Guest Editorial

The Root of the Problem

Not that long ago I was at my dentist's office. Before he began the much needed root canal, he asked what educators were required to do to maintain their teaching certification and participate in professional development (PD). I explained our state's process for renewing certifications every five years and questioned him about his interest. He said that he was curious about what other professionals do because he would be updating his skills by spending the next several Fridays learning new techniques for his field of endodontics. He was truly looking forward to increasing his skill set. His energy and enthusiasm in looking forward to this PD opportunity has remained with me since that interaction. We continued our discussion (as best as possible while I was administered Novocain) about why some people look forward to PD and some do not.

My dentist truly got to the root of the problem with PD. He was actively looking forward to PD specific to his field that he could then apply in his practice. Educators do not often look forward to those upcoming inservice days because the experiences they have habitually do not allow them to engage in PD that is relevant to their field. We are all familiar with a districtwide inservice day that is provided for all teachers on a particular topic. The presenter is well versed on the topic; however, the topic is not necessarily relevant to the needs of each teacher. This method of "one size fits all" is not an effective method by which to provide PD to educators, and in my opinion, is one of the obstacles to providing effective PD for science educators.

Regardless of what subject area or grade level PD is geared toward, effective PD should include two overarching key principles, which are outlined in the NSTA Position Statement on Professional Development in Science Education (see Internet Resource):

> Professional development programs should be based on student learning needs and should help science educators address difficulties students have with subject-matter knowledge and skills.
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> Professional development programs should be based on the needs of science educators—of both individuals and members of collaborative groups—who are involved in the program. Ongoing professional development initiatives should be assessed and refined to meet teachers' changing needs.

When districts provide PD for educators that is meaningful—in terms of improving student performance and learning in a classroom—we can begin to meet the goals of federally mandated programs that require highly qualified teachers who are engaged in ongoing PD to meet the needs of their learners. To address these goals, district offices and those personnel who are planning PD need to reflect on a key aspect that has worked in the classroom—differentiated instruction—and take it one step further by offering differentiated PD to their teachers. One of the key findings best summarized by Loucks-Horsley, Stiles, and Hewson (1996) is that "teachers, like students, best learn science and mathematics by doing science and mathematics, by investigating for themselves and building their own understanding, as opposed to being required to memorize what is 'already known'" (p. 2). These points are well-referenced in the literature and supported throughout various studies over time.

By providing opportunities for in-depth exploration of content and engagement of educators in modeling the instructional process, we will be able to focus on the needed differentiation in the PD of science educators, just as we do when we focus on the need for differentiated instruction for students.

Park Rogers et al. (2007) found that PD is most effective when (a) content is relevant and applicable to classrooms, (b) it engages teachers in learning content through modeling and in similar manners to how their students will learn, and (c) it allows teachers to form collegial relationships through networking with other teachers and the facilitators.

These findings are supported by Kennedy (1999), who examined PD studies that demonstrated increased student learning and found that "the content of in-service programs does indeed make a difference and that programs that focus on subject-matter knowledge and on student learning of particular subject matter are likely to have larger positive effects on student learning than are programs that focus mainly on teaching behaviors" (p. 25). This is taken one step further nearly a decade later in a cross-state analysis conducted by the Council of Chief State School Officers (2008), which stated that not only did the content of PD programs matter but, "Significant effects of professional development programs for teachers of math and science were found when the programs include focus on content knowledge in the math and science subject areas plus training and follow-up pedagogical content knowledge" (p. 1).

These points are supported when teachers are able to participate in PD offerings that have direct links to their curriculum; when they are provided opportunities to engage in learning both new content and pedagogy, practice, and reflect with colleagues; and when they have continuing and ongoing support (Loucks-Horsley et al. 2003).

By providing opportunities for in-depth exploration of content and engagement of educators in modeling the instructional process, we will be able to focus on the needed differentiation in the PD of science educators, just as we do when we focus on the need for differentiated instruction for students. At that point, we can get to the root of the problem and provide experiences that will create avenues of learning for teachers and students alike, but also approach the level of energy and enthusiasm my dentist had when describing his future PD opportunities.

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References

Council of Chief State School Officers (CCSSO). 2008. *Does teacher professional development have effects on teaching and learning?* Washington, DC: CCSSO.

Kennedy, M. 1999. *Form and substance in mathematics and science professional development, 1–7.* Madison, WI: National Institute for Science Education Brief.

Loucks-Horsley, S., N. Love, K.E. Stiles, S. Mundry, and P.W. Hewson. 2003. *Designing professional development for teachers of science and mathematics.* Thousand Oaks, CA: Corwin Press.

Loucks-Horsley, S., K. Stiles, and P. Hewson. 1996. *Principles of effective professional development for mathematics and science education: A synthesis of standards.* Madison, WI: National Institute for Science Education. Available: *www.wcer.wisc.edu/archive/nise/Publications/Briefs/NISE_Brief_Vol_1_No_1.pdf.*

Park Rogers, M., S. Abell, J. Lannin, C. Wang, K. Musikul, D. Barker, and S. Dingman. 2007. Effective professional development in science and mathematics education: Teachers' and facilitators' views. *International Journal of Science and Mathematics Education* 5: 507–532.

Internet Resource

NSTA Position Statement
www.nsta.org/about/positions/profdev.aspx