



Research paper

“Even when it was hard, you pushed us to improve”: Emotions and teacher learning in coaching conversations

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ABSTRACT

We investigate the role of teachers' edge-emotions in coaching conversations. While emotions are common in instructional coaching, they are under-examined in research. This qualitative study examines a particularly emotional coaching event that we facilitated with an experienced mathematics teacher. We use Kerdeman's (2003) framework of being “pulled up short” to describe how the teacher's understanding of her lesson was interrupted, resulting in negative emotions. She was ultimately motivated to transform her practice with our empathy and sustained support. We discuss implications for instructional coaching, particularly how edge-emotions can be leveraged to support teachers' conceptual change.

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1. Introduction

Recently, interest in instructional coaching has grown in both research and practice. In U.S. public schools, coaching has doubled since the turn of the century, with 93% of districts employing coaches (Domina et al., 2015). Reflecting variation in practice, researchers have investigated coaching in many ways. In their review of research on mathematics coaching — a field where many studies are located — Marshall and Buenrostro (2021) found four main areas of interest: (1) coaches' activities and relationships; (2) effects of coaching on student assessment scores; (3) effects of coaching on teachers' practices; and (4) effects of coaching on teachers' knowledge or beliefs. Overall, researchers concur that coaching can support teacher learning, since coaches can help teachers make sense of instructional challenges (Domina et al., 2015; Kraft & Hill, 2020), but in-depth investigations of how such learning happens are rare.

While these findings endorse the expansion of coaching, from our own experiences as coaches and conversations with others, we

note that research often overlooks an important component of the work: the negative emotional experiences teachers sometimes have during coaching conversations. Although some investigators have considered this topic, they have focused on developing coaches' emotional intelligence (Patti et al., 2015; Tschannen-Moran & Carter, 2016), coaches' emotional landscapes (Hunt & Handsfield, 2013), and teachers' positive emotions after successful coaching conversations (Darby, 2008). One exception is Hunt's (2016) work documenting the extent to which coaches avoid negative emotions. Strikingly, few studies of teacher learning examine the commonplace phenomenon of what Mälkki (2010) calls teachers' *edge-emotions* — feelings like fear, embarrassment, guilt, frustration, and anxiety — that arise as in response to situations where assumptions are challenged, as often happens during coaching. Edge-emotions are named as such because teachers typically encounter them at the edge of their comfort zones. Given the frequent presence of edge-emotions in coaching activities, Hunt's work still leaves open questions about how coaches might productively support teachers through such emotions, which are often experienced negatively by teachers and can inhibit teacher reflection (Mälkki, 2010).

This gap between research and practice merits exploration. After a coaching event in our own study sparked a teacher's edge-emotions — and also led to important learning — we

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wondered: What role do teachers' emotions — particularly edge-emotions — have in coaching? And how might those edge-emotions be harnessed for learning and instructional change? Thus, we closely investigate one case of teacher learning using ethnographic methods of data collection and a sociocultural approach to understand the roles of emotions, and the coaches' responses to them, in her learning.

2. Literature review

To conceptualize the role of teachers' emotions in their learning through coaching, we draw on two bodies of prior work — studies of coaching and studies of teacher emotions. We bring these together with sociocultural theories of teacher learning and a lens of teacher identity.

2.1. Coaching and instructional change

Many studies persuasively argue that coaching can catalyze teachers' development (e.g., Kraft et al., 2018), but few look closely at coach-teacher interactions to understand *how* teacher learning occurs. Research shows that coaching can support teachers in improving student assessment scores (Bruns et al., 2018; Campbell & Malkus, 2011; Garcia et al., 2013), adopting new instructional practices (Duchaine et al., 2011; Obara & Sloan, 2009), and improving pedagogical knowledge and beliefs about effective instruction (Bengo, 2016; Gibbons et al., 2017; Hopkins et al., 2017; Knapp et al., 2016), but only a small set of studies look closely at the processes of learning (e.g., Bengo, 2016; Bruce & Ross, 2008; Gibbons et al., 2017). Furthermore, Marshall and Buenrostro (2021) argue that because coaching is situated in classrooms, it can be responsive both to teachers' learning needs (Bengo, 2016; Gibbons et al., 2017; Kohler et al., 1997) and specific instructional contexts (Giamellaro & Siegel, 2018; Hopkins et al., 2017).

Despite the recent growth in coaching research (Gallucci et al., 2010; Gibbons & Cobb, 2016), few studies examine the emotions that arise in coaching conversations. When we share this research landscape with coaches, they usually express surprise: teachers' strong emotions feature prominently in their work. Even before coaching increased in popularity, earlier research on teaching anticipated emotionality in coaching conversations: scholars often noted that teaching is a deeply personal endeavor (Britzman, 2012; Connelly et al., 1997), that educational change is frequently emotional (Hargreaves, 2004), and that reflection with the aim of transformational learning is characterized by the edge-emotions described above (Mälkki, 2010; Rainio et al., 2021). Coaches' work — observing, questioning, critiquing, and re-imagining classroom practice — inevitably places teachers in emotionally vulnerable positions (Bruce & Ross, 2008; Kelchtermans, 2005). Indeed, Shernoff et al. (2015) highlighted the importance of coaches empathizing with and validating teachers' experiences.

In our work, we find that coaching feedback evokes various emotions for teachers. Sometimes teachers respond positively, expressing excitement about a lesson or delight in students' engagement (Darby, 2008). Yet, as in our focal case, coaching feedback can also evoke edge-emotions that teachers experience negatively, like feeling overwhelmed or frustrated.

2.2. Teachers' emotions and educational change

Although the coaching literature is relatively new, research on teachers' emotions has a slightly longer history. Research in the psychological tradition primarily focuses on individual teachers' emotional regulation or emotional labor (Cukur, 2009; Schutz & Lee, 2009; Tsang, 2011). For example, supervisors and cooperating

teachers both assume that preservice teachers' emotions can be adjusted or ignored (Meyer, 2009). Teachers often regulate and manage their emotions because of expectations from their school or society, leading to a moral deception in which they are not able to be their authentic selves (Oplatka, 2009). In brief, this research describes a need for teachers to regulate emotions and avoid strong ones, while cautioning that this emotional labor contributes to teacher burnout (Chang, 2009).

In contrast, sociological research captures teachers' emotions during educational change, documenting teachers' emotionally-laden responses to school reform. Not all change projects are equal, of course: self-initiated change is strongly associated with positive emotions, while externally mandated change is commonly associated with negative emotions (Hargreaves, 2004). Existing school and community norms and practices shape teachers' sensemaking about change initiatives (Coburn, 2001). Sensemaking is also informed by latent theories of teaching and learning (Spillane, 2000) tied to particular teaching cultures (Horn & Little, 2010). Although norms, practices, and latent theories can be described as cultural and epistemic dimensions of change processes, sensemaking about school reform also has emotional dimensions, especially when charged with workplace micropolitics and challenges to teachers' personal investments in their practice (Achinstein, 2002). Overall, this literature documents the extent to which change perturbs the status quo, in which teachers have differing pragmatic, epistemic, and emotional investments. Change creates new expectations that teachers feel more or less prepared (and willing) to meet.

