

# On the Edge: Two Girls Negotiate Participation in a Middle School Science Classroom<sup>1</sup>

Meghan Groome<sup>2</sup>, Angela Calabrese- Barton, and Ann Rivet

Department of Math, Science, and Technology, Teachers College Columbia University Box 210,  
412 Main Hall, 525 W.120<sup>th</sup> St., New York, NY 10027

**Abstract:** This paper presents two case studies of negotiation events observed in one high poverty urban middle school. Ethnographic case studies of thirteen girls were conducted over the course of one school year using ethnographic research techniques as well as case studies of two science classroom communities of practice. As data was collected, events were isolated and classified into extending, facilitating, preventing shut out, and negotiation events. We isolated two negotiation events and explored the context of the classroom, teacher, other students and specifically how the girls enact the various aspects of their authority, how they are positioned not only by the teacher but by the structure of the activity, and what, if any positive outcomes occur because the girl chose to negotiate with her peers. Our results indicate that specific activities position some students as “gatekeepers” and others at a disadvantage. We also found that a girl’s relational authority, in the form of social networks, support or hinder her negotiation. Finally, we explore how girls use the teacher and her instructions as a resource. In conclusion, the understanding of girls’ negotiation events allow us to create pedagogical strategies that support and not bar a girl’s enactment of authority in pursuit of increasing her participation in the Community of Practice.

## Introduction

In this study, we seek to explore how urban middle school girls negotiate their participation in their science classroom community of practice in the face of resistance by their peers. By exploring two case studies of classroom events, we hope to gain a deeper insight into the classroom, teacher, other students and specifically how the girls enact the various aspects of their authority, how they are positioned not only by the teacher but also by the structure of the activity, and the ways in which these negotiations contribute to their sense of agency and their understanding of science.

In the first event, Brandy is interrupted by two boys as she is presenting a new and different idea. She attempts to negotiate her continued participation but is only successful when the rules of participation change her positional authority. In the second event, Sienna negotiates with her group of three boys to gain and voice in her small group. Despite her success in this event, she lacks the relational authority to maintain her working relationship with the boys.

By exploring the details of the context and the case study girls, we identified specific barriers and resources that surround the participation choices of the girls. In both events, the activities are structured in a way that create student “gatekeepers” and place the girls in disadvantageous positions, giving them outsider status. We were surprised by the girl’s use of the teacher as a resource in order to mitigate their outsider status and position themselves in a more “insider” status. Despite differences between the girls, they are theoretically united in their lack of social networks. Without these networks, the girls were essentially alone in the classroom and were unable to leverage their scarce relational authority.

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<sup>2</sup> Contact Author: mpg2004@columbia.edu

Within this paper, we plan to explore three questions: 1) How are participation frameworks enforced by the teacher and the other students? 2) How do the two case study girls negotiate their participation within the boundaries of the participation framework? 3) What resources do the two case study girls rely upon in their negotiation? Despite participation challenges, both girls were able to engage in negotiations with their peers that facilitated entry into the learning community, giving them both new forms of agency and opportunities to delve more deeply into the content. Their negotiations also created opportunities for other students to gain deeper understandings of the science.

### **Conceptual Framework**

#### Community of Practice

In order to understand events within the classroom we have chosen to adopt Lave and Wenger's model of situated learning (1991) that posits that learning is linked to participation in the classroom discourse. By linking learning to participation in the classroom discourse, we have come to understand the importance of an individual's negotiation of participation opportunities within a Community of Practice.

While the applicability of Communities of Practice (CoP) to classrooms has been questioned by numerous scholars (Lineham&McCarthy, 2001; Riel & Polin, 2004), Enyedy and Goldberg (2004) argue that classroom communities contain the two fundamental tenets of a CoP: shared participation and negotiation of rules, roles, and positions that structure joint activities. Of importance to us is the idea that CoP are constantly reshaping and renegotiating their rules, roles, and positions in response to new tasks, members, and activity types. As the classroom CoP shifts, the individual members shift as well and each shift provides them the opportunity to renegotiate their role within the Community (Engestrom, 1999). Many scholars have adopted this framework to investigate how an individual student's learning over time is connected to her participation and interaction with the CoP (Hall & Rubin, 1998; Lemke, 1990).

When we consider an individual student's participation and interaction in the school life, the concept of a CoP can be extended out to include the school as well as down to understand the classroom and consistent small group interactions as CoP (Enyedy and Goldberg, 2004). This allows us to situate a classroom event within the community of the school, the community of the classroom, and even the community of the small group. This also allows us to situate an individual student within the nesting CoP and understand how the individual chooses to deal with newly introduced tasks, members, and activity types. This frames the changes to the CoP in terms of before, during, and after as well as the individual at those three points in time.

#### Agency and Authority

How an individual negotiates changes to the CoP is related to their agency. Agency is defined as one's ability to use new knowledge to purposefully act within that community (Holland et al, 1998). We agree with Holland and colleagues and extend their definition to include the application of epistemic, relational, narrative, and positional authority to a new situation or change within the CoP. Epistemic authority is the content knowledge of science. While epistemic authority is an important component of science class, we believe that a student's relational authority, or their understanding of the social

and relational dynamics of a class, their narrative authority, their knowledge of the world outside of science class, and their positional authority, or the way in which a student is positioned in relation to the rest of the members of the class, are all important elements in understanding complex classroom interactions (Ortiz & Calabrese Barton, 2003).

While a girl can draw upon all four types of authority, Wells (1996) characterizes relational authority as especially important to African American girls. Relational authority becomes important not only in the choices that African American girls make at this age in regard to their activity choices but also in regard to the friends and social networks. Orenstein (1994) argues that the social networks that girls build in middle school can be vital in determining a girl's success in school or a girl's social success. Both Wells and Orenstein portray the tension between doing well in school and being socially successful as a very difficult path to navigate and that for girls, choosing either a academically supportive or socially supportive group of friends is filled with danger and sacrifice. For a girl, the ability of a girl to maintain her friends while demonstrating her epistemic authority is filled with choices that must be made throughout her school day.

In considering a girl's actions within the classroom, we believe that it is important to understand her authority over time. In order to accomplish this, we seek to create a narrative over time that traces her changes in authority over time in regards to the curriculum and the context of the classroom. We use the concept of agency, within a CoP, to be the application of new authority at the time of change.

### Participation Frameworks and Roles

As we attempt to understand the enactment of authority in a time of change, participation frameworks become useful. Participation frameworks are "the rights and obligations of participants with respect to who can say what, when, and to whom (Cazden, 2001, p. 437) and in a CoP, these frameworks are dynamic. One way to understand the boundaries of the participation framework at a certain point in time within a CoP is to look for the member who enforces the rules, roles, and positions. We have applied the concept of a "gatekeeper" to this member, and while the CoP literature does not, it is a useful concept to understand the CoP at a specific point in time in terms of a participation framework, as well as the individual's attempt to negotiate her own change in role, rules, or position.

