

Examining Rights to Participate and Struggles to Belong in Science Classrooms through a Black Girl's Engagement in Argumentation

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Abstract: If we are to support students to become epistemic agents in the ways envisioned in reforms, we must acknowledge that classrooms can be spaces of injustice, where instructional efforts can propagate inequitable systems of oppression. In this case study, we describe the epistemic efforts of one Black girl, Jessie, and the rights and privileges afforded or denied to her as she worked with a group of her peers to develop and negotiate a scientific claim. Through examination of video data, transcripts, and student work products, we characterized students' efforts as about epistemic, rhetorical, and pseudo-argumentation, and how we explored how such efforts invited or constrained Jessie's epistemic agency. Jessie's pattern of persistence, which we understand to be her fight to have her rights as a scientific sensemaker acknowledged, surfaced issues of inequity in which Jessie's ongoing efforts to engage in epistemic argumentation were rejected by her peers.

Introduction

Educational reforms have positioned the development of science proficiency as the end goal of science instruction—that is, students should be able to use the tools of science to construct explanations of phenomena (NGSS Lead States, 2013). This work requires that students are positioned as epistemic agents (Miller et al., 2018; Stroupe, 2014) who share, discuss, and refine their thinking (Berland & Reiser, 2009; McNeill, 2011).

To support students to be epistemic agents, classrooms need to be structured as equitable spaces where students feel their ideas are valued by themselves, their peers, and their teachers—that is, they must be viewed by others and themselves as entitled to and worthy of contributing to the classroom community's advancement of scientific knowledge (González-Howard & McNeill, 2020). Equity, however, is often framed around ideas of access and inclusion for *all* (Martin, 2019). This framing does not always acknowledge that classroom spaces are embedded in cultural systems of knowledge and practice grounded in whiteness and heteropatriarchy (Calabrese-Barton et al., 2022; Ladson-Billings, 2006) that position historically marginalized students as outsiders with minimal power and authority (Nasir & Vakil, 2017). Inviting students into these spaces and expecting them to participate in the dominant discourses and practices that manifest in systems of privilege and oppression (Milner, 2015) may limit their agency in the classroom. More importantly, it may also impact the value they place on engaging in similar future endeavors given the required effort and associated costs (e.g., emotional, epistemic) this engagement requires (Eccles et al., 1983; Wigfield & Cambria, 2010).

If we are to support students to become epistemic agents in the equitable ways envisioned in reforms and discussed among the science education community, we must acknowledge that classrooms are spaces of injustice where a singular approach does not work. We must understand how instructional reform efforts can propagate inequitable systems of oppression. As Calabrese-Barton and colleagues (2022) point out, we must renegotiate “what the rights to being and learning in science are or could be” (p. 54), especially for historically marginalized students. To engage in this renegotiation, we must attend to who has the rights and privileges to participate, and to understand the struggles to belong in science that arise in learning environments constructed to engage students in the epistemic work of science.

Accordingly, this research aims to understand rights and privileges viewed through the experience of one Black middle school girl, Jessie, and her efforts to participate in scientific argumentation in a science classroom. We build from the work of González-Howard and McNeill (2020) that points to engagement in argumentation as consequential for learners' sense of agency. Agency is shaped not only by one's own comfort and perceived capability to engage in the epistemic work and practices of scientific argumentation, such as construction and critique of ideas, but also by the rights and privileges that are afforded by one's community to participate in this work, that is how one's community takes up these efforts (Calabrese-Barton & Tan, 2020; González-Howard & McNeill, 2020).

When students engage in *epistemic ways of argumentation*, they participate in knowledge critique and refinement by using evidence and reasoning to support a claim, challenging the evidence and reasoning of others with competing claims, or examining evidence and reasoning against existing theories (Berland & Reiser,

2009; Duschl, 2008). When students engage in these ways, they come to see their ideas as valid for scientific sensemaking and consequential to the learning community (González-Howard & McNeill, 2020). However, non-scientific ways of argumentation present in science classrooms (Berland & Hammer, 2012) move away from these potentialities and may work to undermine learners' epistemic agency. These ways of argumentation include rhetorical and pseudo argumentation. When students engage in *rhetorical ways of argumentation*, they engage in persuasive aspects of argumentation in which they take a competitive stance stressing differences of opinions rather than working to understand those differences, or emphasizing the correctness of their claim with minimal regard for evidence, reasoning, or competing claims presented by others (Mercer, 2000; van Eemeren et al., 1996; Walton, 1998). When students engage in *pseudo-argumentation*, they engage in the ways of doing school, that is when they work to satisfy the teacher or focus on completing the task, without attention to sensemaking or to coming to a consensus understanding (Berland & Hammer, 2012).

