Determining and Responding to Teacher Professional Development Needs

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LSC Context-Professional Development Design

Prior to 1994, the National Science Foundation (NSF) funded a number of efforts to provide professional learning opportunities for teachers including the well-known and respected Summer Institutes for Teachers held during the 1950s and 1960s. In 1994, the University of Illinois at Chicago-All Learn Mathematics (ALM) principal investigators applied for funding from the NSF Teacher Enhancement Program. We drew upon the research literature, including the work of Shulman, Fullan, Sparks, Loucks-Horsley, Hall, Hord, Guskey, Lieberman, and Smilie. For example, Shulman (1987, p. 227) identified categories of knowledge needed for teaching, including:

- Content knowledge;
- General pedagogical knowledge (e.g., classroom management and general teaching strategies);
- Curriculum knowledge including assessment;
- Pedagogical content knowledge (e.g., the ways of representing and formulating the subject that make it comprehensible to others. An understanding of what students find easy or hard. An understanding of the conceptions and misconceptions that students of different ages and backgrounds bring with them to the learning of the most frequently taught topics and lessons, as well as how to deal with them);
- Knowledge of learners and their characteristics.

Though prior efforts described in the research base emphasized the importance of professional development for the purposes of elevating teacher knowledge and practice, the school improvement and leadership literature suggested that providing professional development for teachers was not the only necessary component for moving school organizations forward. As a result, the initial premise of the ALM project was based on the idea that revitalizing school mathematics programs required full, systemic change,

including changes by administrators and parents, changes in teachers' beliefs and practices, and changes in learning and attitudes on the part of children (Senge, 1991). Although this paper focuses on determining and responding to the professional needs of teachers, it is important to situate this discussion within the context in which the work was conducted.

After the ALM project received funding from the NSF Local Systemic Change Program in 1995, the project staff began to identify schools interested in establishing partnerships to improve the teaching and learning of mathematics. (ALM established partnerships with more than 50 Chicago schools between 1995-2005.) When schools joined the ALM partnership, all the faculty and administrators made a number of commitments, including allocating time and resources to purchase instructional materials; teaching Standards-based mathematics curricula; interacting with ALM staff to design appropriate school improvement efforts involving students, teachers, administrators, and parents; and participating in school improvement efforts including professional development.

The ALM project included a comprehensive professional development program for teachers, in-school and in-classroom support, classroom implementation of challenging mathematics curricula, development of teacher leadership within schools, professional development for administrators, and the implementation of programs for parents and students. Specifically, the ALM professional development program emphasized:

- Mathematics content;
- Effective teaching;
- Implementation of quality curriculum;

- Assessment as an integral part of the instructional process;
- Development of school environments that promote mathematics learning.

In designing the professional development, we considered a variety of professional development strategies such as aligning and implementing curriculum, examining student work, lesson study, and coaching (Loucks-Horsley, Hewson, Love, & Stiles, 1998). Furthermore, as the project progressed, more and more professional development resources became available (e.g., see www.TE-MAT.org) to assist with the design and implementation of professional development for mathematics teachers. To be effective, we needed to make decisions about which resources and strategies to use as well as how to sequence and coordinate them. As Loucks-Horsley, Love, Stiles, Mundry, & Hewson (2003, p. 113) articulately argue, "Professional development is more than offering isolated strategies. Every program, initiative, and professional development plan uses a variety of strategies in combination with one another to form a unique design. Each strategy is one piece of the puzzle, and how a designer fits strategies together depends on his or her particular circumstances. The professional development designer's challenge is to assemble a combination of learning activities that best meets the designer's specific goals and context." The designer's challenge also requires an appropriate balance, sequence, and coordination of learning activities that best meet the needs of the participating teachers.

During that first year, the ALM project team quickly realized that designing one professional development program to be "replicated" across participating schools would not be an effective approach due to the dramatic variations across school contexts. In fact, we had to assess the individual needs of teachers, administrators, and schools, and

design professional development accordingly. In other words, it was important to consider teachers as learners and therefore design the professional development so that it built on the participants' strengths, interests, and needs; it focused on knowledge and practice; it provided opportunities for feedback, revision, and success; and it required interactions with others (Bransford, Brown, and Cocking, 1999).

