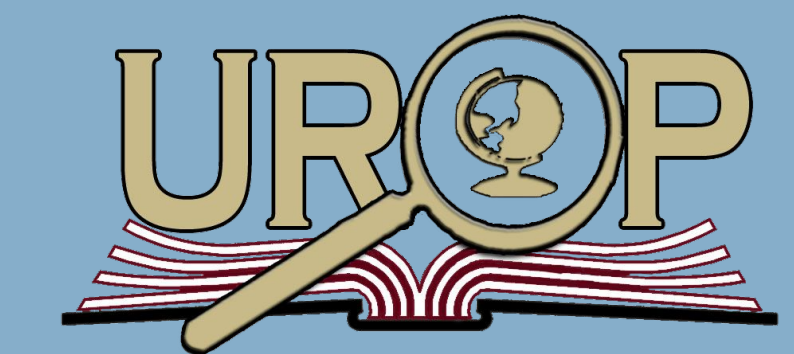# Caring for Students as Thinkers: A Case Study

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Introduction

The field of science teacher education research has a burgeoning imperative to understand and support more equitable science teaching such that all students not only learn science but *do* science in ways that are authentic to the discipline and support students to feel a sense of belonging in science classrooms (National Research Council, 2012). In this work, we seek to add to this literature by sharing an in-depth exploration of the interactional dynamics in the classroom of a public high school science teacher, Danny, during an AP Chemistry lesson on periodic trends in which his students are enthusiastically engaged in the doing of science to figure out *how* and *why* these trends exist. In an effort to explore how Danny supported and sustained his students' outwardly emotional engagement in figuring out the phenomena, we became attuned to the ways in which Danny responded to his students with genuine care for their deep thinking. Here, we share pieces of this ongoing analysis to illustrate how we see evidence of this care in Danny's responses to students and discuss potential implications for practice and future research.

Conceptual Framework

We leveraged the construct of care (Noddings, 2012) as a lens to understand Danny's interactions with his students in order to name, describe, and analyze how Danny demonstrates care for his students as thinkers and doers of science. Such care can manifest in teachers' moves in the following ways:
- Listening to students and observing their interactions
- Being receptive to students' ideas
- Responding positively to students' ideas
- Making space for students to share their ideas (Kang, 2022)
- Responding with encouragement to students' ideas
- Replacing feelings of confusion with feelings of excitement

Methods

In this ongoing qualitative case study (Merriam, 1998), we use multimodal discourse analysis (O'Halloran, 2011) to explore the ways in which Danny showed care for his students as thinkers and doers of science. Our primary data sources for this analysis are video recordings from a camera following Danny throughout the class and transcripts of his interactions with students. As a team, we engage in multiple rounds of collaborative data viewing and inductive coding to mark and interpret Danny's interactions with students (including his words, body language, physical positioning).

Context

In this 2-day lesson, Danny's AP Chemistry class is working on a lab in which the students are performing a flame test on different types of salts. The guiding questions for the students' sensemaking concerned (1) the cause of the various colors they observed in the flames, and (2) how the differing wavelengths of light emitted from the flame were related to the electronic structure of the salts' atoms. The students worked in small groups to test various salts and record observations while Danny walked from group to group, engaging with their thinking and asking them questions.
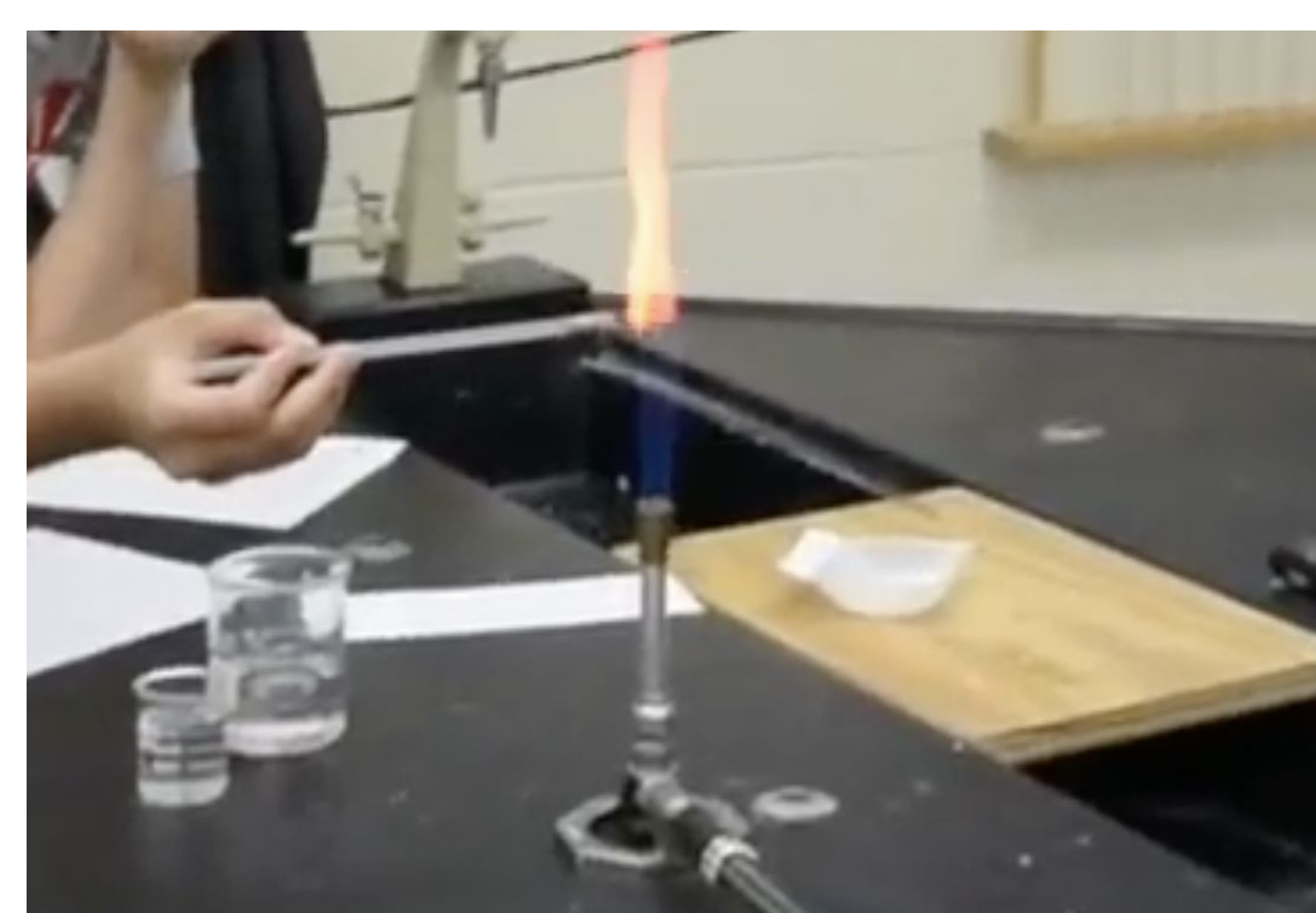