The research presented here aims to better understand the epistemic efforts of Jessie and the rights and privileges afforded to her as she works with her peers to develop and negotiate a scientific claim. We use the theoretical lens of ways of argumentation and ask the following research questions: (1) What ways of argumentation do Jessie and her group members engage in during a small group argumentation activity? and (2) How do these ways of argumentation invite or discourage Jessie's epistemic agency?

Methods

Context and Participants

In this research, we took a case study approach—an approach that allows for an in-depth examination of complex issues bounded by context (Creswell, 2007; Miles et al., 2014). In this case, we study the interactions of Jessie (all names are pseudonyms), and her group members during a small group argumentation episode bounded by a lesson. The group consisted of Jessie (a Black girl), Lee (an Asian boy), Chad (a white boy), and Kendall (a Black girl) as well as another student that interacted with the group named Joseph (a white boy). The lesson was led by Mr. Jerry, the white male teacher of this middle school biology class. Mr. Jerry was a teacher enrolled in a professional development (PD) opportunity, a larger project from which this research is drawn. The PD was centered on supporting teachers to develop instructional practices and knowledge to engage their students in epistemic discourse to learn science in ways that align with science education reforms (NGSS, 2013; NRC, 2012). As part of this PD, Mr. Jerry implemented a four-day lesson called *Cell Structure* (Sampson et al., 2014). This lesson was structured to engage students in scientific argumentation where students were involved in collecting data and using those data as evidence to support a claim that they negotiate with their peers.

For this research, we examined video data and corresponding transcripts from a small group episode and associated student work products. The episode was the main source of data and was analyzed to identify ways of argumentation, as described above. In this analysis, we attended to discourse and multimodal affective markers to understand how Jessie's peers' responses invited or discouraged her epistemic agency.

Analytical Approach and Stages of Analysis

This work began when we, the three authors of this research, were examining small group interactions during argumentation activities to better understand how teachers support students to engage in productive epistemic discourse. As we were focusing in on different small group interactions, the interactions surrounding one student, Jessie, stood out, and we began to recognize that her epistemic efforts were taken up by her group members in different ways during their interactions. We were particularly interested in Jessie because she had a powerful presence in the classroom (e.g., often bringing her ideas forward during whole group discussions and being animated in these interactions) and because she was persistent in her attempts to have her ideas heard and taken up when working in the small group component of activities, work that far exceeded those exerted by others in the activities, and because of the affective frustrations that she exhibited in these interactions.

We began our analysis by examining the efforts that Jessie engaged in as she worked to bring her ideas forward in one argumentation activity, *Cell Structures*. In this analysis, we independently watched videos and examined transcripts of the activity and then met to discuss the dynamics we were observing, how Jessie's efforts were or were not taken up by her group members, the work that was required of Jessie in these efforts, and the salient affective moments that stood out. We recognize that these interactions may be influenced by existing relationships and power dynamics between individuals and within this classroom space. However, we focus on this one lesson, not to minimize the power of these histories but, instead, to closely examine manifestations of these dynamic within this learning context. After multiple views and discussions, we focused on one 24-minute episode that occurred on day three, when the group began developing their argument. This development included deciding on their claim and the evidence that they would use to support this claim. We

chose this episode because it included students' idea negotiations, multiple claims, and evidence consideration in an effort to identify the claim that best accounted for the data.

To further understand the interaction dynamics of this episode, we watched and rewatched video recordings of the group as they made observations and discussed these observations at a microscope and as they worked to develop their claim, evidence, and reasoning (CER) poster at their lab table. The authors watched the video independently and came together to discuss what they were noticing. They noted particular moments that stood out to them from the episode, including moments of discourse and affect that they felt were particularly salient. The authors continued to engage in watching and then discussing the video and examining the transcript to gain a better understanding of the group dynamics and Jessie's efforts within this work.

After this initial analysis, the first author examined the episode and identified thirteen segments. Segments were a period of interactions when the group, or members of the group, held a common focus before shifting to another focus. Many of the segments occurred when the group moved between the microscope and lab table spaces or when one group member physically left the space. However, because of the recursive nature of the group's deliberations, multiple segments occurred within these spaces.