As a result, the ALM design featured both group and individual professional development components. ALM teachers attended professional development sessions with other teachers in a variety of formats including grade-level meetings within schools and across schools, school-level sessions, grade-band sessions, and topic-specific sessions identified by teachers for a minimum of 60 hours over a 2-3 year period. In addition, ALM teachers worked one-one-one with an ALM initiative coordinator, a former experienced teacher, for a minimum of 40 hours inside their classrooms. As a result, every ALM teacher's professional development trajectory was different.

Strengthening the mathematical content knowledge and pedagogical content knowledge of participating teachers was a high priority in both the individual and group professional development sessions. Sessions focused on a range of mathematical topics over the course of the project, including geometry, algebra, measurement, probability, statistics, and number theory. ALM used a variety of vehicles, such as examining mathematical problems, mathematics curriculum, student work, case studies written by teachers, videos of classroom instruction, and lessons taught by the professional development facilitator to deepen teachers' mathematical content knowledge and pedagogical content knowledge within the group formats. For example, when the facilitator taught a third-grade lesson in a specific school, all of the third-grade teachers at

that school observed the lesson. The initiative coordinator assigned to that school would then "debrief" the third-grade lesson without the presence of the professional development facilitator who taught the lesson.

Another powerful strategy was bringing a small group of students into the professional development sessions. The teachers watched as a small group of students worked together to solve a problem and present their solution. This professional development strategy allowed the classroom teachers to focus on the mathematical thinking of a small group of children. This strategy was also more accepted by the teachers because it involved children they knew—not "actors" portrayed on the commercial videos of classrooms. Many scenarios of student thinking were investigated and discussed, some of which were selected so that teachers could strengthen their own mathematical knowledge in a non-threatening way.

In addition to the group professional development sessions, teachers worked individually with an ALM initiative coordinator on a weekly basis. ALM initiative coordinators served a number of roles during these visits. They taught mathematics lessons so that the lessons could be observed by the teacher and then later discussed, co-taught lessons with the classroom teacher, and observed the classroom teacher teach mathematics. They assisted the teachers with issues that specifically pertained to their classrooms, such as curriculum planning, classroom management, or assessment. Furthermore, in many cases, the initiative coordinators worked with teachers one-on-one to assist those who were struggling with the mathematics content or the implementation of Standards-based curriculum. In this individual environment, rather than the group

sessions, teachers admitted that they felt more comfortable acknowledging their lack of content knowledge or experience and welcomed the initiative coordinators' support.

All of these vehicles provided opportunities for ALM staff to observe teachers' thinking. They also provided opportunities for teachers to discuss the teaching and learning of mathematics, to make their thinking visible, to receive feedback on that thinking, and to eventually revise that thinking as necessary. Facilitating professional development within the individual and group settings assisted ALM staff in responding to teachers' needs regarding mathematics content, teaching, and curriculum.

Strategies for Determining and Responding to Teacher Needs

If we were going to build on the strengths, interests, and needs of each teacher, then the project staff required strategies and tools to determine them. We wanted teachers to revise their thinking and their practices regarding mathematics so we needed their thinking and practices to be visible. To accomplish this, we collected evidence using three vehicles: (1) informal conversations; (2) written assessment tools; and (3) observations.

Informal Conversations

The ALM initiative coordinators were in a school 1-3 days per week, depending on size of the school and the number of classroom teachers. They worked hard to become "insiders" at their assigned schools. They had informal conversations with office clerks, custodians, cafeteria staff, administrators, and teachers. These conversations permitted them the opportunity to build relationships, but also opportunities to assess teachers' strengths, interests, and needs. Over time, the teachers became more comfortable seeking advice, discussing areas that needed improvement, and looking for

resources from the ALM initiative coordinators. In other words, they became

comfortable taking risks and asking for help.

