Why Does Teacher Learning Vary in Professional Development? 
Accounting for Organizational Conditions

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The Need for Research

- Much is known about professional development (PD) strategies (Garet et al., 2001; Kane et al., 2017).
- But even well-strategized science PD, teachers vary in how they take up and implement new instructional practices (Lungu et al., 2021; Mole 2021).
- What explains this variation?

Purpose and Framework

We examined how elementary teachers in the western United States differentially understood and implemented reform-based science instructional practices after a year of science PD. We used the Interconnected Model of Professional Growth in an Organizational Context to understand how the interactions between: 1) teacher personal characteristics, 2) their immediate professional world (classroom and students), and 3) their organizational and external context shaped teacher change across levels of implementation.

Research Questions

1. How do interactions across personal/organizational contexts affect teacher change?
2. What deeper understandings of teacher differential learning are afforded by the inclusion of the organizational and external domains in interaction with other domains in the teacher change process?

Context

Science Learning Partnership (SLP)
- Four-year. NSF funded elementary science PD program; grades 3-5
- 120-150 teachers
- Weekend summer institute and three Saturday workshops each year; Lesson study

Main instructional outcomes: Equitable Sensemaking Discourse

Sensemaking as a dynamic process of discourse drawing on student cognitive resources to develop, revise, or critique an explanation or account to discern the mechanism underlying phenomena (Dinken & Ross, 2018). This process must privilege student foundations of knowledge, community values, and existing language repertoires (Basu et al., 2009; Miller, et al., 2018)

For low-change teachers, the teacher-centered and text-oriented organizational environment reinforced their pedagogical beliefs to elymine change (l, e, a). In contrast, high-change teachers' belief alignment with the PD (c, d) allowed for resistance to organizational incentives that were not supportive (g), facilitating implementation of SLP pedagogies (d).

Advancing and Nuanced teachers' reflection on student learning, bolstered by the PD (c) helped them navigate barriers to science education in the organizational environment (q, h). Static teachers were unable to draw on these resources, allowing the organizational environment to reduce change (c).

Imagery

We expected to find that teacher change would be differentiated by the type and number of constraints within the organizational environment. Indeed, we found that teacher change was differentiated by teachers' ability to learn from and draw on motivational resources to resist anti-science and teacher-centered aspects of the organizational environment. These resources were generated through:

1. Coherence between PD, teacher pedagogical beliefs, and existing routines

Because the PGOC model attends to the domains in teachers' immediate professional world as well as organizational and external contexts, it models systems that influence teacher learning, moving beyond "barriers" and illuminating feedback loops that amplified or stymied teacher change (Allen and Penneu, 2015; Longhi et al., 2021; Stollman et al., 2017).

In addition, this study contributes to a body of literature examining teacher resistance to inequitable or otherwise misaligned areas of organizational practice (Gutierrez et al. 2016, Rivera Maulucci et al. 2015, Shi 2020).

Our findings indicate that teacher acts of "creative insubordination" (Bezemer 2014) are a fruitful area of future research, especially in elementary science education (Carlone et al., 2010)

Implications

Need for differentiated PD in two areas (Stollman et al., 2020):
1. Understanding how existing pedagogical beliefs manifest in classroom culture and institutional routines. PD can provide opportunities for teachers to identify existing aligned routines, amplifying the learning and uptake of strategies within the PD.
2. Noticing student assets and student learning, and using these as inspiration to shift instructional practices in the face of organizational barriers.

In addition, PD providers should create opportunities to identify and amplify areas of alignment with the organizational environment, or to discuss ways to resist misaligned incentives (Brown and Weber 2016). This includes using legacy curriculum judiciously, as well as problem-solving ways to use resources available in the PD to overcome barriers. This study confirms calls by Heredia (2020), Allen and Penneu (2015), and others to intentionally build time in PD for sensemaking around organizational policies and evaluation of the relationships between reforms and current practices.

Discussion

We expected to find that teacher change would be differentiated by the type and number of constraints within the organizational environment. Instead, we found that teacher change was differentiated by teachers' ability to learn from and draw on motivational resources to resist anti-science and teacher-centered aspects of the organizational environment. These resources were generated through:

1. Coherence between PD, teacher pedagogical beliefs, and existing routines
2. Observing student learning while trying out PD strategies

Additional citations are in the references section in the text.