

DEVELOPING PROFESSIONAL KNOWLEDGE, IMPLEMENTING PROFESSIONAL LEARNING, AND SUSTAINING PROFESSIONAL GROWTH

Hea-Jin Lee
Ohio State University, Lima

Abstract

The paper focuses on teachers' perceptions of how they gain professional knowledge and use that knowledge, as well as on how they sustain professional growth. This follow-up case study seeks to gain information related to experiences that appear significant in shaping experienced teachers' understanding of this complex subject. By doing so, I hope to review the nature of professional development programs and aim to promote growth by capitalizing on naturally occurring processes. The effects of the professional development on participant teaching of mathematics was evidenced in their perspectives about professional development, students involvement, usage of supplementary materials and information, and problem solving-based and activity-based lessons. Limited opportunities to speak with other teachers, lack of time to attend more classes/workshops, and the learning curve for new technology were reported as barriers to professional growth.

INTRODUCTION

This study is a follow-up study of four professional development programs, which aimed at deepening the participating teachers' conceptual understanding of mathematics content knowledge and exposing them to innovative and creative instructional approaches. This study was designed to address questions about the process of building and using professional knowledge and maintaining professional learning in terms of the contexts, conditions, and experiences that enhance teachers' professional knowledge and learning. According to Lange and Burroughs-Lange (1994), "particular experiences are used by teachers at all stages of their development, as vehicles for remembering significant educational knowledge and responding to teaching and learning incidents" (p. 617). Therefore, it is important for teacher educators to understand which particular experiences play a special role in the process of professional learning, and the nature of these experiences. How teachers develop their professional knowledge is complex, developmental, and idiosyncratic, and subject to a variety of influences (Feiman-Nemser & Floden, 1986). The study aimed to describe teachers' perceptions of professional changes in terms of gaining knowledge and using that knowledge in their classroom. Also, the study investigates the characteristics of those experiences in professional development that teachers considered facilitators or barriers to professional growth.

THEORETICAL CONTEXT

This study is structured based on three fields of studies: attaining professional knowledge, key elements for successful professional development, and a model of teacher professional growth.

Attaining professional knowledge

A premiss belief of the study is that teachers acquire and/or use instructional knowledge that depends on the context and particular experience. Lange and Burroughs-Lange's (1994) support a certain view on how teachers attain their knowledge of teaching. According to them, the processes of learning to teach depend on both contextual factors and personal teacher factors. In other words, teachers acquire their knowledge in contexts that have meaning and purpose, and each teacher makes their own decisions in relation to teaching and learning. Moreover, acquisition and use of the knowledge involve interactive processes of action and reflection. These interactive processes help teachers develop understanding of the teaching/learning process. Teachers often use self-regulation to control the processes of knowledge acquisition through reflection, metacognitive strategies, and motivation.

In order for teachers to sustain professional learning, it is essential to create school cultures where discussions of educational issues occur regularly. Moreover, teachers' professional communities should become productive places for teacher learning. They ought to support a teacher's willingness to take risks and provide a form where teachers may learn from each other's mistakes, and share successful strategies (Ashton & Webb, 1986; Franke, et al., 2001). In summary, "the structure of the school community, how individual teachers learn, and what teachers learn all matters" (Franke, et al., 2001, p.655).

Successful professional development

Even when a teacher is receptive to a new technique, numerous obstacles may prevent its successful implementation. Therefore, a structured approach is essential to ensure that the new instructional technique is not neglected or practiced incorrectly (Galbraith & Anstrom, 1995). Recent research on the professional development of teachers addresses the importance of identifying and organizing individual staff development activities (Lee, 2005; Wong & Tsui, 2007). Also, professional development evaluators and participants report the power of job embedded professional development. According to Wong and Tsui, "teachers' professional development should be embedded in the daily practice of teachers" (p. 459). Job embedded professional development can be provided as a mixture of traditional and reform formats. For example, a periodical face-to-face workshop, together with the implementation of learning in practice between workshop sessions is the most commonly adopted way.

Regardless of the format of professional development, teachers must experience companionship, feedback, analysis, adaptation, and support (Showers, 1984). A follow-up and continued professional dialog is particularly essential for teachers whose educational philosophies and work conditions may vary widely. Through small group or big group meetings, teachers in the same building/district can discuss individual and school needs as well as give and receive feedback about the instructional activities being observed. By sharing instructional strategies and techniques, teachers pool their intellectual resources. This will reduce isolation by providing the professional dialogue that encourages teachers to share ideas and generate solutions to their own problems.

