OUTCOMES

Content-focused learning improves teacher practice and student results

By Laura Desimone

Content focus and coherence are fundamental to professional development that helps teachers boost student learning. Learning Forward's Outcomes standard emphasizes that teacher learning should be focused on subject-matter content and how students learn that content, and consistent with the individual, school, and district factors that shape teachers' work lives. Several key scholars have helped shape our understanding of content focus and coherence and provided evidence to support their significance.

CONTENT FOCUS

Lee Shulman (1987) helped initiate the discussion of focusing on content and how students learn content. He highlighted what some researchers call pedagogical content knowledge — the specialized knowledge teachers need to effectively convey content to students, such as the knowledge to select appropriate models to illustrate new concepts, as well as knowledge of learners and their characteristics. He distinguished pedagogical content knowledge from expert knowledge of a particular content area, such as expertise in the axioms, formulas, and ideas of mathematics. Moreover, he said we must distinguish content knowledge and pedagogical content knowledge from general pedagogical knowledge, which is knowledge about class-

room management and organization across content areas. Shulman convincingly argued that, to teach successfully, teachers must have a deep and meaningful understanding of the content they teach, as well as how students learn that content, including common misunderstandings.

In the context of mathematics, David Cohen (1990) offers a potent illustration of what can happen when professional development does not foster a deep understanding of content and how students learn content. Cohen's seminal piece describes how one teacher, Mrs. Oublier, implemented a mathematics reform. It has been used for two decades to show that both content knowledge and pedagogical content knowledge are important in translating professional development into desired practice. Mrs. Oublier attended professional development that exposed her to an inquiry-oriented mathematics reform, which included using manipulatives to teach concepts and emphasized asking students to offer explanations to demonstrate their understanding of mathematical concepts. She was enthusiastic and committed to the reform. But, when an outside observer watched her class, he saw her teaching the curriculum in ways that reflected a poor understanding of the mathematics as well as a misunderstanding of the reform itself. For example, Mrs. Oublier thought students' math understanding would be boosted simply by touching the manipulatives. She did not have a fundamental understanding of how to use the

STUDENT

4 components critical to principal development

By Glenn Nolly
As told to Valerie von Frank

Through the University of Texas, Austin, we provide a 12-credit-hour block of courses that includes theory and an introduction to practice for future leaders based on the Interstate School Leaders Licensure Consortium standards. The major portion of the coursework is a research study to analyze a school's data. We interview the principal, interview the teachers, and do a community walk. Their task is to develop a case study with recommendations for what that school's principal can do to make the school better. The apprentices then research best practices for their recommendations. The case study approach is an opportunity to talk about the principalship in its entirety so these future leaders can go into it knowing how to impact student achievement positively.

LEADER

There are four important elements of any leadership development: instructional leadership, relationships, politics, and data analysis.

Instructional leadership is critical. The principal has to have enough knowledge about instruction to be able to put into place systems that support teachers as they do their work. It is impossible for a principal to be completely knowledgeable in the pedagogy of each content area. A good instructional leader realizes that teachers should have the opportunity to work together in like groups to discuss content and associated pedagogy.

Another component is understanding the importance relationships play in school environments and structures — the relationship of the principal with the community, teachers, students, and the relationship that teachers develop with students. We focus on how leaders can improve communication. We discuss issues of equity, diversity, acceptance.

Another thing principals should have an idea of is the political terrain and how to map it to accomplish changes in instructional strategies that should occur. First, you have to understand there are political structures. For example, in the community we are studying, there are two extremes — an affluent community and a poorer community. We can't impose middle-class values and a middle-class power structure on the whole community. We have to understand the impact of policy on the lives of people. Navigating political structures can be taught by helping individuals recognize that they must understand who the political brokers are and have access. Leaders need to build relationships with those who can help them accomplish their goals.

Nolly

A final component of leadership is knowing how to analyze data and what to do once you've figured out what the issue is. We must learn how to deeply analyze data to uncover issues of equity. The class does an equity audit and looks at what kinds of classes males and females have access to and admission to Advanced Placement classes. Invariably, we find that poor and minority students are disproportionately disciplined.

We are realizing that the principalship requires special preparation. Part of that should be in the field. Universities need to move away from complete theory to a blending of theory and practice. This program involves a full-year internship supported by individual coaching and monthly feedback in their cohort.

Principals need opportunities to work with other principals to discuss issues and to learn how to be instructional leaders, not only managers.

