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FORUM

Structure, agency, and the development of students' identities as learners

Stacy Olitsky

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Abstract This paper focuses on the role of dominant school discourses in structuring how students position themselves and others relative to a community centered on science. The study was conducted in a diverse, eighth grade classroom in an urban magnet school. I argue that dominant discourses portray a limited view of available subject positions, in that the purpose of learning science is associated with a dichotomous view of people as being either college-bound or not. I explore how these limited subject positions can pose contradictions with some students' interests, constrain students' visions of possibilities, exacerbate disadvantages based on race and class, and interfere with students acquiring identities as science learners. However, there are also possibilities for resistance, agency and self-definition through students' talk.

Keywords Science education · Identity · Discourse · Urban Education · Sociology · Ethnography

Introduction

Aileen, an eighth grade African-American student in a district with school choice at the high-school level, was having a conversation about the process of applying to high schools with several of her peers and me. She said that it was unfair that they did not admit her to the performing arts school because of her low grades in science and math: ''Why do they care about math and science if the school is supposed to teach art? I won't even need science since I am going to be an artist.'' Her statements on this issue cohered with others she had made over the course of the school year expressing frustration that she was required to learn science, as she did not feel it was going to be useful to her in her chosen life path.

S. Olitsky (✉)
University of Pennsylvania, 3700 Walnut Street, Philadelphia, PA 19104, USA
e-mail: solitsky@dolphin.upenn.edu

However, around the same time period, Aileen participated in a discussion with several peers on the question of whether all students should be required to learn science. One student said, ''But if you are not going to college you should study...like vocational stuff...and you don't have to learn science.'' In response, Aileen said in an exasperated voice, ''I am tired of everyone saying things only matter if you are going to college. Lots of people don't go to college and they need to learn science also.'' Later she also said, ''If some people have to learn it, everyone should learn it.''

While Aileen's stated views on the topic of ''who should learn science'' differ between these two contexts, there are some similarities between the incidents. In both cases, Aileen exhibited frustration with how she and others in her social world were categorized, and she resisted being positioned in ways that were disempowering. In the first case, Aileen was aggravated with a system that categorized her as a poor student, which prevented her from achieving her goal of going to a performing arts magnet high school. In the second case, she spoke in opposition to ''everyone'' at the school who suggests that there are two types of people, those who go to college and those who do not, and that science is only important for students who are going to college. As I discuss later in the paper, Aileen's experiences growing up in a low-income urban community have allowed her to see the detrimental effects on her family of this view of ''two types of people,'' and the associated inequalities in access to knowledge.

In this paper, which emerges from an interpretive case study of a diverse eighth grade science classroom in an urban magnet school, I discuss how Aileen's contradictory views on the importance of learning science are not just indicative of a person changing her opinion about an issue. Rather, her statements in these conversations are evidence of her agency as she engages in important identity work related to where she fits within science-centered communities. Yet for Aileen, this identity work entails considerable struggle, which is apparent in her expressions of anger and frustration.

Aileen seems to have the characteristics of a student that should be able to easily develop a science-related identity. She has tested at a high level in science, has an interest in animals and in biology, and attends a magnet school that supposedly encourages ''excellence.'' The fact that she still struggles with her identity related to science learning in spite of this potential suggests that perhaps there are ways in which aspects of the school and/or classroom structures can obstruct rather than facilitate such identities.

In this paper, I argue that Aileen's difficulty identifying with a science-centered community stems partly from the disconnect between the dominant magnet school discourses surrounding the purpose of learning and her own interests and experiences. I describe how these dominant discourses portray a limited view of available subject positions for students, in that the purpose of learning science is associated with a dichotomous view of people as being either college-bound or not college-bound. The view that learning a particular subject corresponds with a particular life trajectory may be experienced by many students and teachers as natural and unproblematic because it reflects the familiar achievement ideology of the school. However, the dichotomy in subject positions can pose a problem for the development of science-centered identities for students such as Aileen who come from low-income, predominantly minority neighborhoods in which there are considerable challenges that restrict opportunities for college attendance. The association of science knowledge with life trajectory therefore may position these students and the people in their neighborhoods as ''not needing science.''

Throughout the paper I explore both theoretical and practice-related issues. On the practice side, this study suggests that the subject positions provided in this school's discourse, and likely in other similar schools, are problematic, as they constrain agency by limiting students' visions of their own possibilities, thereby exacerbating some of the disadvantages students may face based on race and class and interfering with some students acquiring identities as science learners. An implication of this finding is that in order to better encourage the development of science-related identities, it would be beneficial if there were concerted efforts to alter official school discourses in order to depict a greater variety of subject positions and to reflect the diversity in life experiences and trajectories of the students. In terms of theory, I discuss the specific processes by which students can exercise agency through using the discursive resources available in order to resist limitations in subject positions and define their own identities.

Background

Socially situated views of learning suggest that learning an academic subject is not just a cognitive activity, but it also entails developing a social identity associated with practice and discourse within a community (e.g., Lave & Wenger, 1991). In this perspective, ''Social identity'' can be conceptualized as related to the groups to which a person belongs and his/her roles and reputation within these groups. In describing the relationship between learning and identity, Wenger (2000) writes that people will acquire (learn) and demonstrate skills, knowledge and language if they believe that they are a part of a community associated with that knowledge, and desire to be part of that community. Conversely, they will fail to acquire and demonstrate this knowledge if they do not affiliate themselves with the relevant community. Therefore, in order to promote student science learning, it is important for educators to attend to whether classroom structures foster identity formation in science, as without developing such an identity, students will not have the incentive to acquire and use scientific knowledge in class or in other settings. While not all students are likely to feel a part of a science-related professional community and identify themselves as ''scientists,'' they may be more likely to identify themselves as part of a ''school science'' community (Brickhouse, Lowery, & Schultz, 2000) or as part of a community of citizens who can use and apply scientific knowledge for solving problems. While in this paper I focus specifically on identity in science rather than achievement, I do so with the understanding that that the two are intimately connected. Therefore, the classroom conditions that successfully foster group affiliation related to science will help to increase student learning and achievement as well.

