

Giving our professional development more impact

Summary

Professional development is at the heart of improving mathematics education. And yet the impact of typical professional development activities on classroom practice falls far short of the expectations held for them. Professional development offered through graduate programs in universities usually addresses curriculum, teaching, learning and professional growth on a very broad front, concentrating on issues of principle. This contribution to professional growth is an important part of building capacity, a key part of enabling system improvement. However, it is not straightforward to make the link between general principles or theoretical frameworks and the realities of everyday life in mathematics classrooms.

Professional development offered through sessions at regional, state, and national conferences that individual teachers attend are typically focused on interesting instructional tasks, with teachers engaged in hands-on activities. Again, this is an important opportunity for teacher learning, but it suffers from the limitations of one-shot experiences. Districts may offer summer workshops for teachers that can contribute to teacher learning. But even within a local context, the program may not have much impact back in the classroom if it does not have any built-in followup.

At issue is not the kind of professional development opportunity available to teachers but whether and to what extent any of these experiences are connected to an overall long-term, system-wide, district plan for improving mathematics education. To what extent are participant teachers expected when they return to their schools and their classrooms to "use it and share it."

Research suggests that a set of general principles should guide professional development if it is to work. Key is that teacher growth is enhanced when professional development is grounded in specific classroom practices. Situating professional development in classroom practices provides teachers with specific goals for changes in their classroom behavior based on their acquisition and integration of new pedagogical skills and mathematical understanding. The bottom line is that teachers should leave professional development experiences with a clear sense of where they might begin in their own classrooms and what their practice might look like over time.

Professional development grounded in specific classroom practices, and supported by reflective discussion on the specific experiences, shared by all the teachers involved, allows them to learn constructively.

Challenges addressed

Our teachers' professional development doesn't have much effect in our schools

Many of our teachers take advantage of a range of professional development opportunities. They enroll in well-established and popular graduate programs at a local university. They attend NCTM regional, state and national meetings. And they take advantage of district sponsored summer workshops. Our teachers clearly grow, as people and as professionals. However, the impact on the classroom experiences of students in our schools is disappointing. Could we do better and, if so, how?

The strategy

This strategy involves designing a professional development program at the district level built on general principles that research suggests are key to influencing teachers' beliefs and reshaping their instructional practices. It requires a shift in the curriculum, pedagogy and discourse of professional development from simply giving teachers things to do in their classroom toward providing support for more reflective approaches to teaching, learning and assessment. Smith (Practice-Based Professional Development for Teachers of Mathematics, 2001) describes design features of a professional development program in mathematics that aims to build teachers' capacity for innovative practice and improve student learning.

Professional development should:

- have students' learning as the ultimate goal. This entails not only helping teachers to learn about and use new teaching techniques and materials, but providing opportunities for them to reflect on how the use of these might contribute to student learning.
- support the ongoing work of teaching. Activities need to be situated in the actual practices of teaching so that teachers are supported in the day-to-day work of trying out innovative practices.
- be grounded in mathematics content. Many elementary and middle school teachers' own knowledge of mathematics is fragile. Teachers need to engage in the study and doing of mathematics they are expected to teach, to deepen their own content knowledge, and to see how mathematical ideas develop and connect within and outside mathematics.
- model and reflect the pedagogy of good instruction. Teachers need to experience good mathematics teaching, work on rich tasks, and engage in mathematical discussions. This is more than participating in "hands-on" workshops and activities. Teachers need to interrogate anonymous student work on rich tasks, looking for evidence of students' ways of reasoning and the extent to which students understand the concepts and processes embedded in the tasks. Teachers need to try rich tasks with their own students to gain insights into their reasoning. Teachers should reflect on what they and their students learn through work on rich tasks. And teachers need to consider the implications of this experience for their own instructional practice.
- create some disequilibrium for teachers. Much of teacher practice is grounded in beliefs – about mathematics, about who can do mathematics, about what one needs to know and be able to do to be successful at mathematics. Professional development needs to provide experiences that challenge teachers' long-held beliefs so they can consider the effects on students' learning of acting on those beliefs.
- encourage teacher collaboration. Focused study groups, teacher collaborations, partnerships with university faculty give teachers an opportunity to learn in the company of others. Teachers can undertake action research to better understand their own beliefs and the influences of beliefs on their instructional practice. They can draw on research and engage in intellectual as well as practical discussions about the work of teaching.
- take into account teachers' contexts. Teachers are facing increasing demands of accountability for student achievement. Professional development should help

teachers understand the relationship of local and state standards to what and how they teach. And the advocacy of new practices needs to be sensitive to the pressures that teachers feel to raise student achievement, particularly on low level tasks.

