Improving Teaching through Lesson Study

By Tracy C. Rock & Cathy Wilson

A strong need exists for teachers to experience sustained, high-quality professional development in order to improve student learning and teacher instruction. However, teacher professional development efforts are often criticized by educators for their lack of continuity and ability to produce effective change in teacher practice and student learning (Loucks-Horsley, Hewson, Love, & Stiles, 1998). After examining the findings of The Third International Mathematics and Science Study (TIMSS), Stigler and Hiebert (1999) conclude that "American teachers aren't incompetent, but the methods they use are severely limited, and American teaching has no system in place for getting better. It is teaching, not teachers, that must be changed" (p. 10). Many educational scholars believe that a critical component of any educational reform effort should be to provide teachers with opportunities and appropriate support structures that encourage the critical work of on-going improvement of pedagogical practice (Darling-Hammond & McLaughlin, 1995; Garet, Porter, Desimone, Birman, & Yoon, 2001; Sparks & Hirsh, 1997).

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This article presents a professional development initiative developed by a university-school partnership based on the Japanese lesson-study model described by Stigler and Hiebert (1999) in *The Teach-*

ing Gap. Lesson study (jugyoukenkyu), an inquiry model of teacher professional development, is used extensively throughout Japan and has begun to capture the attention of the American educational community as a potential strategy for enhancing teacher professional development in America (See Lewis & Tsuchida, 1998; Lewis, 2000; Stigler & Hiebert, 1998; Yoshida, 1999). As we seek understanding of what is required of professional-development experiences that leads to real improvement in how teachers teach, examining the process of lesson study may provide valuable insight.

The purpose of this study is to describe the effects of the lesson study process on six upper-elementary teachers from a city school system in the southeastern United States. The study will specifically address the following research questions: (a) How do these teachers perceive lesson study as a professional development process? and (b) How will engaging in lesson study affect these teachers' instruction? The findings of the study are important in determining if the model is effective in helping teachers to examine and improve their practice. "To date, the number of US sites where lesson study is successful (judged by teachers' accounts of its usefulness in improving instruction) is still very small, and it is likely these sites had important supporting conditions in place for lesson study" (Lewis, 2002a, p. 33). Indeed, there is a need for research that examines the supporting conditions that enable lesson study to succeed at particular sites (Lewis, 2002a); therefore, this issue will also be examined in this report.

Lesson Study

Lesson study involves groups of teachers meeting regularly over a period of time (ranging from several months to a year) to work on the design, implementation, testing, and improvement of one or several "research lessons" (Stigler & Hiebert, 1999). Research lessons are actual classroom lessons, taught to one's own students, that are (a) focused on a specific teacher-generated problem, goal, or vision of pedagogical practice, (b) carefully planned, usually in collaboration with one or more colleagues, (c) observed by other teachers, (d) recorded for analysis and reflection, and (e) discussed by lesson study group members, other colleagues, administrators, and/or an invited commentator (Lewis & Tsuchida, 1998).

During a three-year investigation of Japanese education, Lewis (2000) found that Japanese teachers were able to successfully shift their approach to teaching science from "teaching as telling" to "teaching for understanding" through intense studying and sharing during lesson study. Japanese teachers believe that time spent studying their lessons will subsequently improve their teaching. Furthermore, they believe that the most effective place to improve their teaching is in the context of a classroom lesson (Stigler & Hiebert, 1999). Japanese teachers consistently credit research lessons as the key to individual, school-wide, and national improvement of teaching (Lewis, 2000).

Rather than Japanese teachers working as individuals in their professional

development, a collaborative approach is used. Through lesson study Japan's teachers work in a unified effort to study classroom lessons and initiate positive change for instructional practice and student learning. To help achieve a unified effort, Japan's teachers follow eight steps for collaborative lesson study. The steps include: (1) defining and researching a problem, (2) planning the lesson, (3) teaching and observing the lesson, (4) evaluating the lesson and reflecting on its effect, (5) revising the lesson, (6) teaching and observing the revised lesson, (7) evaluating and reflecting a second time, and (8) sharing the results (Stigler & Hiebert, 1999). The process for completing the eight steps requires a group of teachers to collaborate and share their ideas, opinions, and conclusions regarding the research lesson. This process requires substantial time and commitment; however, it serves as a catalyst that encourages teachers to become reflective practitioners that use what they have learned from research-based lessons to collegially revise and implement future lessons. In addition, their new found knowledge of instructional practice is shared and discussed with their peers at the school level, and possibly even at a broader regional or national level. Through lesson study, Japanese educators have instituted a system that leads to gradual, incremental improvements in teaching over time (Stigler and Hiebert, 1999).