Danny's Care for his Students as Thinkers

To illustrate the care that Danny has for his students as thinkers, we share select snippets of Danny's interactions with students that we see as representative of larger patterns of Danny's responses to student thinking. These snippets are annotated with our analysis of how Danny demonstrates this care.
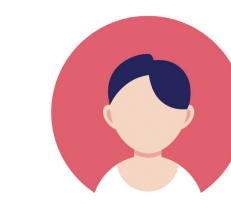
Snippet #1: Cary and her group were asking Danny a question regarding recording their observations
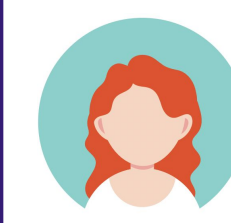
Cary: We were talking about the color and we compared it to Shrek… So, for color for KCl2 we can put Shrek?

Danny: As long as you can explain what you mean by that.

> Danny both accepts the student's playful approach and holds them accountable to the goal of making sense of the phenomena and communicating their ideas to others.

Snippet #2: Connor asked Danny a question regarding the spectrum of colors he and his group might observe.
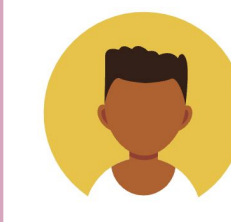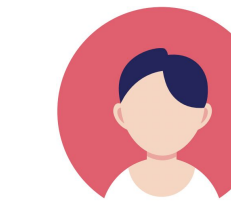
Connor: Mr. Danny, can you give me some insight? Is there a blue [flame]?

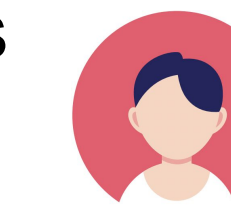**Danny:** Do you think there will be a blue one?

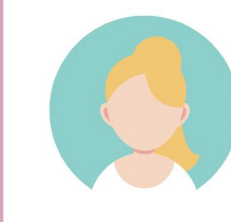**Connor:** Blue is the hardest to make.

Danny: Why?

Connor: Because the metal that burns blue is the hardest to find, I am assuming.

Danny: So, if you see something that burns blue, do you think you'll see it in this flame?

Connor: Why wouldn't you?

Kate: Because propane is already blue. It's already burning blue.

> Danny resists giving the student a direct answer; rather, he responded to Connor's question with further probing questions that facilitate students' deeper thinking about predictions of the relationship between the color of the propane flame and the light emitted from the salts' combustion.
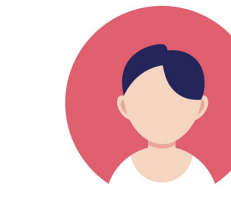
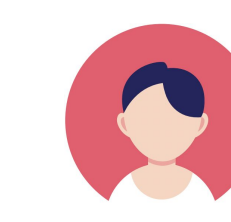**Snippet #3:** Students are questioning how and whether colors will mix in the flame
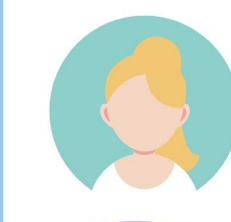
Kate: Would a green flame be hard to make?

Trey: I mean you could make a yellow flame and mix it with propane.

Danny: So, you think the light you will see is going to be the same as, like, paint?

Trey: Yeah, like color mixing on the computer screens is different than, like, color mixing like in paints.

Danny: Okay. How is it going to work for the light? Do you think it'll be the same or different?

Connor: Would they actually mix?

Danny: It could be something to test.

> Danny listened to and revoiced Trey's idea, leveraged this idea to ask a probing question, and encouraged the group to test this idea for themselves rather than give them a direct answer.

Discussion and Implications

Through the strategies that Danny implements in his classroom, he is able to exhibit care to his students and elicit excitement and engagement in his class discussions
- Gives students the open space to share their ideas without being told whether they are right or wrong
- Acknowledges of student ideas and positive responses

Naming and describing the ways in which teachers like Danny demonstrate such care for their students is important work for the field of science teacher education, as this effort can make practices of care more easily accessible and achievable for other teachers to incorporate into their own pedagogies and interactions with students.

Select References

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