In this paper, I use the term ''identity'' to refer in a general sense to self-perceptions, presentations of self to others, and others' perceptions of the self, which makes it both a personal and social construct, with the two dialectically related. This coheres with the idea of identity as related to group membership, as part of ''self-perceptions'' involves group affiliations, part of ''presentations of self'' involves displaying signs that one is a member of particular groups, and part of ''others' perceptions'' involves whether a person is accepted as a member by other participants in that group. Rather than being static or stable, identities emerge through ongoing interaction, shift depending on the setting, and change over time (e.g. Roth et al., 2002). In a classroom that effectively fosters identity formation in science, the

interactions would need to be conducive to the continual emergence of science-related identities. On a micro level, students would need to begin to associate science-related symbols with emotional energy, through participating in solidarity building interaction rituals (IRs), characterized by a build-up of mutual focus, an entrainment, or coordination, of voices and body language, and the development of a common rhythm and mood (Collins, 2004). On a more meso (everyday) level, students would need to have opportunities to present themselves as members through their participation in science-related activity, be accepted as members by having others recognize their contributions, and view themselves as members of a science-centered community.

Although people have some agency regarding their own developing identities, as they have choices in presenting themselves in particular ways, demonstrating particular forms of knowledge, and affiliating with certain groups (e.g., Brickhouse et al., 2000), the possibilities are not infinite. Structures can both afford and constrain whether these positive interactions around science will take place. By structure, I refer to both resources (human and material) and schemas, which include norms, categories and rules (Sewell, 1992). For example, while Aileen might want to be a part of a science-centered community because of her interest in biology, she may encounter obstacles because of aspects of the structure. She may assume, or her teachers or peers may assume, that she will not be good at science because she is Black and female. In this case, the relevant structural issues include the media images of scientists and the related schema regarding the types of people who are likely to be scientists, which may contain racist and sexist assumptions. While Aileen has some agency in developing a science-centered identity, and can take actions such as attending a science lunch group where the purpose is to talk with others about science concepts (which she did voluntarily during this study), these schema still provide constraints to her agency. As I argue later in this paper, so do the dominant discourses surrounding the purposes of learning science in this magnet school.

Discourses can be thought of as entailing both schemas and resources, as they are composed of resources (the symbols that make up language) but also schema, in the form of the shared ideas, categories, positioning, perspectives, and typical ways of portraying types of people that are invoked through the use of particular language. Gee (2000) describes the idea of ''discourses'' as more than just language itself:

> Discourses are characteristic (socially and culturally formed, but historically changing) ways of talking and writing about, as well as acting with and toward, people and things. These ways are circulated and sustained within various texts, artifacts, images, social practices, and institutions, as well as in moment-to-moment social interactions.

Ideally classroom discourses should be more enabling than constraining in terms of facilitating participation within content-based communities. Otherwise there would be little point in teaching that particular content to all students. However, there have been quite a few studies suggesting that in science classrooms, this is not the case. For example, Lemke (1990) describes how teachers reward the use of discourse that is most typical of middle-class, white males, thereby excluding students who are less familiar with those ways of speaking. In addition, some studies have found that aspects of the discourse of urban, low-income students, such as the use of non-mainstream English and the types of examples that they bring up in class to illustrate science concepts, are not always valued by teachers (e.g., Seiler, 2002, unpublished

dissertation). While the above examples refer to discourses surrounding science content, discourses *about* science as a potential membership group that surface in classrooms, such as that science is objective, distant, and ''too hard'' for most people (e.g., Barton, 1998), can also constrain agency in students' developing an identity associated with science, as they portray science as an endeavor in which not everyone can participate.

Holland, Lachicotte, Skinner, and Cain (1998) explain how social constructivists view discourses as the way that power/knowledge ''inscribes bodies and thus creates persons.'' Weedon (1987), who writes from a social constructivist perspective, describes how discourses influence the possibilities for thought and action by positioning people in particular ways, thereby delineating ''subject positions'' for people to occupy. The concept of subject position differs from that of identity, as identity encompasses various attributes such as self-presentation, ideas about oneself, and others' perceptions, whereas subject position refers specifically to the roles and categories of persons that are defined through circulating discourses. While ''identity'' allows for fluidity, emergence through interaction, and some aspects of self-definition, the idea of a subject position is more confining, and references a restricted social location. Although the two concepts are not equivalent, they are intimately tied to each other. Subject positions delineated in the dominant discourses have a role in the development of people's identities, as the accessible categories become internalized and structure people's perceptions of themselves and their place in the world.

The discourses about science and the associated subject positions convey ideas about the possibilities for participation and membership. They also can have differential effects on students depending on their social location. For example, discourse that portrays science knowledge as ''too hard'' conveys the idea that there are two subject positions, that of a special person who can understand science, and that of a non-special person who cannot. Students who are more familiar with the language of science, perhaps due to their social location—their class background, or because their parents are scientists—may benefit from this dichotomy, as they can readily occupy the position of ''special person who understands science.'' Such a position has implications for whether a person feels empowered to act in ways that would facilitate membership in science-centered communities. For example, a bad grade on a test may provide an incentive for such a student to work harder, as his/her membership is assumed. However, for a student differently positioned, perhaps because of race or social class, the idea that there are these two subject positions may contribute to a student believing that s/he belongs in the category of ''people who cannot understand science.'' A bad grade may therefore be less likely to result in a student thinking ''I need to work harder,'' or ''let me ask questions of my friends to figure out what went wrong,'' and more likely to reinforce the idea of ''I am not that kind of special person, and science is not for me.'' This division of people into subject positions is tied to power relations, as those who are classified as ''the special people who understand'' gain access to knowledge, authority and/or privilege.

