

## Chapter 13

# Co-Development of Professional Practice at a Professional Development School through Instructional Rounds and Lesson Study

**Jennifer M. Suh**

*George Mason University, USA*

**Lesley A. King**

*George Mason University, USA*

**Andrea Weiss**

*George Mason University, USA*

### ABSTRACT

*This chapter examines the co-development of professional practices for both clinical faculty and teacher candidates at a Professional Development School through instructional rounds and lesson study. In particular, the authors highlight the nature of the transformative partnership of a collaborative network composed of two university teacher educators, a school-based site facilitator, and clinical faculty who co-designed and implemented a clinical model to enhance the teaching and learning of mathematics methods for elementary teacher candidates and faculty. The model of instructional rounds (City, Elmore, Fiarman, & Teitel, 2009) and lesson study (Lewis, 2002; Lewis, Perry, & Murata, 2006; Fernandez & Yoshida, 2004) were used in an elementary mathematics methods course at a Professional Development School to support teacher candidates in becoming reflective practitioners alongside clinical faculty. The chapter explores the following research questions: (1) In what ways did the targeted Instructional Rounds and Lesson Study impact the development of teacher candidates and clinical faculty's professional practice? (2) How does the co-development model for professional development enhance the transformative partnership at the Professional Development School?*

DOI: 10.4018/978-1-4666-6367-1.ch013

### INTRODUCTION

This study is an outcome of a three-year project called the Professional Development School Math Lab where a mathematics methods course was woven into clinical practice at a Professional Development School (PDS) site with the collaboration of a university faculty and school based faculty. We began the model with a focus on Lesson Study (Lewis, 2002), a professional development structure that is teacher led to leverage the transformative partnership we had between the university faculty and the school teacher-leaders. As we continued to improve our model and partnership, we have added Instructional Rounds that allow both clinical faculty and teacher candidates to have specific targeted observations and bridge the connection between the theory and practice. The primary focus of the PDS math lab design included:

- Targeted instructional rounds to focus on teaching practices such on differentiation, assessment, and math discourse in the classroom, which were the areas that were most challenging for novice teachers;
- Implementation of inquiry-based reform-oriented curricular materials through Lesson Study;
- Reflection on content, instructional rounds, lesson planning, and for math teaching.

It was designed based on the premise of modeling “a partnership of preparation program” that “designs course work and clinical preparation” in tandem so that the translation of knowledge into practice is explicitly demonstrated in a PDS classroom setting (NCATE, 2010, p. 4).

The chapter begins with the design of the PDS Math Lab and how the PDS setting provided an ideal environment for Instructional Rounds and Lesson Study with the necessary infrastructure for a transformative partnership that capitalized on the professional development of teachers at all

levels, experienced and novice. Then, the authors will present data from the study that demonstrates the outcome from this transformative partnership that helped develop and fine-tune clinical faculty and teacher candidates' mathematical knowledge for teaching. Finally, the authors will share recommendations and future directions for research.

### BACKGROUND

#### PDS: An Ideal Setting for Transformative Partnership for University-School Efforts

Identifying high leverage clinical practice at Professional Development Schools is an important component of research on effective PDS sites (Zeichner, 2010) and key organizations like the American Association of Colleges for Teacher Education (AACTE), the National Council for Accreditation of Teacher Education have released reports supporting Clinical Preparation in Teacher Education (AACTE, 2010; CCSSO, 2012; NCATE, 2010). High-quality descriptive reports on design decisions are crucial in understanding the impact the design has on the development of teacher candidates and the professional development of in-service teachers that ultimately impact student learning. As we designed this model, we were intentional in our design decisions to leverage all the affordances offered through our Professional Development School partnership and focused on the goals of developing teachers' specialized knowledge for teaching elementary mathematics.

