

Elementary Science Preservice Teachers' Use of Evidence From Rehearsals When Reflecting on Revisions of Their Practice

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Abstract: Teachers need opportunities to develop pedagogical reasoning around reflection on one's own teaching through the interpretation of evidence from interactions with students. Rehearsals have potential to allow for development of pedagogical reasoning. This study examines the evidence preservice teachers use in reflections on rehearsals in elementary science methods. The findings showed preservice teachers provided evidence from rehearsals to support their pedagogical reasoning; These analyses have implications for developing learning opportunities for developing teachers' pedagogical reasoning.

Introduction

Learning to teach is a complex, challenging activity, as teachers must learn how to use their *pedagogical reasoning* - the ability to use knowledge to make judgements in action- to coordinate interactions between students, content, and context (Shulman, 1987). This development of reasoning includes reflection on and learning from one's teaching practice in a process of analyzing a particular teaching event through the interpretation of evidence (Davis, 2006; Rosaen et al., 2008; Shulman, 1987). Preservice teachers often struggle to develop this pedagogical reasoning as they often attend to management concerns within classrooms rather than the student actions, statements, and work that are evidence of student learning (Davis, 2006; Dewey, 1965). Given these challenges, rehearsals within teacher education offer potential context for preservice teachers to develop pedagogical reasoning through limiting the complexity of the work of teaching (Kazemi et al., 2016). In rehearsals, preservice teachers approximate teaching by enacting elements of teaching practice with peers acting as students (Lampert et al., 2013; Benedict-Chambers & Arum, 2017). Involvement in rehearsals seems to support reflective discussions on student thinking and content within elementary mathematics education, yet more information is needed about how these rehearsals can facilitate pedagogical reasoning, especially across different contexts (Kazemi et al., 2016). In this study, we ask: in written reflection on rehearsals within elementary science methods courses: what forms of evidence do preservice teacher use?

Methods

Using a qualitative case study approach (Miles, Huberman, & Saldana, 2014), this study considers how three cohorts of PSTs, 52 preservice teachers total, who were enrolled in an elementary science methods course during a four-year undergraduate teacher education program at three different institutions, used evidence in their pedagogical reasoning within their written reflections based on too-supported rehearsals (Benedict-Chambers & Aram, 2017). During these rehearsals, the PSTs enacted part of a science lesson (e.g., the opening of a lesson) with their peers acting as elementary students. Afterwards, the PSTs wrote reflections on their enactment, describing areas in need of revision, with differing prompts across the contexts. In Context 1 and 3, each PST taught a small group of peers whereas in Context 2, the PSTs worked in teams to teach the whole class. In Context 2 and Context 3, the PSTs videorecorded their enactments. We coded these written reflections using an emergent coding scheme to describe the type of evidence used to reason pedagogically about the revision with 90% percent agreement. Then, we use a matrix consider patterns across PSTs and across the different cohorts.

Findings

Across the three contexts, the preservice teachers used several types of evidence from their rehearsal in their reflection although some PSTs, especially those in context one, did not provide evidence (see Table 1). PSTs in all three universities often used broad descriptions of what happened during the rehearsal as evidence for their revision. An example of a very general description of *teacher practice* used to provide context for the needed revision is "when I asked how their ideas [changed] over time, I did not write anything on the board and quickly talked about their ideas." (Context 1, PST 7, R3). In contrast, others used more specific evidence connected to interpreting student learning to support their revisions including specific quotes from their peers acting as students, quotes of their responses to students, and patterns in student work to provide reasoning for their revisions. For instance, To support her reasoning for revising her enactment, a PST quoted a peer's "student work": "I predict that I can see an object when I have an object in front of me with nothing blocking the object." She used this

quote to highlight a common pattern in student work that their prediction did not mention “the need for light and/or an eye... “(Context 2, PST 3, R1). This use of student work as evidence was more common in Context 2. Although some PSTs used only one type of evidence, 55% of the written responses used multiple types of evidence to support their revisions. In the following example, the PST used a *student quote* (italics), and a *teacher quote* (bold) to build a more complete picture of the interaction that they would change around helping students “see patterns and make connections within the data they collect:”

After the students collected their data, I asked them “**Do you notice any overall patterns or trends within the data?**” and they simply replied “*Mmm, no.*” The pattern that I could see and wanted them to see wasn’t clear to them because they didn’t have enough data to support it. (Context 3, PST 1, R2.2)

This example highlights the teacher-student interaction, creating greater support for the PSTs’ interpretation.

Table 1. Percent of PST revisions that include each type of evidence in each context

	Teacher Practice	Student action	Teacher Quote	Student Quote	Patterns in Student Work	Time Stamp	None
Context 1	39%	13%	2%	0%	0%	0%	48%
Context 2	52%	9%	2%	17%	14%	8%	6%
Context 3	53%	19%	29%	35%	3%	26%	7%

Discussion

Extending research on the potential of rehearsals in preservice teacher education (e.g., Lampert et al., 2013; Kazemi, et al, 2016), these findings suggest that the preservice teachers *can* use evidence from the rehearsals in their written reflection, suggesting these rehearsals can be used to develop preservice teachers’ abilities to look back and interpret a particular teaching event, a key aspect of pedagogical reasoning (Shulman, 1987) The preservice teachers provided evidence of student work, quotes from students, and teacher interactions in order to consider how to improve student learning, a common struggle of elementary preservice teachers when observing in elementary classroom (Davis, 2006), despite the lack of authenticity of working with adults *acting* as children. Although some of the preservice teachers described their teaching practices rather than the interplay with students as in other studies where teachers examined their practice within elementary classrooms (Rosaen et al., 2008) there was variation in the types of evidence used in the reflections. Some of the variation seemed connected to the supports and settings of the rehearsal context. For example, in Context 2, the preservice teachers taught a larger classroom of peers in the rehearsal, likely allowing the PST more opportunity to attend to students’ work and patterns in students’ responses as compared to the other two contexts. The prompt for reflection in Context 1 did not explicitly ask for evidence from the enactment, likely leading to the less common use of evidence. These findings have implications for creating scaffolds for using evidence of student-teacher interactions in pedagogical reasoning during rehearsals.

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