The dominant discourse(s) of science classrooms are not the only types of discourses that contribute to shaping student identity formation in science. Science classrooms are nested within other contexts, as the classroom is composed of several peer groups, and exists within a school, which is within a neighborhood, which is within a school system, which is within a city, etc. All of these communities involve particular discourses that can delineate various subject positions. While there are many relevant discourses that inform identity formation, in this paper, by ''dominant

discourse'' I refer to the discourse promoted by the school and teachers in official and unofficial communication with students, which is integrally tied to power relations between participants.

The available subject positions within a particular context may limit possibilities for self-definition, but they are not wholly predictive of identity. Identity emerges through interaction, during which participants make choices in the words they use, in their tone, and in other aspects of their self-presentations. Interactions may be patterned, but they are not scripted; there is always an aspect of spontaneity and the opportunity for individual choices of presentation of the self. Subject positions may partially shape thoughts and action choices, but they do not wholly encompass them; they are just the categories that seem readily available through discourses. Further, people do not just endlessly reproduce structures, adopting subject positions imposed on them and enacting prescribed roles. There are mechanisms for change, possibilities for contesting the power relations that are embedded within particular discourses due to their histories of use, and potential for refusal to occupy subject positions that are disempowering. A question remains as to the degree of self-definition that is possible, and the processes by which self-definition takes place.

Holland et al. (1998) write that just as discourse can be a tool for restricting the available subject positions (and therefore identities), discourse can also be a tool that people can use to exercise agency in authoring the self—in other words, determining one's own identity. In making their argument, they draw on activity theory (e.g., Engeström, 1999) and the work of Vygotsky, who argues that mediation of thought and action through tools can afford expansion of possibilities. Holland et al. describe how tools are effective at mediating self-control because of their cultural/historical meanings. In illustrating this point, they use the example of tying ribbons around fingers, which helps people gain control of their own memories because of the social use of that particular artifact. Similarly, because of the cultural/historical meanings associated with discourses, they can be effective for strategic purposes, including directing a person's self-presentation and perception of his or her self, and therefore his/her identity.

Holland et al. describe how people can accomplish their own goals, which include self-definition, through ''improvising,'' as they bring the tools acquired from other contexts and use them creatively. Similarly, Sewell (1999) describes structure as both enabling and constraining, writing that there is evidence of agency when people use tools in novel ways, or in places where they ''don't belong.'' Another view of how people can exercise agency in spite of the constraints of discourses is offered by Bartky (2002), who argues resistance can emerge as people negotiate contradictions in the discourses within which their subjectivities are constituted. Still another possibility for agency and change is when people's experiences do not correspond with the subject positions that are available, which can help them to break out of the restrictions (Weedon, 1987).

Lee and Roth (2004) write that not only does structure enable and constrain action, but also by engaging in praxis, people reproduce the structures. To go back to the example of science as portrayed in the dominant discourse as being ''too hard,'' when adopting the subject positions of ''smart science student'' or ''regular person not good at science,'' people perpetuate the discourse surrounding ''science is too hard for most people,'' the schema of science as an elitist subject, and the unequal power relations that accompany this view of science, such as the different levels of status accorded to professions depending on how much they involve what are

considered the ''hard'' sciences. Regardless of whether you adopt one or the other position, you are still perpetuating this discourse, which rests on this dichotomy—the two sides support and reinforce each other. However, by people rejecting either of these choices/subject positions, which constitute a single discourse, resisting limitations in available subject positions, and working to define themselves, it is theoretically possible for there to be some type of structural change on a local scale.

While there has been previous research on classroom discourses about science, not as much research has been conducted investigating how official school discourses like the ones in this magnet school may constrain or enable science-related identities, and on the processes by which students can engage in self-definition within the constraints of these discourses. In this paper, I look specifically at how students are subjectified through dominant discourses surrounding the purposes of learning, and how students act as agents, manipulating these discourses to author their own identities. Since one possibility for resistance to hegemonic discourse is through everyday talk (e.g., Mohanty, 1991), as part of this study I examine conversations between students about their thoughts on the goals for learning science. One of the long-term goals of investigating the link between dominant discourses and students not identifying with the scientific community is to begin considering ways of implementing changes in the school discourses themselves. I address the following questions:

(1) What types of subject positions were delineated through the dominant discourses surrounding the purposes of learning science?
(2) How did these subject positions contribute to shaping students' emerging identities in science? In what ways did students' talk support the dominant discourse and associated subject positions?
(3) In what ways did students subvert these discourses and exercise agency in self-definition, particularly in relation to their identities as science learners?

Relevant contexts and discourses

In the science classroom that is the focus of the study, the teacher, Ms. Loman, had the intention of conveying a view of science as accessible to all of her students. However, the dominant discourses that portray science as elitist, overly difficult, and accessible to only a few still impact her classroom, as she is situated within them. Their infusion in her talk is demonstrated in some of her statements about her own decision to pursue science, which suggest she accords the subject a ''special'' status: ''I felt good in college, that I could understand physics, since physics is such a hard subject. Also I was one of very few women who majored in it, so you kind of feel special because of that.'' In addition, while the students in the class viewed Ms. Loman as a good teacher who cared about them, some of them still made statements confirming that the view of science as elitist permeated the discourse in Ms. Loman's classroom as well. For example, Aileen and several other students in the class have said that all of their science teachers, including Ms. Loman, use complicated language on purpose to make it harder to understand.