Theoretical Framework

Constructivism

It would be inappropriate to implement lesson study in American schools simply on the basis that it is widely used and advocated by Japanese teachers. Instead there must be a sound theoretical foundation to support its use. Theory provides an essential rationale for answering why when promoting guidelines or suggestions of a particular model. The general theory of constructivism, with an emphasis on social constructivist ideals, provides a framework that supports the use of the lesson study process as a potential method for increasing teacher professional knowledge and development.

The primary theoretical principle of social constructivism asserts the social nature of knowledge and the belief that knowledge is constructed through social interaction and is a shared rather than an individual experience (Gergen, 1995; Vygotsky, 1978). Thus, social construvctivism emphasizes that knowledge is constructed in response to social interactions through social negotiation, discourse, reflection, and explanation. This principle supports the idea that teachers should be engaged in activities that necessitate interacting verbally and require that they communicate often with both novices and experts in their field of study. During the lesson study process, professional collaboration occurs as teachers of various levels of experience work together in groups to study their practice through the implementation of a research lesson.

Another principle of social constructivism states that knowledge acquisition is

an adaptive function designed to organize one's experiences (Fleury, 1998; Prawat & Floden, 1994). Therefore, teachers should be confronted with problems or discrepant events that motivate them to seek, test, and assess answers within socially collaborative environments. During the initial phase of lesson study, teacher study groups work to set forth a goal statement that describes qualities they would like to develop in their students. For example a goal statement might read, *To develop students who are curious about mathematics, and who will engage in mathematics to satisfy their curiosities.* These goal statements are constructed based on a gap that the teachers' perceive between their aspirations for their students and how students are actually developing in their school (Ertle, Chokshi, & Fernandez, 2002). Therefore, teachers focus the lesson study around problems or discrepant events in their practice that they are motivated to resolve.

A third principle of constructivism relates that knowledge is the result of active mental processing by the individual in a social environment (Cobb & Yackel, 1996; Prawat, 1996). Therefore, teachers should be activated to reflect on their experiences, to create understanding, to evaluate their understanding, and to explain their understanding to others. As teachers work through the lesson study process, there are multiple opportunities for them to reflect, analyze, create action steps, evaluate, and share understandings with other teachers. These principles of social constructivism underlie lesson study and validate why each step of the lesson study process is important to bringing about increased professional knowledge and skills.

Current Teacher Professional Development Reform Literature in America

Leading school reformers Ann Lieberman, Linda Darling-Hammond, and Milbrey McLaughlin have recognized a need for reform measures in teacher professional development and assert a social constructivist perspective in their work. They claim that the traditional staff-development training model approach denies teachers the right to learn in a way that educators view as most effective for student learning. Teachers that attend traditional staff development training sessions participate in a primarily passive experience where they receive large amounts of information but have little opportunity to share their thoughts or understandings of the material (Sparks & Hirsch, 1997). Darling-Hammond and McLaughlin (1995) and Lieberman (1995) advocate an inquiry approach to professional development that requires teachers to identify an area of instructional interest, collect data to analyze it, and then make instructional changes based on the data. This kind of professional development is analogous to the teacher researcher work conceptualized by Stenhouse (1998), Cochran-Smith & Lytle (1999) and others. The teacher-research body of scholarship, which goes back over 25 years, acknowledges that teachers learn best when they systematically study their practice in a way that permits verbalization about thoughts and knowledge of what has been learned.

Garet et al. (2001) found three core features of professional-development experiences to have significant positive effects on teachers' self-reports of increased

knowledge and skills and changes to teaching practice: (a) content knowledge focus; (b) active learning opportunities; and (c) coherence in learning experiences. They report that to improve professional development it is important to focus on these core features while also providing sustained and intensive professional-development experiences that involve collective participation of teachers from the same school, grade, or subject. Darling-Hammond (2003) states: "Teachers learn best by studying, doing, and reflecting; by collaborating with other teachers; by looking closely at students and their work; and by sharing what they see (p. 278).

