Which Hat Should I Wear? Examining Teacher Positioning and Engagement in Professional Development

Enderle, P., Schellinger, J., Hagan, C., Akcil-Okan, O., Skrob, S., Granger, E., & Bevis, T.

Problem

Current science education reforms conceptualize science classrooms as sensemaking spaces where students are empowered to grapple with and socially negotiate their ideas to develop rich understandings about scientific phenomena (NGSS Lead States, 2013). The realization of this vision, which is currently not found in many K-12 science classrooms (Banilower et al., 2018; Capps & Crawford, 2013), requires fundamental shifts in instruction (Peltzman & Rodriquez, 2013; Reiser, 2013). Professional development (PD) opportunities are crucial to affect these shifts because they can support teachers to learn new instructional approaches that align with the learning called for in reforms.

Research describes effective PD as that which positions teachers as collaborative and active learners centered on a common content focus with peers that face similar challenges (Banilower et al., 2018; Desimone, 2009; Wilson, 2013). It is not enough, however, for teachers to participate in PD framed with these characteristics; they must see the instructional approaches presented in the PD as meaningful and feasible to their own classrooms and their practice (Kwakman, 2003). The research presented here endeavors to understand how teachers engage in particular types of PD activities that are collaborative and active learning experiences.

We view this work through a lens of positioning theory (Harre, 2015) to understand teachers' responses to the different learning experiences in which they are positioned during PD. This particular lens pays attention to the different positions actors assume or reject in a particular context that are connected to larger narratives and obligations that help them develop meaning for their efforts. Positions are defined in terms of rights (what others must do for me) and duties (what I must do for others) (Moghaddam et al., 2008). While teachers are consistently positioned as learners in PD, the focal constructs they are positioned to engage with may vary. These variations can result in changes to 'rights' and 'duties' resulting in different positioning for teachers based on those foci. Often, active learning experiences in PD can involve positioning teachers as content-learners in similar ways as their students, where the activity involves making sense of phenomena using science concepts and practices; however, other learning activities position teachers as pedagogical-learners to make sense of instructional approaches, shifting the rights and duties for those interactions. The particular PD explored here emphasized productive discourse as a tool to support students' scientific sensemaking during two distinct summer experiences that positioned teachers to engage in various instructional activities as content- and pedagogical-learners. **The focus of this study is to explore the interactions among teachers as they engage in this PD. The specific research questions that guided the study are: 1) How did the teacher's take-up or reject the different positions in which they were placed during the different PD activities? 2) What experiences did teachers perceive as most beneficial to their learning?**

Methodology

This study used an exploratory, qualitative approach with a nested case study design focusing on changes in teachers' engagement levels (see Table 1) as they were positioned as pedagogical- and content-learners in activities occurring across the PD. When teachers were positioned as pedagogical-learners, they engaged in activities explicitly focused on particular

instructional approaches and tools, reflecting on how those tools relate to their teaching, and how they could be applied in their own classrooms. When teachers were positioned as content-learners, they engaged in performing scientific investigations and activities to understand science content in ways similar to those of their students. This positioning often involved modeling of instructional approaches by the PD facilitators.

Table 1. Descriptions of Engagement Levels

Engagement Level	Description
High (E+)	The teacher led the group, their eyes were focused on who was talking (e.g., group member or presenter), and they actively participated in the activity or discussion.
Moderate (E)	The teacher looked at the person who was talking, spoke in group discussions, prompted or unprompted, and they were not distracted.
Low (E-)	The teacher made few contributions to discussions, their gaze was away from the speaker, their body language portrayed disengagement or boredom, and they needed prompting from others to participate in the discussions.

