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Teachers learning how to use data: A synthesis of the issues and what is known

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ABSTRACT

This article provides a synthesis of the articles found in the special issue on data use. The synthetic piece contextualizes how the articles contribute to the knowledge base of how teachers use data. It synthesizes the findings by identifying key common themes. It then describes gaps in the current knowledge base and identifies the requisite steps needed to address those gaps.

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This special issue has provided an international perspective on research and theory on how teachers learn to use data to inform their practice. Using data in education is not new; it has been around for a long time. However, the emphases for education to become evidence-based have been increasing in many countries. Despite the emphases and the recognition that teachers must be equipped with data, little comprehensive effort has been made to improve the capacity of educators to use data effectively and responsibly through teacher preparation programs and explicit requirements for licensure. The articles included in this issue address studies that focus on preparing teachers through professional development, data teaming, coaching, courses, and laying out theories, frameworks, and models of data use. They largely focus on various aspects of data use, its effects on teacher performance, how learning happens after hire, and—in limited ways—address the need to begin preparation for data use earlier in teachers' careers, a point that Mandinach and Gummer (2013, 2016) have made.

For data use to be woven into day-to-day practice, rather than being perceived as an “add-on” to the hard work teachers already do, continuous learning must occur throughout one's career, beginning in teacher preparation programs through to the time of retirement or when one leaves the profession. This means that the

building blocks for data use must be laid in teacher preparation programs (Mandinach & Gummer, 2016; Reeves & Honig, 2015), and that this learning must be extended, reinforced, and fit-to-context throughout one's career if the aim is to deeply embed the use of data as an engrained tool in a teacher's repertoire. Leaving the acquisition of data literacy to traditional forms of professional development is risky at best. Schools of education would not allow the graduation of teacher candidates without appropriate exposure to content, pedagogy, and methods courses, and practical experiences. Data use is no less important. In-service training (e.g., in the event of a new data system) or workshop-style professional learning experiences may well be necessary at times, but even these must build on pre-service experiences. Funding is scarce for professional development and many schools may consider data use to be peripheral, opting instead to focus on topics that are considered more pressing. Learning how to use data must occur over the entire landscape of teachers' careers. Our objective here is to provide an overview of the articles in this special issue, focusing on issues that call for additional consideration as the field considers how to support teacher learning around data use.

1. Cross-cutting topics: what's important for learning about data

In this synthesis, we identify several cross-cutting topics

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addressed by the articles in this issue. We highlight findings from the individual articles, but raise issues that the field must continue to address. Topics include: (a) the need for continuous learning around data – the where and when; (b) the need to integrate data skills with content knowledge and pedagogical content knowledge and link the data skills to other aspects of effective teaching; (c) the sustainability of impact; (d) models of effective professional learning and the impact of collaborative inquiry and data teaming; and (e) the logic model on impact of data use. Our intent here is not to review all the literature on these topics. That is grist for other articles. Instead, we seek to highlight the topics both as keys to models for enhancing data literacy and creating a generation of data literate teachers and as catalysts for dialogue around the ways in which teacher capacity for data use is enabled or hindered by preparation and support efforts.

1.1. Continuous learning

Teachers must engage in lifelong learning that begins when they are teacher candidates. Learning about the ways in which data inform instructional planning, delivery, and intervention efforts when educators are already in practice is too late. Mandinach and Gummer (2013, 2016) lay out the rationale for why schools of education must step up to begin to address the lack of human capacity around data skills. Preparation programs must introduce data use to teacher candidates, who must then have data use-related knowledge, skills, and dispositions reinforced through in-service training and professional development throughout their respective careers. To this point, Van den Hurk, Houtveen, and Van De Grift (this issue) describe how one school of education is addressing data use, while Poortman and Schildkamp (this issue) also focus on the topic by examining how a formal structure (in their study, the data use procedure) can contribute to teacher data use capacity even as teachers collaborate around data to address localized problems of practice. The article from Lai and McNaughton (this issue) describes a three-phase model of professional development on data teaming that helps educators enculturate data use into their practice.

