

Varied Appropriations of Tools from Professional Development: Moving Beyond Levels

Huy Q. Chung and Elizabeth A. van Es, University of California, Irvine, CA, USA
Email: hqchung@uci.edu, evanes@uci.edu

Abstract: In this empirical study we trace teacher's appropriation of literacy teaching tools from professional development and the varied ways they enacted these tools in their classrooms. Teacher appropriation is important in studying professional development because far too often studies do not account for teacher learning and how this learning sustains reform-minded practices. Using two years of qualitative data we traced the appropriation of tools and their impact on instruction. Pushing on Grossman, Smagorinsky, and Valencia's (1999) five levels of appropriation, results indicate that the teachers appropriated tools for different pedagogical reasons, such as appropriating the tools to organize their students' learning, to accommodate their students' learning needs, and to integrate other professional development initiatives. Implications on designing and sustaining teacher learning in professional development are discussed within.

Introduction

In the past decade, researchers, policymakers, and practitioners have given increased attention to the impact of teachers on student achievement (Baker et al., 2010; Darling-Hammond et al., 2009; Yoon et al., 2007). The logic behind this focus stems from studies that conclude that teachers significantly affect student achievement (Nye, Konstantopoulos, & Hedges, 2004). Teacher effects matter even more for schools in lower socio-economic communities that experience high teacher attrition. In order for systematic change to happen in schools and to sustain a strong culture of teaching, education researchers call for an investment in teachers and their practice (Ball & Forzani, 2011; Morris & Hiebert, 2011). Large amounts of funding have been provided to schools and districts to offer professional development programs to improve teaching in hopes of increasing student learning (von Zastrow, 2010). A substantial amount of research related to these efforts focuses on the impact of professional development on student achievement (Baker et al., 2010; Guskey, 2002; Wallace, 2009; Yoon et al., 2007). This emphasis is clearly important; policymakers and taxpayers deserve to know if such efforts are making a difference for students. However, we argue that ensuring lasting impact of teachers' practice and long-term improvements on student learning requires a comprehensive understanding of, and attention to, teacher learning and the relationship between teachers' long-term learning and classroom practices.

While research on teacher education points to the complexity and longevity of developing teacher expertise, studies of the effectiveness of professional development on student achievement have ignored this critical piece of the puzzle. To be clear, research in this vein does look at factors that contribute to teacher learning, such as time spent in professional development, opportunities for active learning and collaboration, and instructional support (Desimone et al., 2002; Garet et al., 2001; Guskey, 2002). However, these studies do not examine how these settings provide or limit teachers' opportunities to learn, the nature and development of that learning, and how the contexts in which they work interact with their participation and learning in professional development. We argue that research that examines the impact of professional development not only consider the effect on student performance, but also what and how teachers learn in professional development contexts, and how that impacts their thinking and practice, which is consistent with other research that advocates for a more comprehensive approach to studying the effects of professional development on teachers (Desimone, 2009; Opfer & Pedder, 2011). In this study, we propose a model to broaden the conception of impact studies to account for several components that influence both what and how teachers learn and develop in their profession. Specific attention to teachers' appropriation of pedagogical tools will be used as an example of this broadening. If teachers are so essential to student learning as research suggests, then attention to teachers' learning, development, and well-being are equally important to consider.

Literature Review

The last decade of research on teacher effectiveness has provided important insight into factors that have the potential to improve teaching and in turn impact student achievement, such as opportunities to collaborate and a focus on student learning outcomes (Guskey, 2002; Thompson, Windschitl, & Braaten, 2012). Three of the main contributions from this literature are the knowledge that most teachers experience professional development on a regular basis, but what that looks like varies across school contexts (Garet et al., 2001; Vescio, Ross, & Adams, 2008), the establishment of an empirical base for what makes for effective professional development (Darling-Hammond et al., 2009; Desimone et al., 2002; Garet et al., 2001), and the conclusion that professional development can impact student achievement (Darling-Hammond, 2000; Guskey, 2002; Wallace, 2009).

