

The Role Of Affect In Sustaining Teachers' Attention and Responsiveness To Student Thinking

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Abstract: Attending and responding to the substance of students' scientific thinking is an important aspect of reform-oriented science teaching. Explanations of why teachers do or do not focus on student thinking have largely centered on elements of teachers' cognition, such as whether teachers have the skills required to engage in this sort of teaching or conceptualize their teaching in conducive ways. In this paper, I analyze two classroom episodes in which teachers' in-the-moment affective experiences seemed to play a role in sustaining their attention and responsiveness to student thinking. I explore the nature and role(s) of the teacher's affect in each case, concluding with a call for continued work along these lines as we seek to understand more about what influences teachers' attention and responsiveness to students' ideas.

Keywords: Affect, Teacher Responsiveness

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INTRODUCTION

A critical aspect of reform-oriented science teaching is closely attending and responding to the substance of students' scientific ideas during instruction [1-3]. When students' ideas are central to instruction, students demonstrate enhanced conceptual understanding [4-5], experience rich opportunities to engage in scientific explanation-building and argumentation [6-7], and are more likely to see themselves as capable of and interested in doing science [8-9].

However, sustained attention to student thinking is rare in American classrooms [1] and, when present, often fleeting in nature [10]. Explanations of why teachers do or do not focus on student thinking largely center on teachers' *cognition* – whether teachers have developed the relevant skills for noticing students' ideas [11-12], including knowledge of students' ideas in particular domains [4], or how teachers conceptualize their classroom activity [2, 10].

In this paper, I highlight the roles that teachers' *affective experiences* may play in promoting their attention and responsiveness to student thinking. A growing body of literature highlights the centrality of affect in understanding human behavior and documents close interrelations between affect and cognition, with emotions impacting cognitive performance [13-14] and mediating processes like conceptual change [15]. This paper specifically aims to bring affective considerations into the discussion of teachers' attention and responsiveness to the substance of students' scientific thinking, and explores ways in which

teachers' emotions foster their pursuit of students' ideas in the classroom.

METHODOLOGY

Stemming from my dissertation work [16], I focused on teachers' in-the-moment activities and reflections on two classroom discussions that arose from ideas or questions that students offered. These focal classroom discussions were selected as part of a collection of episodes in which teachers demonstrated sustained attention and responsiveness to student thinking while teaching. In examining these episodes, I sought to understand what may have stabilized the teacher's focus on students' ideas in each case. I triangulated across several data sources in analyzing each episode, including the teacher's behavior in the episode itself, verbal reflections the teacher had on the episode around the time it took place, and semi-structured stimulated recall interviews in which the teacher and I watched video of the episode and discussed what happened several years later¹. Analytically, I attended to aspects of what went on in the episode that were 1) co-occurrent with the teacher's attention and responsiveness to student thinking, 2) salient in some way to the teacher, and 3) plausibly stabilizing or mutually reinforcing the teacher's focus on students' ideas² – tools others have used in unpacking other kinds of local stabilities [17-18]. In

¹ These sources are respectively noted as [Episode], [Reflection], and [Interview] throughout.

² Episode selection criteria and details on my analytical approach can be found in my dissertation [16].

repeated iterations through the data, I regularly checked for consistencies and inconsistencies with my emerging interpretations.

Through this approach, I explored many varied aspects of what may have sustained teachers' attention and responsiveness to the substance of students' scientific thinking. Here, I focused on aspects involving emotional components for the teachers. I coordinated across verbal and nonverbal communicative cues in teachers' discourse [19] to provide evidence of the involvement of affect or emotion for the teachers, and I used adapted transcriptional notations [20] to communicate the teachers' tones, gestures, facial expressions, etc. I also provided the teachers with an opportunity to member check my interpretations – Ms. L agreed with the interpretation put forth here, and Ms. R did not pursue this opportunity.

In what follows, I describe two classroom discussions that emerged from students' contributions and how teachers' distinct affective experiences during the discussions likely contributed to their sustained focus on students' ideas. In the first example, the teacher's curiosity and excitement about the scientific question at hand supported her pursuit of the question with students. In the second example, the teacher's concern and frustration with what she perceived as students' appeals to authority heightened her emphasis on *students'* ideas.

