Teacher Noticing with 360 Video

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TEACHER NOTICING WITH 360 VIDEO

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Abstract

Teacher noticing is a crucial facet of math and science teacher education, with one goal being to shift preservice teachers' (PSTs) noticing from teacher-centered to student-centered. In this study, we used 360 videos to examine PSTs' choices of where to look in a classroom. We discuss differences in attending behavior of those PSTs who focused on the specific themes of teachers' scaffolding and student engagement.

Keywords: Teacher noticing, 360 Video, Teacher education

Introduction

One valuable aspect of teacher education is developing professional teacher noticing abilities for the classroom. Professional teacher noticing includes the ability to notice what is important in the classroom environment and then connect that to broader education principles or practice (van Es & Sherin, 2002). Noticing is an active engagement where teachers choose to direct their attention to classroom activities and circumstances (Erickson, 2011). In particular, noticing students' ideas is a critical component of teaching and should be developed early in teacher education programs (Stockero et al., 2017). However, there is often concern that novice teachers focus too much attention on teachers (self or others) instead of on students' engagement (Mitchell & Marin, 2015).

In this study of preservice teachers, we use 360 videos to analyze their professional teacher noticing abilities of a mathematics lesson. The major finding in this study is the relationship between attending to teacher scaffolding and student engagement.

Objectives of the Study

The purpose of this paper is to examine the relationship between where PSTs chose to attend in a 360 video and the specificity of their descriptions surrounding themes of teacher scaffolding and student engagement. We utilized 360 videos to explore PST noticing of a mathematics lesson. 360 videos give the PST an immersive experience in a math classroom, thereby allowing them to potentially develop their noticing skills. Another objective of this study was to ascertain what PSTs attended to in their writing and how it relates to what they viewed during the 360 video experience. For clarification purposes, we refer to participants' written noticings as attending, and for participants' physically viewing something, we use the term focusing. Giving PSTs the opportunity to observe and reflect on mathematics lessons lends exposure and experience in classroom environments.

Related Literature

Teacher noticing has emerged as a valuable construct in math and science education. It is a form of situational awareness that involves the teacher recognizing key aspects in the classroom while using reasoning to process the information (Stockero et al., 2017). This ability to notice and interpret events within a classroom is referred to as a teacher's professional vision (Sherin, 2009). Teacher noticing is relevant in teacher training as PSTs initially focus on the teacher's action or other behaviors not related to the content (Barnhart & van Es, 2015; Huang & Li, 2012, Kosko et al., 2020), whereas experienced teachers process how students specifically engage in content (Jacobs et al., 2010). In their study on preservice teachers noticing Amador & Weiland (2015) found that preservice teachers tended to focus on classroom environment and teacher pedagogy.

Preservice teachers often develop their professional noticing within field experience when they are placed in an actual classroom. This development of professional noticing can happen within the classroom but also can be developed with the use of certain technologies such as video (van Es & Sherin, 2002) and precisely that of 360 videos (Ferdig & Kosko, 2020). 360 videos give the viewer the opportunity to look omnidirectionally, thereby allowing the viewer to choose where they attend. Additionally, it provides a sense of standing and being present in the classroom (Ferdig & Kosko, 2020; Walshe & Driver, 2019). This sense of being present in the classroom during a 360 video is embodiment.

Embodied cognition is the potential for cognition through our experiences with sensorimotor capacities embedded in biological, psychological, and cultural contexts (Varela et al., 2016). Cognition and sensorimotor connections are evident in learning and can be utilized in the field of education research (Alibali & Nathan, 2012). Embodied cognition has been used as a theoretical lens for explaining teachers' professional noticing (Kosko et al., 2020; Scheiner, 2021). It stands to reason that professional noticing would be connected with embodied learning or cognition as it recognizes the link between teachers attending physically and mentally to what is happening in the classroom.

