers College Record*, *111*(1), 124-163.

Pink, W. T., & Hyde, A. A. (1992). Doing effective staff development. In W. T. Pink and A. A. Hyde (Eds.), *Effective staff development for school change* (pp. 259-292). Norwood, NJ: Ablex.

Portes, A. (1998). Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology*, *24*(1), 1-24.

Putnam, R. D. (1995). Bowling alone: America's declining social capital. *Journal of Democracy*, *6*(1), 65-78.

Sato, K., & Kleinsasser, R. C. (2004). Beliefs, practices, and interactions of teachers in a Japanese high school English department. *Teaching and Teacher Education*, *20*(8), 797-816.

Scharmann, L. C. (2007). A dynamic professional development school partnership in science education. *Journal of Educational Research, 100*(4), 235-242.

Scribner, J. P. (2003). Teacher learning in context: The special case of rural high school teachers. *Education Policy Analysis Archives*, *11*(12).

Schön, D. A. (1987). *Education the reflective practitioner: Toward a new design for teaching and learning in the professions*. San Francisco: Jossey-Bass.

Sfard, A. (1998). On two metaphors for learning and the dangers of choosing just one. *Educational Researcher*, *27*(2)*, 4-13*

Siskin, L. S., & Little, J., W. (Eds.). (1995). *The subjects in question: Departmental organization and the high school*. New York: Teachers College Press.

Supovitz, J. A., & Turner, H. M. (2000). The effects of professional development on science teaching practices and classroom culture. *Journal of Research in Science Teaching, 37*(9), 963-980.

Sykes, G. (1999). Teacher and student learning: Strengthening their connection. In L. Darling-Hammond and G. Sykes (Eds.), *Teaching as the learning profession* (pp. 151-179). San Francisco: Jossey-Bass.

Van Driel, J. H., Beijaard, D., & Verloop, N. (2001). Professional development and reform in science education: The role of teachers' practical knowledge. *Journal of Research in Science Teaching, 38*(2), 137-158.

Wilson, S., & Berne, J. (1999). Teacher learning and the acquisition of professional knowledge: An examination of research on contemporary professional development. In A. Iran-Nejar and P. D. Pearson (Eds.). *Review of Research in Education* (24) (pp. 173-209). Washington, DC: AERA.

Yager, R. E. (2005). Accomplishing the visions for professional development of teachers advocated in the national science education standards. *Journal of Science Teacher Education*, *16*(2), 95-102

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