THE FOXES DISCUSSION

The foxes discussion took place in Ms. L's³ fifth-grade science classroom. The class was in the midst of a unit on classification, and Ms. L was reviewing the idea that as we move from kingdom down to species, the groups of organisms get smaller, but what we know about the organisms gets larger. She used a diagram from the textbook depicting the classification of a gray wolf to illustrate this point. A fox was included at all levels prior to the genus, where it was mysteriously dropped without any explanation. Although most of the levels included a description of why given organisms were still included in the group, the genus level simply listed the organisms included. A fourteen-minute discussion ensued when a student asked *why* the fox was no longer included at the genus level.

Curiosity About The Scientific Topic

One of the most salient aspects throughout the discussion was Ms. L's own interest and excitement in figuring out the answer to the student's question. She quickly indicated to the students, "I'm not exactly sure

why the foxes get dropped out at this point" [Episode] and reiterated this point seven additional times during the discussion. Moreover, Ms. L seemed to find not knowing to be motivating rather than stifling. She highlighted that the question "would be an interesting thing to think about" [Episode] several times early in the discussion and then changed her plan on the fly to explore it with her students for an extended period of time.

Ms. L excitedly recalled this experience during an interview:

Ms. L: I had NO idea! It was fun:ny, I just hadn't even ever really tho:ught about it. I'm not sure I ever really no:ticed it – that closely. And, but we were trying to work our way down ((mimics moving through diagram)) through o:ne, and it was like ((sits back with furrowed brow and pursed lips)) – why is this- I, I had NO idea! It was so cool! [Interview]

In this statement, Ms. L indicated twice that she "had NO idea" why the foxes got dropped and appeared puzzled as she described working her way through the diagram. Furthermore, the capital letters, underlines, and colons in the quote above reflect how emphatically she described this experience; it was strongly affective in nature, and her tagging of it as "so cool" indicated that not only was she okay with not knowing something, but she was actually enthused by the idea of exploring the topic with her students.

Looking more closely at Ms. L's interactions with students' ideas during the discussion, she seemed to be actively processing students' ideas and often referencing her own thinking in conjunction. For instance, when a student, Latrisha, offered that fur color might be relevant and another student marshaled a counterargument against this idea, Ms. L indicated that the idea of fur color sparked her thinking about a different fur characteristic: "When Latrisha said fur, there – there might be something about a – fox's fur that is a little bit different. Something popped in my-see if you guys think of it" [Episode]. Ms. L brought up the silkiness of the fox's fur later in the discussion. In a reflection shortly after the discussion, Ms. L's pronoun usage indicated that she and the students were striving to figure it out together; she stated that at first "the kids, we could understand the characteristic that was being used," but when the fox got dropped, "we were all I don't know why" [Reflection]. The quick repair from "the kids" to "we" suggests that she was also engaged in sense-making about the situation, and she attended and responded to students' ideas as possibilities to consider and sparks for her own thinking on the matter.

³ Teachers' and students' names are pseudonyms.

THE WAVES DISCUSSION

The second discussion took place in Ms. R's sixth-grade science classroom. The class was learning about types and properties of waves, and Ms. R laid a jumprope on the floor in the center of the classroom and had a student hold one end still while another student shook the other end to create a wave with numerous crests and troughs. When Ms. R asked how many crests there were in the wave, students called out many different numbers, and the rest of the class period was devoted to sorting out the issue. I analyzed the first ten minutes of discussion.

Frustration with Perceived Appeals to Authority

Throughout the discussion, Ms. R seemed particularly sensitive to what she considered to be students' appeals to authority. For example, consider the following exchange:

Rosie (a student): Isn't the crest like the highest point, the highest point of the wave?

Ms. R: Is the crest the highest point of the wave ((looks at other students))?

Student: Yes.

