



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

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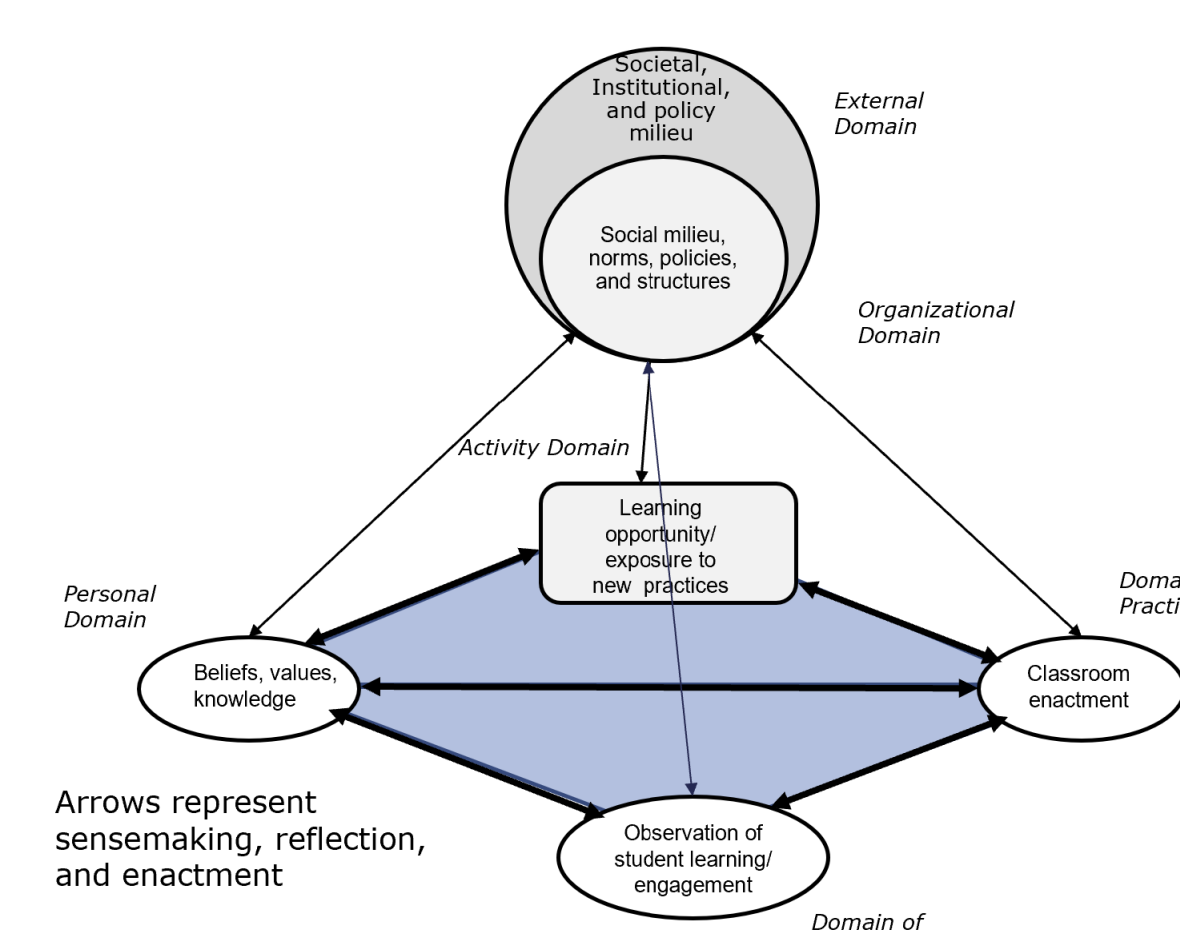
## The Need for Research

- Much is known about professional development (PD) strategies (Garet, et al. 2001; Kennedy, 2017)
- But even in well-strategized science PD, teachers vary in how they take up and implement new instructional practices (Longhurst et al. 2021, Molle 2021)
- What explains this variation?
- Reviews of the literature point out the need to research the role of the context in shaping teacher learning and change (Boylan, et al., 2018; Opfer & Pedder, 2011), including teachers'
  - Professional context (classrooms and students)
  - Organizational context (norms, structures and policies)
  - External context (external funding, social trends)
- Elementary teachers' organizational context can be antithetical to science due to lack of materials, pacing guides, testing, and emphasis on math and ELA (Sandholtz et al. 2019, Stollman et al. 2020)
- Yet when teachers have opportunities to make sense of alignment with their organizational context, they are more positive toward PD (Allen & Penuel, 2015; McNeill, et al., 2011)
- Teachers may also resist norms in their organizational environment to implement equitable science (Carlone, et al., 2010)
- Needs additional research and conceptual definition