Despite these contributions, these studies are also limiting in that they do not capture what and how teachers learn, or the sort of useable knowledge they develop for their teaching. They also neglect how the local, school, and district contexts influenced teachers' ability to take up the ideas they learned in professional development for their practice over time. Teaching is a complex activity. It requires an extensive knowledge-base about teaching, content, learners, and school contexts (Shulman, 1986), development of beliefs and identities as teachers (Richardson, 1996), and constant improvement of teaching practices through critical analysis and reflection. As Schoenfeld (2011) argues, learning to teach, and developing expertise in teaching takes time and is slow to develop.

Impact studies fail to take the complexity and time investment of learning to teach into account and thus often find selected outcomes (i.e., student achievement) plateau or fade after the initial year(s) of professional development (Borman, 2005). Moreover, institutional memory and the expectations that arise out of the cultures of schools also influence the impact of professional development on teachers' practice (Grossman, Smagorinsky, & Valencia, 1999). As with any reform, policy climates change, schools respond differently, and interpret initiatives to meet their context. Thus, another reason why meaningful learning gains may not be sustained is that the designs do not account for the complexity of schools responding to policy climates, the challenges of building a climate of learning and improvement for all students, and school leaders guiding teachers in focused improvement on teaching practice (McLaughlin & Talbert, 2006).

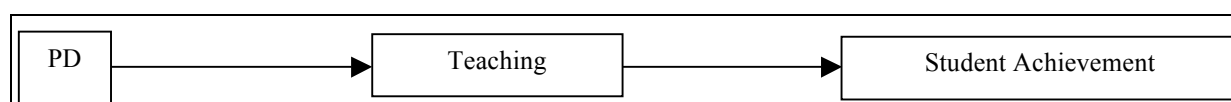


Figure 1. Limited Conception of Impact of Professional Development

In sum, research on the effectiveness of professional development on student achievement attempt to streamline the impact process, but do not currently account for the complexity of teacher learning and changing teaching practices (Opfer & Pedder, 2011). Figure 1 illustrates this limited conceptual model for studying the impact of professional development. In this model, the teacher is largely absent. Instead, the focus is on student outcomes, and teachers' practice (teaching) is used to explain these results. To put it another way, the professional development program is designed to leverage certain teaching practices that have been identified to improve student achievement. Often times, these practices are advocated for without attention to the context of where these practices will be enacted or by whom. If student achievement improves then the professional development program is seen as successful; however, these successes may ignore other important factors that account for their success such as contextual factors, particularly teachers, their experiences, and learning.

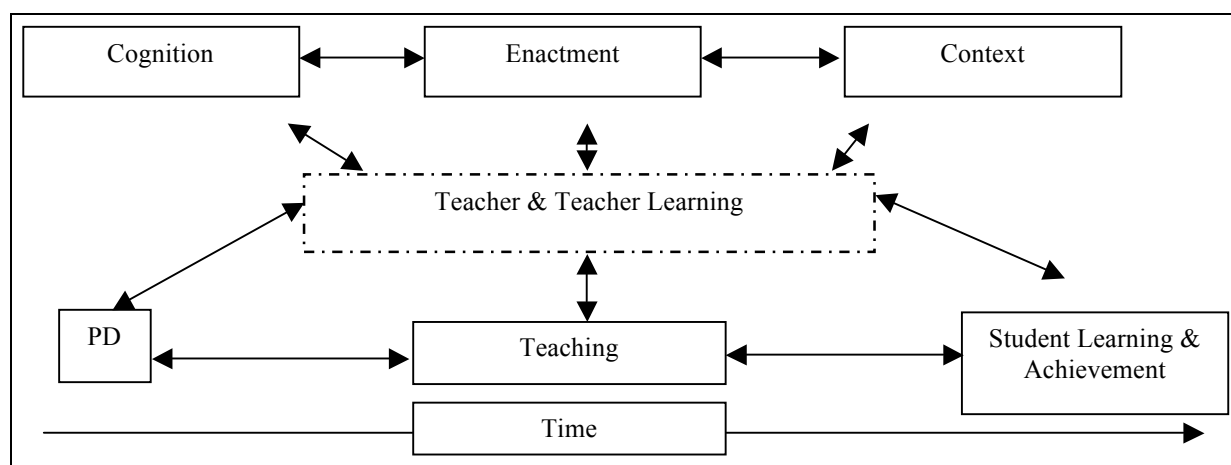


Figure 2. Expanded Conception of Teacher Development

Importantly, across much of this research, studies of teacher learning are largely absent and little research examines how teachers were supported while they implemented new teaching practices (Penuel, Gallagher, & Moorthy, 2011). The model we propose (see Figure 2) incorporates many of the factors we described that operate to influence teacher learning. These factors include:

- *Teachers' cognition*, including knowledge, beliefs, and identity;
- Teachers' local *enactment* of practices promoted in professional development;

- The local, state, and national policy *context*, as well as the school culture and community on teachers' learning;
- *Time* invested for sustained change in teaching and student learning

In this model, the link between professional development, teaching and student achievement remains. However, additional elements are incorporated to expand the conceptualization of how researchers and policy makers should seek to understand the impact of professional development on teachers. Moreover, in this model, we highlight the reciprocity between these elements. We ground our argument using research on how learning occurs in the interactions that take place among multiple reference points. These reference points include teacher cognition, teacher enactment, and teacher context which are understood as developing and interacting with each other over time. The following paragraphs provide a brief, but concise review of why these factors matter for research on teachers participating in professional development, with specific attention to teachers' appropriation of pedagogical tools.

Research in teacher education shows that knowledge for teaching matters and plays a significant role in influencing student learning (Hill et al., 2008). Shulman's (1987) seminal work identifies at least seven different types of knowledge that teachers need to develop to be effective and highlight how they are inter-related and difficult to develop. Teacher beliefs are another aspect of teacher cognition that influences teaching (Pajares, 1992; Richardson, 1996; Stipek et al., 2001). Richardson (1996) underscores the fact that teacher beliefs are strong and enduring and develop from different life experiences that can either be personal, experienced during schooling, or developed in formalized settings such as in their teacher education programs and drives behavior.

In regards to teacher enactment, we also adopt Shulman's (1987) vision of teaching and teacher education, arguing that teachers are professionals who are capable of "enacting –of acting in a manner that is self-conscious with respect to what their act is..." (p. 13). In other words, teachers do not just do what others tell them to do nor do they simply adopt the strategies they learned as students; rather, they are aware of their thinking as they teach and they make conscious decisions about their practice based on what they know and believe (Schoenfeld, 2011). Consistent with Shulman (1987) and the situative perspective (Wenger, 2010), the process in which this change happens can be characterized as an appropriation for practice. Appropriation (Rogoff, 1995) refers "to the process by which individuals transform their understanding of and responsibility for activities through their own participation" (p. 147) in group settings. The interactions that occur during these joint activities shape both the group and community as a whole, as well as the individual. This individual shaping is the appropriation process. During this process individuals discuss and come to agree on shared understandings around particular artifacts, processes, and language and take what is most useful for them during an activity to serve their own purposes. Their knowledge and beliefs also shape what they come to appropriate (Rogoff, 1990). In the context of professional development, even though the group may have an agreement, each individual will come to appropriate tools from professional development differently (Grossman, Smagorinsky, & Valencia, 1999). In other words, teachers will modify and adapt what they learn in professional development based on their knowledge, beliefs, and context (Grossman, Smagorinsky, & Valencia, 1999; Rogoff, 1995). In some cases, the intent remains (Neuman & Cunningham, 2009) and in other cases, teachers greatly modify the information learned and their interpretation of the practice is not in the spirit of the original professional development program (Brown & Campione, 1996).

Related to teacher enactment is the idea of tools assisting teachers in their teaching. Situated learning theory explains that tools embody knowledge valued by their creators and community of users (Pea, 1993). However, individuals take them up and use them in ways that are most suited to their needs. Curriculum materials are one example. Remillard's (2005) review of curriculum use explains that historically, curriculum materials have been viewed as a means to reform teaching practice. However, research on curriculum use reveals mixed findings. Some research suggests that teachers embrace new materials, while others reject and subvert the goals of curriculum. Remillard (2005) proposes that this is the case because the "teacher-curriculum relationship is intertwined with other teacher practices, is dependent on the particular teacher and curriculum, and is situated in a specified context" (p. 212). Attending to this relationship is necessary for understanding the success of materials to transform teaching.