While the discourse within the science classroom has a significant impact on students' science-related identities, it is also important to consider the larger context within which the science classroom is nested, as the official discourses that circulate within schools, and school districts, also contain messages that have implications for

these identities. The school, City Magnet, is in the school district of Philadelphia, which is one of the largest school districts in the country, serving over 200,000 students who are predominantly from low-income and minority backgrounds. The Philadelphia area as a whole has a tiered school system (Kozol, 1991), with high-achieving suburban schools, urban magnet schools, and neighborhood schools. While students in Philadelphia do not have the choice of attending the better-funded suburban schools, within the district there is an extensive choice system that includes magnets, charter schools, and small learning communities within neighborhood schools. In their eighth grade, all Philadelphia students complete a form where they list the schools they would like to attend in order of preference. However, students do not necessarily get to attend the school of their choice, as the competitive magnet schools, charter schools, and special programs within neighborhood schools can decide whether or not to admit students based on grades, test scores, and attendance records. A few of the magnet and charter schools also have interviews or auditions.

City Magnet is divided into a middle school of grades 5 through 8 and a high school of grades 9 through 12. Students are selected from schools throughout the city to attend the middle school based on their third grade test scores and grades. However, many families do not know how to apply to the school or if their child is eligible to apply, and once admitted, their children's position in this school is still not secure. Only about 100 of 200 eighth-grade students will be selected to enter the prestigious high school, housed in the same building. The other students attend other magnet schools, private schools, or neighborhood schools.

This system can be thought of as a disciplinary system (Foucault, 1975), as students are inscribed, categorized, and hierachized. Discourse among teachers about their students reflects the categories of this system, as they discuss whether students are ''City Magnet material'' or not. The students may not use the term ''City Magnet material,'' but they talk about some students who are ''smart'' and ''belong here,'' and students who do not. Race and class inequalities are apparent. Many of the students who came to City Magnet without as much background in math and science, and therefore have had to struggle to prove that they belong, come from low-income, predominantly African-American neighborhoods in which the elementary schools do not have adequate funding.

Throughout their seventh grade year, the students are frequently reminded how their grades this year will determine their future placement, which will in turn affect the type of college they can attend. In their eighth grade, students attend assemblies about the process of choosing the schools to which to apply, in which representatives from magnet and charter schools speak to the students about the benefits of attending their particular school. Accompanying the discourse surrounding the relative quality of the schools are also messages about the value of particular kinds of knowledge and life outcomes. While some representatives did mention extracurricular activities, school climate and food, many schools, including the students' own school, stressed the prestige of the school's name, the rate of college attendance of the students, and the type of student who should attend: ''the best.'' City Magnet students are influenced by the experience of reconciling the messages from assemblies that praise the virtues of particular schools, particular types of knowledge, and particular kinds of persons with other discourses, such as those that circulate among families and friends. In these non-school discourses, different forms and purposes of knowledge and a greater variety of kinds of persons may be valued.

Both the discourses surrounding science and those of school selection can have disciplinary functions, dividing students into categories that have implications for power and privilege. There are consequences for being categorized as ''not good at science'' and ''not belonging'' at City Magnet; not only can such students be denied admission to the high school, but in this particular school their contributions in class discussions are less likely to be accepted and valued by peers.

Methods

The study of City Magnet is part of a larger ethnographic study in five participating schools in Philadelphia on science education in urban settings. In the interest of conducting ethnographic research that would avoid exploitative relationships between the researcher and the researched, I drew on Guba and Lincoln's (1989) criteria for authenticity, which include an emphasis on working with participants toward positive change in local settings and increasing participants' understandings of each others' perspectives. Toward this end, I worked in collaboration with a teacher–researcher and the four student researchers. I was influenced by other projects that have involved students as researchers, such as Elmesky and Tobin's (2005) study, where students made significant contributions by providing insider perspectives, conducting interviews of peers, and serving as teacher educators. In selecting the student researchers, the teacher (Ms. Loman) and I asked students who were different from each other in terms of their academic achievement and their expressed interest in science. Ashley, Aileen, and Monique are African-American, and Lisa's father is White and her mother is African-American. Ms. Loman is White and came to Philadelphia from New Mexico.

As the university-based researcher, I acted as a participant observer in the classroom, videotaping classes, taking field notes, interviewing students about science learning and school choice, coordinating research meetings, conducting a voluntary science lunch group designed to supplement classroom learning, sitting with the students during assemblies when high-schools gave presentations, attending peer advisory sessions, and sometimes coteaching. During assemblies I could hear students whispering their comments both to each other and to me, helping me to understand how messages regarding school selection became incorporated into students' talk. Part of the methods relied on cogenerative dialogues between teachers and students (Roth & Tobin, 2004), which can provide a field for communication across boundaries of age, class, gender, and race (LaVan, 2004, unpublished dissertation). Data were collected in the form of field notes, student work, journals, video and audiotapes of classes, interviews, peer guidance sessions, and assemblies where representatives from magnet high-schools spoke to the eighth grade.

Co-generative dialogues with the teacher and student researchers were held biweekly, during which we discussed issues that were of concern to both the students and Ms. Loman. In addition to taking part in research meetings, the student–researchers interviewed other students about science learning and high-school selection. Having students interview other students was advantageous in that the students could better understand the experiences of other students, and were able to elicit ideas and understand dialect in ways that I could not. However, interviews, whether conducted by me or by the student researchers, are limited in that they can provide information about how the students position themselves relative to the

interviewer, but not how they would position themselves in other settings. The lunchtime research meetings with student researchers provided a setting that allowed students to interact with each other and raise their own issues of concern rather than just answering pre-written interview questions. While certainly my presence changed what the students would have said had I not been there, the informal conversations still provided some data on how students construct their position relative to each other rather than just relative to me.