Hughes (2000) describes a "gatekeeper" as someone that controls access to participation as well as the final arbiter of "correct" or "incorrect" information or process in the classroom. In her work, she described the tension between a teacher's goal of being egalitarian, allowing everyone the opportunity to participate, and promoting a specific idea of what is "correct" in science. When the teacher acts as the "gatekeeper", she controls the rules of participation, the structure of the activities, and what is considered worthwhile for discussion.

Given the importance of every member in shaping the rules, roles, and positions in the CoP model, we would like to expand the notion of "gatekeeper" to include any member of the CoP that enforces the participation framework.

We feel that the examination the CoP and the classroom "gatekeepers" are of importance in understanding how middle school urban girls negotiate their participation in the science classroom. In a CoP, a negotiation event lies at the intersection of a change to the CoP, a girl's enactment of authority in the form of agency, as well as her position

in the classroom by the teacher and in potential conflict with student “gatekeepers”. Given the overwhelming evidence that girls, and especially high poverty urban girls, face unique and pervasive barriers to their achievement in science (Adaman et al., 1998; AAUW, 1992, 1995, 1998, 1999; Kleinman, 1998; Lee, 2002; Malcolm, 1997; Orenstein, 1994; Sanders et al., 1995), we feel that a better understanding of who girls negotiate their participation will support our goal crafting pedagogical strategies that will better support girls in science class.

### **Methodology**

In order to understand the classroom as a Community of Practice it is important to gather data to create a case study analysis of the context of the school and classroom and the teacher and members of the class. We also chose a case study methodology because we recognize that classroom events are complicated in terms of context, learning, and the individual (Donmoyer, 1990).

We chose to craft our case studies using ethnographic research techniques including participant observation, field notes, formal and informal interviews, and think aloud techniques. Over the course of six months, we gathered enough data to be able to create rich, detailed analysis around five different units of analysis: the school, the classroom, the teacher, the individual girl, and the other members of the classroom. In understanding the CoP, we recorded different data about each of those units in order to piece them together in a case study analysis that would reflect the importance of each of those pieces in understanding a community of practice.

In order to follow individual girls, we chose to create a “snap shot” CoP and analyze the classroom for specific happenings or events (Donmoyer, 1990) In this paper we analyze events in which girls are negotiating their participation, but we also identified events in which the girl was facilitating the lesson of the teacher and extending the lesson.

As we analyzed each event, we attempted to combine the different units of analysis to understand how those different factors influenced the positional authority of the girl, the resources available to her, and the barriers to her participation and learning. This allows us to understand the rules, roles, and activities that existed in the CoP before, during, and after a change to the CoP from the point of view of the individual girl.

### **Setting**

#### The School

For this project, research was conducted at two different New York City public middle schools. While negotiation events occurred at both schools, the events detailed below occurred at PSW and only data from PSW is needed in this paper. For a complete description of our second school, please see Tan, Calabrese-Barton, and Rivet (2006).

PSW, is a small public middle school located in Manhattan’s Upper West Side that serves grades 6-8. PSW’s student population consists of primarily Hispanic and African American students, with 70% participating in free lunch.

A few years ago, PSW was designated a SURR school and its curriculum was reorganized by the district to increase math and literacy class time, greatly decreasing the time available to teach science. Each student receives one semester of science a year. At PSW, the sixth grade year is divided, one semester for art and the other for science.

Within the science semester, each student takes three units, each approximately eight weeks long. Students have two 90-minute science classes a week.

PSW prides itself on its interdisciplinary curriculums, dedicated teachers, and strong sense of community. Despite its heavy emphasis on literacy and math, the school prides itself on its arts and social studies program and the teachers have accepted a special schedule in order to maintain small class sizes. While the teachers prep for three to four classes every day and often teach all three grades, they have traded their own time to create a small, community-minded learning environment.

Students come to PSW from all over the city. A large number come from neighboring Morningside Heights and attended the same elementary school, while others travel up to an hour to get to school every morning. PSW has an excellent reputation among parents and it serves as a feeder school to decent public high schools. While the school is not focused on science, the principal has made a concerted effort to improve its science program over the past few years.

### The Teacher

Our partner teacher, Ms. M, has been at PSW for 3 years and this was her second year teaching science. Ms. M is an enthusiastic, young teacher who is respected by her fellow teachers and her students. The students in her class typically have her for science as well as math, social studies, and language arts. She is certified as a math teacher but she, and the rest of the teachers at the school, teach multiple subjects. In order to reduce class size, the teachers elected to teach more classes and have less prep periods. While this is difficult for Ms. M, she appreciates and values her small classes. During the observation period, Ms. M continued to participate in professional development through the Urban Science Center at Teachers College Columbia University and take classes towards her Master's degree in Education. Though this was her second year teaching science, Ms. M was very uncomfortable teaching science and frequently shied away from teaching more difficult science concepts. In an effort to make herself more comfortable, she frequently integrated math, social studies, and environmental studies topics into her lessons. Despite her science phobia, she is an avid gardener and teaches botany at the New York Botanical gardens. She is also an environmentalist and will frequently allow the class to take content detours during whole class discussions to explore environmental issues.

During the course of the study, the teacher used the LiFE curriculum. The LiFE curriculum consists of five modules and engages the content of biology through the study of food production, distribution, and human consumption. At PSW, only the second module, from Farm to Store was adopted to adapt to account both for their schedule and their need for a life science curriculum. We also chose that module because the teacher was drawn to two of the major themes of the unit, sustainable agriculture and conservation of fossil fuels. Typically three to four different activities from different lessons were brought together in each 90-minute class, usually a thought question, mini-lesson, creative synthesis activity, and a hands-on activity.

The curriculum afforded us the opportunity to observe the case study students engaged in many different types of activities including labs, group work, worksheets, interdisciplinary and creative activities, field trips, and whole group discussions.

### **Data Collection**

In the first year of the study, data was collected from two different sites. At each site participant observation yielded field notes and informal interviews with both teachers and students. Formal interviews, student artifacts, and think alouds were also collected. Data was compiled to create thick case studies of thirteen girls in four different classes.

We chose an ethnographic case study methodology to allow us to document the complex nature of learning and classroom as well as to create not only snap shots of classroom events by narratives over time for each student (Donmoyer, 1990).

#### Phase One- Case Study Selection

In the beginning of our data collection, we chose a number of girls from each class that we were observing to be potential case study girls. We attempted to select a variety of girls based on race, ethnicity, participation in class, and interest in science. After an initial observation period, we chose 13 girls as case study girls. We observed 4-5 case study girls in each class.