Research on teacher cognition and teacher enactment draws attention to the individual teacher. A third aspect we include in the model is the context in which the teacher is situated. Here, we draw attention to the influence of the professional development contexts, the organizational contexts, and the policy contexts on teacher learning and changes in practice (Talbert & McLaughlin, 1994). Situated learning theory posits that teachers are nested in contexts and within each context they must learn to negotiate the "rules" for each. Each context can be considered as a system with inherent goals. However, actors within these systems also must work together to create mutually negotiated practices that are within cultural norms and boundaries, are agreed upon, and concrete.

One of the criticisms of current studies of the impact of professional development on students is that they are limited in timeframe (Baker et al., 2010). That is, these studies look at the year that teachers are in

professional development and then look at test scores or teacher change in practice that same year. The presumption behind these studies is that professional development will impact student learning in that same year. However, Richardson and Placier (2001) point out that teacher change is neither linear nor predictable but is rather more idiosyncratic and can take years to manifest in practice. Webster-Wright (2009) also argues that professional development studies need to consider what it takes for authentic teacher learning, citing that time is an essential need and that teacher learning is an indefinite process. Darling-Hammond et al. (2009), Garet et al. (2001), Guskey (2002), and Hawley and Valli (1999) identified the need for sustained and supported professional development opportunities that are beyond one-shot workshops (Goldenberg & Gallimore, 1991). Thus, we argue that studies of the effectiveness of professional development on student achievement and learning take into account time for teacher learning that includes teacher cognition, enactment, and contexts.

Situated learning theory suggests that learning is not unidirectional. Instead, the communities in which people participate both shape and are shaped by the members of the group (Brown, Collins, & Duguid, 1989). Additionally, Kazemi and Hubbard (2008) argue that research attend to the co-evolution of teachers' participation across contexts. That is, they contend that teachers will take up what they learn in professional development in different ways and thus changes in practice will vary across participants. Because of this variation, they will bring back to subsequent professional development activities different experiences, which will influence how and what they learn in future professional development activities. The model we propose gives attention to this movement because it is critical for understanding if and how teachers are impacted by professional development and thus improve student learning.

Finally, this model adds student learning as an additional outcome of interest. While student achievement is critical, current approaches to measuring achievement are narrow in focus (Baker et al., 2010). Additionally, current conceptions of learning suggest that learning is not just about pieces of knowledge, but also includes how learners manage their learning and knowing, how they develop practices for participating in a community, and how they learn to use tools and resources for productive participation (Brown, Collins, & Duguid, 1989). These dimensions are needed in studies of the impact of professional development on teachers and students because without acknowledging these dimensions as critical components, professional development initiatives have little chance of having a lasting influence (Borko, 2004; Desimone, 2009).

Study Context

For this qualitative study, we utilize our expanded conception of teacher development (see Figure 2, above) to frame our study on the impact of a two year professional development program, the Pathway Project, on teachers' appropriation of tools, namely, cognitive strategies for reading and writing analytically. Cognitive strategies are conceptual tools and processes that can help students become more meta-cognitive about their work (Olson & Land, 2007). In her book, *The Reading/Writing Connection*, Olson (2011) likens the cognitive strategies as tools within a tool kit where they are drawn upon depending on the task at hand. Some cognitive strategies introduced in the Pathway Project include planning and goal setting, tapping prior knowledge, revising meaning, adopting an alignment, and making connections.

These strategies are disseminated through teacher professional development. The intent of the program is to provide teachers with lessons and materials to introduce the cognitive strategies to students towards the intended goal of writing analytical essays around either fiction or non-fiction texts, collaboration and support in the use of cognitive strategies, and additional literacy professional development such as strategies on how to teach poetry, use Socratic seminars, or developing academic vocabulary. This professional development program is the perfect context for us to study the following question: How do teachers appropriate and enact the Pathway Project tools for use in their teaching of writing over time?

The teachers in this study come from the two lowest-performing middle schools from an urban school district serving a majority population of under-represented minorities (98% Latino; 88% low-income; 80% English language learners [ELL]; and 74% qualify for free and reduced price lunches [FRPL]). The two middle schools are Lion Middle School (ELL: 59%; FRPL: 92%) and Sparrow Middle School (ELL: 56%; FRPL: 92%). The entire English language arts department from both schools participated in three professional development contexts for two years, during Academic Years 2011-2012 and 2012-2013. Each year, 32 teachers attended a series of 6 full release days, a series of 5 two-hour after school workshops, and 36 weekly grade-level meetings involving on-going professional development around the Common Core State Standards, cognitive strategies use, and instruction around analytical writing. Of note is the fact that a total of 48 unique teachers participated in the Pathway Project, but only 17 teachers were able to participate in the Pathway Project for two years with 15 teachers laid-off the first year of participation and 15 new teachers hired during the second year of participation. Data will only come from teachers who participated both years.