Professional Developments Schools (PDS) are innovative institutions formed through partnerships between professional education programs and P-12 schools (NCATE, 2000). The design of the Professional Development School lends itself to providing an ideal environment for Instructional Rounds and Lesson Study with the necessary infrastructure to capitalize on the

professional development of teachers at all levels, experienced and novice. The fundamental design principle of professional development school sites is one in which school and university partners together emphasize improving teacher education, the professional development of practicing teachers, and student learning within an inquiry-based environment (Castle, Fox, & Fuhrman, 2009; Holmes Group, 1986; NCATE, 2010; Hamerness, Darling-Hammond, Grossman, Rust, & Shulman, 2005; Zeichner & Conklin, 2008). Castle and Reilly (2011) identified several key PDS structural features that positively influences teacher candidate outcomes: earlier, longer, and more structured field experiences; greater school-based and university-based faculty collaboration on coursework and field experiences; greater integration of coursework and field experiences; more exemplary models of teaching along with more trained mentors; more frequent and sustained supervision and feedback from more people in a wider variety of roles and more time on-site by the university supervisor; more exposure to diverse, school-wide authentic learning experiences; more supportive and reflective discussion and dialogue around issues of practice and professionalism within a learning community; and more interconnections between teacher preparation, professional development, student learning, and inquiry. These compelling benefits in research guided us to implement Instructional Rounds and Lesson Study into the PDS Math Lab.

### Creating a Learning Environment at the PDS Math Lab for High Leverage Clinical Practices

*High leverage tasks* are the core responsibilities of a given job. In our teaching profession, these tend to be the activities that will maximize teaching and learning. Researchers at the University of Michigan have identified high-leverage teaching practices that can have the most impact in content areas and contexts and that can be most productively worked on and learned during ini-

tial teacher education ([www.teachingworks.org](http://www.teachingworks.org)). Research indicates “practice-based” activities as necessary for teacher development. (Ball & Cohen, 1999; Wilson & Berne, 1999; Darling-Hammond, 1998; Lampert & Ball, 1998). Many of the high leverage practices included during our instructional rounds and lesson study were making content explicit through explanation, modeling, representations, and examples; Leading a whole-class discussion; Eliciting and interpreting individual students’ thinking and Identifying and implementing an instructional response to common patterns of student thinking; Teaching a lesson or segment of instruction – (See more at: <http://www.teachingworks.org/work-of-teaching/high-leverage-practices#sthash.Flmhodzc.dpuf>) Through this explicit professional development of high leverage practices in teaching mathematics, we also examined our teacher candidates and clinical faculty’s co-development of professional practice through the Danielson’s Framework for Enhancing Professional Practice (Danielson, 1996, 2007). In this framework, Danielson (1996, 2007) outlines four major domains for enhancing professional practice. That includes: a) planning and preparation; b) the classroom environment; c) instruction; and d) professional responsibilities.

To immerse both teacher candidates and clinical faculty in the professional development and examine these teachers engage in these four critical domains, we used Instructional Rounds and Lesson Study. Instructional Rounds (City, Elmore, Fiarman, & Teitel, 2009) is a practice adapted to education from the field of medicine where practitioners work together to solve “common problems and improve their practice”. In medicine, the clinical rounds consist of training how to care for patients, presenting the medical problems and treatment of a particular patient to doctors, residents and medical students. In education, instructional rounds are designed to help schools, districts, and state systems support high-quality teaching and learning for all students. Instructional Rounds help teachers examine closely at what is happening in class-

rooms in a systematic, purposeful, and focused way. Typically, the first step in an Instructional Rounds process is determining a “problem of practice” followed by collective observation and debrief. Complementing the instructional rounds, we used lesson study (Lewis, 2002; Lewis, Perry, & Murata, 2006), which is a model of professional learning that offers situated learning through collaborative planning, teaching, observing, and debriefing that affords opportunities for teachers to reflect individually and collectively. Lesson study, which originates from Japan, has been embraced by teacher educators because it empowers teachers and provides a collaborative structure for developing reflection for critical dialogue about pedagogical content knowledge among teachers (Lewis, 2002; Lewis, Perry, & Murata, 2006). Benefits of collaborating on planning lessons with both novice and experienced teachers include exposure to multiple perspectives and new ideas that result from sharing experiences and expertise. It also aligned with a call for moving the learning of teaching closer to practice in teacher education (Gallimore, Ermeling, Saunders & Goldenberg, 2009). We were interested in documenting this evolutionary process as we followed teachers as they practiced the *pedagogies of enactment* (Grossman et al., 2009 Grossman & McDonald, 2008) where teachers planned for, rehearsed and enacted aspects of practice in the follow up Lesson Study episodes.

## THE STUDY

### Research Questions

The following research questions guided our study:

1. In what ways did the targeted Instructional Rounds and Lesson Study impact the development of teacher candidates and clinical faculty’s professional practice?

2. How does the co-development model for professional development enhance the transformative partnership at the Professional Development School?