- make use of the knowledge and expertise of teachers. This is particularly critical when the facilitator is an outside “expert.” Both bring expertise that must be valued or trust is not likely to be built between teachers and the “expert.”
- be sustained and cohesive. Professional development needs to be long-term and sustainable over time. There need to be structures in place to continue the professional development experience throughout a school year. At subsequent sessions, teachers share what they tried with their students, what they learned about their students’ thinking, and the impact it is having on their instructional decisions.
- continue over the course of a teacher’s career. Some teachers are novices at tackling innovative curricula and teaching. Others have been enthusiastic implementers for a considerable number of years. Whatever their knowledge or experience, all teachers should have opportunities to improve their teaching on the basis of experience and new research-based knowledge about teaching and learning. This can mean providing differentiated experiences for teachers. It can mean tapping more experienced and enthusiastic teachers to take on leadership roles within their buildings to support the professional development of teachers across the spectrum.

A shift in focus for professional development

Away from	Towards
Individual teachers attending summer workshops	Capacity building – emphasizing teams of teachers from schools working collaboratively through the year
Generic PD not connected to an overall program for improving mathematics education	Content-based PD
Developing content knowledge separate from pedagogy	Integrating content and pedagogy using tasks, cases, or other materials grounded in instructional practice
Teachers participating in “hands-on” activities	Teachers engaging in intellectual risk-taking, taking on more reflective approaches to teaching, learning and assessment
Activities based on teachers’ thinking about their efficacy	Activities based on research about students’ thinking
Prescriptive programs for all teachers (one-size-fits-all)	Differentiated learning opportunities that reflect varying experiences, circumstances and needs of a diverse teacher community
Teacher viewed as deliverers of a static curriculum	Teachers viewed as action researchers and members of a professional learning community
Activities that are not aligned with local	Making standards explicit and

standards	connecting them to instructional practice
Having participants evaluate how much they liked the PD activity	Having teachers evaluate the impact of the PD activity on their beliefs, practices, and student learning

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Implementing the strategy

Giving professional development more impact means first designing a long-term plan for improving student achievement where changing teacher practice is central. With an overall conception of what is needed to accomplish the goals, support should be concentrated on those professional development activities that are directly connected to the plan and can contribute to the goals. The professional development activities can encompass a full range of opportunities – from university courses to conferences, to regional workshops, to local offerings – so long as they meet the criteria of moving the improvement plan forward.

Built into the plan is a process for assuring that teachers will and can use what they are learning to shape their instructional practices to enhance their teaching and their students learning. The plan should also assure that teachers will and can share what they are learning with school colleagues, thus extending the reach of workshops attended by individual teachers. This means providing time for teachers to work together, trying out new practices, reflecting on the impact of these changes on their students' learning.

The success of this strategy rests in large measure on professional development leaders to organize and lead or co-lead sessions, model appropriate pedagogy, facilitate analysis and reflection, all the while being sensitive to issues adult learners may face when taking risks among their peers. This means that a plan should include opportunities for the development of leaders as well as teachers.

Strengths

An important strength of this strategy is that professional development is custom-tailored to meet the long-term needs of the district. There are many tools to support on-going professional development and this strategy allows for linking a variety of tools in purposive ways. If a program of professional development is organized around the principles above, it stands a good chance of developing all personnel.

Weaknesses

As the table above suggests, this approach to professional development stands in stark contrast to modal practice. It requires leaders to take hard positions that "not everything goes." A district needs to hold firm in supporting with its own resources only those activities that fit with the overall improvement plan. That may mean resisting calls to bring in charismatic or motivational outside experts or consultants when what they offer is not likely to move the district forward.

Tools

- Mark Driscoll's algebra stuff
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- CGI

- DMI
- Talking Mathematics
- Balanced Assessment in Mathematics the workshop

Complementary Strategies

- *Professional development for and through assessment* is an effective way of enriching teachers understanding of standards-based mathematics and how it can be handled in the classroom. A key tool for this work is the *Balanced Assessment in Mathematics packages*. They help teachers introduce students to richer, more substantial tasks. The tasks bring out the 'process' aspects of mathematics – non-routine problem solving, new connections, extended chains of reasoning, and mathematical communication. The tasks and students' written work on the tasks are powerful sites for raising issues of curriculum, teaching and learning.
- *Curriculum units with built in do-it-yourself professional development support* such as *The Language of Functions and Graphs* (for middle and high school) have the right focus to help such professional development courses.
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- *Engaging students in mathematics discussion* introduces do-it-yourself-professional development focused on a crucial aspect of teaching style.
- Curriculum-led
- Assessment-led