The classroom teachers were able to watch the ALM initiative coordinators teach

as many as twenty lessons. This observation provided opportunities for the classroom

teacher to learn about teaching Standards-based mathematics, but it also provided

opportunities for the initiative coordinators to establish credibility and build trust with the

classroom teacher. The professional development facilitators retained their "outsider

status" so they could address issues that needed to be solved without harming the

initiative coordinators' "insider status." For example, if a school administrator had not

ordered the necessary curriculum materials in a timely manner, the "outsider" stepped in

to get this done.

The ALM initiative coordinators revealed they often learned more about a teacher

from these informal conversations than they did from more formal instruments. This

strategy was effective because the ALM initiative coordinators were able to work with

and build a professional relationship with the same teachers over multiple years. It

should be noted that just facilitating "small talk" will not necessarily lead to determining

the strengths, interests, and needs of teachers. The initiative coordinators learned how to

initiate conversations effectively and refer back to them at a later date, communicating

their importance. They consistently communicated that they were trying to support each

teacher and school environment.

Written Assessment Tools

In addition to informal conversations with school personnel, ALM used more

formal written assessment tools to identify teachers' needs. Some of these instruments

related to the work of the classroom initiative coordinators. For example, the following

checklist sought to understand how the classroom teacher wanted the initiative

coordinator to assist in the classroom.

> I would like the ALM initiative coordinator to:
> ___ co-teach a lesson in my classroom.
> ___ observe me teach for the purpose of discussing mathematics and its teaching.
> ___ provide strategies, activities, and materials to enrich my instructional program.
> ___ teach mathematics lessons and discuss them with me.
> ___ assist with assessment of students.
> ___ help me develop mathematics lessons.
> ___ collaborate with other teachers.
> ___ discuss mathematics lessons during a prep period.

A second instrument the initiative coordinators asked teachers to complete was a

Manipulatives Wish List. In the majority of ALM classrooms, manipulatives were not

present. This instrument was used to assist with the acquisition and initiation of

manipulative use. An excerpt follows:

> Please place a check next to the manipulatives that you would use if you had
> access to them. In the second column, check the manipulatives that you would
> like to use in ALM professional development sessions.

Manipulatives/Tools	Wish I Had	Professional Development
Pentominoes	_____	_____
Pattern Blocks	_____	_____
Tangrams	_____	_____
Geoboards	_____	_____
Geometric Solids	_____	_____
Base Ten Blocks	_____	_____
Unifix Cubes	_____	_____

Some ALM teachers reported that they were unfamiliar with the manipulatives on the list

and did not know how to use them in instruction. Initiative coordinators worked with

school personnel to identify which mathematics manipulatives and tools existed in the

building and which ones needed to be purchased. In some cases, the manipulatives were already in the school, stored away, and teachers were unaware that they had been purchased years before.

Both the *Initiative Coordinator Role Checklist* and the *Manipulative Wish List* were practical ways of collecting information from the teachers. These tools also communicated to the teachers that the ALM project staff was trying to identify the teachers' needs and how to best support the improvement of mathematics teaching and learning. ALM professional development facilitators also used assessments involving questions that required a higher level of reflection. Some questions focused on the actions of the teacher or their students, while others focused on the enactment of the mathematics curriculum. Teachers were only given one or two questions at a time during a group professional development session. The questions below provide some samples.

- Which new teaching strategy have you tried in the last six months? What was the result? Would you use it again? Why or why not?
- Which child's strategy surprised you the most? Why did it surprise you? How did you respond?
- What question did a child ask that you could not answer? How did you respond?
- Which mathematical activity/task was difficult to manage? What could be done to make it easier?
- Please list any needs or concerns about your mathematics curriculum.
- What was the most successful part of the curriculum implementation this year? What was most troubling?
- What other support mechanisms do you want?
- What professional development learning opportunities do you want to pursue?
- What mathematical content is not covered sufficiently at your grade level due to limited time?

After the teachers wrote responses to one or two questions individually, the professional development facilitator initiated a conversation about them with the group

and then collected the written responses for later analysis and staff discussion. This strategy was used to give teachers opportunities to write about their own thinking and practice, but also to help the initiative coordinators and professional development facilitators design more effective professional development in the future.