The first author coded each segment using the ways of argumentation framework described earlier. Further, she identified whether there were particular moments of affective expressions (e.g., gestures and voice intonation) of frustration associated with these utterances and interactions. She focused on these expressions because the authors had noticed in their examination of the data that Jessie's ways of argumentation were often marked by her visible frustration with her peer's ways of argumentation or engagement. While all group members exhibited affective markers, here we focus on Jessie because they were the most pronounced of all group members and because of our concentration on her. Screenshots of these affective moments were captured and added to a summary of each segment, which included an overview of the segment, a description of each student's interaction, and a description of affective dynamics at play.

Once all segments had been coded, the first author created a visualization of the segments showing the different ways of argumentation present within segments, the participants involved, and Jessie's affective markers associated around her frustration when they emerged. We used this visualization and segment summaries to examine the data and answer the research questions, paying particular attention to affective markers, shifts between segments, and ways of argumentation.

Researchers' Positionalities

The three authors, two white women (the first and third author) and one immigrant Arab from Middle Eastern background (the second author), were intimately involved in the larger project from which this research is drawn. We began this project to understand group dynamics at play in students' sensemaking spaces, but as we examined the data from Jerry's classroom, particularly those videos from Jessie's small group, we were struck by Jessie's extensive efforts to be recognized as a contributing member of her group's ideas. As we engaged further in these data, we began to understand the racial and gender dynamics at play in these spaces. While we could understand some of the gender dynamics occurring in the space, given that all three of us have experienced forms of gender inequities as female science learners and scientists, we understand that we do not bring a history informed by racial marginalization, particularly around the lived experiences of blacks in the United States. To account for this positionality, the authors have worked to understand intersecting issues of race, social justice, and gender by examining literature and research around these issues and attending to these ideas in their examinations and discussion of this case. While the researchers acknowledge that these endeavors do not provide an insider view of Jessie's experience, they did provide groundings by which the researchers could work to attend to the intersectionality as outsiders of the community.

Relevant Background to Situate the Episode

In the four day *Cell Structure* lesson, students were tasked with determining how an unknown microscopic organism should be classified (Sampson et al., 2014). On day 1 and 2 of the lesson, students examined plant and animal cells at microscope stations at the back of the classroom. They were tasked with drawing and describing what they saw on a worksheet with one column for the drawing and one column for the written characteristics of the cell. On day 2, a slide mount of an unknown organism was introduced and students were tasked with making observations of the slide before beginning to develop an argument answering the guiding question, "How should the unknown microscopic organism be classified?" On day 3, students continued developing their argument and created a claim, evidence, and reasoning (CER) poster. This required the majority of the class session. During this time, students worked with their groups at their lab tables, while revisiting the microscope slides to check their ongoing sensemaking. Towards the end of the day, groups shared their posters with their peers in a round-

robin format in which one member of the group stayed with and shared the results of the posters with students from other groups. On day 4, students individually wrote up their argument.

Findings

Jessie and her group engaged in multiple ways of argumentation during the episode examined here. The group, particularly Jessie, largely engaged in the epistemic ways of argumentation in which ideas or evidence brought forward by group members were attended to or pushed against, and evidence to support a claim were brought forward. These epistemic ways of argumentation occurred frequently across the episode. However, the ways of rhetorical and pseudo argumentation by particular group members, which occurred to a much lesser extent, worked to constrain Jessie's rights and privileges to have her ideas taken up. We saw evidence of Jessie's frustration as she was not being given full access to the learning space. This evidence manifested in her affective expressions which included gestures (e.g., eye rolls, downward eye gaze, and hand movements) and changes in voice intonation (e.g., raised or softened voice) as she brought forward evidence to support her claim ("The cell is a plant cell because *it has a cell wall*") or brought attention to the fact that group members were not attending to her ideas ("You guys are not listening."). These markers of frustration shifted from ones reflective of Jessie's exasperation to ones that indicated a sense of somberness at the end of the episode as Jessie's persistent attempts were not taken up in the group's argument and she was tasked to present an alternative claim, a claim that did not represent the ideas that she worked so hard to bring forward.