Because of our interest in the role of teachers' emotions — particularly the edge-emotions that accompany reflection — in coaching and teacher learning, we find special relevance in a small body of work on teachers' emotions in the context of professional growth (Finkelstein et al., 2019; Hodgen & Askew, 2007; Hunt, 2016; Rainio et al., 2021; Saunders, 2013). Conceptualizing emotions as co-constructed, these authors qualitatively studied different professional learning settings to suggest the importance of participants' emotional experiences. Important to our analysis, Rainio et al. (2021) built on Mälkki's (2010) construct of edge-emotions to describe how teachers' (and students') ambivalent emotions are inevitable given schooling's contradictions. As teachers navigate these contradictions — *should I follow my students or should I ensure my colleagues respect me?* — the reflections involved often evoke edge-emotions (frustration, fear, anger, shame, guilt, anxiety) that sometimes steer them toward avoiding such issues altogether. Relatedly, Saunders (2013) found that emotions such as anxiety played a role in whether teachers implemented or avoided implementing what they had learned in professional development, while Hodgen and Askew (2007) suggest that professional development should provide opportunities for elementary teachers to engage in emotional and identity construction activities to mitigate negative emotional associations teachers may have with mathematics. Similarly, Finkelstein et al. (2019) found that professional development can cause feelings of anxiety or insecurity when teachers' content expertise is called into question; we argue that this may be even more common in coaching situations where an outsider in the classroom makes teachers feel like their practice is under scrutiny. Indeed, Hunt (2016) found that both coaches and teachers avoided what she calls negative emotions (e.g., shame, fear, and guilt), discursively positioning themselves in relation to ideals like *best practices* and *good teacher*. Hunt conjectured that such moves may support professional relationships but may also diminish learning opportunities. Overall, although this research reiterates the idea that professional growth often implicates both teachers' emotions and identities, it does not investigate *how* teachers' edge-emotions

might contribute to their growth, particularly in the context of coaching (Saunders, 2013). We seek to contribute to this conversation, connecting teachers' emotions in coaching to their learning.

3. Conceptual framework

3.1. Identity as a unifying construct for emotions and teachers' learning in context

To capture the relationship between teachers' emotions and learning during coaching, we use a dynamic conception of teacher identity. Specifically, we view teacher identities as "reifying significant, endorsable stories about a person" (Sfard & Prusak, 2005, p. 14), capturing both the psychological/dispositional and sociological/situational aspects of who teachers are and how they are perceived. For instance, descriptions like *passionate teacher* or *apathetic teacher* reflect particular individual dispositions for teaching, while *immigrant teacher* or *alternatively certified teacher* reference broader social and cultural histories. Obviously, boundaries between individual dispositions and particular settings blur, as passionate teachers can become apathetic in unsupportive teaching situations (Santoro, 2011).

Especially salient to teachers' identities are notions of "good teaching," which reflect both individual commitments and narratives that come from school and society (Chen et al., 2018; Horn et al., 2008; Kelchtermans et al., 2009). Notions of good teaching — whatever that means to teachers themselves, as well as whatever messages they receive — shape teachers' motivations to learn about practice (Nolen et al., 2011). If feedback from teachers' environments challenges their identification with those notions, this can produce strong (often negatively experienced) emotions, especially when they are invested in the educational change efforts.

3.2. Identity and learning: being pulled up short

A sociocultural perspective helps account for learning's emotional dimensions. For instance, Vygotsky (1978) emphasized emotional experiences in learning, arguing that people assign meaning to events when their intellectual and affective processes align (Edwards, 2010, pp. 63–77; van Huizen et al., 2005). This suggests issues of alignment (and misalignment) are a source of emotion in learning. The research on teachers' emotions reviewed above highlights (1) a tendency to avoid or regulate strong emotions, instead of seeing them as something worth drawing on, and (2) the introduction of new or unmet expectations as a source of teachers' edge-emotions. This first point suggests a need for coaches to normalize emotions, and the second suggests an opening for reconceptualizing important aspects of teaching (Hall & Horn, 2012; Horn & Garner, 2022).

Specifically, unmet expectations can create an experience that philosophers describe as being *pulled up short* — "an event [teachers] neither want nor foresee and to which [they] may believe [they] are immune interrupts [their] lives and challenge[s] [their] self-understanding in ways that are painful but transforming" (Kerdegan, 2003, p. 294). When pulled up short, teachers' worlds depart from their expectations, and tensions arise between what they believe and hope and what actually happens. In many cases, the identities people protect the most are also most vulnerable to being pulled up short (Kerdegan, 2003), leading to particular vulnerabilities around questions of "good teaching." Being pulled up short catches teachers off guard, revealing that, despite their planning, lived experiences often unfold in undesired ways, putting them distinctly outside of their comfort zone. This experience can be painful and lead to the biological threat response described by Mäilä (2010), as it may expose teachers' emotional,

physical, and intellectual insecurities (Self & Stengel, 2020). In some cases, the edge-emotions provoked by being pulled up short are impossible to contain, resulting in outward displays of emotion.

These disconnects between expectations and lived reality — and the edge-emotions that surface — are sometimes necessary for teachers to "break hold of [...] prejudices, ultimately enabling them to make something new and more constructive of that emotion" (Self & Stengel, 2020). Edge-emotions result from experiencing loss of sorts, but this loss makes room for transformational learning (Rainio et al., 2021), awakening teachers to previously unimaginable choices and resulting in conceptual change. By *conceptual change*, we refer to the transformation of fundamental understandings of core aspects of teaching (diSessa, 2006; Kelchtermans, 2005), as teachers imagine other possibilities for their practice. The challenge for coaches shifts from *avoiding* edge-emotions — a tendency reported by Hunt (2016) — to *recasting* them as avenues for conceptual change.