## Purpose and Framework

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

Interconnected Model of Professional Growth in an Organizational Context (PGOC model)



### Research Questions

- How do interactions across domains in teachers' immediate professional world (personal domain, domains of practice and consequence) create the conditions for differential teacher learning in PD?
- 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
- 8 districts, 100 teachers
- Weeklong summer institute and three Saturday workshops each year; Lesson study

### Main instructional outcome: Equitable Sensemaking Discourse

Sensemaking as a dynamic process of discourse drawing on student cognitive resources to develop, revise, or critique an explanation or model to ascertain *the mechanism underlying a phenomenon* (Odden & Russ, 2018). This process must privilege student funds of knowledge, community values, and existing language repertoires (Basu et al., 2009; Miller, et al., 2018)

## Methods

Sample: 21 teachers; at least 9 months in PD program

### Data:

- Observed lesson (video)
- Interviewed after observed lesson
  - Understandings of main outcomes
  - Changes in instructional practice
  - PD/organizational features that influenced those changes

### Analysis:

- Continuum of teacher change
  - Analyzed interview transcripts for evidence of instructional change in outcomes,
  - Corroborated with video
  - Placed teachers in one of four categories of change

### PGOC Framework:

- Coded for the domains in the PGOC framework
- Memoed and mapped each teacher's individual change process
- Generated themes based on salient interactions