Ways of Argumentation that Jessie and her Group Members Engaged In

An overview of the ways of argumentation that the group engaged in are represented in Figure 1. In the figure, column headers indicate the different segments (1 to 13) of the episode. The width of each segment represents the proportion of time the segment took out of the 24-minute episode. Gaps in these segments represent moments when the group was not observed to be focused on argumentation. Rows are separated by each of the three ways of argumentation and their characteristic(s). Colored boxes in these rows indicate when something that a student said or did was coded in this way. Orange boxes indicate moments when one of the group engaged in the epistemic ways of argumentation. Green boxes denote when one of the group engaged in rhetorical argumentation including telling an answer or emphasizing the correctness of a claim with minimal or no regard for supporting that claim with evidence, reasoning, or considering the claims of others. Blue boxes denote pseudo argumentation indicating when students were focused on completing the poster. Figure 1 shows the broad distribution of students' engagement in the epistemic ways of argumentation, of which bringing forth evidence occurred most often. Rhetorical and pseudo argumentation occurred less frequently and are clumped within particular segments.

Figure 1

General Overview of Ways of Argumentation Identified Across Lesson Segments

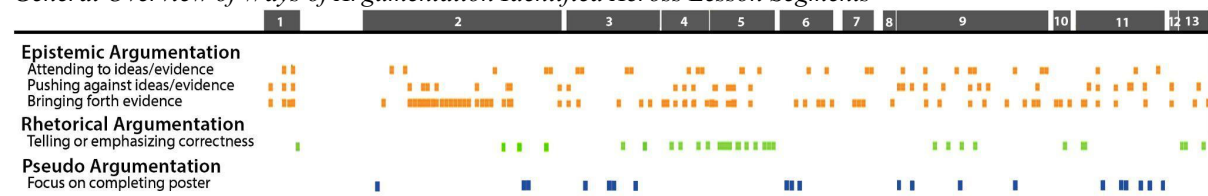
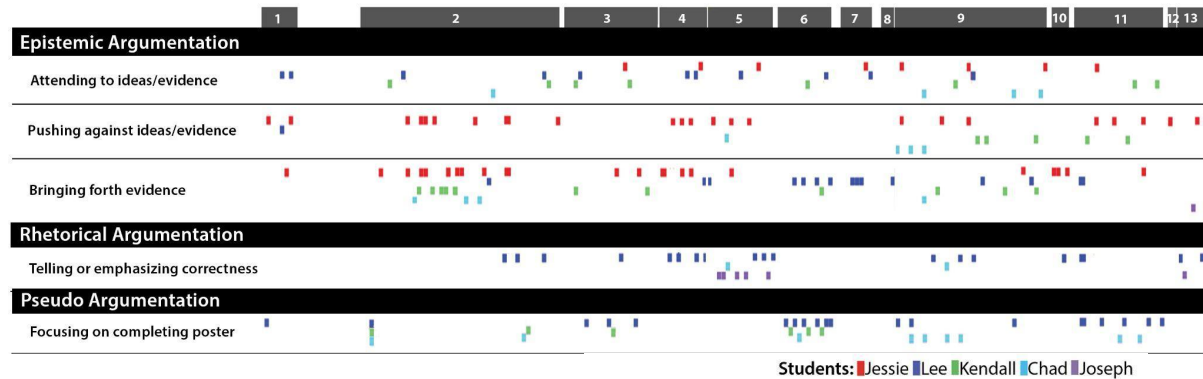


Figure 2 shows patterns in particular students' ways of argumentation. This figure is organized in a similar way to Figure 1 in which column headers represent segments and column rows represent ways of argumentation. However, here students' individual ways of argumentation are visible by the colored box within each row. Jessie is represented in red, Lee in blue, Kendall in green, Chad in light blue, and Joseph in purple. In this figure, we see that Jessie engaged in the epistemic ways of argumentation across the episode. She engaged in multiple epistemic ways including attending to her group's ideas and the evidence they present, pushing against their ideas and evidence, and bringing forth evidence in support of her claim. Bringing forth evidence and pushing against her peers' ideas occurred more frequently than attending to the ideas or evidence of her peers. In this work, she argued that the cell represents a plant because it had a cell wall, an argument that she made consistently across the episode drawing upon evidence in her notebook, the group's worksheet, and the microscope slide to support her claim. She attended to her notebook, a place where she has written down the underlying concepts of the lesson, to "research" her claim or for evidence to support her claim. She used the worksheet, an artifact that represents the observations that the group made when examining the cell slides under

the microscope, as evidence to support her claim. And, she referred back to the microscope to push against Lee's ideas or as evidence to support her claim. Jessie did not engage in rhetorical or pseudo argumentation.