To analyze the data, the interviews, conversations, and field notes were coded for emergent themes and served as the basis for further interviews. In addition, discourse analysis techniques were used to analyze some of the conversations in order to elucidate how students positioned themselves and each other through interaction. These included examining double-voicing, indexicals, deictics (Wortham, 1996), semantics, grammar, subject choice, exclamatives, and appraisal (Eggins & Slade, 1997). After the school year ended, the student–researchers and teacher–researcher continued with their work analyzing videotapes and transcriptions during the following summer and school year.

The four students that I discuss in this study, who also served as student researchers with the project, had very different experiences with the school choice system, with two of them attending high schools that they chose (Ashley and Lisa), and two of them not attending their desired choices (Aileen and Monique). The two student researchers who were the most active speakers in the particular conversation that I discuss in this paper are Aileen and Lisa.

Aileen describes herself as not being very interested in grades or in learning what is taught at school. However, her actions suggest an interest in some aspects of the school's curriculum and activities, as she performed well in English, says she likes to read literature, came to the voluntary science lunch group, and participated in the school's National Academic League team. She was not accepted to City Magnet high school or to the other three schools to which she applied probably because of her grades, which include some Cs and Ds, and her frequent lateness. Often she is late because she is taking care of her young nieces and nephew in the morning, as her parents and sister have to leave for work very early. She is talented at singing and drawing and wanted to go to the performing arts magnet school. Several times Aileen has said she does not want to go to college, although she is on an academic track for students who are college bound. On some occasions she has said that she does not like science, but on other occasions she has described how she likes biology and is interested in animals.

Lisa obtains very high grades in all of her subjects and is interested in being a doctor someday. In addition to being a strong student, she participates in many team sports. Her father is a teacher. She likes biology because she sees it as relevant to medicine but she is not as interested in physical science or chemistry, though she has said that she still needs to learn them so that she can get into medical school. She was accepted to City Magnet high school and chose to attend. She seems enthusiastic about college, and plans to apply to Ivy League schools. While discussing her experiences in City Magnet high school in her ninth-grade year, she described how she missed some of the students who left after the eighth grade, but says it was good in a way because in a small school everyone knows each other and she gets to interact with people in other grades. In her ninth grade, she also seemed to know a considerable amount about how to get into college, as she discussed how particular activities would look good on her college application.

Views of learning science

In the conversations among the students about the purposes of learning science and whether everyone should learn science, several features of dominant discourses about the purpose of learning seem to have been influential. Following is a brief overview of some of the views of learning based on the discursive practices of teachers, administrators, and students in various settings throughout the school as the students, teachers, and I have observed them. In this section, I have not separated out the school and classroom discourses, but instead describe the ways in which they can support each other to convey four specific views of the purpose of learning science. While these may seem to be somewhat ''neutral'' views, I describe later in this paper how they can have some negative implications because of limiting the subject positions that are available to students.

(1) *Learning particular subjects is useful both for individuals' short-term and long-term goals. Science should be learned by everyone because it is useful to them*. For example, in class Ms. Loman often discussed the practical applications of the ideas they were learning and sometimes told the students they will use these ideas at a later time in their lives. Students reflect a view that science is useful (or at least should be useful) in their own talk. Aileen has described how science is useful in people's everyday lives, ''like when a mother mixes formula for her baby.'' Ashley has described how science is needed even for tasks such as using a measuring cup in cooking. The discourse surrounding ''learning should be useful'' helps teachers justify the importance of the science courses that they teach. However, it is also used by students in order to criticize aspects of their curriculum. For example, the student researchers have discussed how they do not like learning topics in science that they feel they never will use again. They described how they should not have had to learn how to identify rocks because it was ''useless'' for them and ''we will never need to do that.'' Ms. Loman has described how she felt that teaching them to identify rocks was actually useful, because they were learning skills of classification that are important in any setting. Although she and the students may have viewed the activity differently, they are both accessing the idea that ''science is/should be useful'' to support their viewpoints.

(2) *Some subjects have inherent value and need to be learned by everyone.* The view that science is inherently valuable is evident in the ways that some teachers, including Ms. Loman, speak in positive ways about their subject. The inherent value of science is also conveyed by the fact that City Magnet and most other schools require all students to learn it. Some of the students reflect this idea of science as valuable for its own sake in their own talk. For example, Ashley criticized a recent move on the part of the school district to only require 3 years of high-school science, since ''everybody should learn science, and now some students won't. I don't understand this 'No Child Left Behind' since now that they only require 3 years of a science, some of these students will be left behind. Science is a school subject and everyone should learn it no matter what.''

(3) *Learning is helpful for grades, which serve as an important credential.* Teachers, including Ms. Loman, reinforce this when they say, ''listen and take notes because you need to know this for your exam.'' While Ms. Loman does not

intend to convey a view of knowledge as only important for grades, she describes how she must make these statements in order to be fair to the students by specifying how students will be evaluated. Students support this idea in their own talk by asking Ms. Loman and each other if they need to know particular topics for an upcoming exam. Some of them explained to me that if the topic is not on the test, they know they do not need to ''pay as much attention.''

(4) *There are different levels of learning any particular subject. If you are not as ''smart,'' you may be able to learn the subject, but a less important or less advanced version. Students should be taught the level of the subject that meets their ''capabilities.''* Such a view of learning is particularly evident in the practice of tracking and sorting students, in how the school does not admit most of the eighth grade students to the high school, and in how representatives from City Magnet and the visiting high school speak about other high schools that have academic programs that are ''not as competitive'' or ''not as rigorous.'' The idea of science as a subject with levels is conveyed when teachers say, ''you won't understand this yet, as it is too advanced for you now...'' While the teachers' intentions may be to make science less intimidating, such statements do convey the view that there are different levels of the subject. The idea of levels in the context of tracking suggests that only special people can really understand science. This idea may potentially discourage student questions in class if they think that they may not even be able to understand the answers.