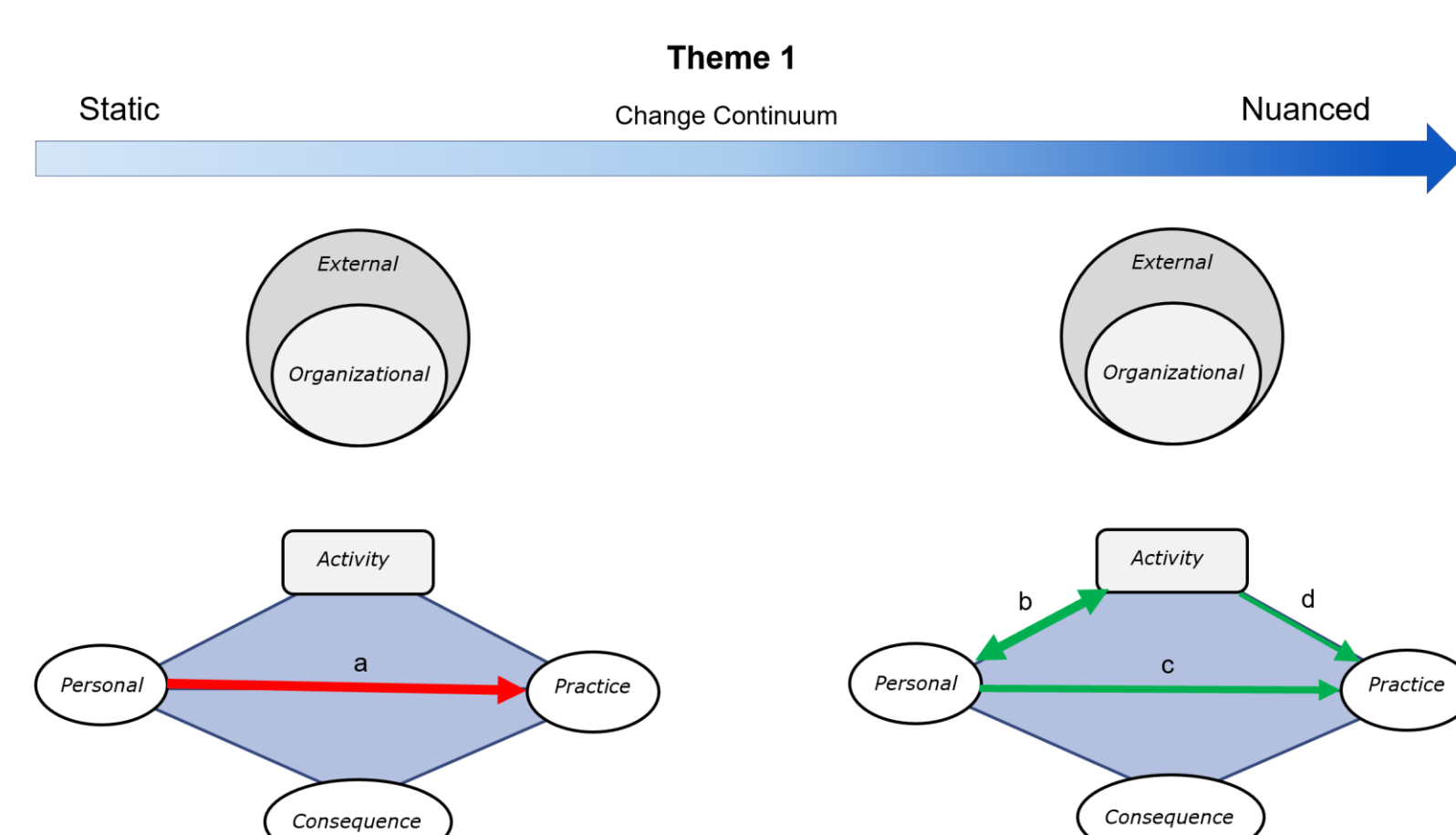
### Teacher Change Continuum

Teacher Change Category	Description	Number of Teachers
Static Change	Difficulty changing practice Generally teacher-centered approach to teaching	4
Initiating Change	Tried out tools, strategies, and formats mechanically or superficially Strategies often used to supplement existing curricula	7
Advancing Change	Experimented with strategies from SLP PD Generally student-centered focus/approach to teaching, emphasizing socially-constructed learning	5