Thirty middle and high school science teachers participated in the PD across two years (N=17 for Cohort 1 in the summer of 2018 and N=13 for Cohort 2 in the summer of 2019). Each year of the PD similarly engaged teachers in 36 hours of activities across six days under the guidance of four PD facilitators common to both years. The focus of the PD was the same for each year (i.e., supporting productive epistemic discourse in science classrooms); however, the number and type of activities differed between the years. The analysis presented here focuses on seven middle and high school biology and environmental science teachers working together in two groups (one group had 3 teachers and one group had 4 teachers) in cohort 1. In cohort 2, we focus on six high school biology teachers working in two groups (3 teachers per group). We chose these particular groups because they demonstrated consistent interactions within groups and across groups during the PD. All teachers are identified by pseudonyms in this proposal.

Data sources for this research include video recordings of activities and observational field notes. The data were analyzed to identify moments when individual teachers participated at the different engagement levels for each of the activities examined. Each teacher was given an engagement score (i.e., E-, E, or E+) for each activity based on the most common level of engagement identified (See Table 1). Three researchers coded the data. The researchers regularly came together to compare their coding and to negotiate an agreed upon final engagement score for each participant by activity. Engagement profiles were developed for each teacher based on these scores. These codes provide a partial analysis of the "communication acts" including verbal interactions as well as paralinguistic aspects such as gestures and physical positions and stances (Herbel-Eisenmann et al., 2015) the teachers engaged in while either taking up or rejecting the roles of content- or pedagogical-learner.

Further analysis focused on the discourse level of positioning among teachers occurring during different activities to provide a more robust description of their communication acts in their different positions. At the time of this proposal, this level of analysis focused on vignettes of two different activity segments of the PD that were similarly implemented during both iterations of the summer experience. The research teams reviewed the various utterances of

participants in these vignettes to determine whether the teachers were positioning themselves as content or pedagogical learners. The researchers determined that these different level of analyses were necessary to provide finer grained insight into teacher learning through PD, in agreement with other scholars who suggest that positioning acts occur at multiple levels, including in structural aspects and personal discursive interactions (Herbel-Eisenmann et al., 2015).

Further data sources used in this study and still being analyzed include exit surveys and interviews teachers completed at the end of the PD experience where the teachers evaluated and reflected on the usefulness of the various learning activities and their value to their thinking and teaching. The surveys include both quantitative and qualitative elements.

Results

Comparing the two summer experiences, the first summer entailed more time spent on pedagogical-learner activities while the second summer PD involved more time spent on content learner activities. During the summer of 2018, teachers spent 7 hours participating in content learner activities, while spending 14 hours in pedagogical-learner activities. For the 2019 summer PD, teachers worked in content-learner activities for a total of 9 hours and pedagogical learner activities for 10 hours. The remainder of time in each summer involved teachers working with their peers on the development of resources. Although valuable for the teachers' learning, these PD activities did not involve explicit positioning of the teachers into either of the roles of interest explored in this paper.

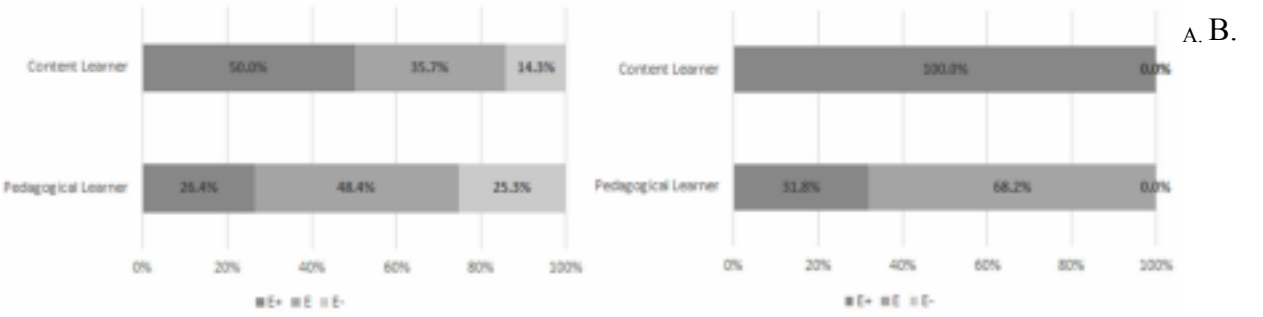

Figure 1 A & B: Engagement Codes by Position Type. Percentage of different engagement levels noted for activities involving each type of learner positioning (Content & Pedagogical) by summer 2018 cohort 1 (A) and summer 2019 cohort 2 (B).