Some of these portrayals of learning appear contradictory. For example, the idea that science is inherently valuable and all students should learn it does not accord with the idea that science comes in different levels and that real science is ''too hard'' for most students to grasp.

I won't even need science

In the conversation that I referenced in the beginning of this paper, Aileen discussed how she felt like her grades in math and science should not have adversely affected her application to the performing arts high school. She said, ''Why do they care about math and science if the school is supposed to teach art? I won't even need science since I am going to be an artist. They should have at least given me an audition.'' In her statements, she invokes the aspect of the school's dominant discourses that ''learning should have practical purposes.'' While this idea is often used by teachers to convince students to work hard in their science classes, Aileen uses this idea to make an alternative argument, that science is not useful to her, and therefore she should not have to learn it.

However, it is important to note that Aileen was not making this argument in order to avoid studying for an exam or being attentive in class. Rather, she made it in the context of a discussion about her admission to the performing arts magnet school. In Philadelphia, this is not a trivial issue, as high-schools vary considerably in their resources, the qualifications of their teachers, their safety, and numerous other factors. Getting into a ''good'' high school has serious implications for the students both throughout their high-school years and beyond. In the years following the study, a common topic of discussion among the students was comparing their high schools. While Ashley's magnet high-school offered SAT preparation, numerous extracurricular activities, and many choices in courses she could take, Monique did not have

access to higher level math classes, and neither she nor Aileen were able to take all of their textbooks home with them to study. It is therefore understandable that Aileen seems to speak against the idea that everyone must learn and perform well in science, as her low performance in science excluded her from a magnet school.

She uses the idea of ''learning should be useful'' as a tool to question how she had been categorized, and to resist a view of herself as someone who should not have the privilege of choosing a high school. Aileen may be subject to a disciplinary system, but she is still being agentic, in that she is using a tool (discourse of ''learning should be useful'') in a creative way and in a different context in order to exercise agency in self-definition. Through her talk, she conveys a view of herself as being unfairly positioned by a faulty system that does not even give auditions, rather than as someone who should not get to attend the school she wants.

Lots of people don't go to college and they need to learn science also

In the lunchtime dialog during which the students discussed whether it is important to learn science, an argument developed between Aileen and Lisa. Toward the beginning of the conversation, Lisa said, ''students who are you know...not going to college... don't really need science. They can study other things.'' Aileen shook her head vigorously and said, ''That is stupid. Not everyone is going to college. If some people learn science everyone should have to learn science.'' They continued to discuss it, their voices getting louder as they frequently interrupted each other.

> Lisa: But if you are not going to college you should study...like vocational stuff... and you don't have to learn science.
> Aileen: I am tired of everyone saying things only matter if you are going to college. Lots of people don't go to college and they need to learn science also.
> Lisa: Yes, but there is no point to learning something that will not really be used. It just wastes their time.
> Aileen: They need science too. If some people have to learn it everyone should learn it.
> Lisa: Well maybe students who are not going to college should learn... a different kind of science.
> (Aileen folds her arms and looks away)

Based on facial expressions, gestures and the volume and speed of talk, both students seemed agitated and Aileen seemed somewhat angry. While Monique and Ashley were not as involved in this particular part of the conversation, Monique nodded at several of the statements that Aileen made. In a group conversation that occurred a few months later, Monique said that either science is important to learn or it is not, and if it is, everyone should learn it. Ashley wrote about the issue in her journal for the project, describing how Aileen, not Lisa, was right because people do not always know what they will be using in the future so everyone should learn science.

Several days afterwards Aileen made some negative comments about the conversation when Lisa was not present. Aileen's comments combined with both students' statements and body language during the conversation suggest that this topic elicited a strong response. I argue that part of what made this a somewhat controversial topic is that students' identities were at stake. Through the conversation, the students were in the process of adopting or resisting (or both) subject positions that

are offered by the dominant discourses of the school surrounding the relationship of knowledge to one's future trajectory.

Subject positions

Out of the four student researchers, Lisa's comments regarding whether different students should study different subjects have demonstrated the most consistency throughout the several years of the study. In this particular argument, Lisa's statement that the sciences are for students who intend to go to college perpetuates the view that learning is for particular purposes, that knowledge comes in different levels, and that the relevant division between students is whether you are going to college or not. One implication of her argument is that even students who plan to study, for example, literature in college should still learn science. In some ways, her argument reflects the sorting process of the school choice system. High schools are considered better or worse partially based on their college acceptance rate and students are sorted into high schools based on their academic performance in all subjects.

It seems that for Lisa, many viewpoints surrounding learning promoted by the school's official discourses cohere with each other and with her experiences as a student who gets good grades in all subjects, plans for a career where science will be needed, and intends to go to college. I do not want to imply that Lisa does not have complex thoughts regarding who should learn what subject, but she does seem able to access the dominant discourses of the school surrounding the purpose of learning in a relatively unproblematic way. Given her position as being categorized as a good student, it seems that the subject positions available through these dominant discourses may resonate with how Lisa views herself.

The way in which students are categorized in the school choice system has implications for how rigid they view the boundaries between those who have been identified as ''the best,'' and therefore have more choices in schools to attend, and those who do not have these choices. There is considerable interactional work among all school participants, including students, in reinforcing these boundaries through discursive practice. In some ways, Lisa's talk as she adopts the subject position of ''college-bound science learner'' and inadvertently positions some students as ''non-college bound students without a need for science,'' supports the dominant discourse that categorizes students in these particular ways. Thus, the dominant discourses and associated categories and student talk can be thought of as constituting each other.

