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Contributing conditions: A qualitative comparative analysis of teachers' instructional responses to data

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ABSTRACT

Despite the press for data-informed decision making, there is still much to learn about when and under what conditions data promote changes in instruction and when they may contribute to other outcomes. The study uses qualitative comparative analysis to examine 245 cases of teachers' data use in five middle schools from a year-long study in the United States. Analysis points to the important influence that certain types of data, the involvement of a coach or peer group, and the school culture can have on teachers' instructional responses to data.

1. Introduction

Today's teachers are inundated with different forms of data, with the expectation that they will use them to inform instructional decisions (Coburn & Turner, 2011; Hamilton et al., 2009; Mandinach, 2012; Spillane, 2012). The push for teachers' data use is a global phenomenon, identified in studies from the Netherlands (Schildkamp & Kuiper, 2010), New Zealand (Lai & McNaughton, 2013), or England (Downey & Kelly, 2013). These data can be collected for external accountability purposes (e.g., state assessment results) or gathered at the school level (e.g., student work) (Supovitz, 2012). Using data to improve teaching and learning is a seemingly simple proposition: If teachers have access to student learning data, they can more easily identify what students know, and they can adjust their instructional practice accordingly. Driving this educational data movement are professional development efforts, data systems, consultants and supporting organizations, websites, and plenty of "how-to" books (Gerard, Spitulnik, & Linn, 2010; Marsh, 2012; Piety, 2013).

However, data use is more complicated than the idealized picture painted by advocates (Horn, Kane, & Wilson, 2015; Nelson, Slavit, & Deuel, 2014; Slavit, Nelson, & Deuel, 2013). Teachers respond to data by setting goals for individual or groups of students, tracking student progress, adjusting content sequencing, modifying curricular materials, or identifying students for intervention support (Beaver & Weimbaum, 2013; Marsh, Pane, & Hamilton, 2006; Schildkamp & Kuiper, 2010; Young, 2006). Teachers can also respond to data in ways that do not significantly change their instructional practice (Firestone, Fitz, & Broadfoot, 1999; Nelson et al., 2014; Oláh, Lawrence, & Riggan, 2010; Supovitz, 2012). Sometimes, teachers may not use data at all, favoring intuition and anecdote instead (Ingram, Seashore Louis, & Schroeder, 2004). We also see troublesome evidence that current accountability systems may promote unintended practices like narrowing instruction or engaging in test preparation strategies (Booher-Jennings, 2005; Jennings & Bearak, 2014; Marsh, Farrell, & Bertrand, 2016).

There is much to learn about when and under what conditions data are used to promote changes in instruction and when they may contribute to other outcomes (Coburn & Turner, 2011). Several factors likely mediate how teachers interpret and act on data, including the involvement of a capacity-building intervention (i.e., a coach or data team), the nature of the data, and the culture at the school (Coburn & Turner, 2011; Cosner, 2011; Marsh, Bertrand, &

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Huguet, 2015; Spillane, 2012). Beyond this list of conditions, we need a sense of how the presence or absence of these factors work in concert for different instructional responses. We need to ask: *what combinations of conditions are associated with different instructional responses to data*? Exploring these issues is essential if we are to understand data-use efforts at the ground level and determine how to best support teachers in these efforts. It is this gap our paper seeks to fill.

2. Literature review

Research suggests that classroom and school improvement can occur when teachers consider and respond to data when planning for their instruction (e.g., Herman, Wardrip, Hall, & Chimino, 2012; Snipes, Doolittle, & Herlihy, 2002; Wayman, Cho, & Johnston, 2007; Zavadsky, 2009). Yet we know that teachers' responses to data can be quite varied (Heritage, Kim, Vendlinskl, & Herman, 2009; Marsh et al., 2006; Means, Chen, DeBarger, & Padilla, 2011; Oláh et al., 2010). Teachers respond to data by setting individual or class goals, tracking student progress, adjusting curriculum and content sequencing, re-teaching content, or make other procedural changes (Datnow, Park, & Kennedy-Lewis, 2012; Goertz, Olah, & Riggan, 2009; Supovitz, 2012). There are also reports of teachers who modify their instruction, identifying new pedagogical strategies and shifting *how* they are teaching, not only *what* they are teaching (Goertz et al., 2009; Marsh et al., 2015). This is the goal frequently mentioned by policymakers and data-use advocates. To understand this range of outcomes, empirical literature points to three oft-cited conditions that influence data use, including the involvement of a capacity-building intervention, the type of data, and the data-use culture at schools (e.g., Cosner, 2011; Jimerson & Wayman, 2015; Supovitz, 2012).