During our data collection we focused our observation on the case study girls and recorded their work in individual, small group, and whole class settings. While our field notes captured the context of the classroom as well as the lesson, we paid special attention to our case study girls by sitting near them during whole class discussions, observing their group interactions, and focusing our video cameras on their groups. During the course of the lesson, we switched our locations and our camera locations in the classroom in order to gather data on each girl during the course of the lesson.

#### Phase Two- Event Isolation and description

In our next phase, we isolated the events where the girls participated and wrote up event descriptions based upon field notes, video and audio recordings. These short narratives were grouped by girl and allowed us to look at the actions of the girl, the context of the classroom, the response of the other participants, and the outcome of the event. We included information about the assignment, the instructions by the teacher, transcripts of what was said, and any other information that would enhance the description of the event.

#### Phase Three- Event map analysis

In the second layer of event map analysis the transcript or field note description was analyzed line by line to determine what the girl did in the event, what the other participants did, the resources that she employed, the risk involved in her actions, her identity in the class, and the final outcome. We coded for resources, space, identity, content, and community interactions.

After coding approximately 20 events in this manner, we began to see different patterns emerge. One of the patterns that emerged were the event types. We saw that the events could be categorized according whether the girls were changing or extending the activity, facilitating the goals of the teachers, and attempting to participate when someone was trying to shut them out. While not all the events could be classified into extending, facilitating, and preventing shut out, we chose these events to begin to look for other communalities to understand the merging practices that the girls engaged in.

## **Results**

### Negotiation Events

In the course of our analysis we identified, four types of events, extending, facilitating, preventing shut out, and negotiation events (For a complete description of the event types as well as a detailed description of our event analysis see Calabrese Barton, Rivet, Groome and Tan, 2005).

This paper presents a detailed analysis of two negotiation events. At the core of these events is the negotiation between a girl and another person or group, either a peer group, another individual student, or the teacher. In a CoP, we have come to think of negotiation events as the point in time when a girl takes the steps to increase her participation in the classroom by changing her role, the rules, or the activity. For some girls, their attempts to increase their participation is easier but for others, the girls face resistance from their peers. In the course of our study we have identified other negotiation events, but in this paper we will examine two events in which the girl is negotiating her ability to participate as a member of the CoP.

In the first event, Brandy, faces resistance to her ideas and that resistance comes in the form of two boys who act as “gatekeepers” to her participation. In order to continue and explain her idea, she must either change the rules for participation by changing the “gatekeeper”, or convince the “gatekeeper” that her ideas merit discussion. As we attempt to understand Brandy’s negotiation, it is important to understand the role of the different people involved, Brandy, the boys, and the teacher. In this event all three play an important role and Brandy’s success is based not only on her own actions but also on the actions of the teacher.

In the second event, Sienna must negotiate her participation in the group including new rules for participation that include her and a new role as a member of the group. In this event, the boys as “gatekeepers” create rules and roles that position themselves as “insiders” and Sienna as an “outsider”. In order to negotiate her participation she must either change her status as an “outsider” or change the rules for how to work will get done. Unlike Brandy’s negotiation, Sienna’s negotiation takes place between Neal and Emmanuel for part of the time and with Jake for the remainder of the time.

Understanding the different elements involved in a negotiation allows us to take into account the complexity of a negotiation event. It is not only the actions of the individual but also the actions and roles of the other players, the structure of the activity, the rules of the CoP, but also the understanding that all of those elements dynamically support or hinder the girl throughout the course of her negotiation.

### **Brandy Asks a Question**

#### Brandy

Brandy was highly successful in school and was on the highest honor roll for the sixth grade. She excelled in science and math and was a member of the school’s prestigious math team. The teacher described her as the student “who had all the right answers”. During science class, she often spoke of environmental issues displayed knowledge of current environmental threats such as global warming, fossil fuels, and endangered species. Using Costa’s (1995) identity classification scheme, we identified

Brandy as a “potential scientist” because her in school identity as a successful science school was aligned with her outside school identity.

Brandy is physically much larger than her peers and towers above both the girls and the boys in her class. She likes to be “fashionable” and often wears brightly colored outfits with elaborate jewelry and styled hair. Her choice of clothing is very different from the other girls who often wear comfortable street fashions such as jeans and hooded sweatshirts with gold jewelry and sneakers. While in a social setting, such as hanging out in the hallways between classes, she was often alone or hanging out on the periphery of a group. In class, she tried to make small talk with her group but she was unsuccessful partially because she didn’t watch the same TV shows or listen to the same music as the other students. Brandy might be considered a nerd by her peers because she is a math and science student but also because of her different clothes, physical appearance, and awkward social skills

Despite her out of place appearance and awkward social skills, she was able to interact with the other students by offering to help them with their schoolwork. During group work, she was frequently the leader and students often went to her for help, asking her to explain concepts, get help with homework or a class activity, or to check completed work. When the class was over or there was down time for the students to talk, Brandy was often alone with no friends to chat with in the class. While she was able to relate to her peers using her epistemic authority, she appeared to continue to try and make friends both in class and out of class, suggesting that she was unhappy with her alone status.

#### Context of the Event

The context in which this event took place was a lesson in which the students were to link together their individual actions and the use of fossil fuels. This lesson was embedded in a larger investigation into fossil fuels where students studied the amount of fossil fuels it takes to produce food regionally and industrially. They mapped where their food comes from, and compared both the distances and the amount of transportation it requires to get food from the farm to the store. They also learned about other farm related uses of fossil fuels such as using machines that maintain and harvest the food on the farm and fertilizers that are derived from petroleum. These activities were meant to lead students to the conclusion that regionally grown food is better for the environment.

In another lesson, the students completed an assignment where they listed the different ways they used fossil fuels and wrote about how they could reduce fossil fuel consumption in their everyday lives. The goal of this lesson was for the students to understand how the choices they made in their lives, from the food they bought to their everyday use of fossil fuels, made a difference in the ecological health of the globe.

#### Ways of Participating

In this unit, Ms. M frequently engaged the students in whole-class discussions. In some whole-class conversations, she asked a question and then calls on students and she determined who could participate and how they would participate. This type of discourse is described by Lemke (1990) as the triadic dialogue. In the triadic dialogue, the teacher poses a question to the students, a student responds to the question, and the teacher reformulates the answer and calls on another student. When this pattern is in



place in the case study classroom, the teacher strictly enforces the participation rules. During this type of discourse, the teacher acts as the gatekeeper.

While the teacher maintains rules for participation during the majority of class, she would frequently allow the rules of discourse to disintegrate when the students got excited about a topic and the students were allowed to call out, interrupt one another, and speak over one another.

The teacher told us in an interview that she enjoyed these kinds of conversations, even naming them “shout outs”, and let them happen when the students are very excited and have a lot to say. During these conversations, the teacher reinforced the participation of the loudest or most aggressive students by acknowledging their comments and calling on them to continue as students struggle to be heard. Instead of the teacher controlling the rules for participation and acting as the “gatekeeper”, the students were allowed to act as “gatekeepers” as well, interrupting and shouting over quieter, less aggressive students in the class. Later in the class had participated in a “shout out discourse”, we include a transcript here as an exemplar of a typical “shout out” conversation.