However, the view of learning perpetuated by Lisa's statements in the above conversation may have offered an untenable subject position to Aileen. By describing science as for college-bound students, Aileen is positioned as someone who perhaps should not be learning science, since she thinks she may not go to college. Such a view also positions Aileen's parents and sister, who had not attended college, as people who do not need to learn science. Yet Aileen knows that her family members have needed to know science in order to succeed in their lives. Both of Aileen's parents work in hospitals and therefore have jobs that relate to science. Aileen describes, ''My mom didn't go to college and she's a nurse now. She needed to know basic sciences to get into and pass nursing school.'' She also describes how her sister did not finish high school, but has three children and needs to know science

to help them with their homework. Several years later, Aileen elaborated on her position:

> I don't want to go to college but I have taken a few extra English classes. I do well in English and I appreciate being taught it. Regardless of if I am going to go to college or not I should have the opportunity to know. My sister dropped out of school when she was in eighth grade. Teachers wouldn't teach her because she was a ''trouble maker'' and now she has three kids who are nearing high school. She can barely help them with their homework now. Just imagine what it will be like when they get to high school. All this because her teachers figured that she wouldn't go to college. They thought ''oh she's not gonna be anything so we might as well not waste the time.'' I think that it's stupid not to teach everyone something especially if it could be beneficial. You can never have enough knowledge regardless of if you use it later or not.

In Aileen's home environment, it is not assumed that everybody will be able to go to college. She knows that some people, such as her sister, may have difficulty getting through high school. Others, such as her mother, may not go to college immediately out of high school because of financial reasons but later, when circumstances allow, may seek further education in order to improve job prospects. It is understandable that Aileen became frustrated in the conversation with Lisa, as the implication that some people do not need science could have negative implications for the people she cares about.

A view of people as falling into a college/non-college dichotomy with regards to their need to learn science does not only contradict Aileen's experiences of varied career paths and multiple reasons for learning science, but is also associated with her experiences of status and class inequality. Aileen has described how her parents are given much less respect than other hospital workers who have more schooling, such as doctors. Aileen may experience Lisa's statements as not only contradicting her own experience that science is needed in many work settings, but also as perpetuating a division in access to knowledge that may contribute to the unjust treatment of her parents.

While Aileen was adamant in this particular conversation that everyone should have to learn science, in other conversations, such as those that I describe earlier, she has expressed the view that people should only learn what interests them. In general she has been more likely to incorporate aspects of the dominant discourses if the subject positions offered in her use of the discourses cohere with her own desires and experiences. However, the subject position seemingly offered to Aileen in Lisa's talk, of a ''non-college going person'' who therefore does not need science, directly contradicts Aileen's experiences of attending science classes each day, doing most of the work, and attending the science lunch group. Such a position also seems contrary to Aileen's interests and that of her family, which would not be met in a world where the relevant division is whether one is college bound or not, and it is the college bound students who get to attend the high-schools they want and get jobs that are more respected and rewarded monetarily.

While Aileen's anger in the conversation seemed directed at Lisa, it needs to be understood in the context of how she experienced other aspects of the school. She, as well as Ashley and Monique, have often described how the school is ''full of itself'' and how many of the students are as well. My interpretation is that at times students may experience discomfort and/or anger because the available subject positions do

not reflect their life experiences. While attendance at City Magnet with its prestige and advanced curriculum could be an opportunity for some students to have more choices in their lives, it is problematic if students' lifeworlds are not reflected in the official discourse.

It is possible that some students perceive that their family members are portrayed as ''other'' in official discourse, since they would not have been classified as ''City Magnet material.'' When speakers in assemblies portray students' main struggle as getting into the most prestigious college possible, they are not discussing how being the first in their family to go to college, or that learning for purposes other than college are also accomplishments. When City Magnet is positioned as the ''best,'' the converse is that those who do not attend are somehow less talented or capable. A dichotomous view of college versus non-college life trajectories portrayed in official City Magnet discourses and perpetuated in student talk may be offensive and alienating for students such as Aileen, Ashley, and Monique, who are very likely to surpass their parents' educational levels. The school claim of ''striving for excellence'' has another side of it, the exclusivity, the dichotomizing of people's paths and the lack of consideration for diversity in life's struggles and accomplishments.

On reflection

Hall (2002) has described how school discourses surrounding difference influence how students position themselves and each other. In her study, she specifically addressed discourses relating to race. In this section, I will argue that even when race is not mentioned explicitly, City Magnet discourses surrounding achievement and life paths still entail racial meanings and biases given the context of the educational and economic inequalities impacting students' lives.

When I asked Aileen about the argument a few weeks after the incident, she told me that sometimes Lisa says things that make her and Ashley mad. However, several years later when I showed my written description and analysis of the event to Aileen and asked for her feedback, her response was more detailed. While she said that she did not remember this particular incident, she could imagine herself saying these things. She described how she remembers frequently disagreeing with many of the statements Lisa had made about education. After reading my written description of the conversation, she wrote:

> It was always hard for me to agree with what Lisa said. I always found a lot of the things she said to be mean. She doesn't understand that some people may not go to college not because they don't want to but because they can't, and for those people it would be wrong not to teach science, and whatever else, especially if that was the only education that they would get. For some reason it seemed liked she never got the whole picture. It's really unfair to say that if you're not going to college you shouldn't learn certain things. In that case people who might not go to college should just skip out on high school all together, and go right to a trade school.