Normalizing edge-emotions as inevitable in deeper learning opportunities requires an epistemological shift about what it means to teach well. In technocratic views of teaching (Biesta, 2007), good teaching is relatively clear-cut, determined by measurable outcomes like test scores (Vongalis-Macrow, 2007; see also Garner et al., 2017). This contributes to binary logic, where all lessons and teachers are either good — or not. This logic implicates the coach-teacher relationship. For example, if a coach identifies an area for improvement in a lesson, a binary framing insinuates that the lesson (or teacher!) is not good. Technocratic views reduce the complexity at the heart of our sociocultural perspective on teaching, which instead posits that teaching is a social practice, and, therefore, is irreducibly situative, dependent on the details of any given teaching situation (Horn & Kane, 2019). In other words, "good" teaching does not look the same in every context, with every group of children (see also Rainio et al., 2021). Eschewing a technocratic view reduces teachers' vulnerability in coaching: the goal shifts from implementing best practices to inquiring into possibilities of different teaching moments (including unanticipated moments) and to work toward the goals of good teaching. From this perspective, the goals of good teaching exist in interactionally-derived meanings rather than predetermined templates, along with accepting the perpetual, imperfect approximation of meeting those goals. This alternative view of good teaching emphasizes teachers' ongoing sensemaking (Biesta, 2007; Horn, 2020).

In this paper, we describe one teacher's experience getting pulled up short and her subsequent emotions. We show how the teacher and coaches navigated through these edge-emotions as her identity as a "good teacher" was challenged and how she ultimately transformed her practice.

4. Methods

Focusing on a critical event (Emerson et al., 2011; Webster & Mertova, 2007), we offer an empirical analysis of instructional coaching that productively engaged a teacher's edge-emotions. Using this case, we investigate the following research questions:

1. How might teachers' emotions — particularly edge-emotions — be harnessed for learning and instructional change?
2. What role could teachers' edge-emotions have in coaching?

4.1. Research context and participants

The focal event and supporting data came from a design-based research project investigating how co-inquiry into rich video and

audio records of lessons can support teachers' learning (Horn & Garner, 2022). In collaboration with a professional development organization (PDO) in a large urban district in the Western United States, the research team iteratively developed a Video-based Formative Feedback (VFF) cycle to support experienced secondary mathematics teachers' development of ambitious and equitable instruction. Typical VFFs included a team of two or more PDO teachers from the same school and two researchers. For each VFF, one teacher was the focal teacher whose lesson we used for collective inquiry. Each VFF was grounded in the focal teacher's inquiry questions, the basis for organizing feedback. Members of the research team — in this case, the first and third authors — observed and recorded the focal teacher's lesson, collecting audio of students' small-group conversations, classroom video, and relevant artifacts. Shortly after observing, the research team reviewed the recordings with the teacher's goals in mind. Within two days, the school-based teacher team debriefed the lesson with the researchers, reviewing moments that supported investigations of the teachers' interests. During debrief conversations, video and audio records served as representations of practice to support teacher learning (Horn et al., 2015; Little, 2003).

5. Researcher roles

In this project, we worked as both researchers and coaches. We managed this in part through a division of labor. Prior to debrief conversations, we recruited other research team members to aid in video and audio review, selecting clips to address the focal teacher's inquiry questions, and strategizing our approach to the debrief; these written plans are artifacts of our work and serve as secondary data sources. During each debrief, one team member facilitated while another documented the conversation. The research team's intensive collaboration necessitated extensive documentation of our decisions, supporting reflexivity about our process (Macbeth, 2001), which mitigated some tensions inherent in our dual roles. For example, the research team reported emotionally-laden coaching interactions with several participating teachers in memos and during team meetings throughout the data collection process, allowing for collaborative reflection. We would often troubleshoot different scenarios and discuss ways to mitigate tensions in future debriefs, such as beginning with a video clip that showed a teachers' growth toward a goal they had shared with us.

Along with our careful coordination of our work during VFFs, we assigned one researcher as the primary contact for each teacher team to support the relational aspect of coaching, allowing teachers to develop comfort and familiarity with the person who typically facilitated their debriefs. This also gave one researcher a firsthand longitudinal perspective on a subgroup of teachers and their contexts. For the focal team at Fermat High School (all school and teacher names are pseudonyms), Brette was the primary contact. Importantly, Katherine was new to the project at the time of the focal event; this was her first sustained encounter with the teachers.

6. Stance on facilitation

In line with our situative perspective on teacher learning, we conceptualize coaching as a process of co-inquiry, framing VFFs with two important assumptions. First, no participant had greater expertise in the coaching conversation; instead, the research-practice collective had multiple forms of expertise for thinking about teaching (Jurow et al., 2019). For example, teachers hold deep knowledge about their teaching contexts, students, curriculum, and the competing messages about “good” instruction that they must navigate. Members of the research team have formal training in

analyzing mathematics classroom discourse, which we brought to our video reviews of focal lessons. We view these knowledge bases as complementary rather than hierarchical. Our second guiding assumption reflected our stance on teaching as an interactional accomplishment and therefore only partially dependent on teachers' skill (Cohen, 2011; Horn & Kane, 2019); thus, our framing of instructional issues rejects binary notions of good teaching, such as that “good” teachers always have good lessons. This normalizes the reality of disappointing lessons and unexpected classroom moments (Horn & Little, 2010; Rainio et al., 2021). In addition to reflecting our commitments, we hoped that these guiding assumptions would mitigate the vulnerability teachers might experience in this process.

7. Focal teacher

During our five-year project (2016–2021), we worked with six teacher teams and conducted 35 VFFs, with intensive data collection taking place in the middle three years (2018–2020). The critical event for this analysis occurred in a VFF debrief with Lizette McLoughlin, a mathematics teacher at Fermat High School, a large urban high school whose student population was racially, linguistically, and socioeconomically diverse. At the time of the debrief, she had between five and 10 years of experience¹, including several years as math department head.

Over the three years of intensive data collection, we worked with Lizette, conducting nine classroom observations, six VFFs (three with her as the focal teacher), five interviews, and various other informal conversations and observations at PDO activities. Through these interactions, we developed a clear understanding of Lizette's teaching and how she made sense of it. Namely, Lizette's notions of good teaching centered on supporting students' mathematical agency, authority, and identity. In interviews and other conversations, she consistently described her instructional goals using the TRU Framework, which emphasizes equitable engagement in rich mathematical tasks (Schoenfeld, 2018). In particular, Lizette valued sustained small-group work, where students collaborated to develop shared understandings of mathematical content. In classroom observations, she displayed a commitment to supporting students' inquiry: rather than providing students with procedures to memorize, she set up interesting tasks for groups to work on so they could develop deep mathematical understanding.

For example, we talked with Lizette about fostering student collaboration. She noted the challenge of convincing high-achieving students to work with peers, describing them as so confident they “check out” if they think their group-mates are wrong. Lizette described collaborative practices she hoped to cultivate instead, including “thoughtfully think[ing] of a way to help [their] group move in a better direction” and learning to value each other and each other's work (VFF Debrief, February 2018). At the same time, Lizette was aware of the potential pitfalls of asking students to develop mathematical understandings together. During debriefs, she mulled over instructional dilemmas — like monitoring students' frustration levels — that stemmed from her emphasis on student sensemaking. As she described in an interview:

If a kid is still struggling [...] are they just done until somebody comes and does something for them? Or are there systems in place so that they are getting help from a classmate or that they can help themselves? (Interview 1, March 2017).