Professional growth

The Interconnected Model of Professional Growth (Clarke & Hollingsworth, 2002) confirms my view on professional growth. This model of professional growth is an interconnected and non-linear structure that enables “the identification of particular change sequence and growth networks, giving recognition to the idiosyncratic and individual nature of teacher professional growth” (p. 947). Kagan’s (1992) emergent model of professional development was integrated to Fuller’s (Fuller & Brown, 1975) and Berliner’s (1988) models. According to her study, professional growth consists of at least five components: an increase in metacognition; the acquisition of knowledge about pupils; a shift in attention; the development of standard procedures; and growth in problem solving skills.

The term “professional growth” in this paper agrees with the description by Clarke and Hollingsworth (2002), “professional growth is reserved for more lasting change. This does not preclude a changed practice or belief from being further adapted or refined. Indeed, the adoption of a growth perspective conceives of change as on-going” (p. 958). This case study focuses on teachers’ perceived knowledge and the use of the knowledge in order to measure teachers’ on-going professional growth in both behavioral and conceptual areas. The interview questions were designed to measure teachers’ growth in the five components (Kagan, 1992) with respect to the factors influencing the learning process, including: external, contextual, practical, and personal factors (Clarke & Hollingsworth, 2002; Lange & Burroughs-Lange, 1994).

PROFESSIONAL DEVELOPMENT PROGRAM OF THIS STUDY

The overall goal of these professional development programs was to improve the quality of classroom teaching through professional development. As part of this goal, the professional development programs of this paper were designed to provide teachers with knowledge and skills that will improve their a) capacity to teach high standards - understanding of the mathematics concepts they are teaching, b) understanding of how children learn mathematics, c) skills in the use of higher order research-based instructional methods, and d) capacity to use formative and summative assessment to guide instructional decisions in their classroom (Desimone, 2002; NCTM, 2000).

The major activities of the projects included 90 contact hours in distributed among 13 - 14 full-day meetings: an all day special introductory workshop in winter, five face-to-face sessions in spring, a one-week summer workshop, and 2 - 3 sessions in fall. In addition, teachers provided a family math night or a school-wide/county-wide professional development in the following winter. During workshop sessions, participating teachers were exposed to innovative and creative approaches that necessitate active participation in developing mathematics concepts.

Each workshop session focused upon national and state standards, how students learn, high order instructional methods, and assessment. The participants experienced mathematics by discussing concepts, asking “what if” questions, exploring, and using manipulatives. Between sessions, participants had opportunities to create new ways to teach mathematics within their classrooms. They also shared experiences/ideas and sought better instructional ideas through a WebCT (Web based Course Tool) or e-mail. These virtual dialogues helped teachers build a collaborative professional community (Lee, 2004).

Each project objective had three or four performance indicators on professional activities, how the activities affect the ways teachers teach, and how the different ways of teaching improve student achievement. Achieving these indicators requires teachers' ongoing growth in knowledge of mathematics, conception of their practice, and engagement in ongoing learning (Franke, et al., 2001).

METHODOLOGY

Data Collection

This case study investigates teachers' perceptions of the effectiveness of various kinds of teacher professional development activities. It is a qualitative case study that respects contextual and personal differences in teachers (Peshkin, 1993). Six participants were interested over a period of 2 - 4 years after their professional development program took place.

Each teacher interview lasted about 2 hours and was conducted at the school site. The interviews were not scripted but were framed by a list of questions. The interviews centered on how teachers perceived their own change. In other words, the interview assessed a teacher's perceptions of how and why she had changed since the professional development program. The questions paralleled the project goals in order to (1) provide a common comparison for characterizing teachers' level of growth in knowledge and (2) make use of the information gained through the professional development program. The interviews were audio-taped and transcribed. Interview transcripts were returned to the teachers for checking and comment.

In order to evaluate the effectiveness of the programs, an analysis was performed on: the existing documents such as program materials, teacher reflection, teachers' work during the program, program evaluators' reports, and project instructors' observational reports. These notes, dialogues, teacher reflections, and transcripts formed the raw data for analysis.