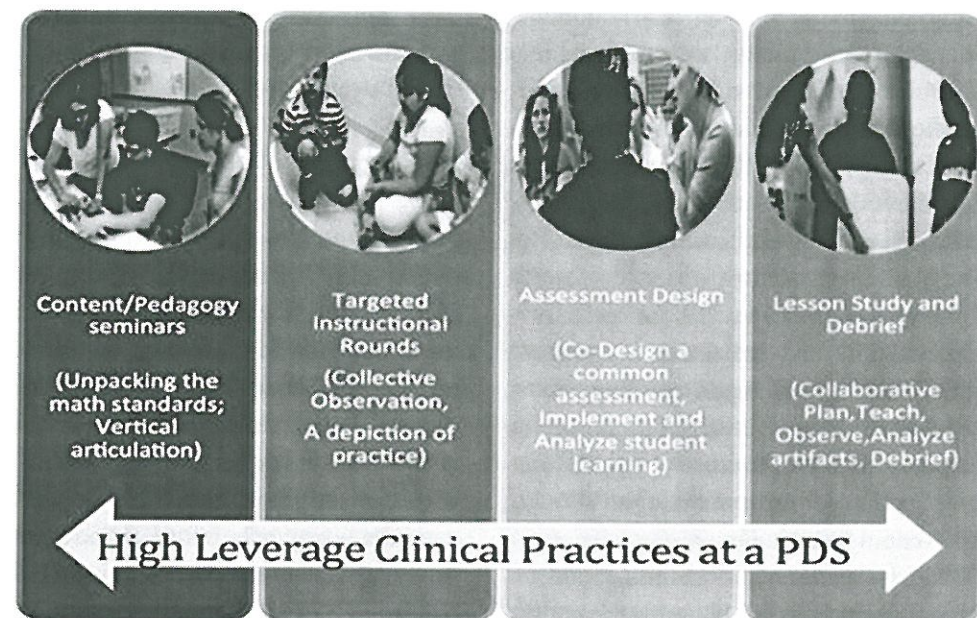
### Participants

For this study, we focused on the development of twenty-nine teacher candidates, in terms of their ability to teach a conceptually-based mathematics lesson rich in classroom discourse and their reflective practice. In relation to the teacher candidates’ preparation, this mathematics methods course was in the second semester of their five-semester program. In the first semester, teacher candidates began their foundation courses with 30 hours of classroom observation and fieldwork but had limited experiences in planning and teaching lessons. Following this project, teacher candidates are immersed in a year-long, two semester- internship in diverse PDS sites with a clinical faculty as their mentors for the academic year. Their last semester is an action research project related to student learning.

### Procedures

The PDS Math Lab was designed around a 3-credit methods course. It was scheduled to be held daily for five weeks in the summer semester and unlike most teacher preparation courses, the course was held at a PDS site where 50 invited students from this Title I community school attended a primary and upper grades enrichment math lab. We chose four key high leverage clinical practices as described in Figure 1. One of the clinical practices was a focus on unpacking the mathematical standards where teacher candidates worked with the mathematics educators by mapping out the learning progression and the vertical articulation while being immersed in problem solving. The second clinical practice was introducing teacher candidates to Instructional Rounds, where as a class, we conduct joint observation of clinical

Figure 1. High leverage clinical practices at a PDS



faculty focused on important skills as differentiation, questioning, orchestrating math talk in the classroom and assessment. The third clinical practice was collaborative assessment design, where teacher candidates co-designed a common assessment and administered the task to diverse learners. Finally, the fourth clinical practice was Lesson Study, where teacher candidates collaboratively planned lessons in small teams with the support and feedback from clinical faculty and teacher educators focused on math content and pedagogy.

#### DATA COLLECTION AND ANALYSIS

To address our research questions, we included data sources such as teacher candidates' reflective journal entries, transcribed notes from the video clips of the planning and debrief meetings, researchers' memos, classroom observations, and planning documents. Using the constant comparative method (Strauss & Corbin, 1994), we used the open coding techniques and tested

for recurring themes and patterns. We identified common themes in the teacher candidates' written reflections and the video recordings from the Instructional Rounds and the Lessons Study experience. Using an observational approach, we kept researchers' memos, which were anecdotal notes and in-depth information about teacher behaviors and comments as a way to capture the phenomenon as it happened. These different data sources were used to triangulate the data and verify the common themes.