Teacher: Now who has ever walked in the woods? (Many students raise their hands). What do you see on the ground? Lydia?  
Lydia: Dirt  
Teacher: What else? Francis?  
Francis: Sand?  
Randall: (interrupting) No, not sand.  
Jack: (overlapping) Dirt...  
Randall: (overlapping) leaves...and bits of old leaves  
Edwin: (overlapping) twigs and sticks and branches...  
Teacher: Randall  
Randall: I've seen leaves and smaller pieces of old leaves and twigs and stuff that you walk on  
Teacher: That's exactly right...

In this class, the “shout out” conversations were dominated by a few boys. Brandy did not compete with the boys during these conversations. In order to participate she waited until the din died down and the rules for participation were reinstated to voice her opinion.

#### Event description

The event takes places twenty minutes into the ninety-minute period and over about fifteen minutes. For analysis, the event is broken into four different phases. The first is the context of the event that sets up the activity that the students are engaged in and the rules that will govern participation. The second is Brandy's initial participation and interruption by two boys, Randall and Jack. The third is her negotiation of the challenge to her idea and the fourth is the teacher's intervention and subsequent discussion.

#### Phase I

The class was engaged in a discussion around the question “What would happen if we ran out of fossil fuels?” The question was posed by the teacher and was given to the students as an opportunity to synthesize information about fossil fuel patterns of use, methods of conserving fossil fuels, and the dwindling global supply of fossil fuels. The teacher posed the question to the students, and the students raised their hands to respond to the question.

- Line 1- Teacher: So I want to move on to what we’re going to do today. Who knows what we’re going to do if we run out of fossil fuels? Let’s make a prediction. (Brandy raises her hand) Think about all the things that we use fossil fuels for, think about all the things that we about last week, remember. Francis?
- Line 2- Francis: I think that we could use the things that we’ve already made from fossil fuels, so that we could use the plastic that we’ve already made.
- Line 3- Teacher: So he’s saying that we could use the fossil fuels that are already made, like recycling?
- Line 4- Francis: Yeah.

The students commented on a number of topics including the use of solar technology, the importance of finding alternative fuels, and the economic importance of finding other sources of energy. As each student gave his or her answer, the teacher responded to the answer, often restating the student’s answer. Initially, Brandy was the first person to raise her hand. After the teacher called on the first person she put it down and then put it back up after the first person was done. She repeated this for the second person as well but when the second person was done, she raised her hand and waved it around. As the third person was talking, she sighed and put her hand down. This continued for five minutes.

After calling on four students who had their hands raised, the teacher finally called on Brandy.

## Phase II

Brandy initially asks if she can ask a question and the teacher gives her permission. Brandy then begins to ask her question:

- Line 5- Brandy: I have a question.
- Line 6- Teacher: Yup.
- Line 7- Brandy: If all the fossil fuels is gone, then how would we wouldn’t we all like die or something cause...
- Line 8- Randall: (Interrupts) No!
- Line 9- Jack: Duh!
- Line 10- Brandy: No. (Pause) Its just a question... (trails off)
- Line 11- Teacher: No wait, let’s listen, it’s a good question.
- Line 12- Brandy: Because wouldn’t food, that grows on the farm, grow up and you have to put fertilizer on it, and fertilizers is from fossil fuels so wouldn’t we have no more food?

Line 13- Teacher: Wow. Well this is more specific that I'd like to get but does anyone know what we used before we had fertilizer?

As Brandy began her question she introduced the idea that people could go extinct. Randall, one of the main participants in science class, reacts quickly to her idea and interrupted by shouting "No!" and then Jack, one of Randall friend, quickly followed and said "Duh!". The boys were also laughing at her as they interrupted her question.

It is important to note that interruption is common in this class. In an interview, the teacher talked about the way that students interrupt each other. She views interruptions and "shout out" discussions, where the teacher allows the students to shout out their ideas without her as the intermediary, as positive and usually supports them because she feels that shouting out and interrupting is based in enthusiasm and excitement for the subject.

What is unusual about this interruption is that both Randall's initial "No!" and Jack's comment of "Duh!" were said while the boys laughed at Brandy's suggestion. The interruption did not occur because the boys had something to say but because they did not agree with what Brandy said and thought it was "stupid". Despite the derogatory nature of this comment, the teacher treated it as if were a content interruption.

After the initial interruptions, Brandy attempted to regain control of the conversation by saying "No." (Line 10). At this point, she pauses a few beats and then distanced her self from her initial statement by saying, "Its just a question..." and she choose not to continue. It seems unlikely, given Brandy's aversion to "shout out" discussions and the boys' interruptions, that she would continue to explain her divergent point of view.

After her voice trailed off, there is a pause for a few moments. Right after the interruption and while Brandy was speaking, no one from the class spoke out in support of Brandy's idea in the same manner that Randall's friend spoke out to support Randall.

### Phase III

In the next phase of the event, the teacher intervened and told the class "No wait, let's listen, it's a good question." This is an unusual intervention by the teacher. In similar events where a student has been interrupted, she frequently just called on the next person who raised his or her hand and the conversation continued. During a professional development session, we used this event to illustrate another aspect of our work. Ms. M was part of that session and we had the opportunity to interview her about the episode.

During the interview, she talked about her decision to give Brandy more time to discuss this idea. She related how the activity was originally designed as a quick review and wrap up activity. It was not meant to take more than a few minutes but by the time Brandy was called on, it had already extended past the time allotted for the conversation. Time is a constant pressure at PSW because there is so little of it for science class. As a result, the teacher is under pressure to keep the class on task and she does not usually allow conversations to go over their allotted time. While Ms. M acknowledges that this is not fair to the students, she does make some exceptions when the students are excited by the material. In her classroom, if the students are eager to participate, she will occasionally allow the conversation to continue.

When Brandy was interrupted, the teacher had to make a choice, either move on to the next topic or continue with a conversation where many students wanted to participate. In this case, the teacher felt that Brandy made a comment that connected two related topics, fossil fuel consumption and sustainable agriculture and that the comment was worth exploring. The teacher also mentioned that she trusted Brandy to communicate the point to the rest of the class. When asked to explain how she knew that Brandy's point would be worth the time, the teacher explained that Brandy almost always had the right answer and that Brandy played that role during many class discussions.

#### Phase IV

After the teacher encouraged Brandy to continue, she restated her question by tracing the logic behind her initial statement, "Because wouldn't food, that grows on the farm, grow up and you have to put fertilizer on it, and fertilizers is from fossil fuels so wouldn't we have no more food?". She does not grammatically phrase her sentence as a question but she raises her voice at the end of the sentence, signally that she is presenting her idea as a question (Lemke, 1990).