Figure 2

Ways of Argumentation by Enacted by Students Across Lesson Segments



Kendall interacted in epistemic ways as well by attending to ideas or evidence, pushing against the ideas or evidence of others, and bringing forth evidence herself. These interactions were largely with Jessie and Chad. While Kendall engaged in epistemic ways of argumentation, she also engaged in pseudo argumentation when she focused on constructing the poster for completion, a way of argumentation that Chad similarly engaged in. Chad, who was tasked by Lee with constructing the CER poster, engaged in all forms of argumentation. However, he remained largely focused on drawing the component parts of the poster and making sure the group presented a complete claim on the poster, as evidenced by the light blue marks in the pseudo argumentation category in Figure 2.

Lee similarly engaged in all ways of argumentation. He engaged across the episode in epistemic ways and also participated in rhetorical and pseudo argumentation. Lee's rhetorical argumentation occurred when he told the group the claim (i.e., the unknown slide represented an animal cell) providing minimal evidence to support the idea and when he pressed Jessie to convince him that her claim was correct. These rhetorical ways of argumentation are located around moments when Lee brought forth evidence in ways aligned with epistemic argumentation to support his claim as well as times when he also engaged in pseudo argumentation as he directed the poster construction. This mixture of argumentation resulted in rhetorical and pseudo argumentation being foregrounded in the interaction he has with his peers, a dynamic explored in more detail below.

Lastly, Joseph, a student from a nearby group, who is denoted in purple in Figure 2, engaged with the group in mostly rhetorical ways of argumentation when he told Jessie how the evidence should be interpreted in the middle of the lesson and again at the end of the lesson in support of Lee's argument.

Ways of Argumentation that Invited or Discouraged Jessie's Epistemic Agency

As noted in the introduction of this section and as shown by the density and distribution of Jessie's argumentation efforts, Jessie consistently engaged in epistemic ways. This portrait of engagement intertwined with her peers' ways of argumentation might suggest that Jessie had equal access to the sensemaking space. That is, from a cursory examination, one might assume that a student's engagement in the epistemic ways of argumentation or the interactions of one's peers around this argumentation, as visualized in Figure 2, means that students are collaboratively considering each other's ideas and negotiating these ideas towards a shared understanding. However, upon closer examination of these interactions and the affective markers surrounding them, mainly Jessie's exhibits of visible and verbal frustration, we came to understand that Jessie's persistent efforts were an ongoing attempt to gain access to the group's sensemaking efforts and to have her ideas heard and considered. All the while, the ways of rhetorical and pseudo argumentation Jessie's peers engaged in were powerful in acting against her epistemic agency, reducing her rights and privileges in the learning space.

In Figure 3, we overlay the affective markers of Jessie's expressions of frustration that we identified to assist in visualizing and animating these dynamics. These markers are presented as red squares in the first row of the figure and represent moments when Jessie was visibly and/or verbally frustrated in a segment. These moments were marked by Jessie cupping her face in her hands, putting her head up towards the ceiling, spreading her fingers and putting her hands out in front of her, shrugging her shoulders, hunching over, rolling her eyes, putting her hands on her hips, or making statements such as, "You guys aren't listening to me" or "If

I'm wrong I'm going to feel like a failure." in raised or softened intonations. Table 1 provides examples of some of these gestures.