Data Analysis

The data were analyzed in terms of the comparison of the teachers' changes in knowledge and usage of their learning. To interpret the teachers interviews, the author and a graduate student started by reading the entire collection of transcribed interview data. First, we wanted to get an initial sense of their responses and to create a summary of each interview data. The second review was conducted with the intention of developing the common ideas, categorizing their perceptions. Our main goal was identifying the criteria they seemed to be using to assess their growth. After two reviews, we revisited all 5 interview data to confirm the tentative themes developed during the two reviews. In all, each individual case was reviewed at least four times to develop major themes.

Codes were taken directly from the language that the participants used during the interview and formulated by the author using knowledge of the field. Core categories were central, frequent, and related to other categories with clear implications that allow theory to emerge (Strauss, 1987). Categorizing thematic differences and similarities across data provided a story illustrating the teachers' perceptions about teaching and learning mathematics. Also, it illuminated how their professional development program experience influenced their beliefs and knowledge of teaching mathematics.

RESULTS

This study was designed to address questions regarding the process of building and using professional knowledge and maintaining professional learning. It explores these issues in terms of the contexts, conditions, and experiences that enhance teachers' professional knowledge and learning.

Teachers' perceptions of professional changes: Gaining and using knowledge.

The data were analyzed through a comparison of the teachers' changes in knowledge and usage. Teachers reported an increase in metacognition, the acquisition of knowledge about pupils, a shift in attention, the development of standard procedures, and growth in problem solving skills. The effects of the professional development on participant teaching of mathematics was evidenced in their perspectives about professional development, students involvement, usage of supplementary materials and information, problem solving-based and activity-based lessons.

Teachers now decide what to teach and how to teach based on the recommended standards, school curricula, and students' needs and levels. Their teaching is guided by: national state standards; problems from the NCTM magazine *Menu of Math*; and text books for problem solving; activities that cover more than one standard.. Teachers who participated in the program mainly use the New Math Series text books purchased by the school, the school curriculum guide, and the text to assign problem sets. At the same time, they often use hands-on activities to teach math concepts independently of the text book. With regard to instructional strategies, they make greater use of: visual aids, manipulatives, peer teaching, whiteboards, the one-on-one approach, group work, peer teaching, and parental help.

Their newly acquired understanding of students has led the project participants to assess students at the beginning of the year to determine their interests/skill level, so that they may assign problems based on student needs. They use problem solving content to learn more about students and their skill levels and better recognize the need to build students' math background. Teachers who participated in the project have come to realize the importance of student involvement. They do more activities with students, and try to have students discover things on their own; and they try to get students to think, rather than merely to apply a pattern. Teachers also better recognize areas in which the students are struggling and ask students if answers make sense. They now support struggling students differently, by finding various ways to explain/show the same concept, or by using an alternative perspective. They themselves have a different perspective about students, including a greater sensitivity to students with special needs.

Participant teachers' changes in their knowledge of students' thinking and mathematical understanding can be found in following quotes: "Always changing—adapt to research better teaching or best practices." "I think better, can understand concepts better." "I can relate it to kids." "Hands on helps kids understand concepts better than just using the book." "Using vocabulary helps kids make sense." "Kids engaged through actively participating." "The project helped me get across to kids." "I often think of other ways kids might learn." "I look for more activities because I understand mathematics and direct instruction." "Integrate concepts across math content." "It was enlightening/changed a lot of things I believed before."

Participants of Project Discovery reported that it had changed their math lives and it prompted them to search for other professional development opportunities. They also report improved self-monitoring skills and conversation skills when speaking with other teachers. They make frequent analyses on what works and find other strategies when things do not..

Facilitators and barriers to professional growth

Teachers reported the following as facilitators to professional growth:

- Understanding the needs of members of the school community: Awareness of children's needs; sensing the needs of colleagues; and their own needs.
- Understanding of curriculum and new ways of understanding what they do
- Creating meaning through: Observation of children's reactions to their learning; focusing on their professional behaviors or the nature of their own teaching; interacting with colleagues and with management personnel; other sources outside the school environment; and continual adjustment.
- Influence of colleagues and school administrators: feedback.
- Formal education courses
- Sources for professional learning: Their own experiences; school context; and system initiatives.

Reported barriers to professional growth included limited opportunities to speak with other teachers, lack of time to attend more classes/workshops, and the learning curve for new technology.