Nuanced Change	Begins to see students as co-constructors of scientific knowledge Adapts new strategies to classroom context with expertise	5

## Results

Two themes showcase key interactions between domains in the teachers' immediate professional world that differentiate teacher learning (Theme I and II). Panning out to include the organizational and external domains (Themes I and II in context) demonstrates how interactions with context shape teacher learning.

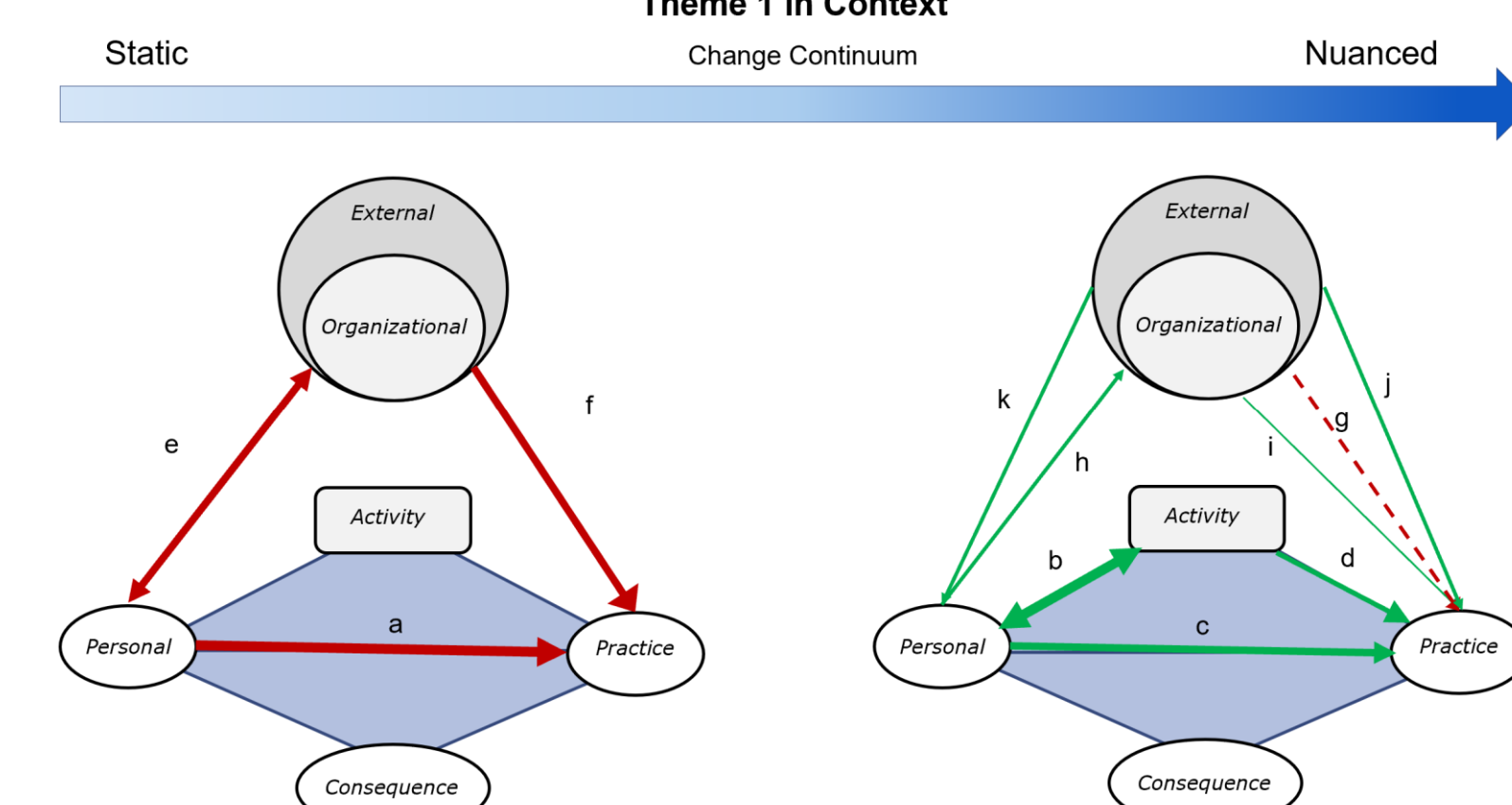
### Theme I: Alignment between personal and activity domains facilitates change