#### RESULTS

##### Impact of Instructional Rounds and Lesson Study on the Co-Development of Teacher Candidates and Clinical Faculty's Professional Practice

To address the first research question, *In what ways did the targeted Instructional Rounds and Lesson Study impact the development of teacher*

*candidates and clinical faculty's professional practice*, we analyzed teacher reflections, and interviews with teacher candidates and clinical faculty. The recurring theme in teacher candidates' reflections and interviews with clinical faculty were categorized using Danielson's framework (2013) for Enhancing Professional Practice, more specifically, the four domain including: a) planning and preparation; b) the classroom environment; c) instruction; and d) professional responsibilities were used to categorize how the clinical faculty and teacher candidates co-developed.

#### Clinical Practices Focused on Planning and Preparation

In the planning and the preparation for the Lesson Study, the clinical faculty and the teacher candidates collaborated on organizing the content that students were expected to learn. Although teacher candidates were given a reform math curriculum to guide them in their teaching, it still took the skill of a veteran teacher to know where to pare down the lesson. In the following quote intern expresses the support that they felt and how they felt validated in their concerns about the scope of the lesson.

*It was very helpful to hear feedback from Ms. J. and Ms. K. today as it affirmed some thoughts that I had regarding the content covered in lesson 3; it was a lot to cover so the focus of the lesson may need to be narrowed down.*

Another teacher candidate also reflected on how one needs to be intentional in their teaching. She goes on to comment on a challenging aspect of the mathematics knowledge for teaching, which is to anticipating students' responses and formulating follow-up questions.

*The next time I teach a mathematics lesson, I plan to work on developing my questions and follow up questions in order to effectively engage students in discussion as well as help them reflect on their own work.*

Ms. J., the clinical faculty, commented on the experience working with this Lesson Study team. She stated,

*This is a new curriculum for me as well so it is a learning curve for me to guide the teacher candidates through the lesson design. I did know from my previous experience teaching this concept that what the interns had planned would be logistically too ambitious for the allotted time. I wanted the interns to spend more time letting the students to wrestle with the ideas of scaling up from an original shape.*

This clinical faculty demonstrated her ability for "content-focused coaching". In her interview she elaborated on and recommended to the Lesson Study team that its important to have students build enlarged scaled version of the original model so that students can connect the procedural algorithm of scaling up with the conceptual understanding of enlarging 3-dimensional shapes.

#### Clinical Practices in Creating a Productive Classroom Environment

Although the summer PDS Math lab was five weeks, the Clinical faculty was intentional in creating a classroom environment that focused on respect and collaboration among the students, while establishing a culture for learning, managing classroom procedures, managing student behavior, and organizing the physical space. The clinical faculty was intentional in using "choice words" with students to model for the teacher candidates what a profound impact language can have in

establishing a learning classroom culture and on students as individual learner. One of the teacher candidates observed and noted,

*From the observations, it is abundantly clear the power that carefully chosen words and phrasings have on student learning and classroom atmosphere. The teachers make it seem easy, but the thought and self-awareness surrounding is harder that it sounds.*

Many of our teacher candidates voiced concern regarding classroom management, transitions and managing two or more simultaneous activities to maximize student learning.

*The next thing I would improve on what the CF brought up was about making sure to tell the students what their jobs are before leaving the carpet. The CF mentioned that even experienced teachers struggle with this because they just get excited about the activity but I think if we had done this well, the room would have been a little less chaotic. I also need to focus on the student learning goals.*

Because classroom management was one of our teacher candidates' primary concerns in teaching lessons, our clinical faculty had to articulate explicitly their pedagogical decisions for why they managed classroom procedures or student behavior in a particular way during instruction and how they organized the physical space and timing for a lesson. The nature of this talk aloud enhanced clinical faculty's ability to articulate their professional rationale for their pedagogical decisions.

### Clinical Practice Focused on Exemplary Instructional Routines

Teacher candidates spent the first week of the PDS Math Lab observing instruction through Instructional Rounds. As the CFs modeled instruction,

the teacher candidates took notes on the students' engagement. These "look fors" included communicating clearly and accurately, using questioning and discussion techniques, engaging students in learning, providing feedback to students, and demonstrating flexibility and responsiveness. The unpacking of the standards took place as the teacher candidates began their Lesson Study. As they planned their lesson, they received feedback from the CFs and the two university mathematics educators on their lesson design and also debriefed after implementing their lesson. The following quotes from teacher candidates reveal specific attention to Clinical Faculty's instructional moves.