¹ To further de-identify our participants, we report their years of experience in five-year ranges.

This nuanced interpretation of student experience, with its careful parsing of particular behaviors, was characteristic of her pedagogical reasoning (Horn, 2005).

Regarding her instructional practice, Lizette established a collaborative and welcoming environment. One of her core strategies was listening to students, inviting and building off of their ideas. She typically used strategies from Complex Instruction (Cohen, 1994; Horn, 2012) to support students' collaboration. Our fieldnotes repeatedly remark on the emotional tone of her class, which was consistently warm and playful. Students typically entered her classroom with smiles on their faces, eager to share funny stories or tease her about news of her favorite pop star or sports team. She and her students often bantered as they worked through mathematics. Overall, Lizette had good relationships with students and demonstrated strong commitments to ambitious and equitable mathematics instruction.

8. Data sources

We focus on Lizette's Fall 2018 VFF as a "telling case" (Mitchell, 1984) about the potential role of edge-emotions in coaching and teacher learning. Prior to this debrief, we had conducted three VFFs with Lizette and her partner teacher, Julie Woodman, including two with Lizette as the focal teacher (see Fig. 1 for a summary of data collection events).

The primary data for this analysis come from the October 2018 VFF: video and fieldnotes from Lizette's lesson; our team's debrief planning notes; video and fieldnotes of the debrief; a follow-up

semi-structured interview; and many informal conversations in person, text, and email (see Fig. 1). All video records and interviews were transcribed. As we developed this analysis, we conducted a member-check interview (Lincoln & Guba, 1985) with Lizette to vet and refine our emerging interpretations. Additionally, one year after completing data collection for the larger study, we conducted a second classroom observation and member-check interview with all participating teachers to further inform our analysis and enhance the trustworthiness of findings.

To contextualize these primary data, we relied on the larger corpus to understand Lizette as a teacher. We drew on additional video and fieldnotes of Lizette's teaching, including VFFs in which Lizette was a focal teacher or a partner teacher; interviews throughout three years of data collection; artifacts from Lizette's teaching, including lesson plans and student work; other analyses comparing focal teachers; and fieldnotes from PDO meetings, including observations of Lizette's participation in and facilitation of workshops on different aspects of ambitious and equitable mathematics instruction.

9. Focal event

Our analysis focuses on a sequence of coaching activities related to a strong emotional reaction that one video debrief provoked. While there were emotionally-laden coaching interactions with several participating teachers, Lizette's emotion became exceptionally visible to our team during this debrief, which anchored the series of events summarized in Fig. 2. As she explained in a later interview:

Teaching is really personal. It's an emotional rollercoaster of, "Here's a really good thing," and you feel like, "Oh my God, look at that cool thing I did!" And then, here's the thing you're doing and it's like, "Whew. [sounding defeated]" [...] There's a lot of emotions involved in this. (Interview 4, May 2019)

Like other teachers in our study, Lizette told us that she found VFFs worthwhile but emotionally vulnerable, particularly when she was the focal teacher.

As Fig. 2 shows, we observed and recorded Lizette's Lesson 1 on a Thursday during 4th period (A). That day, the research team reviewed Lesson 1 video and planned the debrief (B). Friday, the research team debriefed the lesson with Lizette and Julie during their morning planning time (C). During the debrief, Lizette described changes she planned for her 4th period class later that day; we returned to see her implement those plans in Lesson 2 (D). On Saturday, at the PDO's monthly meeting, Lizette sought out Katherine to brainstorm the next week's lessons (E). The following Monday, Lizette implemented strategies from their brainstorm in Lesson 3 (F); although our team was unable to observe, she texted us photos of her classroom and commentary on how the lesson went.

Data Sources			
Fermat Team VFF Cycles		Lizette Interviews	
VFF Cycle 1	October 2017	Interview 1	March 2017
VFF Cycle 2*	February 2018	Interview 2	September 2017
VFF Cycle 3*	June 2018	Interview 3	April 2018
VFF Cycle 4*	October 2018	Interview 4	May 2019
VFF Cycle 5	February 2019	Interview 5	February 2020
VFF Cycle 6	March 2019		

Fig. 1. Primary data sources for this analysis. The left table shows the VFF cycles, with the asterisks indicating that Lizette was the focal teacher. The bold type shows the focal event for this paper. The right table lists the interviews.

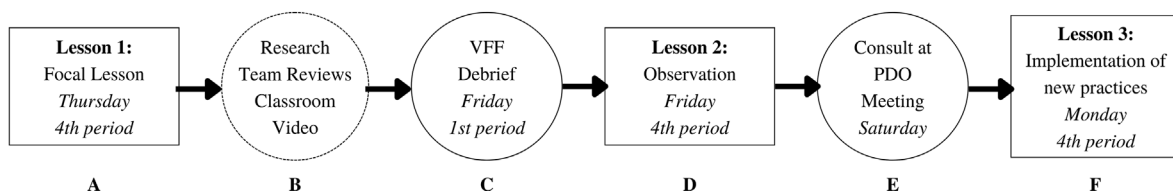


Fig. 2. Chronological sequence of lessons and coaching activities that are the focus of this analysis. Rectangles represent lessons in the sequence and circles represent coaching activities.

9.1. Data analysis

Our data analysis deliberately attended to how Lizette's edge-emotions supported her learning. Because the focal lesson and our video review provide important context for our interpretations as well as the teachers', we ground our narrative in an understanding of how those events (Fig. 2A and B) made aspects of Lizette's teaching salient during the debrief.

As we have established, during the debrief (Fig. 2C), Lizette surprised us with her strong emotional response to the conversation. We consider it a critical event for both her teaching and our relationship with her and Julie, as it was a moment of rupture: the usual flow of things changed, allowing us to understand and examine what is typical. From a learning perspective, such moments of trouble also invite repair, which highlight how participants revise their approaches to situations and develop new sensitivities, both of which require (and uncover) sensemaking (Jordan & Henderson, 1995; Rainio et al., 2021).

To analyze our focal event and Lizette's learning, we used interaction analysis to analyze the debrief video recording and transcript. We started by open coding (Charmaz, 2006) teacher and facilitator talk — attending to discursive frames (Goffman, 1974) and affect (Gee, 2014; Goodwin, 2007) to understand how the conversation unfolded and what led to Lizette's emotional response. Because of our interest in teacher learning, our codes attended to Lizette's sensemaking (e.g., "That's a lot to think about"), emotions (e.g., "I'm just overwhelmed"), affect (e.g., tone of voice), and identity (e.g., "I'm naturally pretty hard on myself"). We also coded for nonverbal behavior, including facial expressions and body language, which has been shown to be useful in analyzing teachers' emotional reactions during video-based learning activities (Chang et al., 2018).