Data Sources

Approaching this question requires comprehensive qualitative data analysis using a variety of sources of data to understand how the teachers' understood the intent behind the Pathway Project tools as well as how they take

them up and use them in their teaching. The data sources for this study consisted of two years of field notes of the professional development settings, 80 observational protocols from literacy coaches, 34 teacher self-reports during written reflections, and 6 teacher focus group interviews. The field notes came from 12 full release days and a series of 10 two-hour after school workshops over two years. The protocols were conducted on random announced days by two literacy coaches. Their feedback came in the form of letters that outlined what learning activities took place during instruction and how the teachers incorporated or did not incorporate the Pathway Project tools while teaching. The teacher self-reports were reflections on the Pathway Project, what tools they used from the Pathway Project, which tools they found the most valuable, and how their teaching has changed as a result of the Pathway Project. Finally, the focus group interviews were conducted at the end of each year of implementation. They were done in grade level groups and addressed the affordances and limitations of the Pathway Project on the teachers' instruction.

Analytic Methods

Analysis was done in three phases. During the first phase a comprehensive list of tools, lessons, and materials provided to teachers during professional development meetings was generated through field notes, the observational protocols, and questions from teacher reflections practice surveys. The three types of tools identified in this phase include tangible tools, conceptual tools, and experiential tools (e.g., unit and lesson plans). During the second phase, the first author coded the 80 feedback letters from the literacy coaches for all 17 teachers and traced the presence of the tools identified during the first phase and noted how they were being used. The first author also used the surveys and the focus group interviews collected during both years for all teachers to triangulate the data. In the third phase, the first author qualitatively analyzed how these tools were appropriated, adapted, or adopted by comparing their enactment to field notes of how these tools were meant to be used when introduced during the professional development days. After analysis, the second author pushed for confirming and disconfirming evidence as well as for robust examples of these appropriations to develop validity across the data set.

We approached the data with a top down, bottom up approach and analyzing them for concepts (Corbin & Strauss, 2008) by considering how a wide range of tools are used or not used, when they are used, and to what extent they were appropriated from the Pathway Project to understand the degree in which the principles behind these tools have been internalized when in practice (Rogoff, 1990). Moreover, we also characterized how the teachers utilized these tools in different ways by triangulating their use with other data and constantly comparing their use (Miles & Huberman, 1994) with, for example, the focus group interviews or teacher reflection surveys. In this study we also move beyond the five levels of appropriation that Grossman, Smagorinsky, and Valencia (1999) proposed as a framework to study teachers' appropriation of tools. Though the levels are a good guide, we argue that a more comprehensive understanding of how teachers appropriate tools and for what purposes is more useful in designing professional development for teachers.

Results

In general, there were five distinct patterns in which the teachers appropriated the Pathway Project tools. The five patterns are grouped around the purposes for appropriation: appropriation as organizing student learning, appropriation as incorporating competing professional development goals, appropriation as accommodation of student learning needs, appropriation as addressing gaps in the curriculum, and appropriation as engaging students. The following paragraphs provide examples of how teachers appropriated the Pathway Project tools in these ways, demonstrating the complexity of enacting professional development.

Appropriation as Organizing Student Learning

The majority of appropriations came in the form of teachers creating different tools pulling disparate components of the Pathway Project tools together into packets that walked students through the reading, interpreting, and writing of complex textual analysis emphasizing the use of cognitive strategies, graphic organizers, writing prompts, and essay components. Other ways they organized their students' learning was creating a check list of tasks, rearranging the sequence of the curriculum, or only using the basic components of a curriculum to address the demands of time and pacing.

Appropriation as Incorporating Competing Professional Development Goals

While the Pathway Project tool was an important focus for the teachers in this study, their district also had other professional goals for the teachers. In order to address the demands of both the Pathway Project and their other professional development activities, some teachers would combine different tools together to meet these demands. For example, thinking maps and graphic organizers, a district-wide initiative, were incorporated into the texts that the teachers were given from the Pathway Project. Other teachers would also use the cognitive strategies with Sheltered Instruction Observation Protocols (Echevarria, Short, & Powers, 2006).