Figure 3

Ways of Argumentation by Student

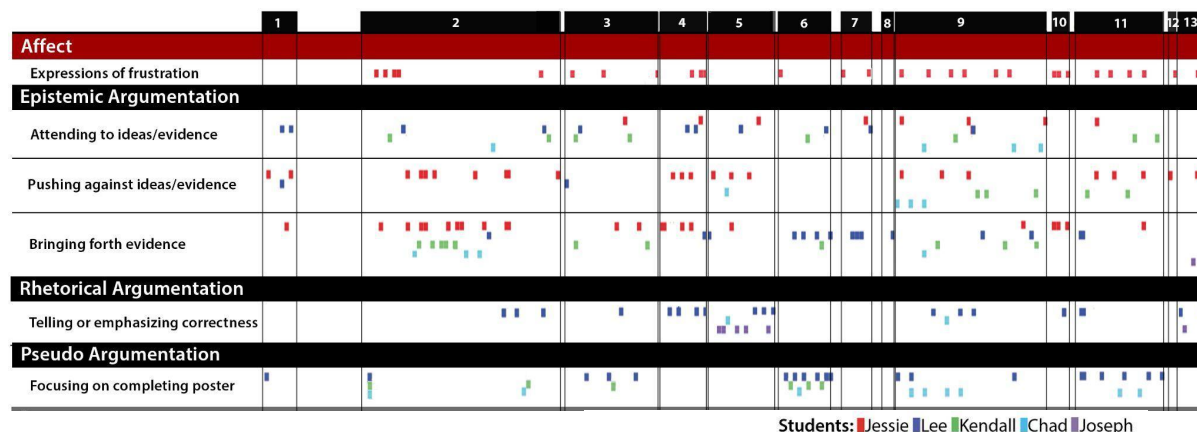


Table 1

Examples of Jessie's Affective Gestures



These moments of frustration occurred at the bookends of many segments. Black column lines have been added to Figure 3 to help visualize the location of these markers in relationship to these segment boundaries. One example of such a frustration occurred in segment 2 when Lee was directing Chad and Kendall in constructing the structural elements on the poster (i.e., a section for the claim, evidence, and reasoning). In this interaction, Jessie was arguing that the unknown cell represented on the slide was a plant because it looked like the plant cell that the group had observed and drawn on their data sheet. Jessie pointed to the group's worksheet where they had recorded their observations of the plant cell and told the group "it looked like that because it [the unknown cell], it looked like it had lines." The group continued working on the poster without attending to Jessie's comment. Jessie then told the group to "Listen." to her and she continued to describe the slide saying "before, before somebody moved it [the slide mount under the microscope], it had, it didn't look like that [point to an animal cell on the worksheet]." She then questioned the group pointing to the unknown cell on the worksheet and saying in a raised tone, "This is the unknown right there, so why would it be this [an animal cell] when it looked like this [a plant cell]?" The group continued to focus on the poster and Jessie said "You guys are not listening. You are drawing on the piece of paper. Can you listen now?". In this interaction, Jessie is leaning on the table with her hands placed in front of her, she had an exasperated look on her face with her eyes wide open, and she asked for the group's attention in a raised tone. These efforts worked to shift Kendall and Chad's attention away from the poster to engage with Jessie's ideas, represented by the green and light blue marks in the ways of argumentation rows in the middle portion of segment 2 in Figure 3. Lee enters the conversation after these interactions saying "But, that's clumped up [the depiction of the unknown cell] and everything. It's clumped up." He then poses the question "So are we saying animal or are we saying plant?". This question is not answered by the group and instead results in Chad and Kendall moving back to focus on the poster (i.e., pseudo argumentation). Jessie remains focused on presenting evidence to support her claim and pushing against the evidence brought forward by the group saying,

You guys are saying that this [the representation of the animal cell on the worksheet] is the same thing as this [the drawing of the unknown cell], but when you have these lines and you see these dots inside those lines [characteristics the unknown with matches a plant cell] that's not the same thing. That cannot be the same thing when it looks that different. It's not an animal cell!

In response, Lee tells Jessie that she might be right but that she needs to "give us evidence", "support the evidence", and "support your claim". Here, Lee's comments represent rhetorical ways of argumentation because

he is requiring Jessie to convince him of her claim using the vocabulary of argumentation without using the conventions of the discipline (e.g., bringing forth evidence to support an alternative claim). In response to Lee's comment and his disregard for the epistemic work that she was doing, Jessie puts her hand behind her head in exasperation before saying "If I'm wrong..." in a frustrated tone before she moved to her notebook to do "research" before putting her it down slowly and turning back to the group to look at what they are doing.

The example just provided is an exemplar of the kinds of effort (cognitively and emotionally) required of Jessie to have her ideas heard by the group. She raised her voice and asked for the group's attention ("Can you listen now?") and while she obtained Chad and Kendall's attention, she lost this focus when Lee entered the conversation. In this space, Lee directed Chad and Kendall in the development of the poster and he pressed Jessie to justify her claim that the cell was a plant, justifications that she made (e.g., pointing to the group's representation of an animal cell that did not match the characteristics of the group's representation of the unknown cell) but were disregarded. In these presses, he provided minimal evidence to support his claim that the cell was an animal and, instead, took the stance that he needed to be convinced that his idea was not correct (i.e., rhetorical argumentation). The red marks in the row for ways of epistemic argumentation in segments 9, 10, and 11 in Figure 3 show that Jessie continuously engaged in the epistemic ways of argumentation across these segments. Also shown are the corresponding expressions of frustration that Jessie exhibited as she made these efforts for her ideas to be taken up.