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manipulatives, how they might help student thinking, and how she could capitalize on using the manipulatives with her own teaching. This is an excellent example of the limits of professional development that focuses solely on pedagogical strategies such as example lesson plans or activities, rather than on teacher learning about the content of the lesson, how students learn, what is important about the ideas and how they are presented, how students can engage with the material, common misunderstandings of the content and how to address them, and how to connect concepts and representations.

In-depth case studies of teacher learning have expanded our ideas about how effective teaching is linked to teacher knowledge of content and how students learn that content (for example, Grossman, 1990; Leinhardt & Smith, 1985; Stein, Baxter, & Leinhardt, 1990). Using a nationally representative sample of teachers, Michael Garet and his colleagues (Desimone, Porter, Garet, Yoon, & Birman, 2002; Garet, Porter, Desimone, Birman, & Yoon, 2001) conducted the first study that provides systematic, quantitative evidence that content focus in professional development works to improve teaching. They administered a national survey to more than a thousand teachers, drawn so that the sample was representative of most teachers in the U.S. (the sample covered about 90% of districts). The researchers found that teacher reports of increases in their teaching knowledge and skills and changes in classroom practice were significantly related to whether their professional development in math and science had focused on math or science content and how students learned that content. This study confirmed, in the case of math and science, that professional development should focus on subject-matter content. This combination of theoretical and empirical studies has given renewed emphasis to the profound importance of subject-matter focus in designing high-quality professional development.

COHERENCE

Learning Forward's Outcomes standard also emphasizes that professional development should be coherent with factors that affect teachers' work. Professional development for teachers is frequently criticized on the grounds that the activities are disconnected from one another — in other words, individual activities do not form part of a coherent program of teacher learning and development. A professional development activity is more likely to be effective in improving teachers' knowledge and skills if it forms a coherent part of a wider set of opportunities for teacher learning and development.

Several dimensions of coherence are critical for effective professional development. One of these dimensions is the extent to which professional development builds on what teachers already know and is appropriate for their level of knowledge and skills. Professional development is less effective if it is targeted too low or too high, or if it doesn't build on ideas that teachers have already been exposed to. Thus districts and school leaders can play a critical role by thinking about teacher learning opportunities comprehensively. Instead of providing an array of workshops on assorted topics that teachers choose, leaders can construct opportunities that build on one another and provide opportunities for learning that are adapted to individual teachers' needs.

A second critical dimension of coherence is that professional development content should be aligned with national, state, and local standards; assessments; curriculum; and other reforms. This type of alignment is a fundamental component of standards-based reform. Michael Smith and Jennifer O'Day (1991) argue that aligning policy instruments (for example, standards, assessments, curriculum) with teacher learning opportunities is a fundamental building block of successful reform. Teachers receive guidance about what to teach and how to teach it from multiple sources, such as material covered in formal professional development, textbooks, assessments, and state and local standards. If these varied sources share a coherent set of goals, they can help teachers improve teaching practice; if they conflict, they may create tensions that impede teachers from developing their teaching in a consistent direction (Grant, Peterson, & Shojgreen-Downer, 1996). One approach to making teacher professional development more coherent is to align professional development with state and district frameworks, standards, and assessments. This process can take a number of forms. For example, professional development can be chosen to reflect the topics emphasized in state and district standards. Professional development can also focus on the goals for student learning emphasized in state assessments or the pedagogical methods emphasized in state curriculum frameworks (Webb, 1997).

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A third dimension of coherence is how professional development encourages and supports sustained professional communication among teachers who are working to reform their teaching in similar ways. An ongoing discussion among teachers who confront similar issues encourages them to share solutions to problems, and it reinforces the sense that improvement is possible. Several researchers have focused on how teacher interactions with one another affect their learning. Judith Warren Little (1993) shows how learning opportunities are embedded in teachers' daily lives. Embedded professional development, directly related to the work of teaching, can take the form of co-teaching, mentoring, reflecting on lessons, group discussions of student work, a book club, a teacher network, or a study group. By sharing methods, discussing written work, and reflecting on problems and solutions, teachers foster a better understanding of the goals for student learning that proposed changes in teaching imply. David Cohen, Milbrey McLaughlin, and Joan Talbert (1993) view professional development as a complex

array of interrelated learning opportunities, which can range from formal, structured seminars to informal hallway discussions with other teachers. Marilyn Cochran-Smith and Susan Lytle (1999) emphasize a broad-based view of teacher professional development, treating teacher learning as interactive and social, based in discourse and community practice. Hilda Borko (2004) also helps us understand that formal or informal learning communities among teachers can act as powerful mechanisms for their growth and development. In the past decade, Ken Frank (Frank & Yasumoto, 1998) has shown how social networks and helping behaviors can translate what is learned in professional development to the classroom.

