Prospective Teachers' Noticings in Videos of Their Own Mathematics Teaching

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Abstract

Video usage has grown in teacher preparation programs, but little is known about what prospective teachers (PSTs) really see and focus on when they watch their own teaching videos. This paper presents a study where PSTs made video observations after a peer microteaching lab experience and analyzes those observations based on what PSTs attended to in their video observations and how they were thinking about using the observations to improve their teaching practice.

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Most teacher preparation programs have embraced the use of video as an effective tool for developing prospective teachers' (PSTs') ability to notice (Sherin, 2004; van Es & Sherin, 2002; Star & Strickland, 2008). Further evidence supports that PSTs tend to focus on themselves, while more experienced teachers tend to attend to students (Fuller, 1969). Concerned about what I was asking PSTs to do as a course instructor, I investigated what PSTs were able to notice in video of their own teaching, particularly in a peer microteaching setting, and how PSTs intended to use video observations to develop their practice. In this paper I share evidence of what PSTs are capable of "seeing" through the use of video prior to entering the classroom when supported by a noticing protocol developed for this study.

Theoretical Framework

This study builds from two main bodies of literature – teacher development and teacher noticing. In the first area, Fuller's (1969) "developmental conceptualization of teacher concern" (pg. 218) offers a framework for describing three developmental phases: non-concern, concern for self, and concern for student. These can help identify where teachers at each level would potentially place their attention in the classroom.

Recently, video has provided PSTs the opportunity to engage in professional conversations about teaching with their university instructors and possibly develop lenses of noticing in their classroom. In particular, the ability to document and study one's teaching has research suggesting that with practice, video can be used to strengthen noticing skills and expand

the ways beginning teachers reflect on their own practice (Sherin & Han, 2004; Star & Strickland, 2008, van Es & Sherin, 2002;).

The current study also builds on van Es and Sherin's (2002) three key aspects of learning to notice. This study concentrates on the first two aspects which focus on identifying what is important in video and being able to make connections from observations to other experiences and knowledge. The third key aspect of noticing that is not addressed in this study is concerned with context, which was difficult to consider since the PSTs were co-teaching peers who were pretending to be middle/high school students in microteaching lab.

Methods

The study took place in a secondary mathematics methods course for PSTs at a large public university in the Midwest. PSTs were in their fourth year of a five-year teacher preparation program. The methods course was designed to support attention to student thinking through the use of high cognitive demand tasks (Smith and Stein, 1998), and the five practices for discussion facilitation (Stein et al., 2008). The design of the microteaching lab was intended to provide a safe space for PSTs to practice implementing tasks and constructively discuss teaching episodes in terms of lenses introduced in the methods course.

In this study, 26 PSTs used an observation tool designed by the researcher. The tool included space for the PSTs to list all of their video observations and space to prioritize and explain the importance of their top three observations. The tool served as a way of focusing PSTs' noticing and collecting data. A total of 78 noticing statements from the PSTs' ranked observations section served as the data analyzed for this study. These data were analyzed using a grounded theory open coding approach (Glaser, 1978) to respond to two research questions: 1)

What aspects of their teaching practice are PSTs able to notice when viewing video of their own microteaching? 2) How are PSTs using self-video observations to improve their teaching practices?

Data Analysis

Coding categories were based on prior research on teacher concerns and noticing with video (Fuller, 1969; Sherin & Han, 2002; van Es & Sherin, 2002). The coding categories were: concern for student or teacher, level of inclusion of mathematics, specific or broad, and reaction to video moment (Table 1).