Low-change teachers exhibited misalignment between their pedagogical beliefs and SLP. Their more teacher-centered beliefs continued to shape their practice (a). High-change teachers had well-developed pedagogical beliefs that aligned with the student-centered pedagogical principals of SLP (b). They incorporated SLP strategies that fit their beliefs (c, d). Here Emily discusses how she felt about SLP strategies (c, d, e):

To me that's that aspect of really good discourse, is when...they're like, 'I don't know if that fits yet and I need to talk to you more about it.' I'm just in love with that concept...' (Nuanced teacher)

### Theme I in context

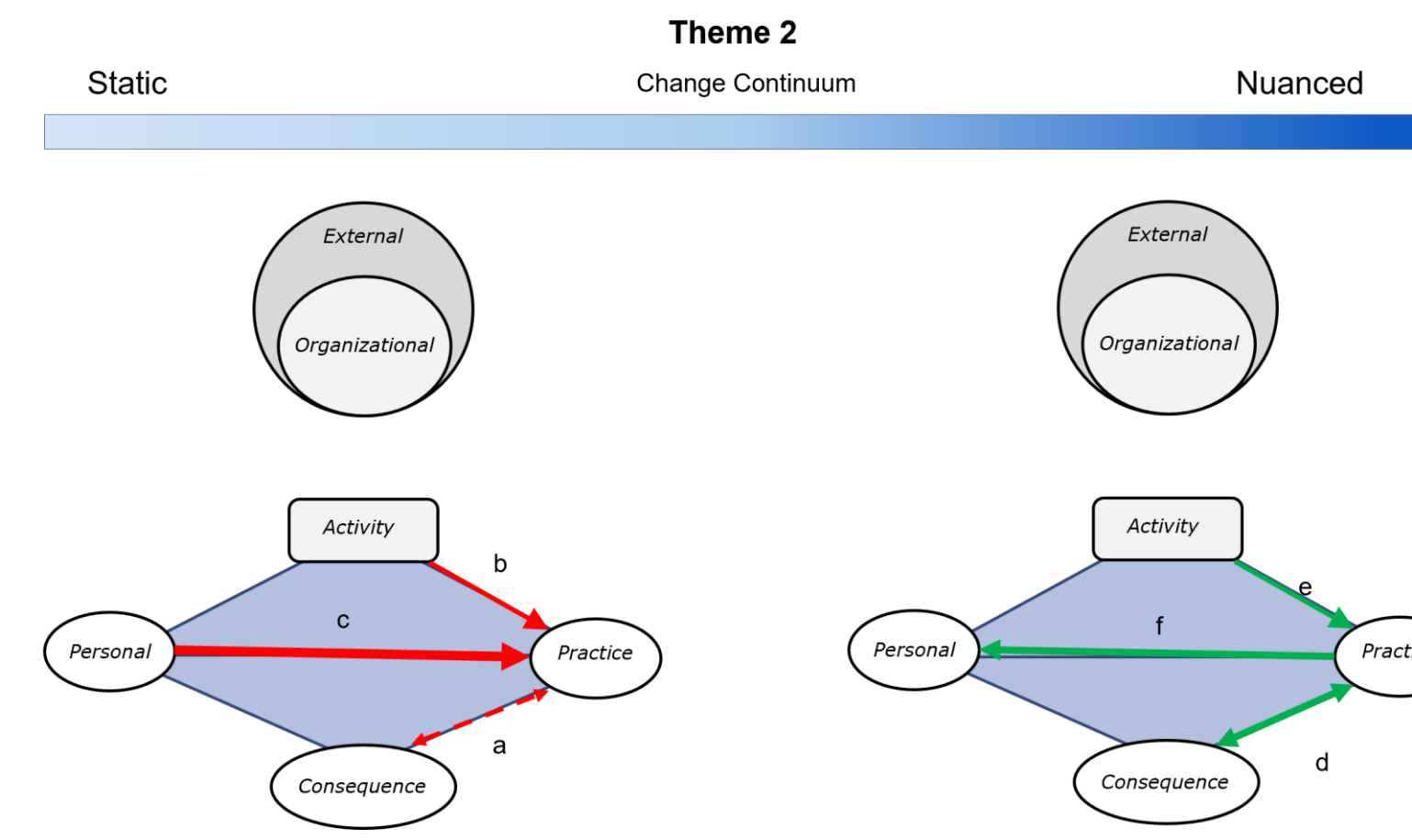


For low-change teachers, the teacher-centered and test-oriented organizational environment reinforced their pedagogical beliefs to stymie change (f, e, a). In contrast, high-change teachers' belief alignment with the PD (b, c) allowed for resistance to organizational incentives that were not supportive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

So when you add in the ELA, the math...I've used up more than the minutes I have...So I have to figure out and be smarter about how can I connect...Or you shut the door and you ignore...I am going to do science, and I'm going to do social studies. (Nuanced teacher)

Leslie navigated organizational constraints through content integration or "shutting the door" (g), drawing on SLP and her commitment to teach science (c, d).