> When teachers, in professional learning communities, can discuss new ideas with other teachers, practice them, receive feedback, share students' reactions, and brainstorm with other teachers, they much more successfully implement what they learn in professional development.

All of this suggests that teachers are more likely to change their practice when they experience professional development that builds effectively on their knowledge and skills, is aligned with other policies that influence their teaching, and fosters ongoing formal and informal professional communication. This is true even among teachers who have gained the same underlying knowledge and skills as a result of their professional development experiences. The work by Garet and colleagues (Desimone, Porter, Garet et al., 2002; Garet et al., 2001) provides empirical support for the relationship among the coherence of professional development, growth in teacher knowledge and skills, and changes in classroom practice.

IMPORTANCE OF THIS STANDARD

Professional development that does not increase teachers' content knowledge and knowledge of how students learn content and that is not coherent as defined above holds little chance of improving student learning. Careful, detailed work by scholars such as Deborah Ball (2000) and Mary Kay Stein (Stein & Lane, 1996) shows that teachers' lack of content knowledge is detrimental to student learning. For example, when teachers do not understand the mistakes children make in their thinking, they cannot correct those mistakes. When teachers do not have a broad but in-depth knowledge of a field like mathematics, they cannot make the connections between concepts, graphics, and representations that allow students to develop a conceptual understanding of math topics. Much research shows that teachers with a limited knowledge of math tend to focus on memorization and procedures and can't offer students multiple ways of solving the same problem. Also, such teachers tend to miss opportunities to connect important concepts and representations.

Many research studies have shown how teacher content knowledge is related to improved teaching and is thus essen-

tial for student learning. Take math, for example. Scholars have shown that teacher knowledge about math and how to teach math is likely to translate into several desirable types of instruction, such as the ability to construct better mathematics representations, better understand students' methods and mistakes, and have a clearer understanding of structures underlying mathematics and how they connect (for example, Ball, 1993; Borko et al., 1992; Carpenter, Fennema, Peterson, Chiang, & Loef, 1989; Leinhardt & Smith, 1985; Ma, 1999; Thompson & Thompson, 1994). In general, teachers with more explicit and better organized knowledge provide instruction that features conceptual connections, appropriate and varied representations, and active and meaningful student discourse. According to Fennema and Franke (1992), teachers with more knowledge differ in the "richness of the mathematics available for the learner" (pp. 149-50). Teachers with limited knowledge have been found to portray the subject as a collection of static facts; to provide impoverished or inappropriate examples, analogies and/or representations; and to emphasize seatwork assignments and/or routinized student input as opposed to meaningful dialogue.

When professional development is not coherent, teachers have to deal with the tension of learning things in professional development that are not consistent with policy messages they are receiving. In a study of comprehensive school reforms, which rely primarily on professional development to foster teacher change, a synthesis across multiple studies showed that when a professional development reform pushed in a different direction from accountability or standards, teachers did not adopt and implement the improved teaching fostered by the professional development (Desimone, 2002). Extraordinary measures were sometimes necessary to address the misalignment, such as allowing schools to be exempt from standardized achievement test results, to allow teachers to work on changing their instruction in ways that were not responsive to the district testing regime.

Coherence in terms of embedded practice and dialogue has been shown repeatedly to be a critical component in teacher learning. When teachers, in professional learning communities, can discuss new ideas with other teachers, practice them, receive feedback, share students' reactions, and brainstorm with other teachers, they much more successfully implement what they learn in professional development (Cochran-Smith & Lytle, 1999; Cohen, McLaughlin, & Talbert, 1993; Little, 1993).

ESSENTIAL PRACTICES

In my own work, I have found that both content focus and coherence are essential to effective teaching practice. In studies of large-scale samples of teachers, my colleagues and I have found that teachers who participate in content-focused professional development are more likely to use inquiry-oriented instruction (Smith et al., 2007); and that teachers are more likely to change their instruction and increase their knowledge

and skills when professional development is coherent in terms of activities being aligned with each other, with teacher knowledge and beliefs and with school, district and state reforms and policies (for example, Desimone, 2009). Further, my colleagues and I have found that teachers who are able to engage with one another to build an interactive learning community around professional development tend to report that the professional development increased their knowledge and helped them change their practice (Desimone, Porter, Garet et al., 2002; Garet et al., 2001).

Similarly, in estimating the effect of different qualities of professional development, I found that content focus and coherence are two of the most important factors in determining whether teachers consider the professional development useful for developing their knowledge and skills and making improvements in practice. Further, in a synthesis of professional development literature, I found that content focus and coherence are consistently found to contribute to professional development's effectiveness (Desimone, 2009).