DISCUSSION

The paper discussed the effects of the program in the following areas: Change in attitudes and beliefs about teaching mathematics; Becoming more knowledgeable practitioners; Being a reflective practitioner; Creating a student-centered classroom; and Aligning with the Standards. Most of the strategies that teachers described as leading to professional growth, greater confidence and increased job satisfaction involved their adoption of an active approach to resolving challenging situations. Professional growth reported by the project participants can simply be described as a progress from emphasis on a content-oriented approach to a more process- and learner- oriented one. Teachers related that the knowledge they gained from our professional development project had been implemented in the areas of deciding what to teach and how to teach it; understanding children's thinking; use of NCTM and Ohio standards; understanding the mathematical content they teach; assessment techniques; supporting strategies for struggling students; and self-monitoring skills.

A transformational model of continuous professional learning (Lange and Burroughs-Lange, 1994) explains the relationship between past experience and the present situation in teachers' professional growth. This model suggests that after a particular experience, the concept of understanding is changed (transformed) and acquires a meaning that was not reflected before. The experience has become part of the meaning of the transformed concept. In order for teachers' experiences to have an influence on their professional growth, they must be perceived by the individual as in some way challenging what they currently assume to be best practice. When they have a clear comprehension of what it is that challenges their current practice or understanding and why this has arisen they then have some criteria for

reviewing those resources that may be available to them for effectively resolving the challenging within this context.

The findings of this study suggest the core and structural features of professional development activities that enhance teachers' knowledge and skills and have a positive effect on teaching practice. It is indicated that professional learning must be relevant to student learning. In other words, effective professional development programs guide teachers to construct knowledge in the same ways as do effective learning experiences for students. This study also suggests ways to enhance professional learning: including the teacher as decision maker and consumer, recruiting teachers from the same context, connecting professional learning and practice, and building a partnership between university, schools, and local education agents.

References

- Ashton, P., & Webb, R. (1986). *Making a difference: Teachers' sense of efficacy and student achievement*. New York: Longman.
- Berliner, D. C. (1988). Implications of studies on expertise in pedagogy for teacher education and evaluation. In *New directions for teacher assessment*. (Proceedings of the 1988 ETS International Conference, pp. 39 - 68). Princeton, NJ: Educational Testing Service.
- Franke, Megan Loef.; Carpenter, Thomas P.; Levi, Linda (2001). Capturing teachers' generative change: a follow-up study of professional development in mathematics. *American Educational Research Journal* v. 38 no3 (Fall 2001), p. 653-89
- Clarke, D., & Hollingsworth, H. (2002). Elaborating a model of teacher professional growth. *Teaching and Teacher Education, 18* (8), 947-67.
- Desimone, L. (2002). How can comprehensive school reform models be successfully implemented. *Review of Educational Research, 72*(3), 433-479.
- Fuller, F., & Brown, O. (1975). Becoming a teacher. In K. Ryan (ed.), *Teacher Education* (74th Yearbook of the National Society for the Study of Education. Part 2, pp. 25-52). Chicago: University of Chicago Press.
- Galbraith, P., & Anstrom, K. (1995). Peer Coaching: An Effective Staff Development Model. *Forum: Newsletter of the National Clearinghouse for Bilingual Education, 18* (3).
- Kagan, D. M. (1992). Professional growth among preservice and beginning teachers. *Review of Educational Research, 62* (2), 129-169.
- Lange, J. D., & Burroughs-Lange, S. G. (1994). Professional uncertainty and professional growth: A case study of experienced teachers. *Teaching and Teacher Education, 10* (6), 617-631.
- Lee, H. J. (2004). Change in prospective teachers' perspectives about effective teaching of mathematics: Structural patterns and qualitative categories. *Proceedings of the annual meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education*, http://www.allacademic.com/meta/p117597_index.html.
- Lee, H. J. (Fall 2004 & Spring 2005). Developing a professional development program based on teachers' needs. *The Professional Educator, 27*(1 & 2), 39-49.
- National Council of Teachers of Mathematics (NCTM). (2000). *Principles and Standards for School Mathematics*. Reston, VA: Author.
- Peshkin, A. (1993). The goodness of qualitative research. *Educational Researcher, 22*(2), 23-29.

- Showers, B. (1984). *Peer coaching: A strategy for facilitating transfer of training*. Eugene, OR: Center for Educational Policy and Management.
- Strauss, A. (1987). *Qualitative research for social scientists*. Cambridge: Cambridge University Press.
- Wong, J. L. N. & Tsui, A. B. M. (2007). **How do teachers view the effects of school-based in-service learning activities? A case study in China.** *Journal of Education for Teaching*, 33 (4), 457-470.