Methodology

Sample and Procedures

This study included 21 participants enrolled in an undergraduate education technology course. Participants were PSTs registered in a Midwestern University based in the United States. Demographically they were predominantly female (76.2%) and white (95.2%), majoring predominately in secondary education (42.9%), early childhood education (19.0%), and middle childhood education (9.5%). Regarding technology, the majority of participants considered themselves to be more technologically savvy than not (81.0%), and the majority had prior experience with 360 videos (71.4%).

During the Spring 2020 semester, as a stay-at-home order was in place due to the COVID pandemic, participants were engaged in this online study. As part of the study, participants initially viewed a tutorial video of how to watch a 360 video. Next, they watched a 360 video of a grade 4 (ages 9-10) elementary classroom. The video was 5 minutes, 49 seconds and recorded students working in small groups to find equivalent fractions. In the video, elementary students worked with fraction strips and determined the common denominator through arithmetic. After viewing, PSTs described what they noticed about students' mathematical thinking and then viewed the video a second time but were asked to focus on one moment involving students' mathematics that they considered pivotal. PSTs screen recorded their viewing sessions, providing additional data for analysis. Table 1 includes a classroom map displaying camera and student locations.

Analysis

We used a convergent mixed methods design to examine the relationship between where PSTs chose to attend in a 360 video and the specificity of their descriptions of the classroom scenario. Convergent mixed methods design allows scholars to use qualitative and quantitative methods to converge data and better understand a given phenomenon. In this paper, we qualitatively examined PSTs' written noticing using Systemic Functional Linguistics (SFL). SFL examines how grammar functions to convey meaning (Eggins, 2004). In this study, we focused on how PSTs used reference and reference chains to convey information about what they noticed. Concurrent with this analysis, PSTs recorded first viewing of the 360 videos were quantitatively coded for the particular region of the classroom they focused on at any given second (see classroom map in Table 1). We then quantified the presence of qualitatively observed themes and examined PSTs' distribution of focus and with the presence of specific themes. To further understand trends in statistical analysis, we then examined key moments in PSTs' screen recordings to triangulate findings and results (Creswell & Plano Clark, 2011).

Results and Discussion

Qualitative Findings

Analysis of PSTs' reference chains yielded several emergent themes, including teacher scaffolding, students' engagement, hands-on work, mathematics content, and group work. In this paper, we focus on PSTs' reference chains attending to students' engagement and teacher scaffolding. Reference chains representing the student engagement theme referenced students and used the system of transitivity (i.e., verbs) to convey material and mental processes as ways of engaging in the class and content. For example, Natasha's excerpt (Figure 1) references "students tried dividing…realized [they] couldn't…" to point to ways that students were engaging in class.

Student Engagement

When some students tried dividing fractions, //
they [students] realized that the *couldn't*
divide 5 by another number because 5 is prime.

Also, for [students] finding an equivalent fraction for 3/8, //
students realized they *could* not use fraction strips //
because they didn't have strips//
that *could* show 6/16 or higher denominators.

Teacher Scaffolding

The teacher **encouraged** a student to keep the written work he had done//
even though he **could not show i**t with his number strips.
She [teacher] then// asked him[student] to add on another answer //
that was workable with his strips.
Another time in the video she [teacher] had to remind the same student that
he needed to also **work it out** with his strips.
This extra attention and encouragement [from teacher] given to students who need it,
for whatever reason, **helps** them[students] immensely,
There are teachers that **would have told** him he was wrong// simply because it [student's work] **did not match up** with the visual aspect of the assignment// and this would have left the student **feeling defeated**.
Instead, she[teacher] **praised** him [student] and **encouraged** him[student] to also work towards the task at hand.

Figure 1. Examples of emergent themes for Natasha (left) and Carol (right).

Teacher scaffolding emerged via reference to the teacher acting upon students. This was evident in Carol's reference (Figure 1) that "the teacher encouraged a student… asked [student] to add on…*had to* remind the same student…" and so forth. Transitivity here serves to convey ways that the teacher acts upon student(s) in various ways that coincide with forms of scaffolding. We distinguished this form of reference to the teacher from others where the teacher may be referenced as writing on the board or posing a problem (as those do not connect to their acting upon students). Once these themes emerged from the analysis, participants' written noticings were coded for the presence or absence of these themes. We used Cohen's Kappa to examine for inter-rater reliability and found sufficient agreement for student engagement (K = 0.548) and teacher scaffolding (K = 0.777). Twelve participants attended to teacher scaffolding, 16 attended to student engagement, with seven participants attending to both.