Lesson study in the U.S. lacks a strong research base to support it as an effective professional development method; however, it is supported by a strong theoretical foundation and aligns precisely with what scholars in teacher professional-development are calling for in American educational reform. The outcomes of this study could serve as a future reference tool for teachers and instructional leaders seeking a professional development model that is based on social constructivist principles to guide teacher professional growth and development.

Methodology

Setting/Context

Shady Brook Elementary School serves as the setting of this research study. Located in Kannapolis, North Carolina, Shady Brook is one of five suburban elementary schools in Kannapolis City Schools. Approximately 320 Kindergarten through fifth grade students attend the school. Support classes include exceptional education services, academically gifted services, and reading remediation classes. Shady Brook receives Title I financial support.

Shady Brook Elementary School works in partnership with the University of North Carolina at Charlotte to host clinical experiences for preservice teachers. Through this partnership, the curriculum coordinator (second author) at Shady Brook Elementary shared with a university faculty member (first author) the desire for an intensive, focused professional development opportunity that met the needs of their individual teachers. The university faculty member, who had research interests in inquiry models of teacher professional development, proposed lesson study as a potential framework to guide the initiative and assist the teachers in meeting their professional growth needs. The curriculum coordinator, who was a graduate student at UNC Charlotte and also had research interests in teacher professional development, suggested that the model should be introduced to the teaching faculty at Shady Brook. The article authors jointly presented the lesson study model and the teachers decided that they would be interested in engaging in lesson study. As a result, a University-School Teacher Education Partnership (U-STEP) mini-grant, provided by the state of North Carolina and administered by local universities, was written jointly by university and school faculty and awarded the full amount of $1500.00 to support the effort. This amount of funding forced the

initial effort to be limited to the intermediate-level teachers of Shady Brook. However, if effects of the pilot program show promise, then a larger U-STEP partnership grant would be sought in future efforts. A larger U-STEP partnership grant would expand it to a two-year project that could support all faculty members who chose to participate.

Procedure

All intermediate-level elementary teachers (n=7) were given the opportunity to engage in the pilot implementation and evaluation of the process; six of these teachers volunteered to participate. The one who declined cited the required time commitment as the reason for not participating. The participants were all white females.

Following the introduction to the process, the participants spent time brainstorming aspects of their practice they were interested in improving and setting a goal statement. The overall goal became to develop students who were appropriately challenged and motivated to complete excellent quality work. Based on common interests and needs, the participants grouped themselves into inquiry groups. The participants worked in two groups with each group consisting of three members. Ann, Bonnie, and Carol, all fourth- grade teachers, chose to investigate small-group math instruction using manipulatives to meet differentiated instructional needs. Their range of experience was from two years to six years. Debbie, Emily, and Fran, third and fifth grade teachers, chose to investigate differentiated literacy instruction. Their experience ranged from one to eleven years.

The participants then worked to form their ideas into problem statements and began to identify areas of research needed in order to understand their problem more deeply and to allow for informed lesson construction. The University faculty member and the curriculum coordinator (article authors) served as the lesson study facilitators and assisted teachers in locating appropriate research articles and literature to read and discuss in the lesson study groups. Based on their readings and discussions both groups came to the consensus that in addition to their readings they would also like to have experts in the selected focus areas work with them and provide additional knowledge and strategies for them to consider before they began the actual planning of classroom instruction. The university-based lesson study facilitator was able to recruit two university faculty members that specialized in differentiation of instruction and developmental math instruction to provide two, separate, two-hour workshop sessions at the school site. Prior to the workshops, the university faculty were provided with the lesson study goal, problem statements, and a list of questions generated by the teachers.

Following the sessions led by university faculty and group discussions, the participants felt ready to plan an initial lesson. Substitutes and teacher assistants were used to release the participants from their classrooms for one half of an instructional day to use for the focused planning of the research lesson. One member of each group volunteered to teach the group lesson while the others chose to observe.

Following the lesson implementation, the lesson study groups spent approximately two hours reflecting and critiquing the lesson. The school-based lesson study facilitator, who attended the implementation of the research lessons, acted as a commentator during these sessions. The commentator listens and, if needed, shares insights, poses additional questions, and pushes the teachers to probe and think more deeply about what was experienced and observed. Next, the participants began working on a revised lesson plan based on what was observed and discussed. A different member of the lesson study group volunteered to teach the revised lesson plan, and the others again came to observe. Once again, the participants met following the implementation of the revised lesson to reflect on and discuss the lesson. At each phase the participants were asked to record in a reflection log what they were feeling, understanding, experiencing and learning from the process. At the conclusion, the participants compiled a written report of what they had learned and copies of the research lessons to present to the entire school faculty.