The type of question that she asked has been described by Watts and Alsop (1995) as a "thought experiment". In a thought experiment, a student creates a hypothesis of their ideas and shares them with others to gather evidence to either support or deny the experiment. In this case, the teacher takes up the experiment and presents it back to the class.

Once again, the teacher decides that Brandy's idea is worth the time and responds "Wow. Well this is more specific that I'd like to get but does anyone know what we used before we had fertilizer?" The teacher chooses to pick up a specific piece of the experiment and she rephrases it for the class. At this time a number of hands are raised to answer the teacher's question. Ironically, it is Randall who first raised his hand and talked about other civilizations that have survived without oil and chemical fertilizers.

After Brandy's comment, the teacher leads the class in a five-minute discussion about alternatives to fertilizers. The conversation leads directly to the next planned topic of conversation, decomposition.

#### The anatomy of the negotiation

In order to understand this negotiation event, it is important to contextualize it in terms of the CoP before, during, and after a change. In this event, the exchange occurs not by the introduction of a new activity type (since the students frequently engaged in whole class discussion) but by the introduction of a new synthesis of ideas, the effects of one's consumption of fossil fuels on the global environment. At this point in time, the students are asked to think about two different familiar ideas as related to one another. This creates the opportunity for students to draw both from their in school knowledge and funds of knowledge to introduce new and different ways of thinking about a topic. The introduction of divergent thinking is an important aspect of learning in a socially constructed community and has been considered a way to shift the norms of the CoP (Barab Hay, Barnett, and Keating, 2000).

As we enter into the event, there is a set of rules governed by the teacher. Brandy waited patiently for her turn to participate and share her idea that human consumption of fossil fuels could be related to human extinction. This idea has the potential to shift the

CoP because it is a new way of thinking about the existing content and it related the students' individual actions to the perilous fate of the earth.

As Brandy waited her turn to participate, the teacher acted as the "gatekeeper". Once Brandy shared her idea, Randall, adopted the role of "gatekeeper" and publicly judged her idea to be "stupid". Jack, Randall's friend, also adopted the "gatekeeper" role. By not reprimanding the boys for interrupting or for being rude to Brandy, the teacher allowed the boys to remain as "gatekeepers" to Brandy's participation. By not reprimanding her ideas, she also allows the conversation to continue in a "shout out" mode. If Brandy wanted to continue to promote her ideas, she needed to overcome the participation barrier set by the boys on her own.

In order to do this, she had to demonstrate that her idea wasn't "stupid", as intimidated by the boys. Instead of directly confronting the boys and demonstrating that her idea had merit, she continued to position her idea as "just a question", diminishing her support of the idea. By stating that her idea is "just a question", she signals to the class that it is not a fact or something that she believes to be true but that is an idea that she would like to present to the class.

Watts and Alsop (1995) discuss a "thought experiment" as an opportunity for a student to make their thinking transparent and to gather evidence from the rest of the members of the classroom. Watts and Alsop also position the "thought experiment" as an inherently risky move for a student because her nascent ideas are to be picked apart and judged by the members of the class. She rejected the boys initial judgment that her idea was "stupid" when she forcefully said "No" but was then unable to quickly restate her "thought experiment" in a way that would have satisfied and made sense to the boys.

At this point, Brandy chose to back down from the negotiation and she let her voice trail off. While we do not know what Brandy was thinking as her voice trailed off, the few moments of silence signal to the teacher that Brandy is unable to continue to support her idea. The teacher then steps in and reinstates the triadic dialogue. In her reinstatement, the teacher tells the class "No wait, let's listen, it's a good question." and granting Brandy the space to conduct her "thought experiment"

Within the rules and roles of the triadic dialogue, Brandy can continue with her thought experiment instead of negotiating with the boys in order to convince them that her ideas have merit.

By reestablishing herself as the "gatekeeper", Ms. M potentially signaled to the other students in the classroom that divergent thinking and ideas like Brandy's would be accepted and taken up in the classroom discourse. Brandy's uses her epistemic authority in order to participate and share a new idea with the class. By acting as "gatekeepers" the boys tried to keep her from enacting her agency and shift the topic of conversation. By giving Brandy a chance to reexplain her point, the teacher is giving Brandy a chance to enact her epistemic authority and increase her participation.

#### Sienna and the boys

In this event, we observe the typical interaction of particular one group composed of three boys and one girl. This event takes place during the very first group project and its pattern of negotiation is repeated through the course of the next six weeks. This group is considered a CoP embedded within the larger CoP of the classroom and school (Enyedy and Goldberg, 2004). As the unit moves on, Sienna continued to work within and change the CoP while the boys continued to try and keep her out of the CoP.

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## Sienna

Sienna had gone to elementary school with many of the students in the class but had drifted in and out of the neighborhood, moving back and forth between her mother's family and her father's custody. During the course of the observation period, she disappeared from school for a few weeks and the school was unable to locate her. When she returned to school, she had a new hairstyle and a set of new designer outfits. When asked, she said that she had "gotten away" to her dad's and lived with him for a while.

Sienna is a very dynamic girl; she plays the role of the conciliator with her group but constantly challenges the teacher and other adults. She is frequently suspended and spends much of her school time sitting outside of the principal's office either waiting to be reprimanded or waiting to be picked up after a suspension. Despite her behavior problems, she was eager to participate in our study and frequently stopped and chatted with the RA in between classes. She did not frequently interact with her peers but often volunteered to help out with small classroom tasks such as carrying books between rooms and running notes to other teachers and students. She was also well liked by Ms. M and when she was present she tried hard in Ms. M's science and math class. When speaking about Sienna, Ms. M remembered Sienna's positive contributions to the class, including her ability to get along with anyone and her persistence in tackling hard challenges, and not her behavior problems.

Sienna's grades did not reflect her hard work because she was frequently absent and had refused to take a number of important tests. Despite her enthusiasm for school science, her independent library research on science topics, her experiments and field experiences, and her desire to be a pediatrician, her behavior and absences prevented her from getting good grades in science. While she enthusiastically chatted about her science interests during formal and informal interviews, she rarely spoke of her experiences during science class and did not seem to reference any of her outside science knowledge during whole class or small group activities. Her work in science class was not reflective of her love of science and she was one of the few students who we classified as an "inside outsider". Costa (1995) describes an "inside outsider" as someone who's personal interest in science does not match either her school or her out of school identity.

As the Farm to Store Unit went on, Sienna continued to experience resistance from her group. At first, they resisted working with her and as the unit progressed, they began to make fun of her hair, questioned her intelligence and her numerous singing awards. While she continued to work with the boys and negotiate her role in the group, she could, in theory, have switched out of her group at any point. In the beginning of the Unit, the teacher assigned seats but as the Unit progressed, many students moved their seats, either to sit with friends or to move out of a group that they did not like. The other girl who was working with all boys finally moved to a group of her friends who were excited to sit with her. Another boy, who had been seated with all girls moved to sit with his friends as well. Both students changed dramatically when they got to sit with their friends, going from quiet and uninvolved group members to talkative and productive members of their new group.