CHALLENGES TO IMPLEMENTATION

One major challenge in developing, administering, and studying the effects of content-focused professional development lies in conceptualizing and defining different types of teacher knowledge and how to measure them. Deborah Ball and Heather Hill, among others, have made great progress in this area for mathematics (Hill, Ball, & Schilling, 2008), although there is substantial work to do in defining and measuring the domain of knowledge for teaching. There is still no consensus regarding the form, structure, or components of pedagogical content knowledge, the amount of this knowledge that teachers should have, or the extent to which this form of knowledge includes teacher beliefs about particular content or how to teach that content. There is also little consensus regarding the amount of knowledge teachers must possess, the particular characteristics of knowledge that enable effective teaching, and the role of teacher knowledge in instructional practice and student achievement. Another challenge is the imprecision with which we are able link teacher learning and knowledge and how it affects student learning. Furthermore, conceptualizations of teacher knowledge are often based on logic and intuition. Researchers have generated relatively little evidence to support intuitions regarding the content and structure of teacher knowledge.

A major challenge to providing content-focused, coherent professional development is cost. Schools and districts understandably feel a responsibility to reach large numbers of teachers. But a focus on breadth in terms of number of teachers served comes at the expense of depth in terms of the quality of the experience. One clear direction for schools and districts is that, in order to provide useful and effective professional development that has a meaningful effect on teacher learning and fosters improvements in classroom practice, funds should be fo-

cused on providing high-quality professional development that is content-focused and coherent. This would require schools and districts either to focus resources on fewer teachers or to invest sufficient resources so that more teachers can benefit from high-quality professional development.

Time is also a substantial constraint to providing the dimension of coherence that allows teachers to engage with each other about instruction. It takes time from the school day to offer teachers a chance to talk with each other, practice, observe, get feedback, and meet with their professional communities. Few schools, especially inner-city public schools, have the resources to give teachers this amount of time. Again and again, teachers complain that a major reason for not implementing what they learned in professional development is that they don't have enough time to understand and practice and get feedback on what they are doing (Desimone, 2002).

TAKING ACTION

Districts and schools can take several measures to foster content-focused, coherent professional development. My research on leadership and district roles indicates that districts can play a key role in organizing and aligning professional development with district priorities. For example, involving teachers in planning professional development helps ensure that it responds to their needs, concerns, knowledge, skills, and challenges (Desimone, Porter, Birman, Garet, & Yoon, 2002). We also found that professional development tended to be more content-focused and coherent when districts used multiple funding sources to pay for professional development activities (a way of merging and integrating goals from multiple programs) and when they explicitly aligned professional development activities with state or district standards and assessments. District monitoring of activities and their effects through continuous improvement efforts was also related to better professional development.

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- In a given setting, planning a new professional development program or revising an ongoing program involves the study of the organization, the states of learning of students, the curriculum and instruction used by the instructors, and the professional social climate of a sample of the schools.
- A local design team needs to be organized and legitimized by the district officials and needs to include a healthy sample of teachers, principals, and district organizers.

DESIGN AND ALTERNATIVE MODELS OF PROFESSIONAL DEVELOPMENT

Here we draw directly from our formulation of five models of professional development and underline how our design team might relate to them. Each model can be the design core of a professional development component (Joyce & Calhoun, 2010).

Support for individuals: The most common form is stipends and brief leaves for individual teachers. The objective is to enable individuals to create their own learning opportunity. Their judgment determines goals, and their energy and good scouting ability generate the processes. Can our design team organize school district personnel, including policymakers, to build a component around this model? Yes, it can.

Personal and professional service models, such as coaching and mentoring programs, have been written about by so many others that we will simply urge our design team to look into them carefully.

Collegial study models (usually in the form of professional learning communities) also have a huge literature for our design team to explore.

Curriculum implementation models are important because curriculum improvement depends on professional development. Our design team finds that the concept of repertoire and the knowledge about how people learn new repertoire are at the core of those models.

DESIGN REQUIRES LEARNING

We will not try to summarize this short piece here, but rather to commend the organization for attempting to build standards to guide its constituency. We have read the Hall & Hord (2011) article in this issue on implementation (p. 52), and one of the authors' most important points is that implementation *requires* new learning. That is true of design as well. This may be the most important message from the latest version of the standards.

Ron Edmonds' fine statement makes the issue clear: "We can, whenever and wherever we choose, successfully teach all children whose schooling is of interest to us. We already know more than we need to do that. Whether or not we do it must finally depend on how we feel about the fact that we haven't so far" (1979).

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