Data Sources and Analyses

A qualitative design (Crestwell, 1994) was selected to be the most appropriate research approach for this study because of the nature of the research questions and the intent of the researchers to gain an in-depth understanding of the lesson study process and its meaning for teachers through their own voices and words. Data sources used were (a) participant interviews, (b) field notes/observations, and (c) teacher reflection journals.

Participants were interviewed individually after engaging in the lesson study process. They responded to open-ended questions pertaining to the lesson study model (e.g., How was the lesson study process different from other professional development activities you have engaged in? How has engaging in lesson study impacted your instructional practice?). Interviews were tape recorded and transcribed.

Field notes were recorded throughout the study; notes were taken during professional-development sessions, group collaborative sessions, observations of instruction, and after reading participant reflection journals. The purpose of the field notes was to identify changes the participants made in their instructional practice, identify common educational themes among participants, and record observation notes that could be compared with participant reflection journals. In addition, observation notes of each teacher's instructional practice were made before, during, and after engagement in lesson study through drop-in observations that were conducted both formally and informally by the school-based lesson study facilitator. Then, further notes were made during the observation of research lessons and revised lessons to determine the impact that the lesson study model had on teachers' instruction.

Teachers maintained an individual reflection journal throughout the study. Teachers were asked to reflect on literature and research readings. They also wrote

reflections after completing professional-development sessions, planning sessions, revision sessions, and observations of lessons.

Tesch's (1990) systematic process of analyzing textual data was utilized to segment the interview transcripts, field notes, and written journal entries into coding categories that allowed for the emergence of themes and patterns in the data. As recommended by Miles and Huberman (1984), a matrix was developed to display data related to the change in the participants' instruction in a systematic format for the reader. Construct validity (Yin, 1994) was addressed in this study through (a) using multiple sources of data, (b) using different researchers to analyze the data, (c) establishing a chain of evidence, and (d) requiring member checking. To check against bias by the article authors, who favor the use of inquiry models of teacher professional development, the participants reviewed transcripts and the written report to insure that their verbal and written expressions were accurately interpreted and the nature of the experience was accurately captured. The findings presented in the next section represent a summary of the patterns of effects documented for the participants of this study.

Findings

Six themes emerged related to the research question: How do teachers perceive lesson study as a professional development process? Multiple sources of evidence suggest that all six of the participants:

- found the focused and sustained work to stimulate their growth as teachers;
- experienced an increase in their professional confidence;
- stressed that the peer collaboration was valuable to their professional development;
- found the reading and sharing of professional literature and the consultations with experts that directly related to the problem of study were very beneficial to the process;
- expressed their belief that peer coaching and mediation training would improve their abilities to engage in lesson study more effectively.

Focused and Sustained Work

These participants stated that they each experienced professional growth as a direct result of their engagement in the on-going, sustained professional work of lesson study. They reported that past experiences with professional development efforts consisted mostly of attending one-shot workshops that involved very little interaction or discussion and required no follow-up or support. During the lesson study process they found that they were much more actively involved in controlling and sustaining the experience; and even though this was more demanding it was much more rewarding in increasing their professional understandings and compe-

tencies. Selecting the focus of the study to match their own instructional needs was found to be important to all of the participants. "I felt that selecting the focus of the study gave us ownership of the process and kept us motivated and interested throughout the four-month process" (Fran, Interview, March 6, 2002). Debbie indicated "that this process would be beneficial to any teacher, no matter how long they have been teaching because you feel the work has purpose and meaning to your practice" (Interview, March 4, 2002).

Participants were particularly receptive to the focused professional-development activities involved in lesson study. Ann indicated how important it was that all team members interacted with the same information and instruction to discuss and process as a group. She believes the "shared instruction made a positive difference in their team planning and instruction" (Interview, March 4, 2002). Debbie and Emily were thrilled to receive new information that was directly applicable to a focused need within their classrooms. Emily wrote, "I was amazed at how much I learned and will actually use in my classroom. This approach to teaching math is easier for even me, a continual student and teacher." (Reflection Journal, January 28, 2002). This comment shows how the lesson study process engages teachers as learners within their own classroom.