In Table 1, the teacher candidates' reflections reveal how the interaction with the CF and the SF through feedback and observation allows for all the teachers, novice and experience to focus on enhancing their instruction.

### Clinical Practices to Develop Professional Responsibilities

Reflective practice is one of the most important professional responsibilities of a teacher. The course focused on reflecting on teaching, growing and developing professionally, and showing professionalism. Having a knowledgeable other like the CFs and mathematics educators observe the teacher candidates' practice and follow-up with a debrief helped identify areas for improvement. One type of focused reflection was on content as evidenced in this quote:

*After the debrief session with Ms. K. and Ms. A, I gained some much needed insight into how to make the lesson better. When teaching commutative property next time, and if timing allows, I will set up more of a context of the properties such as listing the different properties and asking which one they think the examples we discussed were, then giving them that term if they did not yet have that vocabulary.*

Table 1. Instructional moves and teacher candidates' reflections

Focused on Instructional Moves	Teacher Candidates' Reflective Comments
Engaging students in mathematics learning and connecting big ideas	<i>If the students were already familiar with writing their scaled enlargements symbolically, then we could have played with the commutative and associative properties using Mrs. Johnson's idea of having a selection of students hold up large cards of the factors at the front of the room and then mixing the students (and thus the factors) up for the rest of the class to see that rearranging and regrouping the factors results in the same product every time.</i>
Communicating clearly and accurately, using questioning and discussion techniques,	<i>I observed the CF's teaching, I was blown away by the ratio of questions they asked of the students to information they just told the students. Being able to when and what to ask students and responding based on what they answer is going to take a lot of practice, but I know it is the only way to get students to really think deeply and critically.</i>
Focusing on meaning student learning objectives and responding to students' readiness	<i>I was also glad that the site facilitator shared what she learned during the first few years of her teaching career, about trying to cram too much into every lesson: her students learned less, not more, as a result. This resonated with me because I can imagine myself becoming over enthusiastic about my subject matter and trying to accomplish too much in every lesson. As a result, I will try to pick one objective to be the focus throughout my lesson and make assessment of each individual a priority, so I can monitor the success of each learning activity.</i>

Another type of reflection was on pedagogy. More specifically, the following quote is related to developing adaptive teaching skills. Adaptive teaching (Bransford, Derry, Berliner, & Hammerness, 2005) is knowing how to adapt to the responses of students and think on your feet.

*No matter how much time you spend planning a lesson you cannot account for every variable and every possible outcome. Being able to think on your feet and be willing to change the lesson in the middle of it, is very important for teachers. Again this is something that will most likely become more natural with experience.*

The last type of reflection was meta-reflection. In other words, teacher candidates commented on the different level of reflection that ranges from micro-level, fine grain analysis, which is harder for novice teacher because it requires decomposing the complexity of teaching.

*The one thing I am most curious about would be learning how to be more reflective. We have been pushed from the day we started this program to be reflective teachers and I very much agree with*

*this concept. I have been working on being reflective and this course has definitely helped me in building this skill, but I feel this is where I could do more growing. I often feel I don't know what or how to reflect as much as I would like. I need to find a process to think thru my reflecting. I think as I do it more, I will become better at it. I may work on coming up with more in depth questions.*

### LEVERAGING THE TRANSFORMATIVE PARTNERSHIP AT THE PROFESSIONAL DEVELOPMENT SCHOOL THROUGH THE CO-DEVELOPMENT MODEL FOR PROFESSIONAL DEVELOPMENT

To address the second research question, *How does the co-development model for professional development enhance the transformative partnership at the Professional Development School*, we analyzed the reflections from teacher candidates, memos from the university mathematics educators, and focus interviews with the site facilitator and the clinical faculty.

### Leveraging Collective Participation to Focus on a "Problem of Practice" and Constructive Feedback to Enhance Professional Practice

One of the ways in which this model proved to be a *transformative partnership* was the way in which the collective work involved both clinical faculty and teacher candidates seamlessly toward one goal—enhancing their professional practice for the improvement of student learning. The clinical faculty, who led the summer lab school and modeled lessons for our teacher candidates, had prior Clinical Faculty training on strategies for being a master teacher, mentor, coach, and professional resource to teacher candidates. The targeted Instructional Rounds were focused on areas that our teacher candidates typically had difficulty with, such as, differentiation, assessment and mathematics communication. Each morning, the math educators identified a targeted mathematical practice that the teacher candidates would observe, they were asked to make notes and after the observation, the class would debrief. Each evening, the teacher candidates were asked to reflect in a memo and describe their learning. On many Instructional Rounds, the clinical faculty who modeled the lesson would meet with the teacher candidates and have a discussion about the pedagogical decisions they made during the lesson.