As coding progressed, we developed an account of Lizette's emotional response, how it shaped her motivations to learn, and her resulting conceptual change. The progression of events aligned with the description of teachers' being pulled up short (Kerdeman, 2003; Self & Stengel, 2020), and we used that framework to understand what transpired. Specifically, Kerdeman describes being pulled up short as (1) an interruption to current understandings, (2) a transformation of said understandings, and (3) an unforeseen and unwanted event that precipitates this transformation. We then coded deductively (Miles et al., 2014) to explore how Lizette was pulled up short during the debrief and how her ideas and practices shifted as a result.

10. Findings

To explore how edge-emotions can be harnessed for teacher learning and instructional change, we analyze the transformation in Lizette's understandings as she worked through getting pulled up short (Kerdeman, 2003). We found that Lizette's experience unleashed strong edge-emotions as she moved outside of her comfort zone — she was disappointed in herself and overwhelmed about how to proceed with her students. Because we were available to work with her after this event, we also documented how our coaching helped her process these feelings, motivating her to find new understandings and adopt alternative instructional practices — evidence of conceptual change in teaching (Horn et al., 2015; Horn et al., 2017; Horn & Garner, 2022).

We first ground our analysis in an account of Lizette's lesson and our team's video review, since these shaped our interpretation of her teaching. Then, our analytic narrative unfolds using Kerdeman's (2003) framework, which aligns with our conceptual change perspective emphasizing the transformation of fundamental understandings (diSessa, 2006; Horn & Garner, 2022). Specifically, we

use our data to answer:

1. What is the unforeseen and unwanted event that precipitated this transformation?
2. Which aspect of Lizette's understanding was interrupted?
3. How exactly was Lizette's understanding transformed?

As we will show, her understanding of a key practice in her instruction — *eliciting and building on student understandings during groupwork* — was interrupted when we showed a video clip of students in her class struggling to understand a problem with little teacher support. In the end, she reconceptualized her teaching practices to be more thoughtful about group dynamics, more intentional about how she spent time with each group, and building more resources into her classroom environment.

10.1. Prior to being pulled up short: the lesson and debrief

10.1.1. Part A: focal lesson

The focal VFF centered on Lesson 1 in October 2018 (Fig. 2A), where Lizette taught an Advanced Placement (AP) Calculus class. In Lesson 1, students worked in small groups on a task about position, velocity, and acceleration, three aspects of objects in motion whose relationship can be explored through calculus. Students were given an equation of a particle's position and questions about its position, velocity, and acceleration. Then, they were given a graph of a soccer ball's velocity and asked to answer similar questions about its position, speed, and acceleration, with the goal of making connections across these ideas in different contexts.

That day, Lizette had 40 students in her AP Calculus class; this was 15 more than we had seen in previous years. Students sat in 11 groups of approximately four students; in previous years, Lizette's class consisted of six groups. In fieldnotes, researchers described the room as "packed (and warm), so there aren't many empty spaces" (Fieldnotes, October 2018).

10.1.2. Part B: classroom video review

After Lesson 1, Katherine and Brette reviewed fieldnotes and classroom video, listening closely to groups' conversations (Fig. 2B). In the video, we saw that the additional students meant that each group necessarily received less direct support from Lizette, despite her efforts to distribute her attention. Lizette interacted with students during much of the groupwork part of the lesson: She was constantly moving from group to group, answering questions from students who called her over. Unlike other lessons we had observed involving fewer students, these check-ins were often brief one-on-one discussions rather than conversations addressing the whole group. (See Ehrenfeld & Horn, 2020 for a description of Lizette's earlier approach to groupwork.) Consequently, she spent less time with each group and had fewer opportunities to think carefully about their responses. As a result, students expressed confusion about the task and frustration at being unattended for extended periods of time.

This was reflected in fieldnotes: During the lesson, Katherine focused her observations on one group. Throughout the lesson, she noticed the group struggling with understanding the task, noting that the group was "having a side conversation during the whole-class discussion. They seem a little confused (cocking their heads to the side, screwing up their faces deep in thought), and are trying to make sense of it" (Lesson 1 Fieldnotes, October 2018). The group worked to make sense of the task independently, consulting notes and work from previous lessons. Eventually, the group gave up and sought Lizette's help but were unable to get her attention:

I just now notice that a student has his hand raised, and that the group has stopped talking about the task as they appear to be stuck and waiting for Lizette to come over to answer their question. I didn't catch when he started to raise it, but it was long enough to prompt him to ask, "How long do I have to hold my hand up for?" and mention that his arm was tired. (*Lesson 1 Fieldnotes, October 2018*)

As we reviewed the video, we realized that multiple groups had experiences like this. Lizette's students worked hard to make sense of a challenging mathematical task, but often had to wait extended periods of time before getting her attention.

Students' experiences in Lesson 1 were markedly different from what we observed in prior years. Though Lizette's students typically engaged in productive struggle around challenging tasks, Lizette was able to intervene and support groups' sensemaking throughout the class period. We attributed the changes in Lizette's groupwork monitoring to the large class size: It seemed that Lizette was attempting to use similar strategies for facilitating groupwork — letting small groups collaborate for extended periods of time while she circulated around the room and periodically checked in with groups. But with 50% more students than previous years, Lizette could not spend as much time with each group or visit each group as frequently. Ultimately, we felt that Lizette's pedagogical approach — while sufficient with smaller classes — did not work

well in an overcrowded classroom.

As we planned the VFF debrief, we recognized that hearing students' frustrations would be difficult for Lizette, as it conflicted with her identity as a helpful and supportive teacher. We chose to frame this as an issue of class size — both because it seemed to be the case and because it allowed us, as facilitators, to minimize an evaluative stance on her teaching. That is, we wanted to avoid a binary assessment of Lizette's groupwork monitoring approach as being good or bad; instead, we wanted to highlight how different contexts could render pedagogical approaches more or less effective. While Lizette could not change the size of her class — indeed, overcrowding was an ongoing point of contention among teachers in the district — we could help her identify different groupwork facilitation practices to support greater alignment with her teacher identity, even in a large class.