Professional Confidence

Participants also indicated that they experienced increased confidence in approaching instruction as a result of engaging in the lesson study experience. Carol claims, "participation in lesson study improved my instruction, and now I am able to work more confidently with my math groups" (Interview, March 6, 2002). Fran shared her reflections:

> I feel more confident. You always hear about differentiation and things like that and this is my eleventh year, so I have heard it a lot. You do a little bit here and there but it just seems like a complicated process. This experience has allowed me to stop, organize it, experiment with it, reflect on it and revise my ideas with help from others and with the speakers and the research we have explored during the lesson study. (Interview, March 5, 2002)

Emily also believes that the lesson study process increased her confidence level. She stated that she felt better about herself as a teacher. She didn't feel as though she was going through the motions just trying to learn things and do them with her class. She was able to discuss them with other colleagues and go through and see what worked and what didn't (Interview, March 6, 2002).

Debbie felt a sense of empowerment after a collaborative lesson planning session. "This is the best planning session that I have ever been involved in. We were so focused. When I left, I had a feeling that I could take on the world and move mountains" (Reflection Journal, March 8, 2002).

Peer Collaboration

Regular collaboration with peers about curriculum objectives, teacher instruction, and information learned from field experts helped the participants learn new approaches to instructing students. After planning collaboratively for the first research lesson, the participants indicated a desire for continued collaborative sessions (Reflection Journals, February, 2002). The teachers indicated that group planning was powerful. Ann said, "Today was awesome! We took what we got from the workshop and planned some of our decimal unit. It was finally great that Bonnie and Carol heard and understood what I knew. We could all collaborate" (Reflection Journal, February 7, 2002). Bonnie claimed that collaborative planning was particularly beneficial to her as a new teacher to North Carolina: "The collaboration was incredible. I know this planning time is critical for me as a teacher new to North Carolina. I am doing what I can to adjust my styles of teaching to fit with the new challenges of small group instruction and using manipulatives" (Reflection Journal, February 7, 2002).

Similarly, Carol considered the collaborative planning sessions to be ideal for teachers.

> Today's meeting was basically a teacher's planning dream. It was wonderful to sit down together and focus on a lesson plan with the purpose of designing it to meet all of our students' needs. Sadly, teachers never, or rarely, get an opportunity to work and plan together closely. (Reflection Journal, March 7, 2002)

Carol claims that her professional growth is evident in her lesson plans. "It has helped me grow so much professionally. I have better understanding of my students as a result of input from my fellow teachers" (Interview, March 6, 2002).

Professional Literature and Education Experts

It was beneficial for the teachers in this study to participate in the reading and sharing of professional literature that was directly linked to their problem of study. They indicated that the information was instrumental in increasing their knowledge of instructional techniques and strategies. For example, Debbie wrote, "Wow! This article was full of information. It has opened my eyes to the various sides that make up differentiated instruction" (Reflection Journal, January 16, 2002).

Emily appreciated receiving professional literature without having to locate it herself:

> That is the one thing I always wanted to be able to do. Sit down and read articles that are current. It's just so hard to find the time. I felt more prepared with the articles. I read them and was able to have questions prepared for the professional development leaders. (Interview, March 6, 2002)

Fran attributed her professional growth partly to the assistance she received in being provided with professional literature and professional-development sessions with

expert leaders: "I know how much this has helped us. The whole thing of not having to go and do it on my own. Having you there to organize it and show us where to get stuff and providing speakers and resources" (Interview, March 5, 2002).

Debbie conveyed, through her written reflections, the idea that the information gained from the focused professional development sessions with the education experts was immediately applicable to the group's lesson study work and therefore made the sessions very meaningful and worthwhile.

Peer Coaching and Mediation

According to these participants, teachers involved in lesson study would benefit from peer coaching and mediation training. The training should help them feel more comfortable when providing or receiving constructive feedback from their peers. Ann and Debbie expressed concern about providing constructive feedback to more experienced teachers: "That was one of the biggest things when we got back to discuss the first lesson; it was very difficult for me as a younger teacher and not as experienced to critique a more experienced teacher" (Interview, March 4, 2002). Debbie also indicated that she would be very uncomfortable critiquing a more seasoned teacher. She doesn't consider herself to be far enough along in her professional career to make that judgement (Interview, March 4, 2002). Other participants felt that peer-mediation training might prevent hurt feelings. Bonnie and Ann were concerned about hurting their team member's feelings. "We were worried about hurting her feelings, but at the same time, she knew we were not just out there being nit-picky and picking out things and trying to catch her on things" (Bonnie, Interview, March 5, 2002).