Another way this *transformative partnership* maximized teacher learning was through the nature of the relationship and trust developed in the process. The collective ownership in the lesson design during the Lesson Study process allowed the clinical faculty and teacher candidates to let their guards down and focus deeply on the lesson without feeling like one was being judged upon. One of the challenges of mentoring novice teachers is to be honest with instructional feedback without the teacher candidates feeling sensitive about the critique. Receiving constructive criticism can be a challenge. However, such information can be used

to improve one's practice. By establishing a model where instructional rounds was used to create a learning environment where the CFs and Teacher candidates all knew that the critical feedback was the norm for improving their practice and that it was their collective responsibility to look critically at pedagogical decisions. This teacher candidate shares how receiving critical feedback was difficult but made her realize that she needed to be more responsive to students when she teaches.

*The feedback we received during the debrief was valuable but difficult to hear but will help me improve. There are many teaching skills that I need to work on. I need to be more lively and exciting about how I speak to the students and pay attention to the cues the children are giving me. I need to think of teaching strategies that are accomplished quickly, and in an engaging and meaningful way.*

It was also humbling for the teacher candidates to hear from veteran teachers that teaching requires continuous improvement. The Clinical Faculty also shared with them that time management, pacing, and determining what is important in a lesson are skills that develop with more teaching experience.

*Another takeaway is that the best-planned lesson will not go according to plan; especially when it comes to pacing. I knew that time management would be a problem for us, but it was surprising to hear the CFs say that veteran teacher still have problems with pacing out lessons. Knowing what to cut out of lesson and what to teach will be challenging but necessary.*

Excerpts from pre-service reflections revealed the benefits of implementing best practices and working collaboratively with other expert master teachers.

*While watching the CF's co teach I realized how valuable it is to have someone else to teach with. Personally I never saw co teaching in action, there was always one lead and an assistant, but the two teachers I observed the past weeks were very effective. I was glad I had the opportunity to see an effective teaching team working together and taking the lead while teaching to their strengths. When they taught in front of the students they worked as if they were one teacher. I know that I will have to work with many teachers when I enter the school system and I was excited to see respect and collaboration from both Ms. S. and Ms. J.*

The shared experience helped the teacher candidates and the clinical faculty develop a common culture of instruction by focusing on philosophy use to teach mathematics and providing examples of best practices and precise mathematical language.

Clinical faculty stated,

*The PDS math lab school concept deepens the school vision of spreading best practice strategies in a systematic way. Using the instructional rounds and Lesson Study ensures that the existing school practices are deepened and explicitly taught to new and beginning teachers so that the culture is self-sustaining and can weather any change in personnel. It also ensures that we are not a school with pockets of excellence but that all practices that are shared across classrooms and across programs.*

It was evident by the end of Math Lab, that the teacher candidates had a common vision for best practices. During these summer school sessions, teachers were observing, learning, and refining assessment and instruction with clinical faculty. They were able to note, question, and analyze in a true school setting. In the afternoon, teachers shared observations and reflections. Clinical faculty provided new learning that could be observed

or attempted by teachers the following days in summer school. This provided opportunity to refine and practice teaching behaviors immediately, making best practices common practices.

Through this experience of being immersed in mathematics teaching and observing during PDS Math Lab, the teacher candidates felt more prepared to begin their intensive internship in September. They developed knowledge of the school culture and practice and saw it in action in the summer school classrooms. They had time to both observe and often teach lessons that directly related to the best practices embedded in the school. These teacher candidates were given the tools they needed to begin the school year with more confidence in both the curriculum and the culture of the school.