Sienna chose to remain with her group even though each group project was a struggle and she was not always successful in promoting her own agenda. One possibility for this choice is that Sienna didn't have many friends in the classroom or in the school.

She only interacted with the boys at her table and had a number of small fights with different girls in the class when she reached out to interact with them. She rarely interacted with anyone in the hallway and she frequently asked the RA if she could eat lunch in Ms. M's classroom while interviews were being conducted. Sienna may have chosen to continue to work with the boys because she was not friends with anyone else in the class and had antagonistic relationships with many of the other girls in the classroom. The other students who moved had social relationships to move to while Sienna had few if any options in a small class with only a five groups.

### Group Dynamics

This event takes place on the third day of the new science class and this is the first time that they are working on a group activity. While this is a new group, two of the boys are close friends while Sienna and Jake are peers. Jake is new to the school, having gone to a different elementary school. He is also different because he is one of the few white students in the entire school. In his short time at PSW, Jake has gotten into trouble for fighting with other students and talking back to the teachers. He is normally a quiet student and when left alone, will work by himself to complete his assignment. He can be very aggressive and defensive when other students pick on him. He isn't very interested in science but loves sports and has sports related binders and school supplies. The other boys in the class have noticed his nice school supplies and he has begun to make friends with a few boys who don't sit at his table.

Neal and Emmanuel were childhood friends and frequently work together on other school projects. Neal is interested in science and often shares stories from the television shows that he watches at home. Emmanuel is less interested in science but has done well in math class at PSW. When they work together, the boys will "gang up" and bully other students. When they sit alone, they continue to actively participate but do not individually bully other students. The teacher is unaware of their friendship when she made the seating arrangement.

In order to make her seating arrangement for new students, the teacher consults other teachers to find out potential conflicts and positive working relationships between the incoming students. When she inquired about this group, she found out that Emmanuel, Neal, and Jake all had past behavior problems. She chose to put them together at the front table in order to watch over them. Unlike the boys, she knew Sienna from her math class and she placed Sienna there because she knew Sienna "could get along with anyone".

Unbeknownst to the teacher, she had created a group that would have a very hard time working together.

### Curriculum Context

In this lesson, the students read paragraphs about three different types of packaging, paper, plastic, and glass. This lesson was taken directly from the "Farm to Store" curriculum. Each paragraph gave information about the positive and negative attributes of each packaging type. In the first half of the worksheet questions, the students simply noted the "pros and cons" of each packaging type but in the second half, they are given a scenario and had to decide which packaging type would work the best. Because each packaging material could work for each scenario (though some work better

than others) the students must choose one and then present evidence for why their choice is the best one. In some groups, the students just picked a packaging type and avoided any negotiation about the “best” type.

This was also the first time that the teacher taught this lesson. During the course of the lesson, she moved from table to table but she sat with one group who was arguing and having difficulty beginning their group work for most of the lesson.

### The Event

This event takes place in the middle of a 90-minute lesson. It occurs over the course of about 20 minutes. The event is broken into five phases. In the first phase, the teacher gave the class the instructions and the boys promptly ignore them. Sienna attempted to get the group to work together. The second phase began when she changed her negotiation tactics and started to work with just Jake. In the third phase, Sienna and Jake have established a working relationship and work on the task at hand. In the fourth phase, the task changed slightly and Jake attempted to work with the boys again. This causes a renegotiation of the task and the students take up their old way of working. In the final phase, Sienna and Jake continue to work together and complete the assignment. Unlike the previous event with Brandy, we observe Sienna negotiate her participation in this small group event at three different points in the event.

### Phase I

To begin this task, the teacher passed out the worksheets and explained that the groups were to read the information as a group and come to a decision that all four people made.

As soon as the teacher gave the instructions, Emmanuel and Neal disregard her instructions and began to work in together. They frequently worked together and have a set pattern that established their working method; Usually Neal suggests how it will be done and Emmanuel takes it up and begins the task. In this task, they have decided to read the information out loud to one another and they begin to work in this method.

Jake, another outsider in the group, took his cue that he would not work with them and began to do the worksheet on his own. Sienna looked around and then asked the teacher as she walked past if they should work as a group. The teacher confirmed her instructions.

After Sienna asks the teacher to confirm her instructions, she loudly and clearly repeated the instructions back to the boys. Neal told her that they were going to work by his rules and Emmanuel told her that they wouldn't work with her. They turned back to their work while Jake continued to read.

### Phase II

Sienna turns to Jake and asked him where he is reading. He lied to her and told her that he has skipped ahead. She didn't notice that he was actually reading at the beginning and told him to “Please read”. He suggests that she could just listen to the other boys instead of making him read aloud. She then pointed to the paper and asked him to read just one paragraph. He agreed and begins to read aloud. When he is done with the first paragraph, she began to read aloud and he does not interrupt her but listened



to her read. They don't negotiate between each paragraph but trade off, each allowing the other to start the next paragraph when the previous paragraph is done.

### Phase III

At this point in the event, they have completed the reading and have moved on to the questions. Without missing a beat, Sienna read the first question aloud. After a few moments, Jake shouted out the answer and Sienna told him that she agreed. They both filled in their worksheet. Sienna read the next question aloud and Jake immediately began to read through the paragraph for the right answer. At this point in the worksheet, the students are engaged in reading comprehension questions where the students look to find the answers in the paragraphs. As Jake continued to work, Sienna pretended to look for the answer but quickly looked up from the paper and looked around the classroom.

After a few moments, Jake found the answer and shouted out again. She nodded and smiled, agreeing with his answer and they both wrote it down on their papers. There is only one more reading comprehension question and Sienna and Jake finished it in the same manner.

### Phase IV

After Sienna and Jake completed the reading comprehension questions, they moved onto the section in which they must choose a packaging material to fit the scenario. At this point, all four students are on the same problem. Both Sienna and Jake read the question but instead of sharing with Sienna. When the boys discussed the answer to the question, Jake interrupted them by sharing his answer and disagreeing with them. They talk about it for a few moments and when they can't come to an agreement, Jake threatened Neal, who began to get up out of his seat. Meanwhile, Sienna has sat silently but kicked Neal under the table. Neal told Sienna to stop kicking him and Sienna tells Neal and Emmanuel to mind their own business.

Without pausing she asked Jake a question about the problem that they were working on and Jake responded to her content question.

### Phase V

In the final five minutes of the event, Sienna and Jake continued to work together using the turn taking rules established earlier in the task. They completed the final set of questions by reading the event aloud, thinking individually for a few moments, and then making their case to one another to come up with the best answer. Neal and Emmanuel continued to work on their own as well and debated the merits of each packaging material for the given scenario.