Observations

The ALM initiative coordinators and professional development facilitators did not use an "I have to follow my agenda" approach to professional development. They recognized the importance of using observation for assessment purposes and more importantly, modifying the professional development based on that assessment. Over the course of the 100 hours of professional development provided to each teacher, the ALM staff had the responsibility to observe teachers so that they could determine the professional needs related to the participating teachers' knowledge bases and teaching practices. As they observed the interactions of the classroom and professional development environments, the ALM staff identified immediate needs and long-term goals regarding the professional knowledge and practices of each teacher.

Through the documentation and analysis of observations, informal conversations, and written assessment tools, project staff members were better able to determine and respond to teacher needs. This process required qualified initiative coordinators and professional development facilitators who were able to identify and respond to teacher professional needs. If professional development programs are going to design "learner-centered, knowledge-centered, assessment-centered, and community-centered learning environments" for teachers (Bransford, Brown, and Cocking, 1999), then the professional development designers have to identify or create systems, structures, and tools for

determining, documenting, and coordinating the strengths, needs, interests, and professional growth of teachers. Too often, the learner-centered and assessment-centered perspectives in relation to teacher professional development are taken into limited consideration.

Success and Failure

Determining the strengths, needs, and interests of teachers related to knowledge bases and teaching practice, required the use of multiple vehicles.   Using observations, conversations and written tools helped the project team to better understand the needs of each individual and design professional development accordingly. The professional growth of teacher knowledge and practice was enhanced by:

- Honoring the past while pursuing improvement;
- Treating teachers as professionals whose practice could be enhanced with appropriate support;
- Building trust and respect carefully;
- Identifying and removing obstacles to school improvement;
- Facilitating professional development for groups as well as individuals;
- Including professional development inside and outside of the classrooms;
- Scheduling professional development in the school during times that were convenient for teachers;
- Providing opportunities for teachers to analyze and discuss mathematics, mathematics curriculum, student work, and teaching;
- Including "real-life" children and classrooms in professional development settings;
- Establishing support structures that facilitated shared dialogue, collaboration, reflection, and decision-making;
- Providing feedback to teachers so that they could make improvements;
- Making the teaching and learning of mathematics visible for the community to analyze and discuss;
- Emphasizing the importance of equitable practices;
- Tackling current issues such as standardized testing;
- Developing systems to assess and document growth over time for individual teachers;
- Assigning initiative coordinators to track the progress of specific teachers over time;
- Setting short- and long-term goals for individual teacher growth; and

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- Remaining flexible.

Even though ALM was successful in many respects regarding professional development design and implementation, the project also experienced a number of challenges that hindered progress. Among all the challenges faced by the project, three were critical. First, the capacity of the project staff was not sufficient. The project staff could not accomplish everything it needed or wanted to do. The needs of the school communities were overwhelming and the members of the project staff had to prioritize how their time was spent and which problems they should tackle first. A second and related challenge was that the project design did not build sufficient time for staff to reflect, discuss ideas, and share strategies with one another. The initiative coordinators had to visit too many classrooms on a daily basis, which limited their planning time as well as the amount of time to document teacher status and progress. The professional development facilitators spent the bulk of their time working with groups of teachers. These commitments were prioritized and time for reflection and collaboration were frequently allocated to the back burner. Third, the project staff did not always know how to best meet the teachers' needs. They were constantly confronting new situations and obstacles. As professional development facilitators and classroom "coaches" they often felt like "novice" teachers in their first classrooms. With experience, they learned new strategies that worked across a variety of contexts. Based on our experiences, the work of restructuring school environments and supporting large numbers of teachers and administrators is extremely demanding and challenging. The number of teachers and schools involved in the project coupled with the restraints of financial and human

resources reduced the potential impact of the project specifically in relation to assessing and responding to teacher needs.

Hindsight is a Wonderful Thing

If they knew then, what they know now, what would the ALM project staff have done differently? The ALM project staff would have worked with a smaller number of teachers and built in more time—more time to think about the problems they were encountering, more time to document the strategies that they tried, and the results of those trials, more time to work on the assessment files for each teacher, and more time to write manuscripts for publications so that the field was informed by the work. With these modifications, the project could have had a greater impact within the ALM schools and made a contribution to the research literature on professional development.

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