### IMPLICATIONS AND RECOMMENDATIONS FOR PROFESSIONAL DEVELOPMENT SCHOOLS

The Instructional Rounds and Lesson Study process provided a unique opportunity for teacher candidates to experience an authentic professional learning community with a set of established norms that ensured the success of the study for both pre-service teachers and clinical faculty. Teachers, new and experienced, need more time for professional learning: to understand new concepts and skills; to get support and feedback while trying new approaches and integrate them into their practice (Cambone, 1995; Corcoran, 1995; Zeichner & Conklin, 2008). Donahoe (1993) suggests that such set-aside "collective professional time" is particularly important for significant school improvement. The Lesson Study at the PDS provided this collective professional time. Giving teacher candidates an opportunity to collaborate with practicing teachers at a school site supports Lave and Wegner's (1990) notion of

situated learning: knowledge needs to be presented in authentic contexts, settings and situations normally involving that knowledge. Social interaction and collaboration with practicing teachers at a PDS site allowed pre-service teachers to integrate classroom reality with the theory they learned in class. We share this project in hopes that it demonstrates attributes of the model that the Blue Ribbon Panel Report would define as a model that “supports the close coupling of practice, content, theory and pedagogy” (NCATE, 2010, p. 4).

### FUTURE RESEARCH DIRECTIONS

We plan to continue to further study the co-development of teacher candidates and clinical faculty engaged in other collective clinical experiences like Action Research during their Internship and professional learning taking place while developing performance-based assessments. For Professional Development Schools to truly be a *transformative partnership*, the collective development of professional practice for both the CF and teacher candidates must be a priority. In this vein, we are planning to offer math professional development (PD) throughout the academic school year where CFs and teacher candidates can collectively participate in mathematics PD and examine the impact that the collective participation has on their development of professional practice and the impact on student learning in mathematics instruction.

### REFERENCES

American Association of Colleges for Teacher Education. (2010). *Reforming teacher preparation: The critical clinical component*. Washington, DC: Author.

Ball, D. (2003). *What mathematical knowledge is needed for teaching mathematics?* Paper presented at the Secretary's Summit on Mathematics. Washington, DC. Retrieved March 18, 2010 from [www.erusd.k12.ca.us/ProjectAlphaWeb/index.../BallMathSummitFeb03.pdf](http://www.erusd.k12.ca.us/ProjectAlphaWeb/index.../BallMathSummitFeb03.pdf)

Bransford, J., Derry, S., Berliner, D., & Hammerness, K. (2005). Theories of learning and their role in teaching. In L. Darling-Hammond, & J. Bransford (Eds.), *Preparing teachers for a changing world* (pp. 40–87). Hoboken, NJ: Jossey-Bass.

Cambone, J. (1995). Time for teachers in school restructuring. *Teachers College Record*, 96(3), 512–543.

Castle, S., Fox, R. K., & Fuhrman, C. (2009). Does professional development school preparation make a difference? A comparison of three teacher candidate studies. *School University Partnerships*, 3(2), 58–68.

Castle, S., & Reilly, K. A. (2011, April). *The Impact of Professional Development School Preparation on Teacher candidates*. Paper presented at the Annual Meeting of the American Educational Research Association. New Orleans, LA.

City, E. A., Elmore, R. F., Fiarman, S., & Teitel, L. (2009). *Instructional rounds in education: A network approach to improving teaching and learning*. Cambridge, MA: Harvard Education Press.

Cohen, D. K., & Ball, D. L. (1999). *Instruction, capacity, and improvement*. Philadelphia: Consortium for Policy Research in Education, University of Pennsylvania, Graduate School of Education.

Corcoran, T. B. (1995). *Helping teachers teach well: Transforming professional development* (No. 16). New Brunswick, NJ: Consortium for Policy Research in Education.

Council of Chief State School Officers. (2012). *Our responsibility, our promise: Transforming educator preparation and entry into the profession*. Washington, DC: Author.

Danielson, C. (1996). *Enhancing Professional Practice: A Framework for Teaching*. Alexandria, VA: Association for Supervision and Curriculum Development.

Danielson, C. (2007). *Enhancing professional practice: A framework for teaching*. Alexandria, VA: ASCD.

Darling-Hammond, L. (1998). Educating Teachers for the Next Century: Rethinking Practice and Policy. *Yearbook of the National Society for the Study of Education*, 1, 221–256.

Desimone, L. (2009). Improving impact studies of teachers' professional development: Towards better conceptualizations and measures. *Educational Researcher*, 38(3), 181–199. doi:10.3102/0013189X08331140

Donahoe, T. (1993). Finding the way: Structure, time, and culture in school improvement. *Phi Delta Kappan*, 75(4), 298–305.

