Characterizing Mathematics Teacher Educator Noticing and Its Relation to Novice Teacher Opportunities for Learning

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Abstract: We report on a study of mathematics teacher educator (TE) noticing within rehearsals of teaching. Using data from noticing interviews with four TEs, we highlight seven topics of TEs' selective attention and seven strategies that TEs used to make sense of what they attended to. In addition, through analysis of the rehearsals, we found disconnects between TEs' noticing and how they supported novice teachers.

Keywords: mathematics teacher educator noticing, rehearsals, opportunities for learning

In order to support novice teachers (NTs) to prepare for the complexities of teaching, a number of teacher education programs use rehearsals. In *rehearsals*, an NT teaches a lesson while their peers act as students (Lampert et al., 2013). Unlike other simulation models, rehearsals allow for interjections where teacher educators (TEs) and NTs exchange questions, suggestions, and reflections about teaching (Lampert et al., 2013). These interjections can support NT learning, but the TE plays a key role in deciding when to interject and how to support the NT during the interjection (Ghousseini, 2017). To do so, TEs must attend to and make sense of such moments – what is often referred to as *noticing* (Sherin & van Es, 2009). However, we know little about what TEs notice when providing feedback to teachers. Accordingly, we examined the noticing of four TEs as they watched videos of their facilitation of one rehearsal. We asked: 1) What did TEs notice when facilitating rehearsals? 2) How did TEs' noticing relate to the opportunities for learning that arose during interjections?

Theoretical perspectives

We conceptualize *noticing* as an active and intentional process in which a person interacts with the complex visual and auditory stimulation within their environment (e.g., Mason, 2011). In this sense, noticing is socially constructed and shaped by a person's commitments, experience, and perspectives (e.g., Stevens & Hall, 1998). Sherin and van Es (2009) highlighted two components of teacher noticing that we extend to our analysis of TE noticing: (a) *selective attention* (who or what the person focuses on) and (b) *knowledge-based reasoning* (how a person makes sense of what is noticed). In addition, we conceptualize *opportunities for learning* as arising when individuals connect *lived* concepts (specific experiences) to *formal* concepts (general principles) (Horn, Garner, Kane, & Brasel, 2017). By design, rehearsals engage NTs in simulations of practice, enabling the development of lived concepts. Thus, Ghousseini, Beasley, and Lord (2015) characterized learning opportunities within rehearsals as related to where TEs made "explicit connections to professional commitments" (p. 477).

Methods

This study took place in multiple sections of an elementary math methods course in a large public university in Eastern Canada. NTs participated in one rehearsal in groups of 2-3 (~10 minutes per NT). They selected one of four instructional activities (IAs) for their rehearsal, with a lesson plan provided. Participants included four TEs with varied experience with facilitating rehearsals. We conducted four post-rehearsal noticing interviews (Sherin & van Es, 2009) with each TE (one per IA). For this paper, we focused on interviews related to one IA. In the interviews, the TEs watched a video of one of their rehearsals. The video was paused for discussion: a) following an interjection within the rehearsal and b) when the TE noticed a moment in which they wished they had interjected. At each pause, the TE reflected on why and how they interjected (or would have interjected). We transcribed the interview data into episodes based on these moments of reflection of the video. We developed two noticing coding schemes: one for selective attention (the *actor* and *topic* noticed) and one for knowledge-based reasoning (the *strategies* used to make sense of what was noticed). To characterize the opportunities for learning in rehearsals viewed during the interviews, we first created episodes based on interjections. We coded these episodes to capture the foci of *precipitating events* (Ghousseini, 2017) that caused the interjections in the rehearsal, drawing on categories from Lampert and colleagues (2013). For each episode, we then considered whether the TE made explicit connections to formal concepts.

Results

TEs focused on three actors: (a) *the rehearsing NT*; (b) *the students*; and (c) *teaching tools*.We identified seven distinctions for the topic of TEs' selective attention: (a) *how an NT enacted a teacher move*; (b) *routine aspects of the IA* (i.e., common elements that occur each time the IA is taught); (c) *technical aspects of teaching* (aspects of teaching less central to supporting students' mathematical thinking, such as the size of the NT's handwriting); (d) *language used by the NT* (i.e., the phrasing used when asking students a question); (e) *students' explanations of their mathematical thinking*; (f) *students' non-mathematical participation or engagement*; and (g) *mismatch between a teacher move and a student contribution*. TEs used seven strategies to make sense of what they attended to: (a) *connecting to principles and practices of teaching emphasized in the course* (e.g., maintaining expectations for learning); (b) *connecting to the instructional goals for the IA*, often using the goals to highlight why a teacher move needed to be improved on; (c) *connecting to the IA protocol* (i.e., relating to how the lesson was described in the lesson plan); (d) *drawing upon one's knowledge of students' thinking*; (e) *drawing upon one's cultural knowledge of the nature of math*; (f) *examining the sequence of actions that a teacher enacted*, allowing the TE to discern what they felt was missing from the NTs' practice; and (g) *comparing what occurred in the rehearsal being viewed to another rehearsal that had occurred*.

When comparing the TEs' noticing to the opportunities for learning provided during the interjections, two points stood out. First, even when TEs' knowledge-based reasoning strategies showed that their noticing was connected to broader principles, they did not always articulate these connections to NTs during interjections. Second, the way that TEs framed the problem during an interjection did not always match how they did so when noticing. For example, one TE noted in his interview that he saw issues with the NT's representation of student thinking. However, during the interjection, he focused on pressing on the student's thinking. Such disconnects can have implications for how NTs connect those actions to broader principles.

Discussion

Unlike previous frameworks on TE noticing (e.g., Amador, 2016), ours aims to capture nuances specific to what TEs see and hear when providing in-the-moment feedback to a teacher. Future research may consider expanding this framework to other contexts in which TEs or professional development leaders provide feedback to teachers on their teaching. Our study also contributes to a small but growing body of work that examines relations between noticing and practice (e.g., Sherin & van Es, 2009). Our analysis suggests that even if TEs make sense of interactions in teaching based on overarching principles, they may need support on how they can help NTs see those connections. A first step may be to help TEs see the disconnect between their noticing and their practice by reflecting on videos of their facilition.

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