### Theme II: Close observation of student learning reinforced SLP pedagogies

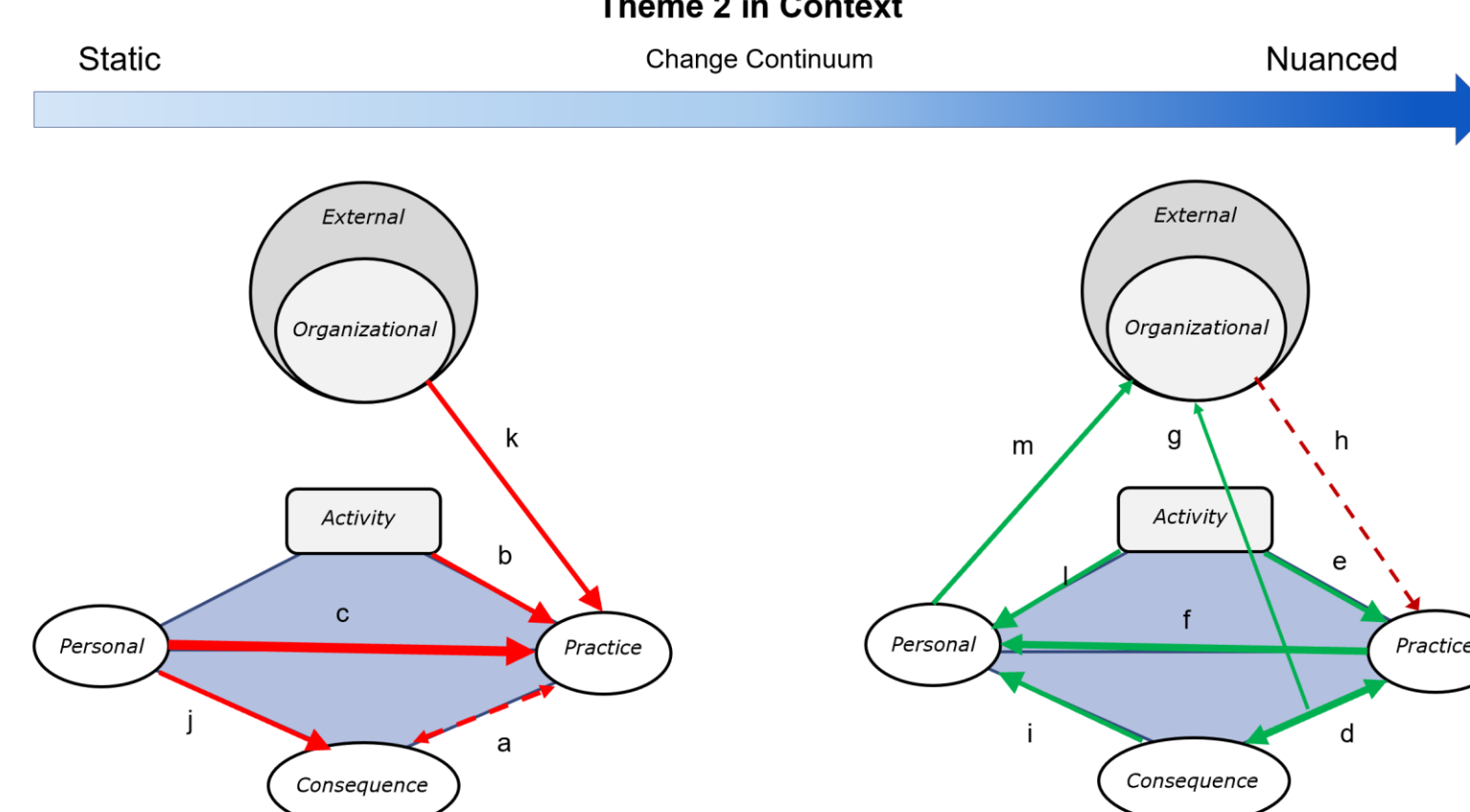


Low-change teachers championed fact accumulation and had difficulty connecting student learning to their instructional practice (a, c), undermining their ability to adopt SLP instructional practices (b). High-change teachers conceptualized student learning and their teaching practice as integral (d), and described student productive struggle when implementing SLP strategies (e).

One of the [SLP] strategies that I really feel is successful is when we're all in productive struggle, when we see a group that is getting a hook in something, that we fishbowl or do a gallery walk [SLP strategies]...it's really effective. (Advancing teacher)

As Tess reflected on trying out SLP strategies (e) she celebrated student sensemaking in relation to the learning process (f, d).

### Theme II in context



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

I don't have a curriculum. I don't know how it's all going to come together. But when we actually looked at student work, it was amazing to see how much more they had picked up than I thought...maybe in the absence of a curriculum I had more freedom to play around with this, with my students...It's exciting. (Nuanced teacher)

Kathleen once believed a lack of curriculum inhibited science (k), but ongoing PD and seeing the student learning (e, d, i) shifted her perception of curriculum as a barrier (g, h) and gave her freedom to try new pedagogical strategies (e, f).

## 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

(Marshall et al. 2021, Allen and Penuel 2015, Stollman et al. 2020; Fore et al. 2015, Franke et al. 2001, Schipper et al. 2017).

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 Penuel 2015, Longhurst et al. 2021; Schipper 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 2016, Rivera Maulucci et al. 2015, Shi 2020). **Our findings indicate that teacher acts of 'creative insubordination' (Gutierrez 2016) 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):

- Understanding how existing pedagogical beliefs manifest in classroom culture and instructional routines. PD can provide opportunities for teachers to identify existing aligned routines, amplifying the learning and uptake of strategies within the PD.
- 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 their 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 how to use resources available in the PD to overcome barriers. This study confirms calls by Heredia (2020), Allen and Penuel (2015), and others to intentionally build time into PD for sensemaking around organizational policies and examination of the relationships between reforms and current practices.

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