10.2. Being pulled up short: what unforeseen and unwanted event precipitated transformation?

10.2.1. Part C: VFF debrief

As described above, Lizette was a highly reflective teacher committed to her ongoing learning. Most relevant to this VFF debrief, Lizette described pushing herself to "really think deeper about what [student] responses meant" (*Interview 4, May 2019*), engaging perennial dilemmas of teaching, such as "when do you

Speaker	Dialogue
Student 1	So, but what about...Not two to four, that's speeding
Student 2	No—
Student 3	Wait, I thought—
Student 1	No, it's negative slope, but the positive quadrant, or the positive—
Student 3	One and two... is it positive?
Student 1	No, no, that's zero to one.
Student 3	Oh.
Student 1	One to two.
Student 3	I was so confused.
Student 1	Okay, so one to two.
Student 2	And then— what is that?
Student 1	From three to four, it's...slowing down?
Student 2	Mhm
Student 1	So, three to four.
Student 2	What is that? One, five – no – six, seven, eight. Six to eight.
Student 1	What is the maximum speed of the soccer ball?
Student 2	Two. Isn't it just two?

Fig. 3. Excerpt from October 2018 lesson 1 transcript.

tell them versus when do you let them keep struggling" (Interview 5, February 2020), and fostering students' positive experiences in mathematics (Interview 3, April 2018). During the debrief (Fig. 2C), we showed a video clip of her teaching that challenged these commitments.

Specifically, the clip reflected the confusion we had observed in Lesson 1. In the clip, three students discussed their confusion and frustration over an extended period of time, focusing on questions about the velocity graph of a soccer ball (see Fig. 3):

In this excerpt, the students tried to make sense of the relationship between the graph of a soccer ball's velocity and its speed and acceleration over time. They pointed to different time intervals on the graph (e.g., "from three to four") and they noted features of the graph (e.g., negative or positive slope, slowing down or speeding up). The students posed many questions to each other ("Is it positive?", "it's ... slowing down?", "What is that?") but were unable to settle confidently on a solution. Student 3 verbally expressed confusion (Turn 9).

After playing this clip, we elaborated on trends we noticed in the classroom, like students "working so hard, but they're spinning" and how "they raised their hands a few times" throughout the class (VFF Debrief Transcript, October 2018). We emphasized positive elements of Lizette's classroom — such as groups' sustained engagement in collaborative sensemaking — in spite of students' clear frustration. We also described how the large class size led to different teacher moves, such as Lizette's interactions with groups being "mostly student-initiated because there were so many kids with their hands up" and her tendency to "talk to the one person with the question" instead of her former mode of involving the whole group (VFF Debrief Transcript, October 2018).

Lizette expressed surprise, comparing her perspective of the lesson to the students' perspective shown in the video: "From a kid perspective, they're not getting very much help... but from my perspective, I'm constantly with someone or calling up the huddle or whatever," (VFF Debrief Transcript, October 2018). By contrasting her perspective to theirs, Lizette emphasized the difference between how she and her students perceived Lesson 1. This new understanding was clearly uncomfortable for Lizette, since their frustration conflicted with her core commitment to support students' sensemaking. The unpleasant realization of the conflict between her pedagogical goals and her students' experience resulted in several edge-emotions for Lizette: disappointment about how the lesson did not connect with students, frustration on her students' behalf, and embarrassment at seeing this so vividly on video. Essentially, viewing this clip was the unforeseen and unwanted event that elicited many emotions, but, as we argue below, it also precipitated her transformation.

10.3. Which aspect of Lizette's understanding was interrupted?

Lizette came to the debrief understanding that one of her teaching strengths was thoughtfully eliciting and building on students' ideas during groupwork, and we agreed. However, the debrief interrupted this understanding, as she saw herself interacting with students only briefly and individually, unable to elicit and build on their ideas. She later explained, "I think there were also some things, though, that came out that are, like, fundamental weaknesses of my teaching" (Interview 4, May 2019).

As we have established, Lizette was a highly reflective teacher. In fact, Lizette later reported that she had reflected on Lesson 1 prior to the debrief and recognized on her own that it had not gone well:

I had already thought about it a bit. You know, it's not like when we met I was like, "That was a great lesson! What do you guys

think?" And you were like, "Nope!" I knew that it didn't land. (Interview 4, May 2019).

She even described planning Lesson 2 to address her concerns about Lesson 1: "I had already thought about some of the things that needed to be different. [Friday's] lesson was already a different style" (Interview 4, May 2019). Indeed, during Friday's Lesson 2 (Fig. 2D), Lizette told the students, "We're going to pause on the paper [activity] from yesterday. We're going to do a couple of things today that will help clarify, then we're going to go back to it" (Lesson 2 Transcript, October 2018).

Coming into the debrief, Lizette had reflected on Lesson 1, realized it "didn't land," had attributed the lesson's failure to difficult content and a poorly written task, and made adjustments to her Lesson 2 plan accordingly. Importantly, her experience in the debrief refined this diagnosis: While the content and task may have contributed to the students' frustration, her inability to spend quality time with each group also played a role. She described this uncomfortable realization later, explaining, "I can address scaffolding the questions differently. I can address the way that I'm going to pose questions, but I can't — I have not thought about how to completely change my strategies for teaching this class yet" (Interview 4, May 2019). Thus, Lizette's understanding of her teaching as *helpful and supportive* was interrupted as she saw evidence that her teaching was actually a source of frustration, at least for the students in the clip.

Describing what she saw during the debrief, Lizette said, "Instead of doing something to help it click, I just kept walking around to the different groups and — I don't know," (VFF Debrief Transcript, October 2018). This new understanding of her teaching — one where she was not helping it "click" for students — contradicted her previous understanding of herself as helpful. In this moment, Lizette's nonverbal behaviors signaled that she was feeling edge-emotions. She put her hand over her mouth as she was speaking, lightly bit her fingernails, and fiddled with her coffee cup, which may have been due to feelings of shame she was experiencing (Chang et al., 2018). As the conversation continued, Lizette stopped speaking mid-sentence and buried her face in her hands while inhaling deeply. For the next minute of conversation, Lizette listened quietly while rubbing her temples and keeping her face in her hands. These nonverbal expressions of the physiological distress that often accompanies edge-emotions suggest that the new self-understandings emerging through the debrief contributed to feelings of disappointment and shame (Chang et al., 2018; Mäkki, 2010).

Ten minutes after Lizette made this comment, she left the debrief in tears, further confirming that this realization was painful — and surprising enough that, although she had already reflected on the lesson after it "didn't land," she likely would not have come to it on her own. This reaction aligns with Self and Stengel's (2020) description of the relationship between negative emotions and being pulled up short:

We are caught off-guard, left reeling. We experience insecurity, emotional, physical, intellectual. The insecurity comes from what feels like an attack on one's self: cherished beliefs and traits we claim as our own are called into question. As we come face to face with our own limitations and blind spots, we are humbled. We experience loss. (p. 65)

In sum, Lizette's initial understanding of the source of her students' frustration was interrupted as she arrived at a new diagnosis for the problem in Lesson 1.