Appropriation as Accommodation of Student Learning Needs

Another prevalent pattern of appropriation was adjusting the Pathway Project tools as accommodating student learning needs. A common theme from the focus group interviews revealed that the teachers felt the tools from the Pathway Project were too advanced for the majority of their students who were either English language learners, special-needs students, or below grade level in terms of reading and writing. They would often change the complexity of the curriculum materials by reducing the cognitive demands of writing prompts, by replacing texts given to them with other texts with less demanding language, by chunking lessons across multiple days rather than one single day as they were intended to be given, and by creating new tools with more scaffolds than were given to them.

Appropriation as Addressing Gaps in the Curriculum

Some teachers also addressed gaps in the curriculum given to the teachers. The curriculum from the Pathway Project addressed the teaching of analytical writing, specifically through the analysis of theme in both fiction and non-fiction texts. The curriculum also included ways to scaffold students in the different components of an analytical essay, such as an introduction, body paragraphs, conclusion, a thesis about the theme, and textual evidence. These lessons all used different texts to be taught over two or three days. Some of the teachers felt that the curriculum was not comprehensive enough and would develop other tools or materials to address such gaps. For example, a teacher created a protocol for her students to use when engaging in Socratic Seminars. The protocol addressed students' participation norms and sentence starters to use when discussing their text. This protocol was not given to the teachers by the Pathway Project facilitators. Other tools were created to address content standards, to expand concepts, and to scaffold students even more than what was covered by the Pathway Project curriculum.

Appropriation as Engaging Students

Finally, many teachers were concerned about the complexity level of the materials disengaging students so incorporated technology, created new tools to capture student interests, and developed games incorporating the Pathway Project tools for students. For example, another teacher developed a matching game for students to identify and define what the cognitive strategies were. Other teachers incorporated the cognitive strategies into silent reading activities or when discussing other types of writing.

Discussion

The students of the 17 teachers in this study incorporated many aspects of the Pathway Project curriculum and tools in their teaching. Many of them latched on to the tangible tools they were given such as cognitive strategies posters, book marks with sentence starters, and color-coding strategies that helped their students recognize gaps in their writing if they lacked textual evidence or commentary. What also resonated with the teachers was a process approach to writing and the meta-cognitive ways to engage with the texts they use in their curriculum. Thus, the teachers learned how to teach their students through appropriating the various tools from the Pathway Project. Separate analysis of the students' writing from these 17 teachers showed improvement in terms of the quality of their writing and quantity of their writing. In this regard, the teachers' appropriation of the Pathway Project tools led to an improvement in student learning around analytical writing. However, due to the limitations of the data we cannot attribute this improvement to just the Pathway Project curriculum. More systematic collection of data is needed to understand what aspects of the Pathway Project tool influenced the teachers' teaching and what other parts of their professional lives impacted their teaching. This limitation demonstrates the complexity that is learning from professional development.

Conclusion

The teachers appropriated the Pathway Project tools for different purposes and demonstrated the complexity of teacher learning through their enactment of the Pathway Project tools. The teachers became a Pathway Project teacher through their participation across two years. The teachers had to make sense of the tools they were given and adopt and adapt them as they saw fit to meet their students' learning needs and to meet the needs of other professional development initiatives. The findings from this study demonstrate how complex teacher learning is and how professional development can trace that learning. Moreover, by using appropriation as one component of this complex endeavor, and demonstrating the varied ways teachers do so, this study moves the field beyond the levels of appropriation to consider the purposes of appropriation and the affordances and limitations of such appropriations on students' learning.

Teachers are the main vehicle in which education policy is enacted. Without attending to their learning, such as how they appropriate tools from professional development, sustained improvements in education cannot occur. Moreover, systematic understanding of the impact professional development has on different domains is also needed. Teaching is a complex practice. Research needs to acknowledge the complexity of teaching and recognize that just bringing teachers together is not enough. Rather, a holistic and comprehensive view of

teaching is needed. This study adds to our understanding of the impact of professional development on teachers, their learning, and ultimately their students' learning as a complex endeavor that is worthy to be studied through careful analysis of teachers' appropriation of tools and the factors that influence this process.