Table 1:

Coding Scheme and Code Descriptions

Category	Codes	Description
Concern for Student or Teacher	Concern for Student	"Concern with pupils: with their learning, their progress and with ways in which the teacher would implement this progress" (Fuller, 1969, p. 211); and The noticing statement specifically discusses a student or discusses how the teacher's actions affected a student or student learning.
	Concern for Teacher	"Concern with self, i.e. concern with self-protection and self-adequacy: with class control, subject matter adequacy, finding a place in the power structure of the school and understanding expectations of supervisors, principal and parents" (Fuller, 1969, p. 211); and The noticing statement was all about the teacher specifically.
Level of Inclusion of Mathematics	Yes	A mathematical concept was mentioned, the task/material was mentioned (which would have been mathematical), or student learning of mathematics was mentioned.
	Inconclusive	Mathematics was not specifically stated in the observation, but the idea of student learning/thinking/conceptions was included.
	No	The noticing statement did not reference mathematics or any ideas regarding student thinking/learning/conceptions; or The statement did not meet the requirements for the "Yes" or "Inconclusive" categories.
Specific or Broad	Specific	The noticing statement describes one specific moment in time and did not discuss the situation more broadly in terms

Understanding of Event			of next time, or similar situations.
	Broad		The noticing statement describes a specific situation but then expands on the case more generally to a future classroom, broad conceptual learning, or expanded the concept beyond the situation at hand; or The noticing statement extends to describe teaching beliefs or larger lessons learned.
Reaction to Video Moment	Satisfactory		The noticing statement indicates that the PST was happy with the observation, felt s/he had done something good, or found it to be positive.
	Unsatisfactory (change mentioned)	Identity	The noticing statement referenced something specific that the PST needed to change about herself/himself.
		Planning	The noticing statement referenced planning, preparation, or being prepared.
		Implementation	The noticing statement referenced doing something different in the moment of teaching, referenced the enactment, or stated something like "Next time teaching, I'll do this."

A limitation of this coding was that some statements were difficult to interpret, especially because they may have stated something about what the teacher was doing, but in further discussion mentioned how it impacted the students. Statements like these were coded as a "concern for student" instead of "concern for teacher" because the literature indicated PSTs would be less likely to attend to students. Therefore, I wanted to code every moment in which PSTs were noticing students or considering how their actions were affecting students.

Below are two examples of noticing statements that were coded for the four categories. Don's noticing statement was coded as concern for teacher, no mathematics, and broad, since the statement identifies issues that: 1) focus on how he presents himself to students (concern for teacher), 2) do not include math or student learning (no mathematics), and 3) he references more generally as improving over time and outside of the microteaching lab context (broad). Since the statement mentions "practicing some self-awareness" the reaction to the moment is coded as unsatisfactory-identity.

> **Don (Concern for teacher):** *The third most important observations I made were regarding my self-presentation. Things about the volume of my voice, the placement of my hands, the tone and energy in my voice and the time it takes me to get my sentences out are simple fixes, but necessary ones. I need to practice some self-awareness, but a lot of this is due to stress of being in a new environment and being evaluated by my peers, and therefore will simply reduce on its own in time…*

To demonstrate more coding categories, Madeline's noticing statement is very different than Don's noticing statement. Madeline's noticing statement considers how her actions affected students' understanding of graphing (concern for students, mathematics). This noticing statement is coded as specific because it only focuses on this one particular aspect of the lesson. Madeline's reaction to the moment is coded as unsatisfactory-implementation because she references wishing she had done something different, when she writes, "It should have been mentioned."

> **Madeline (Concern for student):** *It should have been mentioned, after reading the story problem and going over number 1, that we would be graphing these constraints so that they [students] would know to only use two variables between all of the constraints and that the variables would have to be consistent throughout. Also, this would cause less confusion when creating the constraints, and that they have to be individual of one another because the graphing of them on one graph would do the work for them.*

Noticing statements were also coded by whether they were the PST's first, second, or third ranking, with the first being the most important observation. This ranked coding allowed for observations to be analyzed in regard to individual PSTs, specifically in situations where two or three noticing statements fell into the same category subsection. Overall, the coded data was analyzed using descriptive statistics about the number, rank, and frequency of the statements.

Results

In response to the first research question, this study found that PSTs' video observations were more student-focused and demonstrated a strong focus on mathematics and student learning. The following observations illustrate this.