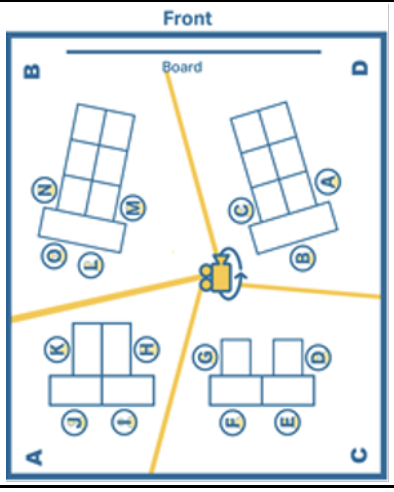
Quantitative Results

A Chi-square statistic was calculated to examine the relationship between PSTs' written noticing and their focus in the 360 videos. The resulting statistic is not independent of chance ($\chi^2(df=8) = 191.797, p < .001$), suggesting that PSTs' attending to one or both themes corresponded with differences in where they focused in the 360 videos (see Table 1). Specifically, PSTs who attended to teacher scaffolding (or both teacher scaffolding & student engagement) focused on Section B of the classroom (the teacher's location) for a longer time than their peers.

Table 1.

Distribution of Focus and PSTs' Attended Themes.

	Sections of the Classroom Map					Total
	A	B	C	D	n/a	
SE	156 *228.43*	905 *958.28*	348 *394.25*	1669 *1483.38*	23 *36.66*	3101
TS	57 *132.74*	596 *556.89*	274 *229.10*	848 *862.00*	27 *21.30*	3101
Both	249 *176.57*	794 *740.72*	351 *304.75*	961 *1146.62*	42 *25.34*	2397
Total	405	1699	699	2630	65	5498



Note: Student Engagement (SE) & Teacher Scaffolding (TE) are abbreviated. Observed counts are regular text & expected counts are italicized. Indeterminant focus is indicated by 'n/a'.

PSTs who attended to student engagement focused proportionally longer on Section D than their peers. Notably, this section included a group of students who interacted significantly throughout the lesson, and the camera was near to their table (camera was also adjacent to the table in Section C). Another result of note is the proportion of seconds classified as 'indeterminate' (labeled n/a in the table). These were moments where PSTs did not appear to have a section of focus (focusing on the ceiling/floor). Notably, PSTs attending to both student engagement and teacher scaffolding had a much larger number of observed indeterminate seconds of focus than was expected by chance ($z = 3.44, p < .001$).

Merged Analysis

To better understand the statistical analysis and corresponding qualitative findings, we examined tendencies in participants' viewings. Specifically, we created graphics illustrating where each individual participant focused at any given time. We then grouped participants by whether they attended to student engagement, teacher scaffolding, both or neither and compared their 'timeline graphs' for patterns that corresponded with the statistical findings (see Table 1). For example, we looked for whether there was a time period that PSTs attending to teacher scaffolding tended to focus on Section B in the video, and we did the same for PSTs attending to student engagement for Section D. Three example timelines are illustrated in Figure 2, which we use to discuss general trends observed. PST's who attended only to student engagement focused on section D more than expected by chance, whereas their peers did so proportionally less. Notably, between 3:12 to 5:12, all participants showed a substantial increase in focusing on section D, when students were engaged in working together to solve the math task at hand. However, PSTs attending to teacher scaffolding often shifted their focus to other areas of the classroom and back while those attending to student engagement illustrated sustained focus (see Figure 2). PSTs attending solely to teacher scaffolding focused on section B more so than expected (see Table 1 & Figure 2). This was particularly evident during periods of whole class discussion such as between 5:04 to 5:32 when the teacher is attempting to finalize students' review of using the common denominator or fraction strips to compare fractions. Although most participants did focus on the teacher during this timeframe (see Natasha in Figure 2), PSTs such as Carol, who attended to teacher scaffolding, had a more sustained focus on the teacher.