References

- Baker, E.L., Barton, P.E., Darling-Hammond, L., Haertel, E., Ladd, H.F., Linn, R., Ravitch, D., Rothstein, R., Shavelson, R.J., & Shepard, L.A. (2010). *Problems with the use of student test scores to evaluate teachers*. Washington, DC: EPI Briefing Paper.
- Ball, D. L., & Forzani, F. M. (2011, Summer). Building a common core for learning to teach, and connecting professional learning to practice. *American Educator*, 35(2), 17-21.
- Borko, H. (2004). Professional development and teacher learning: Mapping the terrain. *Educational Researcher*, 33(8), 3-15.
- Borman, G.D. (2005). National efforts to bring reform to scale in high-poverty schools: Outcomes and implications. *Review of Research in Education*, 29, 1-27.
- Brown, A.L. & Campione, J.C. (1996). Psychological theory and the design of innovative learning environments: On procedures, principles, and systems. In L. Schauble & R. Glaser (Eds.), *Innovation in learning* (pp. 289-326). Hillsdale, NJ: Erlbaum.
- Brown, J.S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), 32-42.
- Corbin, J., & Strauss, A. (2008). *Basics of qualitative research* (3rd edition). Los Angeles, CA: SAGE Publications.
- Darling-Hammond, L. (2000). Teacher quality and student achievement. *Education Policy Analysis Archives*, 8(1), 1-44.
- Darling-Hammond, L., Wei, R.C., Andree, A., Richardson, N., & Orphanos, S. (2009). State of the profession: Study measures status of professional development. *Journal of Staff Development*, 30(2), 42-50.
- Desimone, L.M. (2009). Improving impact studies of teachers' professional development: Towards better conceptualizations and measures. *Educational Researcher*, 38(3), 181-199.
- 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.
- Echevarria, J., Short, D., & Powers, K. (2006). School reform and standards-based education: A model for English-language learners. *The Journal of Educational Research*, 99(4), 195-211.
- Garet, M., Porter, A., Desimone, L., Birman, B., & Yoon, K.S. (2001). What makes professional development effective? Results from a national sample of teachers. *American Educational Research Journal*, 38(4), 915-945.
- Goldenberg, C., & Gallimore, R. (1991). Changing teaching takes more than a one-shot workshop. *Educational Leadership*, 49(3), 69-72.
- Grosman, P., Smagorinsky, P., & Valencia, S. (1999). *Appropriating conceptual and pedagogical tools for teaching English: A conceptual framework for studying professional development*. National Research Center on English Learning and Achievement, Report #12011.
- Guskey, T.R. (2002). Does it make a difference? Evaluating professional development. *Educational Leadership*, 59(6), 45-51.
- Hawley, W. D., & Valli, L. (1999). The essentials of effective professional development: A new consensus. In L. Darling Hammond & G. Sykes (Eds.), *Teaching as the learning profession: Handbook of policy and practice* (pp. 127-150). San Francisco: Jossey-Bass.
- Hill, H.C., Blunk, M. Charalambous, C., Lewis, J., Phelps, G. C. Sleep, L. & Ball, D. L. (2008). Mathematical Knowledge for Teaching and the Mathematical Quality of Instruction: An exploratory study. *Cognition and Instruction*, 26(4), 430-511.
- Kazemi, E., & Hubbard, A. (2008). New directions for the design and study of professional development: Attending to the coevolution of teachers' participation across contexts. *Journal of Teacher Education*, 59(5), 428-441.
- McLaughlin, M.W., & Talbert, J.E. (2006). *Building school-based teacher learning communities: Professional strategies to improve student achievement*. New York, NY: Teachers College Press.
- Miles, M.B., & Huberman, A.M. (1994). *Qualitative data analysis: An expanded sourcebook* (2nd edition). Thousand Oaks, CA: Sage Publications.
- Morris, A. K., & Hiebert, J. (2011). Creating shared instructional products: An alternative approach to improving teaching. *Educational Researcher*, 40, 5-14.
- Neuman, S.B., & Cunningham, L. (2009). The impact of professional development and coaching on early language and literacy instructional practices. *American Educational Research Journal*, 46(2), 532-566.

