EVALUATION LANDSCAPE

Written by
REBECAH BUSSELLE

The complex landscape of science teacher professional development (PD) is shifting in response to advances in technology and changing educational goals as states adopt the Next Generation Science Standards (NGSS) and the Common Core State Standards (CCSS) for English Language Arts and Mathematics. These shifts mean evaluation must shift as well.

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NGSS AND COMMON CORE

As of this writing, 42 US states have adopted the new Common Core State Standards (CCSS) and 19 have adopted the Next Generation Science Standards (NGSS). Many of the remaining states have developed their own new standards, drawing heavily on CCSS and NGSS for inspiration. These new standards require significant shifts in teaching practices and in the content taught in classrooms.

Many teachers and administrators need — or will need — substantial professional development to understand and successfully implement these changes. This is particularly true in K–6 classrooms where teachers must deeply understand and implement all three sets of standards. Many K–6 teachers are now expected to teach science content for which they have no formal training. Thus, we're seeing a renewed focus on PD for teachers across the country. This focus presents new challenges and opportunities for evaluation.

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>
> — Unconference Participant

One of the major shifts in teaching and learning brought about by NGSS is the idea of multi-dimensional learning. The Framework for K–12 Science Education used to develop the Next Generation Science Standards categorizes science teaching and learning into three broad dimensions. The dimensions laid out in the framework are Science and Engineering Practices (skills), Disciplinary Core Ideas (content), and Crosscutting Concepts (recurring themes). The Next Generation Science Standards also includes links to two dimensions of the Common Core State Standards: English Language Arts and Mathematics. Effectively implementing NGSS means integrating multiple dimensions in each lesson, classroom activity, student resource, and assessment.

Evaluating science teacher professional development in the age of NGSS requires understanding what multi-dimensional teaching looks like and using tools that measure multi-dimensional learning. But the newness of NGSS means there are likely gaps in the availability of NGSS-aligned resources for teachers and evaluators alike. Good science PD evaluation should anticipate and respond to these potential gaps. For example, a teacher may have a transformative professional development experience that shifts her knowledge and skills in significant and meaningful ways. But lack of access to good, multi-dimensional curriculum materials may be an insurmountable barrier to implementing NGSS in her classroom. An evaluation of the PD may assume that acquiring knowledge and skills will lead to implementation. But if the evaluation does not consider the curricular resources needed for implementation — because they've been widely available in the past — it will fail to explain why this teacher, and others in similar situations, are unable to translate PD into classroom practices. Similarly, an evaluation that plans to use NGSS-aligned student assessments to measure shifts in student content knowledge may be derailed when evaluators discover the assessments they expected to use do not exist.

> "NGSS is very challenging to understand and even tougher to implement. Educators face a lack of good materials and low levels of content knowledge."
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> — Unconference Participant

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TECHNOLOGY

Technology is shifting the ways teachers organize their own professional learning.

Traditionally, professional development takes place face-to-face, at conferences or in workshops organized by schools or districts. Increasingly, online PD courses are being offered that mirror their face-to-face counterparts, allowing more teachers to attend PD sessions without incurring travel expenses. But technology is changing more than just access to PD, it's also changing the types of PD that teachers engage in.

Many teachers are turning to their computers and mobile devices to access PD opportunities and resources of their own choosing, on their own schedules. Personal, online PD might mean listening to TED-Ed talks from leading education thinkers or watching YouTube videos about complex science topics. It might mean leveraging the collective knowledge and experience of educators worldwide by joining Professional Learning Networks (PLNs) through social media platforms such as Twitter, Edmodo, Ning, and Facebook. It might mean convening an unconference where participants choose the PD agenda and volunteer to share their expertise with others. Or it might mean collaboratively developing classroom tools and resources using tools such as Google Docs and Evernote.

In many ways, technology is making professional learning more accessible and equitable. But it's also making PD experiences and participation more distributed. This presents new challenges for evaluation. For example, there is little research on the outcomes of these PD experiences, making it difficult to develop a theory of change to guide evaluation. Additionally, teachers don't all participate in online PD experiences at the same level,

even with formal, online courses. The individual PD opportunities afforded by technology mean each teacher's PD experience is unique and likely extends beyond any one program being evaluated. Thus, a good PD program evaluation needs to control for these outside experiences and levels of engagement and/or capture the rich tapestry of PD experiences that may be changing a teacher's knowledge, skills, and classroom practices. Good evaluations can contribute to our collective understanding of how these shifts in technology impact teacher learning.

> "Online learning is reaching more people but they don't all participate at similar levels. Evaluation needs to assess engagement as well as learning outcomes."
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> — Unconference Participant

At the same time, technology is making it easier for evaluators to collect and analyze data. One of the biggest challenges evaluators face is reaching participants after their engagement with a PD program. For many evaluation designs, particularly longitudinal evaluations, being able to email participants weeks or months after their last face-to-face meeting is crucial. Online tools, such as Google Forms and Survey Monkey, make it easier for evaluators to collect data and for participants to respond to surveys from their mobile devices. Technology also makes certain types of data (e.g., logs, pictures, tweets, surveys, videos, interviews) easier to record, access, and analyze. Finally, powerful tools for conducting certain types of statistical analyses are becoming easier for non-experts to access and use properly.

03 LOOKING FORWARD

Previous evaluation efforts have helped shift our view of good science PD from many stand-alone summer and weekend workshops focused on content to PD programs that integrate pedagogy and are sustained over time with on-demand supports. Many believe this will result in an increase in teachers changing their classroom practices, an outcome that can have a significant impact on student learning. Evaluation efforts have also helped us to understand that PD is most effective when teachers participate as a cohort and can support one another in implementing their learning after the initial learning experiences. Future evaluation efforts will help us understand new challenges in K–8 science professional learning and better meet the needs of teachers and students moving forward.