2.1. Capacity-building interventions

To date, educational leaders have invested in a wide range of interventions to help teachers interpret and use data to inform their instruction (Farley-Ripple & Buttram, 2014; Jimerson & Wayman, 2015; Marsh, 2012; Marsh et al., 2015). Coaches have become a central part of many school improvement efforts (Woulfin, 2014). Coaches are specially trained, master teachers who offer on-site and ongoing support for teachers. They can perform multiple roles, of which data support may be only one (Coburn & Woulfin, 2012; Marsh et al., 2008; Rodgers & Rodgers, 2007). Studies suggest that coaches can help teachers become more expert in interpreting data, understanding student thinking, and designing instructional responses (Marsh, McCombs, & Martorell, 2010; Means, Padilla, & Gallagher, 2010).

Groups of teachers who meet to analyze data are frequently associated with data-driven reform initiatives, called professional learning communities (PLCs), inquiry groups, or data teams (Slavit et al., 2013; Vescio, Ross, & Adams, 2008). They typically involve collaborative work among peers, guided by a lead teacher or facilitator (Hipp, Huffman, Pankake, & Olivier, 2008). One study suggested that working in a small group setting promoted more sound data interpretations, with colleagues clarifying and correcting analysis errors (Means et al., 2011). Other studies point to positive effects of data teams on teacher understandings, beliefs, and practices, although these effects are not universal (Farley-Ripple & Buttram, 2014; Gallimore, Ermeling, Saunders, & Goldenberg, 2009; Marsh et al., 2015; Schildkamp & Poortman, 2015).

2.2. Types of data

Different forms of data likely matter for teachers' data use (Rose & Fischer, 2011; Supovitz, 2012). Teachers see some types of data as more credible and valid than others, based on alignment to standards, instruction, or other assessments (Coburn & Talbert, 2006; Farrell & Marsh, 2016; Ingram et al., 2004; Jennings, 2012). Data gathered from certain kinds of assessments may be more consequential for educators. For instance, teachers may attend to data generated from high-stakes assessments with "gaming" activities (i.e., focusing on test preparation strategies) because of the consequences of poor performance for themselves or their schools (Booher-Jennings, 2005; Henig, 2012).

One key distinction may be whether data are designed and collected locally at the classroom or school levels or generated by an external, centralized source (i.e., state assessment data) (Farrell & Marsh, 2016). In one study (Ingram et al., 2004), teachers reported prioritizing locally-developed data while discounting standardized or norm-referenced assessments, and some teachers believed that state achievement indicators were unlikely to provide useful information about their practice. Further, educators may turn to certain data over others based on what kind of information they feel they are able to glean from them. For instance, data from classroom assessments may provide valuable information regarding recent student learning compared to district benchmark assessments that provide predictive information on future performance on state assessments (Young & Kim, 2010).

2.3. Data-use culture at school

School context is an important factor in shaping whether data are used for inquiry and reflective instructional practice or towards goals of monitoring, compliance, and accountability (Datnow et al., 2012; Diamond & Spillane, 2004; Nelson et al., 2014). In schools with an inquiry or improving culture, teachers may be more open to considering how their instructional choices contributed to patterns in student learning data (Marsh et al., 2015; Nelson et al., 2014). In schools with a focus on performance and meeting accountability goals, teachers may be more likely to focus on certain responses, like complying with accountability requirements instead of considering new instructional strategies (Anderson, Leithwood, & Strauss, 2010).

School leaders play a crucial role in framing messages around data-use that permeate to the classroom level, serving as policy mediators (Rorrer & Skrla, 2005) and reform sensegivers (Cosner, 2011). Leaders can balance – or buffer – the demands of the external accountability policies and the associated data from state assessments with internal accountability and long-standing traditions of classroom feedback (Knapp & Feldman, 2012). School leaders can also shape the data-use culture of their schools through the design of school-level routines and protocols (Coburn & Turner, 2011; Little & Curry, 2009; Spillane, Paarise, & Sherer, 2010; Supovitz & Klein, 2003). Data-use routines can structure educators' work, influencing what data they attend to and with what goals in mind (Horn et al., 2015). These routines and protocols can focus discussion on substantive issues in instruction (e.g., Lasky, Schaffer, & Hopkins, 2009), while in other cases, they can lead to conversations that are superficial or become "activity traps," in which educators go through the motion of examining data (Timperley, 2009).

Rather than assuming any one condition serves as the driving factor for instructional outcomes, we need to attend to data use as a multifaceted, context-bound process (Coburn & Turner, 2011; Little, 2012; Spillane, 2012). We need more information on how this set of conditions, in combination, matter for different instructional

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