Those PSTs who attended to both student engagement and teacher scaffolding were observed to have significant movement from one section of the classroom to the next. The aggregated number of seconds illustrated in Table 1 suggests a more sustained focus in section B, but analysis of participants' timelines and screen recordings suggests this was more often a touchstone of sorts. For example, Sylvie's timeline in Figure 2 visually conveys a significant shift in focus over the course of her viewing. Every so often, she would stop for brief periods at either section D or B. For most participants attending to both themes, the common 'stopping point' was section B, with Sylvie serving as a unique variant in this set of participants.

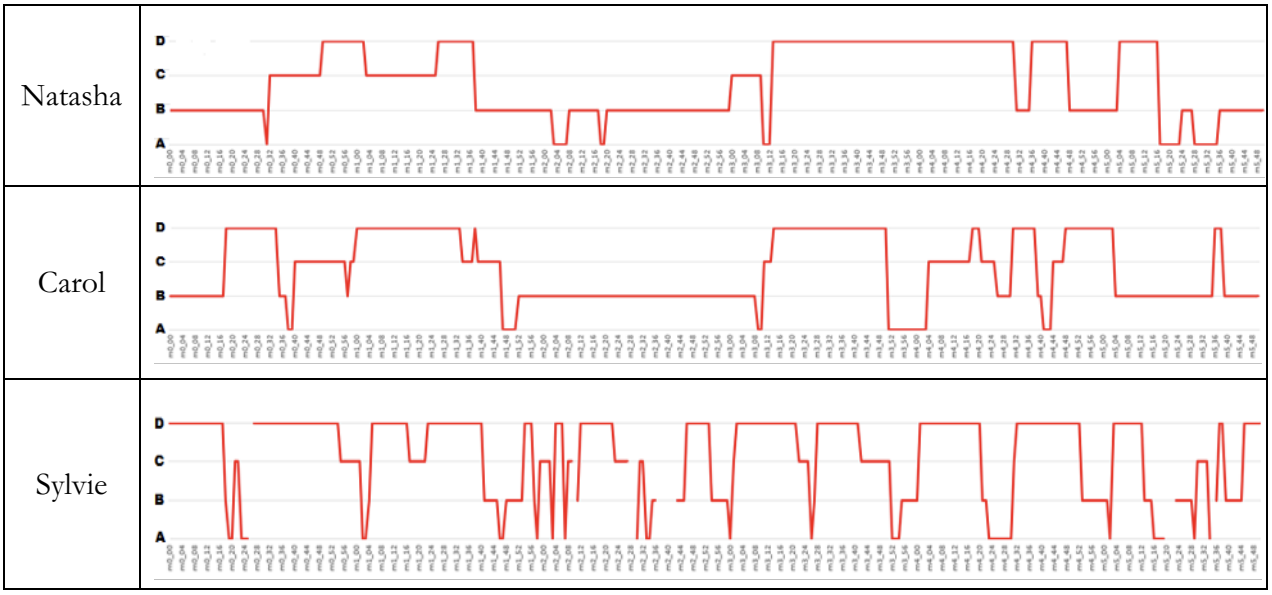


Figure 2. PSTs' Sections of Focus by Time in the 360 Video.

Discussion

The significance of these findings reinforces the idea that PSTs' noticing is an embodied experience as their physical focus during a 360 video experience was connected to their written noticings. These findings can help teacher educators shift PST noticing from teacher-centered to student-centered thereby helping PSTs on their journey of becoming professionals.

Implications

This study allowed us to have an in-depth view into PSTs viewing and noticing during a 360 video experience. In this study, we looked at how 360 videos elucidate PSTs' noticing in connection with their physical movements and written responses of the virtual classroom. This research has value in contributing to a better understanding of PST professional noticing within math and science education.

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