Figure 1 A & B provides an overview of each body of learning activities that were positioned differently over both summers in relation to the relative amounts of each level of engagement. Overall, a difference in engagement was noted between cohort 1 and cohort 2 in both types of learning activities. For cohort 1, teachers were highly engaged for 50% of the time in content-learner activities and 26.4% of the time in pedagogical-learner activities; moderately engaged for 35.7% of the time in content-learner activities and 48.4% of the time in pedagogical learner activities; less engaged for 14.3% of the time in content-learner activities and 25.3% of the time in pedagogical-learner activities. In contrast, cohort 2 teachers were highly engaged for 100% of the time in content-learner activities and 31.8% of the time in pedagogical-learner activities; moderately engaged for 48.4% of the time in pedagogical-learner activities; and no teachers in this cohort were observed with low engagement during the different types of activities. Both cohorts of teachers demonstrated higher levels of engagement when positioned in content-learner activities compared to pedagogical-learner episodes. Another notable contrast was the lack of low engagement in the cohort 2 teachers across both kinds of learning activities.

Overall, these results suggest that these teachers preferred being positioned in and taking up the role of a content-learner, similar to their students, when engaged in PD. We posit this trend may occur because in this position, teachers feel better able to assess the meaningfulness and feasibility of these activities for their classrooms, two key factors that have been found to influence teachers' engagement in PD (Kwakman, 2003).

To understand the nature of each teacher's communication acts, we also analyzed their levels of engagement in total across all PD activities analyzed (Figure 2 A & B). The engagement profiles presented in Figure 2 provide a view of how much each teacher was highly, moderately, or less engaged during their PD experience. Cohort 1 teachers (Figure 2A) showed greater variation in their levels of engagement during the PD compared to cohort 2. For example, Monica (High: 47.1%; Moderate: 52.9%) and Lisa (High: 41.2%; Moderate: 52.9%) consistently sustained elevated engagement across the learning activities, while Joey (Moderate: 52.9%; Low: 47.1%) and Jerry (Moderate: 47.1%; Low: 35.3%) were noticeably less engaged during the PD. For cohort 2 teachers, we observed significantly less variation in the engagement profiles of each teacher. Indeed, these teachers sustained similar overarching patterns of high and moderate engagement in learning, with Gloria (High: 72.2%; Moderate: 27.8%) showing the highest levels of engagement, while Sally (High: 33.3%; Moderate: 66.7%) demonstrated an inverse in her levels of engagement. As Gloria and Sally were partners in the same group during all activities, these patterns do not represent the full nuance of their uptake or rejection of their roles.

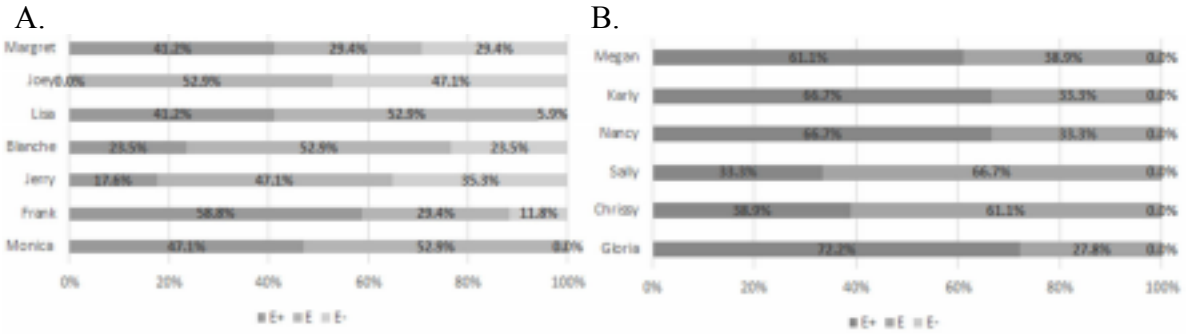

Figure 2 A & B: Engagement Codes by Teacher. Percentage of engagement levels noted across activities for each teacher by summer 2018 cohort 1 (A) and summer 2019 cohort 2 (B).