Fernandez, C., & Yoshida, M. (2004). *Lesson study: A case of a Japanese approach to improving instruction through school-based teacher development*. Mahwah, NJ: Lawrence Erlbaum.

Gallimore, R. B., Ermeling, B. A., Saunders, W. M., & Goldenberg, C. (2009). Moving the Learning of Teaching Closer to Practice: Teacher Education Implications of School-Based Inquiry Teams. *The Elementary School Journal*, 109(5), 537–553. doi:10.1086/597001

Grossman, P., Compton, C., Igra, D., Ronfeldt, M., Shahan, E., & Williamson, P. W. (2009). Teaching practice: A cross-professional perspective. *Teachers College Record*, 3 (9), 2055–100.

Grossman, P., & McDonald, M. (2008). Back to the future: Directions for research in teaching and teacher education. *American Educational Research Journal*, 45(1), 184–205. doi:10.3102/0002831207312906

Hammerness, K., Darling-Hammond, L., Grossman, P., Rust, F., & Shulman, L. (2005). The design of teacher education programs. In L. Darling-Hammond, & J. Bransford (Eds.), *Preparing teachers for a changing world: What teachers should learn and be able to do* (pp. 390–441). San Francisco: Jossey-Bass.

Holmes Group. (1990). *Tomorrow's schools: Principles for the design of professional development schools*. East Lansing, MI: Holmes Group.

Lampert, M., & Ball, D. L. (1998). *Teaching, Multimedia, and Mathematics: Investigations of Real Practice. The Practitioner Inquiry Series*. New York, NY: Teachers College Press.

Lave, J., & Wenger, E. (1990). *Situated learning: Legitimate peripheral participation*. Cambridge, UK: Cambridge University Press.

Lewis, C. (2002). *Lesson Study: A Handbook of Teacher-Led Instructional Change*. Philadelphia, PA: Research for Better Schools.

Lewis, C., Perry, R., & Murata, A. (2006). How should research contribute to instructional improvement? The case of lesson study. *Educational Researcher*, 35(3), 3–14. doi:10.3102/0013189X035003003

National Council for the Accreditation of Teacher Education. (2000). *Standards for professional development schools*. Washington, DC: NCATE.

National Council for the Accreditation of Teacher Education. (2010). *Transforming teacher education through clinical practice: A National Strategy to prepare effective teachers. Report of the Blue Ribbon Panel on Clinical Preparation and Partnerships for Improved Student Learning*. Washington, DC: NCATE.

Stigler, J., & Hiebert, J. (1999). *The teaching gap: Best ideas from the world's teachers for improving education in the classroom*. New York, NY: The Free Press.

Strauss, A., & Corbin, J. (1994). Grounded Theory methodology: An overview. In *Handbook of Qualitative Research*. Sage Publications.

Wilson, S. M., & Berne, J. (1999). Teacher learning and the acquisition of professional knowledge: An examination of research on contemporary professional development. *Review of Research in Education*, 24, 173–209.

Zeichner, K. (2010). Rethinking the connections between campus courses and field experiences in college- and university-based teacher education. *Journal of Teacher Education*, 61(1-2), 89–99. doi:10.1177/0022487109347671

Zeichner, K., & Conklin, H. G. (2008). Teacher education programs as sites for teacher preparation. In M. Cochran-Smith, S. Feiman-Nemser, D. J. McIntyre, & K. E. Demers (Eds.), *Handbook of research on teacher education: Enduring questions in changing contexts* (3rd ed., pp. 269–289). New York: Routledge.

## KEY TERMS AND DEFINITIONS

**Examining Participant Learning and Development in Professional Development School Partnerships:** The process of evaluating teachers' learning while participating in PDS Partnerships.

**Instructional Rounds:** A systematic, purposeful, and focused format of identifying an instructional problem, planning and implementing lessons, analyzing its impact, and refining instruction for future use.

**Lesson Study:** A set of processes used to collaboratively plan, teach, analyze, and refine a lesson or series of lessons.

**Mathematics Knowledge for Teaching:** A construct that describes the types of mathematics knowledge that teachers need in order to be effective educators.

**Professional Development Schools:** Formal collaborative partnerships between a teacher education program and a local P-12 school.

**Professional Practice:** The processes associated with an individual's profession.

**Reflective Practitioners:** Individuals who consistently participate in reflection about their work and the impact of their work.