Preparation programs are but one side of the equation, as these articles point out. Jimerson, Cho, and Wayman (this issue) for example, highlight the ways in which in-service teachers may struggle to fit data to practice when data-related concepts have not been well-introduced in teacher preparation programs. They note that in the absence of solid mental models for data use (student-involved data use, in their particular study) teachers may intuit their own purposes. In a similar vein, Farrell and Marsh (this issue) note the moderating effect of teacher beliefs in the use of data and capacity building as they highlight the importance of improvement-oriented (rather than compliance-oriented) routines for using data. Teacher beliefs about data use matter, and so learning around data must address not only the technical aspects of data use (e.g., accessing systems or interpreting reports) but also the assumptions teachers make about what data “count” and whether or how data use benefits students. Continuous learning, then, means less that either side of the equation (i.e., teacher preparation or school district/organization) does a “better” job at supporting data use, than it does that *both* sides of that equation must collaborate to not only build capacity around data use, but also provide a continuum of ever-deepening learning experiences in using data to inform teaching and learning.

1.2. Data skills: an integrated approach

Effective data use, as pointed out by the Farrell and Marsh piece (this issue), is a complex and nuanced endeavor. Underscoring this

complexity, and the importance of aligned and structured supports, Hoogland et al. (this issue) note the importance of data literacy and beliefs in data use. Mandinach and Gummer (this issue) outline a construct, data literacy for teachers, that contains some 53 skills and sources of knowledge teachers need to use data effectively and responsibly. This construct is grounded in Shulman’s (1986, 1987) knowledge needed for teaching. Fundamental to the conceptual framework is that data skills for teaching must be surrounded by several forms of knowledge, most specifically content knowledge and pedagogical content knowledge (Gummer & Mandinach, 2015). Many educators may have the skill set to understand data, but as the pieces from Lai and McNaughton (this issue) and Mandinach and Gummer (this issue) make clear, teachers must move beyond that understanding to put their interpretations to work in the form of transformed instruction. That Farrell and Marsh (this issue) as well as Van Gasse, Vanlommel, Vanhoof, and Van Petegem (this issue) find few instances of transformed instruction as a result of data use suggests that a gap exists in how the field supports teachers to develop just this capacity. Most commercial professional development providers of data use admit that they do not go far enough to connect to the pedagogy (Mandinach & Gummer, 2013). In contrast, Lai and McNaughton (this issue) refer to pedagogy and Poortman and Schildkamp (this issue) address curriculum, assessment, and instruction. There may well be a difference in the level of integration provided by academics such as Lai and McNaughton (this issue) and Poortman and Schildkamp (this issue) in contrast to the commercial professional development models, with the former providing more of an integrated approach whereas the commercial models focusing more on just the data skills. Preparation and training around data skills must be integrated with both content knowledge and pedagogical content knowledge. These activities must incorporate the skills that Mandinach and Gummer (this issue) outline and are mentioned in passing in several of the other articles.

A question we must raise is what is the base level of each type of knowledge (e.g., data skills, content knowledge, and pedagogical content knowledge) required to serve as a starting place for effective data use? The field needs to explore the relationships among these skill sets. Not everyone needs to be a data nerd, but every educator must have some passing knowledge of inquiry, data collection, data interpretation, and application to instructional planning and delivery. Some educators may only need to be good consumers of information. Clearly some teachers lack a deep understanding of data, using only the most cursory data to inform their practice, and even making interpretive errors based on misunderstanding of the data. (To be certain, this is problematic among many school leaders as well, but as this issue focuses on teacher learning for data use. That is our focus here as well.) As Means, Chen, DeBarger, and Padilla (2011) found, teachers with good data skills who work in collaborative teams can compensate and backfill for other teachers who lack such skills. But as van Gasse et al. (this issue) note, collaboration does not occur automatically, having found little collaboration among teachers on data use. For teachers, they also must rely on their knowledge of content and pedagogy: this knowledge is not negotiable. Teachers without content knowledge and pedagogical content knowledge and who possess only data skills, may well be considered data nerds, but not effective teachers; these teachers will not be able to transform information into instructional steps. Teachers without content knowledge will be unable to diagnose student misconceptions, strengths, and weaknesses. Therefore, efforts to support teacher learning around data use must contribute to a solid operating foundation in each of these areas of knowledge. As there must be some minimum acceptable levels for all of these areas of knowledge, no facet of data literacy should be neglected.

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