Emily felt uncomfortable expressing a different opinion from her group members:

> We were discussing the lesson after the first lesson was taught. I felt one of the other teachers was going off in a different direction and I knew it, but I just couldn't say anything. I kind of changed it and said, well, how about this instead. But, I didn't want to tell that person that they were wrong, so that made me feel a little uncomfortable. (Interview, March 6, 2002)

Instructional Improvements

The second research question explored in this study was: How will engaging in lesson study affect teachers' instruction? There was evidence to suggest that the following areas of instruction were affected by the lesson study experiences: (a) instructional vocabulary, (b) differentiated instruction, (c) manipulative math instruction, (d) knowledge of math learning stages, and (e) establishing high student expectations. The table in Appendix A illustrates the impact that lesson study had on each teacher's instructional practice. The following description supports those findings.

Evidence of increased use of higher-level vocabulary in math instruction was

noted for Ann, Bonnie, and Carol. Debbie, Emily, and Fran demonstrated increased use of higher-level vocabulary in differentiated literacy lessons (Researcher Observations, February-March, 2002). Ann and Bonnie indicated that including the use of higher-level vocabulary words in their instruction was difficult. However, information learned through the lesson study process had prompted them to strengthen their instructional vocabulary. For example, Bonnie commented during her interview:

> I think my vocabulary has improved a great deal. Ann said it really takes a conscious effort to use that vocabulary. When I was doing the lessons I actually had to have an index card with the list of words we said we wanted to use. Having that in front of me made me more conscious about saying "make" instead of saying "build" or "create."

The lesson study experience impacted Ann, Bonnie, and Carol's use of math manipulatives to meet differentiated instructional needs (Classroom Observations, March 2002). Prior to lesson study, the three teachers didn't plan for differentiated student needs in small group math instruction. Knowledge gained from lesson study has now enabled the teachers to regularly include differentiated instructional strategies when planning for small group math instruction. Previously, when the participants planned for small group math instruction, all groups had identical lessons that addressed a specific objective and used the same materials and sequence of activities. However, after engaging in lesson study, the skill or concept was the same for each of the small groups but the difference was the depth and extent of learning addressed and the materials used. For example, Ann taught differentiated math instruction using the objective that the students would be able to identify and form decimal numbers. Her lower-achieving group was given place-value mats to use to identify and form decimal numbers, and by the end of the session they were creating decimal numbers using the place-value chart. Her groups that were working at grade level were using number tiles and dry-erase boards to identify and form decimal numbers. The students working above grade level began by identifying and forming decimal numbers using dry-erase boards with increasing complex numbers. Ann stated after the lesson: "Our lesson study group sees evidence that we are beginning to achieve our goal of appropriately challenging our students. They [students] are more engaged and successful" (Field Notes and Classroom Observations, February-March, 2002).

Similarly, lesson study impacted Debbie, Emily, and Fran's ability to plan for differentiated student assignments in their reading instruction. Prior to lesson study, the three teachers rarely planned for differentiated student assignments. Now, all three teachers stated that they consistently plan for differentiated student assignments (Interviews, March 2002 and Observation Notes, March-April, 2002).

Findings revealed from the data clearly indicate that the lesson study model can serve as a means of teacher professional development with positive impact on

teacher instructional practice. Data from the study indicates that teachers consider themselves and their practice to be more effective as a result of participation in the lesson study model.

Discussion

The findings of this study suggest that the lesson study process embodies the core features of professional development experiences identified by Garet, et al. (2001) that have significant positive effects on increased teacher knowledge and skills and changes to instructional practice. The sustained, on-going nature of the lesson study experience, involving the processes of researching, collaborating, active learning, observation, and focused reflection and discussion, led to professional growth that these participants believe will have lasting impact on their instructional practices.