> *I think I could have handled [Zane's] misconception better; it was a simple problem of calculating surface area based on a two dimensional drawing rather than on the 3-D figure as they should have.*
>
> *I thought that the fact that we kind of ignored [Aiden] and his vertical line graph was really important. We let another person come up to help explain what they had for a graph, but we didn't really see any problem with her erasing Aiden's graph to draw her own at the time. Now, we realize that it would have been much better to have both of their graphs on the board so that we, as a class, could compare them. We also didn't follow-up with Aiden and let him go back to his seat without checking if he understood what was wrong on his graph. I feel that this is the most important one because it's a real let down to [Aiden] and it's something we should not have let happen. If that was an actual 9th grader, they would lose out on learning.*

Eighty-one percent of the 78 ranked observations were focused on students, with 16 PSTs having all three observations focused on students, and approximately 50% were mathematics focused. The data provides evidence of "who" and "what" PSTs are focusing on when viewing records of their own teaching. These results differ from Fuller's (1969) conceptual model of teacher development that suggested novice teachers are more concerned about themselves as teachers, than about their students. The mathematical awareness demonstrated by PSTs in this study also differs from the earlier findings of Star and Strickland (2008).

In response to the second research question, this study found that PSTs exhibited both broad and specific understanding of video moments. In total, 41% of the ranked observations made by PSTs included specific observations, while 59% of the ranked observations were broad, often extending the case more generally into conceptual learning or making connections to similar situations. The development of both these skills is important for PSTs as they continue to

learn what specifically to focus on in their teaching practice, while also working to move toward more generalized conclusions that can impact larger aspects of their teaching practice.

Also connected to the second research question was the finding that PSTs' noticing statements often made suggestions that something they noticed could be improved in the implementation stage, versus improvements in planning or themselves. Coding the 58 unsatisfactory noticing statements according to what aspect PSTs mentioned changing revealed 12 identified a change needed to occur within themselves, 12 referenced planning, and 34 (59%) mentioned simply doing something different in the implementation stage. The small emphasis that PSTs placed on planning demonstrates a belief and misconception that suggests teaching is all about improvisation. Thus, these findings resituate the PSTs in this study as thinking more like beginning teachers.

Educational Importance of the Research

This research presents an interesting case for the benefits of video observation in the context of microteaching as research on this kind of practice teaching is often mixed. The PSTs that participated in this study demonstrated the ability to look beyond themselves in their microteaching videos, focusing instead on students and mathematics in ways that went beyond the level that past research has found for novice teachers. They also demonstrated the ability to dissect specific teaching moments, as well as situate observations among previous teaching experiences and theories, which are two aspects of learning to notice discussed in van Es and Sherin's (2002) work. As cautioned by Star and Strickland (2008), this study is not a case where noticing skills were developed just by having PSTs observe their own practice in video, but more likely a result of a combination of aligned curriculum across the methods course and microteaching lab that provide PSTs opportunities to practice and develop their noticing skills.

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Appendix A

Organizational Tool for Video Observation

This tool is to help you document what you are noticing while watching your teaching video. The goal is to help you create a complete list of everything you noticed and then to have you focus in on the three observations that you think are the most important and why these stuck out as the most important to you.

Part 1: List of things I noticed…

Directions: While watching the video of yourself teaching, make a list of all the things you notice. The list doesn't need to be in any particular order, just observations that you noticed and are now aware of from watching the video. I've placed some bullets below to get you started, but feel free to add more or use less depending on what you see in your video.

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Part 2: Prioritizing which observations were important

Directions: After watching the video and making your list of observations, you need to pick the top three things you noticed from your video. Rank these 1 (Most important observation), 2 (Next important), and 3 (Least important out of your top three observations). Write down what your observation was and then go into detail (at least a paragraph) as to why that specific observation was so important and how you decided to rank it there.

1. (Most important observation)

2. (2nd most important observation)

3. (3rd most important observation)