Analysis of the teachers' interpersonal discourse during these activities provided a more dynamic understanding of teachers' agency in shifting their positioning when engaged as content-learners and pedagogical-learners through structural elements of the PD (Harre, 2015; Herbel-Eisenmann et al., 2015). For example, Gloria more frequently resisted the structural positioning of particular activities, often asserting that she already employed variations on the instructional approaches or implying more effective approaches than what was being explored during pedagogical-learner activities. Further, many of the teachers would switch their positional identity in the midst of working in their groups on an activity, particularly content learner activities. That is, as they worked in a content-learner activity, teachers' discourse would shift from the development of shared understanding of relevant science concepts to considerations of how their students would respond to the activity and how they would implement and adapt it. Interestingly, the PD facilitators were also significant participants in discursive interactions within each group and provided a useful signifier that supported the teachers in shifting between their positional identities. The PD facilitators would use the imagery of different 'hats' that can be put on and taken off to signify different positional identities, using a binary of 'teacher hat' and 'student hat'. In several vignettes analyzed for this aspect of the study, the PD facilitator would often come to a group's table while they were engaged in a content learner activity and

begin exploring how teachers were making sense of a phenomenon or investigation. While in that discussion, the facilitators would then press for a positional switch by asking the teachers to "put your teacher hats on" and further press their thinking with questions about how they would work with an activity in their classrooms.

Considering the second research question guiding this study, a similar pattern emerged in teacher reflections and exit survey data (not shown) provided by both cohorts of teachers. When asked to rank the combined set of both types of activities by teachers' interest and preference, the top five ranked activities were majority content-learner activities, except for the fourth highest ranked activity for cohort 1 being a pedagogical-learner activity. Further qualitative analysis of open-ended questions probing teachers' reasoning for their rankings will develop themes for the presentation that identify patterns to understand the teachers' preferences and their engagement in them, exploring considerations of meaningfulness and feasibility (Kwakman, 2003).

Contribution

The study described above will contribute to scholarship that focuses on different forms of science teacher PD and the various impacts those experiences have on teacher thinking and practice. As PD literature has emphasized active learning as an essential element (Desimone, 2009; Wilson, 2013), this study endeavors to explore the nature of "active" learning and how teachers respond to those experiences. Employing Harre's (2015) positioning theory, the study also demonstrates how this perspective can be used to understand the nature of interactions during PD. This theoretical perspective can help researchers understand the agency teachers bring to these events and how their structure influences equitable access to opportunities for teacher learning. Further, through continued exploration of PD experiences that enhance science teachers' thinking and practice, a corollary implication of such work will assist science educators and teachers in understanding how to continuously improve the science learning experiences for all learners. For example, the impact of the PD facilitators' discourse contributions on how the teachers positioned themselves, and thus shaped the nature of their engagement and 'active' learning are important considerations for the design of PD experiences. This study can also extend knowledge about how curricular and instructional structures position different kinds of learners, teachers and students, in comparison to discursive positioning and how such positions enhance or limit their learning experience.

General Interest

NARST members interest in the focus of Strand 8 should find value in continued exploration of models of summer PD experiences, which are rather prevalent in schools and districts across the country. Also, the activities and the focal constructs of the PD experiences were grounded in current visions of three dimensional science teaching and learning, as well as the established importance of fostering and sustaining productive epistemic discourse in science classrooms. As such, the insights and findings of this study respond to current needs in broadening understanding of effective PD for science teachers broadly, with another example of how to develop a robust understanding of the impact of different PD structures. Finally, positioning theory (Harré, 2015) offers a useful research and pragmatic lens to explore and develop impactful PD experiences.

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