When the whole group is brought together to discuss the answers, the teacher does not have the groups present their material but asked them to give individual answers to the scenarios. All four students participated and their way of working was never mentioned to the teacher.

### Anatomy of the Negotiation

It is useful to think of this small group as a CoP within a larger CoP of the classroom. At the outset of this activity, the teacher gave the students instructions for

how to work but did not provide any scaffolding for the students to work together nor did she enforce her instructions during the course of the event. This allowed the students to complete the task in whatever groupings and using whatever rules for participation that they chose. We have also included a timeline of the negotiation in order to clarify the order of events.

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Figure 1. Timeline of the Negotiation

Timeline of the negotiation
Teacher gives assignment and sets instructions
Sienna attempts to negotiate that the whole group will work together
Neal and Emmanuel reject her rules, set rules of their own
Sienna attempts to negotiate her participation with Jake
Jake initially rejects her attempts
Jake and Sienna negotiate to establish working rules
Jake attempts to negotiate his participation with the Neal and Emmanuel
The boys disagree and Jake attempts to renegotiate his participation by arguing with them
Sienna renegotiates her participation with Jake
Jake and Sienna continue their working relationship through the end of the activity

In the beginning of this event there are two separate rules for the activity, those laid out by the boys and those laid out by the teacher. Because there are two separate sets of rules both Neal and Emmanuel and Sienna can act as “gatekeepers” to enforce the rules. When the group begins the activity, Sienna tries to enforce the teachers’ rules, which are advantageous to her, by repeating the teachers instructions. The teachers’ instructions, to work together as a group, require that all members of the group agree to participate using those rules and the boys’ action of rejecting the rules demonstrate how little authority Sienna has as an individual “gatekeeper”.

The boys’ rules, on the other hand, only require that two people agree to them, Emmanuel and Neal, because they are designed to exclude everyone else. In the face of exclusion, Jake and Sienna are forced to find another way to work without Neal and Emmanuel. Jake decided to work on his own, while Sienna continued her quest to work in a group. Once the boys reject the teacher’s rules, Sienna stops trying to negotiate a whole group activity and begins to negotiate an even smaller group activity with just Jake and her.

In the beginning, Jake seemed to be against working with her but as Sienna negotiated with him, she changed his mind with a combination of persistence, questions, and direct orders. As she moved through the negotiation, she diminished her demands of him until he agreed to work with her. Her increasing compromise results in his agreement to read “just one paragraph”. In the end, her negotiation netted her not only a partner to work with but also one who will read out loud to her. As Sienna and Jake

work, they create their own turn taking method of working and sustain it as the task changed.

During Phase IV of the event, Jake attempted to work with the boys again and they agreed by debating with him. As “gatekeepers” the boys have let Jake into their working group. At this point, Jake begins to negotiate his participation with the boys. It appears that in order for Jake to continue to work with the boys, he must agree with their assessment of the content. He is unwilling to compromise his ideas and his participation must be renegotiated again, this time in the form of an argument.

As the negotiation escalates into an argument, Sienna takes up her negotiation with Jake by supporting him against the boys. Jake, faced with resistance to working together from the boys or a working relationship with Sienna, chooses to join Sienna again and continue to make forward progress on their assignment.

Unlike the opening negotiation, Jake chooses to be a part of a group with Sienna. In contrast to the beginning of the activity, the group now has benefits for him. During Sienna and Jake’s working alliance, both students seemed to enjoy working together, laughing and moving easily through the work. For Jake, being part of the group may be more enjoyable and more efficient than working alone.

As a whole, this negotiation event is catalyzed by Sienna. While the boys are able to act as “gatekeepers” but she is able to work within the group to establish a functional working relationship with at least one group member. While this is not exactly the instructions that the teacher laid out in the beginning, Sienna is able to change the CoP to her favor. In the end, she is able to take advantage of the resources that Jonathan has to offer and both of them are able to complete the assignment in a way that may be more enjoyable and efficient.

For Sienna, she is able to enact her relational authority by negotiating her participation into a group. While she is unable to sustain this working relationship over time, her actions led to a potential increase in agency and the creation of new learning and participation opportunities.<sup>3</sup>

### **Discussion**

In our case studies, both girls, Sienna and Brandy, maintain unique scientific identities within their classrooms and are positioned by the teacher in a way that places them in situations that require them to negotiate their own participation rules.

In both events, the girls attempted to adapt their ways of participating to the change the CoP. In Brandy’s event, she responded to a synthesis activity by introducing a new concept to the group. She was able to present her idea and change the course of the conversation but only with the support of the teacher. While her intention may have been to present her idea to the class, she had to negotiate its acceptance and when she was

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<sup>3</sup> Much of the events described here and in future class, took place without the teacher being aware of Sienna’s negotiations. This was possible because Sienna herself worked in order to hide the confrontations and negotiations from the teacher, allowing the boys to take credit for her work and keeping her negotiations quiet and uninteruptive. During these group activities, many of which were being tried for the first time, the teacher was engaged with other groups who either asked for her help, complained about their group, or attracted attention to themselves by having loud and disruptive negotiations of their own.

unable to negotiate successfully with the boys, the teacher picked up her idea and create a space for Brandy to share her idea. In Sienna's case, she negotiated her participation within the smaller, newly created CoP of her small group. While she was able to use her relational authority to convince Jonathan to work with her, she was not able to maintain that over time and potentially lost agency.

In both events, the girls used their authority to renegotiate the change to the CoP. For Brandy, she demonstrated her epistemic authority around the ideas presented in class and her own outside knowledge of the environment. Unlike many of the other students that presented ideas during the whole class discussion, her idea was new to the class and according to the student "gatekeepers", not within the boundaries of the classroom discussion. For Sienna, she enacted her relational authority in order to align part of her group with the teacher's instructions. She was able to gain the benefits of working with another students while fulfilling the role of the "conciliator".

### The importance of social networks

In both case studies we are introduced to very different girls. Despite there differences in background, achievement, interests, and role in the classroom, there are similarities that are exposed in these two events. Both girls lack relational authority. In the classroom, many other girls have relational authority in the form of a social network. If we think about both girls in the terms laid out by Wells (1996) and Orenstein (1994), we can understand their struggle in terms of their desire for a social network without the relational authority to acquire or keep one.

In Sienna's case, she attempted to reach out to other students but was met with rejection and in some cases hostility. The boys in Sienna's group hold relational authority and it Neal and Emmanuel to remain allies and allows Jake to join their group and work with them. Sienna holds some relational authority and uses it work with Jake in this particular event but it proves insufficient in the future when the boys point how she is different and socially inferior to them. She is essentially alone in the classroom and is unable to make lasting alliances and influence how work is completed.