10.3.1. Factors that contributed to Lizette's emotional response

Multiple circumstances made this debrief different from previous Fermat VFFs and likely intensified Lizette's emotions. Along with her experience of encountering the unexpected, our debrief planning notes (Fig. 2B) show that we had not fully anticipated Lizette's surprise. This situation was worsened by the fact that the debrief conversation took place during first period, just hours before Lizette taught the same students again. In previous Fermat VFF cycles, we met with Lizette and Julie during the last period of the day; the conversations could continue after the final bell and come to a more natural stopping point, and the teachers could adjust their lesson plans overnight. As Lizette told Brette (see Fig. 4):

Speaker	Dialogue
Lizette	I just wish I had, like, processing time before-
[Author3]	I know. When you left I was like, I don't like debriefing in first period.
Lizette	No, because then I like have all these things that I want to do different, and there's like no time-

Fig. 4. Excerpt from October 2018 VFF debrief transcript.

In this excerpt, Lizette expressed a desire to transform her teaching ("I have all these things that I want to do different"), but emphasized that she did not have time to process the conversation and adjust her plans; this was exacerbated by teaching right after the debrief.

Second, Katherine was a new member of the research team and had only met Lizette once before. Throughout the project, the

10.4. How exactly was Lizette's understanding transformed?

Because Lizette recognized a problem in her instructional practice — that it was not feasible to circulate among 11 groups and support their sensemaking — and because of her commitment to support students' mathematical sensemaking, she diagnosed an issue that required a new course of action on her part, setting the stage for her learning (Bannister, 2015). Despite the unforeseen nature of what the clip revealed, the debrief offered space for Lizette "to make constructive sense of her experience in light of the mandate for pedagogical responsibility" (Self & Stengel, 2020, p. 16). For example, Brette recognized that Lizette's partner teacher, Julie, frequently taught large classes and had developed

strategies for facilitating groupwork with 40 or more students in her classroom. During the debrief, Brette asked Julie to describe her strategies for leading whole-class discussions that mitigate potential confusion in large classes. Julie explained a practice of strategically interrupting groupwork to address key points of the lesson. Lizette engaged in this conversation, asking questions about Julie's routine (see Fig. 5):

Speaker	Dialogue
Lizette	So when you do that, do you tell kids to stop at certain points?
Julie	Mhm [<i>affirmative</i>]
Lizette	And do they tend to stay – like, do they tend to take about the same amount of time or do you have people who finish–

Fig. 5. Excerpt from October 2018 VFF debrief transcript.

research team worked hard to establish trust and rapport with participating teachers; in this case, Brette had worked closely with Lizette and Julie. But we had not fully anticipated the effect of bringing someone new into the VFF, which is a vulnerable space for teachers. As Lizette described this debrief in Interview 4, she disclosed how this heightened her emotions:

That was the first time that I had Katherine. So like it was a new person in the mix too [...] which puts a different pressure on it. Right? because I feel like you guys have talked a lot about how much you did trust building, like those relationships. (*Interview 4, May 2019*)

Being disappointed in her lesson was hard enough, but debriefing with a "brand new person" was even more difficult.

Here, Lizette discussed facilitation strategies to better understand how Julie manages whole class discussions, considering how she might incorporate them into her own practice. She was ultimately unable to make the changes she wanted that day because the debrief was coming to a close, adding a sense of being overwhelmed to her other negative emotions. ("This is the problem with [debriefing in] first period. Normally, I would have tonight to think about it before we had to teach," *VFF Debrief Transcript, October 2018*). As she recalled the event in Interview 4, she affirmed our interpretation of her experience:

In that case, it was very much like: here are all these ideas that would be really helpful, but I literally can't implement them today, because my class was happening in an hour, or because it was first period. It wasn't a day where I could revise some stuff on the spot. (*Interview 4, May 2019*)

The timing of the feedback gave her little opportunity to reorganize her lesson to build on the insights, adding further frustration to the experience.

10.4.1. Part E: seeking a consultation at PDO meeting

After the debrief, Lizette found time to process her emotions and, ultimately, transformed her practice. The day following the emotional debrief, the PDO held its monthly meeting, also attended by the research team (Fig. 2E). During the meeting, Lizette ducked out of a session to seek us out and collaborate on lesson plans for the upcoming week. As she and Katherine discussed potential changes, Lizette's demeanor was positive, and she was eager to find new strategies to improve her teaching. We discussed various ways she could build in sensemaking supports for students that did not rely on her direct presence in the small groups. Specifically, Katherine proposed using anchor charts — large posters that illustrate a mathematical concept or procedure, which could be displayed as a resource. Katherine explained that anchor charts hung in a visible location in the classroom allow students to refer to them as needed, potentially reducing the number of individual questions Lizette needed to answer during groupwork.

Lizette initially expressed discomfort with this strategy, saying, “I’m not an anchor chart person.” This framed anchor charts as conflicting with her teacher identity. Lizette elaborated that she thought of anchor charts as a teacher-centric tool to emphasize procedural knowledge over conceptual understanding, referring to cutesy examples that are prominent on teacher social media. We were aware of these proceduralizing uses of anchor charts and shared Lizette’s commitment to supporting conceptual understanding. To address these concerns, we explained how anchor charts could align with these goals: Katherine explained that Lizette could co-construct anchor charts with her students and focus on mathematical concepts, thereby supporting students’ sensemaking and conceptual understanding. In this elaboration, Katherine helped Lizette reconcile a core part of her teaching identity (valuing student understanding) with a tool she saw as contradicting her values (anchor charts as cutesy rather than substantive). Through this dialogue, Lizette re-imagined the role of anchor charts in her classroom to support her teaching goals. Once she had a chance to process her negative emotions, Lizette was motivated to find a solution to her newfound limitations brought on by the large class size, sparking new learning.

10.4.2. Part F: shifting from “teacher as resource” to “distributed resources” for groupwork

The following week, Lizette texted Brette photos of anchor charts that she had developed with her students during follow up Lesson 3 (Fig. 2F). Alongside the photos, Lizette wrote, “The anchor charts we made in class this week. I don’t have Katherine’s number but tell her thanks for the idea!” This additional practice of using anchor charts helped Lizette reconceptualize what it means to support students during groupwork. Instead of support only coming from her — a resource limited by time and attention —, she saw ways to build resources into the environment. While the debrief was initially upsetting, it spurred Lizette to seek new instructional practices to better align with her core values — her identity — as a teacher.