- Nye, B., Konstantopoulos, S., & Hedges, L.V. (2004). 'How large are teacher effects?' *Educational Evaluation and Policy Analysis*, 26, 237-257.
- Olson, C.B. (2011). *The reading/writing connection: Strategies for teaching and learning in the secondary classroom* (3rd edition). Boston, MA: Pearson, Inc.
- Olson, C.B., & Land, R. (2007). A cognitive strategies approach to reading and writing instruction for English Language Learners in secondary school. *Research in the Teaching of English*, 41(3), 269-303.
- Opfer, V.D., & Pedder, D. (2011). Conceptualizing teacher professional learning. *Review of Educational Research*, 81(3), 376-407.
- Pajares, M.F. (1992). Teachers' beliefs and educational research: Cleaning up a messy construct. *Review of Educational Research*, 62(3), 307-332.
- Pea, R. (1993). Practices of distributed intelligence and designs for education. In G. Salomon (Ed.), *Distributed Cognitions: Psychological and Educational Considerations*, (pp. 47-87). Cambridge: Cambridge University Press.
- Penuel, W.R., Gallagher, L.P., & Moorthy, S. (2011). Preparing teachers to design sequences of instruction in Earth systems science: A comparison of three professional development programs. *American Educational Research Journal*, 48(4), 996-1025.
- Remillard, J.T. (2005). Examining key concepts in research on teachers' use of mathematics curricula. *Review of Educational Research*, 75(2), 211-246.
- Richardson, V. (1996). The role of attitudes and beliefs in learning to teach. In J. Sikula, T. Buttery, & E. Guyton (Eds.), *Handbooks of Research on Teacher Education* (pp.102-119). New York: Simon & Schuster Macmillan.
- Richardson, V., & Placier, P. (2001). Teacher change. In V. Richardson (Ed.) *Handbook of Research on Teaching* (4th Edition, pp. 905-947). Washington, DC: American Educational Research Association.
- Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. New York, NY: Oxford University Press.
- Rogoff, B. (1995). Observing sociocultural activity on three planes: Participatory appropriation, guided participation, and apprenticeship. In J. V. Wertsch, del Rio, P., & Alvarez, A. (Eds.), *Sociocultural studies of mind* (pp. 139-164). New York: Cambridge University Press.
- Schoenfeld, A.H. (2011). Toward professional development for teachers grounded in a theory of decision making. *ZDM Mathematics Education*, 43, 457-469.
- Shulman, L. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, 15(2), 4-14.
- Shulman, L. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*, 57(1), 1-21.
- Stipek, D.J., Givven, K.B., Salmon, J.M., & MacGyvers, V.L. (2001). Teachers' beliefs and practices related to mathematics instruction. *Teaching and Teacher Education*, 213-226.
- Talbert, J.E., & McLaughlin, M.W. (1994). Teacher professionalism in local school contexts. *American Journal of Education*, 102(2), 123-153.
- Thompson, J., Windschitl, M., & Braaten, M. (2012). Developing a theory of ambitious early-career teacher practice. *American Educational Research Journal*. doi:10.3102/0002831213476334
- Vescio, V., Ross, D., & Adams, A. (2008). A review of research on the impact of professional learning communities on teaching practice and student learning. *Teacher and Teacher Education*, 24, 80-91.
- vonZastrow, C. (2010). Making professional development investments that matter. *Learning First*. Retrieved from <http://www.learningfirst.org/making-professional-development-investments-matter>
- Wallace, M. (2009). Making sense of the links: Professional development, teacher practices, and student achievement. *Teachers College Record*, 111(2), 573-596.
- Webster-Wright, A. (2009). Reframing professional development through understanding authentic professional learning. *Review of Educational Research*, 79(2), 702-739.
- Wenger, E. (2010) Communities of practice and social learning systems: the career of a concept. In C. Blackmore (Ed.) *Social Learning Systems and communities of practice*. Springer Verlag and the Open University.
- Yoon, K.S., Duncan, T., Lee, S.W.-Y., Scarloss, B., & Shapley, K. (2007). *Reviewing the evidence on how teacher professional development affects student achievement* (Issues & Answers Report, REL 2007 No. 033). Washington, DC: US Department of Education, Institute of Education Sciences