Ms. R: Okay? So what are you say::ing by that ((to Rosie))? (pause) ((walks toward Rosie)) What are you say::ing- what do you mean by that? I mean, why did you ask that? [Episode]

During an interview, Ms. R acknowledged that "in the book it did say ((mimics with raised eyebrows)) 'the crest is the highest point'... I'm like, what's that mean? Because then they couldn't- they didn't know what it meant over there ((gestures to jumprope on video)), so it didn't mean anything" [Interview]. Ms. R's sarcastic recapitulation of what the book said, combined with her repeated emphasis on meaning both in the episode and during the interview, communicated a sense of frustration with the approach she saw Rosie take. She certainly did not blame students for saying "what sounds right, sounds good," seeing it as more of an issue with the structure of schooling – "they've all played school before, they know, get the right answer, the teacher gets excited, we move on" [Interview]. Yet she was concerned and frustrated by the presence of this sort of response in her classroom and emphasized students' own thinking or processing in return. Note in the exchange above how Ms. R reflected Rosie's question to other students and then repeatedly pressed

Rosie for *her* thinking and how that piece of information was relevant to her, steering the conversation away from the book and toward students' ideas.

In addition to the book, Ms. R also recognized that students might treat other students as authorities. In an interview, Ms. R described how some students do not want to go against "the smart kid, or the cool kid" [Interview]. Toward the end of the discussion, this kind of awareness and sensitivity may have actually drawn her attention *back* to students' ideas. Ms. R was pressing a student, Rolland, to distinguish between crests and troughs when another student, Marcelo, spoke up:

Ms. R: It's five crests or five troughs?

Rolland: Fi-five ((students laugh)), uh, I don't know.

Marcelo: No, one-

Rolland: There's just five things.

Marcelo: Look, does this count? ((points at a crest))

Rolland: Yes.

Ms. R: Does it count for you ((to Marcelo))?

My interpretation of the exchange in part hinges on the particular students involved. During an interview, Ms. R indicated that she felt Marcelo was confused at this point in the conversation, and she identified Rolland as a student who liked and portrayed himself as knowing a lot about science. In this context, Ms. R may have interpreted Marcelo's question to Rolland as an appeal to Rolland's authority, even though there is evidence to suggest that Marcelo may have been setting himself up to disagree with Rolland (i.e., Marcelo's initial "No, one-" before his question). Rather than letting the conversation play out, Ms. R quickly jumped in and directed attention to Marcelo's thinking, asking if it counted *for him*. This represented a shift in her attention, which had previously been focused on differentiating crests from troughs.

DISCUSSION

Teachers' in-the-moment activities and reflections on the classroom discussions above illustrate the importance of considering teachers' affective experiences when seeking to understand their attention and responsiveness to the substance of students' scientific thinking – experiences that have been underexplored in the literature on attention and

responsiveness to student thinking. As evidenced, influential affective experiences may be varied in nature. In the case of Ms. L, she experienced a sense of curiosity and excitement with respect to the scientific question a student raised during discussion, closely tied to her own lack of knowledge about the specific example in question. In contrast, Ms. R experienced a sense of concern and frustration with respect to what she perceived as students' appeals to authority rather than reliance on their own thinking. Ms. R's example highlights close connections between affect, her beliefs about knowledge (and the importance of meaning and relevancy), and her behavior in the classroom. Note that the nature of affect in play in each case, as well as what the affect was connected to or oriented toward, were different.

Additionally, although these affective experiences were both likely involved in sustaining teachers' attention and responsiveness to students' ideas, they seemed to play distinct roles in the episodes. Ms. L's curiosity and excitement about the fox question in part initiated the shift from her planned review activity to the joint pursuit *with* students of a sensible response to the question. Moreover, her own interest in figuring out the answer continued to interact with her attention and responsiveness to students' ideas throughout the episode, suggesting that her affective experience was ongoing and sustained her focus on student thinking. In contrast, Ms. R's concern and frustration with students' potential appeals to authority occurred irregularly during the episode (as she perceived such appeals taking place), but in each case, it firmly drew her attention to students' ideas – even when her attention had been elsewhere.

This work is highly exploratory in nature, but it contributes to efforts across fields to understand the variety of ways in which affect, cognition, and behavior are connected. With respect to teachers' attention and responsiveness to student thinking specifically, future research could continue to map out the impact of affective experiences teachers have while attending and responding to students' ideas, considering the 1) nature of the affect involved, 2) object of the affect, 3) connections to various cognitive constructs, and 4) role(s) the affect plays with respect to their focus on student thinking. It would also be beneficial to look more closely at the impact of teachers' affective experiences on students' participation and learning opportunities in such discussions.

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