In Brandy's situation, she was unable to relate to the other girls on any level other than schoolwork. This leaves her without a network of friends to rely upon. In the course of this event, Randall is supported by his friend who joins in his dismissal of Brandy's idea. His friend takes Randall's dismissal one-step farther by saying "Duh!" and rejects her idea as both wrong and "stupid". Brandy is unsupported anyone in the class including the teacher and she has no one to stand up for her or her ideas.

During the course of our investigation, we saw many examples of girls who made alliances between themselves in order to promote their ideas and girls who would stick up for their friends when the friend was interrupted or "disrespected" in some way.

Even within the event "Sienna and the Boys" described above, we see how relational authority can be used to support a "disrespected" ally. When Jake and the other boys argue, Sienna stands up for Jake and tells the boys to "Mind their own business". Being part of a group not only provides benefits for doing and completing work but also protection from other students in the class.

In all of the above events, the social networks of the girls are a form of relational authority and the relational authority is enacted in different ways. For both Brandy and Sienna, they lack the sustained relational authority. For Brandy, there is no one to

support her when she is “disrespected” and she must rely on the teacher’s change of rules to participate. For Sienna, she is able to build relational authority with Jake but is unable to sustain it. Her lack of social network is an important factor in her inability to remove herself from a difficult situation and therefore limits her options for how she can work in the classroom.

### Students as “gatekeepers”

In Haynes (2000) discussion of a “gatekeeper”, she talks exclusively about the teacher as “gatekeeper”. One commonality between these two case studies is the role that students play as “gatekeepers”. In both cases though, it is the teacher’s design of the activity that positions one student over another, unintentionally granting students “gatekeeper” status.

During the exchange between Brandy and Randall, the negotiation takes place using two different sets of discourse rules. When the teacher enacts the triadic dialogue, both Randall and Brandy are in a position to participate and as students with epistemic authority; they are frequent contributors to the conversation. When the teacher allows the “shout out” discourse, Randall, who is much more aggressive, is positioned to not only participate but to dominate the conversation. As Randall interrupts Brandy, the teacher has the opportunity to maintain the rules of the triadic dialogue. Because of her perception that “shout out” discussions are positive, she does not reinstate the rules. It is only because Brandy’s point may be useful in tying together the goals of the Unit does she reinstate the triadic dialogue rules. This reinstatement restores Brandy’s positional authority, and Randall is no longer the “gatekeeper”. The teacher is once again established as the “gatekeeper” and Brandy is positioned in the role of “the student who always has the right answer”.

As Sienna works with the boys, they immediately act as a “gatekeeper” to her participation in the group. This allows her to continue to work by herself but does not give her access to resources of the other group members and does not allow her to work as the teacher intended them to. Within the literature that discuss CoP, many scholars point to the benefits gained by the students within a CoP (Lemke, 1990; Barab Hay, Barnett, and Keating, 2000)

Despite the teacher’s instructions to work together, she neither enforces the instructions nor does the activity require that the students work together to complete the activity.

After observing this and other lessons that were unscaffolded for group work, the teacher added more structures such as specific roles for students to play, activities where the work had to be distributed to be completed, and spot checking on the groups to make sure they were working together. This would help the teacher ensure that students are completing the activity as designed by the teacher and gain the benefits of the group work. While students may always act as “gatekeepers” in the absence of the teacher, vigilance on the part of the teacher could help to ensure that student “gatekeepers” are enforcing the rules as intended by the teacher in creating a CoP.

While it seems difficult to image a classroom in which students were not positioned to be “gatekeepers”, both of these events highlight pedagogical strategies that support girls in their efforts to negotiate their participation. For Brandy, she was positioned to participate through enforcement of participation rules. Sienna would have been aided by specific structures that would have forced the group to rely on each other

in completing the activity. The lack of structure hampered both girls, and created conditions that allow the boys to dominate the girls and position science as only having one right answer. The teacher unintentionally created a CoP that reinforced gender roles and a view of science that she was working to overturn in her classroom.

### Use of the Teacher as a Resource

When we consider the classroom as a CoP, the teacher becomes the “old timer” who has moved through the step-wise ranks of the CoP from a student to a teacher (Enyedy and Goldberg, 2004). As a teacher, she has a specific role to fill: in the case of Brandy, she is the mediator of the conversation and has the authority to determine how the conversation will take place. In the case of Sienna, she designed the activity and told the students how they should organize and mediate themselves.

For both girls, the teacher becomes not only an authority figure and a mediator, but both girls rely upon her to legitimize her participation in the CoP and ultimately act as “gatekeepers” to their participation. In both cases, the girls relied on the teachers to create an environment that was supportive of their participation.

If we examine the pattern of Brandy’s whole class participation, she was only willing to participate when the teacher was in control of the rules of discourse, or in the “triadic dialogue” (Lemke, 1990). The structure that the teacher provided became a resource for Brandy.

In Sienna’s case, the teacher created an environment that enabled her to participate in the small group activity. By advocating for the teacher’s rules, she isn’t necessarily doing so to because she wants to maintain the “good girl” identity for the teacher. By advocating for the teacher’s group work rules, she is advocating for her own position as an important member of the CoP. In Sienna’s case, the teacher herself does not become a resource but her initial instructions are used by Sienna to position herself as a full member of the group. It is the teacher’s lack of supervision that allows the boys to act as “gatekeepers” and dictate Sienna’s roles in the group. With full supervision, it is possible that Sienna could have maintained her initial attempts at being the “gatekeeper” for the teachers rules and the boys would have had to consider her a full member of the group.

### **Conclusions**

Through our analysis of girls’ negotiation events we have come to understand that the narrative of a girl’s participation over time is built upon individual negotiation events or “snap shots” of a classroom event. At the time of the event, the girl is figuratively “on the edge” of negotiating her place in the rules, roles, and activities of a dynamic CoP.

In order to understand how a girl negotiates her participation, it appears as if all of the elements, the classroom, teacher, peers, and school as a whole contribute to her success or failure. While the framework of a CoP requires that we understand all of these elements, a special focus on one student, in this case one girl, allows us to understand how her individual actions, resources, and authority frame the options that are available and the choice that she makes. By understanding the event from the point of view of the girl, we can further understand the how an individual balances her own goal of participation against the other members of her class, both friend and foe, and the teacher.

We hope that this work can help researchers understand the complexity of a short negotiation event and provide a framework for analyzing “snap shot” events within a classroom. We also hope that these events will guide teachers in selecting the types of supports that they can provide for girls that will lead her to increase her participation.

By understanding the elements that surround a girl’s negotiation, we can further develop structures that will enable those elements to support a girl and not act as a barrier to her participation. In the second year of this grant, we are using the data gained in the first year in order to craft pedagogical strategies that will support girls in the enactment of their authority in the form of agency and merging practices. (For a full discussion of Girls Science Merging Practices see Calabrese Barton, Rivet, Tan, and Groome (2006))

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