Notable in this depiction are the marked increases of Jessie's expressions of frustration across segments 9 to 12. These related not only to Lee's requirement for Jessie to convince him that her argument was valid, but also to the group's uptake of Lee's claim, even when Chad acknowledged that it did not represent the group's ideas ("We think it's a plant but they [Lee] think it's an animal"). In this interchange, Chad asked Mr. Jerry what to do about this disconnect between Lee and the alternative claim. Mr. Jerry responded by telling the group to "roll" with what they had on their poster ("you wrote animal, so go with that") and then to give their "side of the story". Jessie exhibited exasperation that her ideas, again, are not being considered, asking if she had to argue for the alternative claim ("Do I have to argue this?") and stating "If I'm wrong, I'm going to feel like a failure." in segment 12. While Jessie continued to push against these ideas in segment 13, she ultimately shared the claim that the cell was an animal during the first round robin interchange. She stated, "The evidence is that there is no cell wall, the cell doesn't have a defined shape", both pieces of evidence that she argued against throughout the episode. As she described the claim on the poster, she said

Okay, so basically we looked. They looked for. Lee, Lee looked for everything that were in plants to see if it was in the cell that we are observing and he determined that they don't have any characteristics.

In this statement, Jessie is positioning herself as an outsider to the group, shifting from the use of the collective "we" to then distance herself from the action with the pronoun "they", referring to her group members, and ultimately calling out Lee in particular as the one in charge of this sensemaking effort. In this interaction, Jessie is somber and soft spoken as she leans up against the wall as she shares the claim, one that was counter to what she had continually argued for. These affective markers contrast those for which she exhibited during the episode when she was more energetically focused (e.g., animated hand gestures and raised intonation) as she worked to have her voice heard and ideas taken up by her group.

While we share these examples as evidence that Jessie engaged in considerable effort, in the epistemic ways of argumentation, to gain access to the scientific sensemaking of the group, privileges and rights were blocked Lee, Kendall, and Chad through their use of the tools of rhetorical and pseudo argumentation. We would also like to make note of Joseph, the fourth student that entered this group from time to time. We attend to Joseph's interaction with the group because they worked to bolster Lee's position and to further push against Jessie's epistemic agency as his efforts served to validate Lee's claim, often in the ways of rhetorical argumentation, in which he told Jessie that Lee's claim was correct (i.e., the cell represented an animal). We think that these interactions, while infrequent, were powerful in enforcing Lee's rhetorical efforts and Jessie's access to the learning space.

Conclusion

The case study presented here is an attempt to understand the rights and privileges to participate, and to understand the struggles to belong in science that arise in science learning environments through the lens of a young woman of color, Jessie, and her experiences. Our analysis as shown in Figures 2 and 3 provides an account of Jessie's efforts, detailing the extensive and continued work she engaged in to have her epistemic agency acknowledged by her peers. In many ways, Jessie's continued efforts to be seen as an active contributor

to the construction and critique of knowledge claims are to be celebrated given the ways in which her peers (often boys) worked either actively or by omission to push her efforts as a Black girl toward the periphery. At the same time, further examination of these efforts highlights that Jessie's persistence is a reflection of her fight to have her rights as a scientific sensemaker acknowledged, and surface issues of inequity in which Jessie's efforts to exert her epistemic agency were eventually rejected by her peers. In this case, we see Jessie's continuous efforts to have her rightful presence acknowledged when the tools of argumentation were used to marginalize and subvert her privilege.

This analysis illustrates the interplay of the personal and communal in the performance of students' epistemic agency and the power that the community has in shaping this dynamic (Calabrese-Barton & Tan, 2020; González-Howard & McNeill, 2020). Recognizing and understanding this interplay and the power dynamics inherent in classroom spaces are essential if we are to push against systems of oppression inherent in classroom spaces towards more equitable and just science learning environments.

This material is based upon work supported by the National Science Foundation under DRL #1720587. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

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