Lizette experienced a transformation in the way she fundamentally understands her role in fostering productive groupwork, shifting to thinking more about group dynamics and individual pacing. Reflecting on the experience, Lizette said:

One of the things I think that came out of that was, like, I’ve just done a lot more with how I work with my groups and how I set

up those dynamics and less about how I set things up for the whole class and so that — I thought about that a lot this year because of that. (Interview 4, May 2019)

When pushed to elaborate, Lizette described “being more conscious of making sure I’m not dwelling on one group for too long,” doing more to “try to keep people moving at a similar pace [through the task],” and trying to find a balance between rushing some students and having other students sit idle (Interview 4, May 2019). Although the initial realization about her students’ frustration was painful, it motivated Lizette to reimagine how she supported students’ collaborative work, or, in her own words, “changing my teaching for the better” (Interview 4, May 2019).

10.5. Coaching responses that facilitated Lizette’s learning

To answer our second question about the role edge-emotions could have in coaching, we now summarize the coaching responses that supported Lizette’s learning. First, during the debrief, the team showed her video clips that uncovered an issue in her teaching that had escaped her attention and led her to re-diagnose why her lesson did not “land.” Second, the coaches contextualized the clip, pointing to the increased class size that made supporting students especially challenging. They showed empathy when she was upset, as happened with the exchange between Lizette and Brette at the end of the debrief. Third, they made themselves available to keep brainstorming solutions with her, as with Katherine’s conversations about anchor charts. Within this conversation, Katherine addressed Lizette’s concerns about the proposed practice and her core teaching commitments — her teacher identity. Finally, they followed up with her about the intervention to see how it went, showing care and interest, as well as offering further support.

This summary is not intended to propose a coaching routine but rather to emphasize the respect, empathy, and ongoing nature of the support for Lizette’s learning as she reinterpreted a disappointing lesson and found new ways to move forward and improve her instruction. Indeed, in a member check interview, Lizette reflected on her experiences working with our team, saying: “Even when it was hard and emotional, you guys have always really honored who we are and the hard work that we do, but also whether it went well or not, pushed us to think about how to improve” (Interview 4, May 2019). We suspect that this supportive stance, coupled with availability to continue to make sense of a difficult moment and identify ameliorative actions, might facilitate other teachers’ learning in coaching conversations that evoke challenging edge-emotions.

11. Discussion

In this paper, we wanted to both examine how edge-emotions could be harnessed for learning and instructional change, and to understand the role of these emotions in coaching. Focusing on a critical event wherein a teacher showed strong emotions of being overwhelmed, upset, and disappointed, the framework of being pulled up short (Kerdeman, 2003) helped us make sense of Lizette’s learning.

During the coaching conversation, we viewed video clips showing Lizette’s students’ frustration and difficulties making progress during a calculus lesson. Circumstances beyond her control — specifically, a significant increase in class size — posed substantial new teaching challenges, and Lizette experienced an “interruption” to a core aspect of her teacher identity as someone highly committed to supporting her students during groupwork.

This evoked strong emotions, accompanied by numerous physiological responses, including tears. Although others (e.g., Finkelstein et al., 2019; Hodgen & Askew, 2007; Hunt, 2016) have shown that negative emotions may occur with teacher development, our study extends these findings to show how such negative emotions may catalyze a teacher's learning.

Through a series of coaching interactions that showed respect, empathy, and availability for ongoing support, Lizette was able to integrate a new practice into her teaching — using anchor charts to build sensemaking resources into her classroom — and to shift her thinking about student small group support from *arising from her direct presence in groups* to *making supportive resources available in her classroom*. This is evidence of her conceptual change about her teaching (Horn & Garner, 2022).

The strong edge-emotions that surfaced during the coaching conversation, although difficult for her (and us) at the time, resulted from recognizing a teaching problem that she had not yet discerned — and one that cut to the core of her identity as a teacher. In this instance, at least, the emotions helped us understand her commitments as a teacher (to be responsive and caring) and aspects of her work conditions that posed challenges to these commitments (large class sizes). Others have found that teachers can learn from challenges encountered in their practice (Horn & Little, 2010; Rainio et al., 2021; Smith, 2015), but most explorations of negative emotional experiences show that they can impede teachers' learning (Finkelstein et al., 2019; Saunders, 2013). Instead of avoiding the unwelcome experience of edge-emotions, as Hunt (2016) found coaches tend to do, this analysis shows how coaches can support teachers through them, with curiosity and care about their source. Lizette's frustration and disappointment were linked to misalignments between her core commitments and an unexpected classroom situation, giving us new spaces for pedagogical co-inquiry.

In the end, Lizette's intense emotions motivated her to develop a new form of practice. Her motivation was so strong, she sought out Katherine during a PDO meeting to continue making sense of her disappointment in her lesson. Although the anchor charts that Katherine proposed were not initially a comfortable solution for Lizette, they helped her reconceptualize what it meant to support students during groupwork. Prior to this, she had relied primarily on direct intervention with students. Realizing the untenability of this approach in her large class, she sought out ways to distribute resources throughout her classroom to help students troubleshoot difficulties without her immediate involvement.

Like any case study, there are important limitations to this analysis. On the one hand, numerous conditions enabled our coaching relationship with Lizette to support her learning. She was a highly committed teacher; we had an established and positive relationship with her; we were working on a funded research project that allowed us to spend extensive time and resources thinking about one class and one teacher. Although these conditions may have made Lizette a “best case” for thinking about edge-emotions that arise in coaching conversations and their potential for teacher learning, at the very least, they offer an existence proof that such emotions can be harnessed in constructive ways.

We see several directions for future research into coaching conversations. Most evidently, coaching research would benefit from more examples of teachers' transformational learning after being pulled up short to help develop more robust theories of how to support this outcome. Additionally, researchers might explore how coaches can better anticipate teachers' edge-emotions during vulnerable conversations to arrive at generative places for their learning. Finally, understanding edge-emotions as experienced differently by different teachers with different personal histories of

critique and in various contexts could inform organizational perspectives on teacher change.

12. Conclusion

These findings suggest that coaches do not need to avoid edge-emotions. In fact, they can be harnessed to foster important transformational learning if coaches and teachers take the time to figure out what those emotions mean. We are not suggesting that coaches incite teachers' negative emotional experiences during coaching conversations, nor that they become psychotherapists. Rather, this case highlights teachers' vulnerability in coaching relationships and thus the potential for edge-emotions whether outwardly displayed — as was the case for Lizette — or not. While Hunt (2016) found that exploring negative emotional experiences can be an entry point for coaches and teachers to develop a shared vision for teaching, we offer evidence that they can serve as more than an entry point; when coaches show empathy and offer support beyond an initial lesson debrief, teachers' edge-emotions can transform their understanding of what it means to be a good teacher. As Lizette later told us, because her relationships with her students were so strong, she “didn't even realize [she] needed help yet.” If we had avoided showing her the clip, knowing it would upset her, she would have lost this opportunity. Attending to edge-emotions that we know to be commonplace during coaching opens doors for teachers' transformational growth.

Data availability

The data that has been used is confidential.

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