If teaching is to be improved in our schools, then we must invest in professional- development activities that involve the processes that research shows foster improvements in teaching (Garet, et al., 2001). Typically, most school faculty members attend disjointed professional-development sessions without sustained feedback or collaboration with peers. Little positive evidence exists in regard to the impact this type of professional development has on teacher instruction or student learning. However, thousands of dollars continue to fund this ineffective cycle of professional development.

In this case, one of the initial support structures in place was available funding through a university-school partnership grant. Funding was necessary to (a) meet costs of professional development experts; (b) hire substitute teachers so that teachers could spend time in training, planning, or observing others; (c) pay modest stipends for extended planning and written reports for teachers; and (d) copy professional literature. These participants agreed that professional development money spent on lesson study, rather than on disjointed professional-development sessions outside of the school, had more of an impact on their abilities to initiate change in their teaching.

This study also suggests the importance of having someone serve as lesson study facilitator to guide the process, organize resources, and assist in finding coverage for classrooms to allow for teacher planning, observations, and reflection/critiquing sessions. These participants viewed this support as critical to the success of lesson study. However, it is important to remember that lesson study is teachers' work; therefore, the facilitator must truly operate only as a facilitator. In this case, an administrator and a university faculty member served as the facilitators, but other potential lesson study facilitators may be lead teachers in the school.

With appropriate support these participants were very eager to engage in the lesson study process and tackled the work with fervor. However, it was found that these participants felt inadequate in their abilities and comfort levels with peer

coaching and critiquing. Even when ground rules for engaging in lesson study (see Lewis, 2002b) were discussed, these participants noted that it could be difficult for teachers to critique one another. Some feared hurting another teacher's feelings; others worried about repercussions from administrators who evaluate them. Often, younger, inexperienced teachers do not feel comfortable or confident providing constructive feedback to more experienced teachers. Lewis and Tsuchida (1998) report that collaboration among teachers is emphasized and competition is avoided within the Japanese culture. In fact, it is suggested that in the Japanese culture "identifying one's shortcomings and gracefully accepting criticism seem to be ways of showing competence, not failures to be avoided" (p.51). It is important to understand that this may not be the mind-set of American teachers who often work in an environment where external evaluation by administrators rather than peer evaluation is emphasized. Therefore, attention toward creating a culture of learning and collaboration for teachers who engage in the process is needed. It should be emphasized that the focus of the critique should be on the design and structure of the research lesson that was constructed by the group rather than on the individual teacher implementing the research lesson. There may be a need to allow for participants to engage in more-extended peer coaching training as an initial part of the lesson study process, along with a commitment that groups begin each session with a review of group norms and expectations.

The strongest indicator that these teachers believed that the lesson study process effectively assisted them in improving their teaching practice is that each of them declared the desire to engage in the process again the next year. In addition, after sharing their lesson study experience with the entire faculty at an end-of-the-year meeting, they convinced the faculty to agree to pursue a larger grant to secure funds that would permit the entire teaching faculty to engage in lesson study in the future.

Conclusion

Teacher learning through inquiry relies on the assumption that teachers have the ability to formulate valid questions about their instructional practice and then design objectives that will assist in locating answers to the questions. Inquiry models of professional development also assume that teachers are experts with experience and are inclined to seek data that will answer questions about their instructional practice. Finally, it is assumed that teachers will develop new understandings as a result of the data collection and analysis. Some may question these assumptions and be skeptical of whether teachers can take on the responsibility of improving their own teaching. "There is, in our society, a widespread lack of confidence in teachers" (Sigler & Hiebert, p.169). However, this research shows that these teachers were able to engage in the inquiry process of lesson study and successfully bring about change in their practice that addressed the individual learning needs of their students. The importance of the professional literature, the

educational experts, and the lesson study facilitator as means of guidance and support to teacher thinking during this process cannot be overlooked; further investigation is needed to fully understand the role each plays in the process.

Therefore, there is a continued need for further implementation and future research on the lesson study model. A better understanding of how to make this type of professional-development model work most effectively for our teachers in a variety of settings and contexts is needed. The findings of this study are not generalizable; however, the description of how lesson study was implemented and the suggestions provided may prove to be useful to others who choose to experiment with lesson study. Additional studies are also needed to document the direct effects of teachers engaging in lesson study on their students' learning. Darling-Hammond (2003) affirms repeatedly in her work "creating a profession of teaching in which teachers have the opportunity for continual learning is the likeliest way to inspire greater achievement for children" (p. 281).

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