She explained that the differences in her and Lisa's viewpoints relate to differences in their life experiences, as Lisa has a White parent, could expect it to be easier to go to college and be successful, and would not have a perspective on what it was like to be Black and encounter more obstacles. Aileen described, ''the other day my father and I were pulled over by the police because they were looking for a Black man who

was either short or tall and a young Black woman who was also either short or tall. That could be anyone. Lisa does not have to deal with that.'' When I asked her if she could recall whether she considered issues of race when she used to argue with Lisa in eighth grade, Aileen said no, but that she probably just ''thought Lisa was just better or something.''

When Ashley read the description of the event, her written response indicated a perspective that differences in what is taught to students could exacerbate inequalities:

> Everyone despite whether or not they are going to college should learn science in order to keep the playing field as even as possible. Why deprive someone from obtaining a certain skill or knowledge just because they choose not to take their education to the next level. Also college is not for everybody, so the people who go to college will already have an edge on those who don't, so why make the edge bigger then it already would be... (also) Sometimes life circumstances do not allow people to go to college but that does not mean that that student was incapable of getting into a college.

Ashley also connected the reason for the dispute between Aileen and Lisa to differences in the students' racial identities, without my asking her directly about race. She explained that her views differ from Lisa's because Lisa is ''mixed'' and ''sees success all around her.'' She writes:

> See if I'm not mistaken Lisa's parents went to some type of college and her brother was on his way to college and she was smart and participated in school activities making her a good candidate for some school. Me on the other hand, my mom has a high school diploma and my dad didn't even graduate from high school. So my motivation is different, my motivation is to be better then my parents and not fall into the traps that the rest of my family fell into.

Ashley explained that ''how close you are to success'' affects your view of the world, such as whether you even consider that people may need to learn science not for college, but in order to teach their children. She also explained that being White often means having more access to successful people and therefore an inability to consider the circumstances of those who encounter more obstacles.

Unfortunately, I did not get to speak with Lisa years afterwards in order to get her perspective on the event as an older high-school student, as she stopped participating in the study after 2 years. However, I certainly do not think that Lisa positioned Aileen negatively intentionally or that she would condone inequalities based on access to science knowledge. Based on the conversation, it seems that she perceives teaching students a ''different kind of science'' as more fair rather than less fair since people should not be spending time learning things they will not use. Lisa's view of the harder sciences as being primarily for college seems logical to her based on her immersion in school discourses and their coherence with her life experiences and expectations. Understandably, she wishes to attend the most prestigious and challenging college that she can and she has learned that the students in higher-tracked science classes have an edge in college admissions. It is also likely that Lisa assumed that Aileen was intending to go to college, and therefore did not think that her statements implied that Aileen did not need to learn science. Monique's later perspective on the event was similar to mine, as she described how she thought that Lisa did not know Aileen was not planning on going to college and did not intend to insult Aileen.

However, while Lisa's statements were not intended to be controversial and may appear logical and coherent with official school discourse, the corresponding assumption that knowledge of a subject is associated with a particular life outcome is not a value-neutral assumption. The available subject positions associated with that assumption seem to be less problematic for students whose families are college-educated than they are for students who encounter a greater variety of economic and life circumstances in their lifeworlds.

I do not discuss Ashley and Aileen's comments about Lisa's family and background in order to make a claim that Lisa is a particularly privileged student at City Magnet. Their assumptions may not be entirely accurate, and also do not account for the unique difficulties that multiracial students face, which are documented in research literature but are not the focus of this paper. However, their perspective that the arguments that occurred between themselves and Lisa were related to racial differences is significant in understanding how some of the official City Magnet discourses can have racially biased connotations. A dichotomous view of life paths is not only problematic because it limits possible subject positions, but also because such a view may disproportionately disadvantage African American students from low-income areas of the city who do not see their families' experiences represented. When I asked Aileen if she prefers the racial mix at her school now, where the majority of students are African American, she said, ''At least we can understand where each other are coming from.''

While both Ashley and Aileen discuss race as accounting for the tension that arose surrounding this and similar issues, my interpretation is that the intersecting oppressions of race, class, and gender that Collins (1990) describes as structuring people's experiences were accentuated in City Magnet because the available subject positions corresponded more with the interests and experiences of students from more privileged groups. It is understandable that Ashley and Aileen interpret Whiteness as being ''closer to success,'' because that is what they see in their community and in larger society. While there were many working-class and poor White students in City Magnet, there were considerably more White students with high SES than Black students with high SES. Therefore, when the official discourses cohere more strongly with the experiences of students from economically and educationally advantaged families, some African American students may experience an environment where White students are privileged and their own experiences are marginalized.

It seems that Aileen and Ashley are positioning Lisa as ''other'' relative to themselves. However, while their otherizing of Lisa may have a social impact on her, the otherizing of Aileen and/or her family by the dichotomous view of life paths in dominant discourse not only has a social impact, but also could have consequences for Aileen's academic achievement. If she continually hears that science is not necessary for people because of their anticipated life paths, she may come to believe these messages, and think that science is not for people like her. She may therefore be less likely to identify with a community centered on science, which can pose obstacles for her learning. While the long term effects of such messages are difficult to ascertain, numerous conversations, other than the one described in this paper, suggest that some of the students are conflicted as to whether they feel themselves welcome in science-centered communities. For example, Monique once said to me, ''I have a question... why are they teaching science to us, since they don't really want us to learn it anyway?''

Implications for science identity

Constraints of dominant discourses

While some of the teachers at City Magnet espouse the view that competition for scarce spaces in high schools and colleges motivates students to achieve academically, evidence from this study suggests that the discourses in this particular magnet school surrounding the relationship between learning and life paths could have negative implications for students' identities as science learners. The prevalent schema regarding the purposes of learning particular subjects both constrain and enable students' agency by delineating the available subject positions, thereby highlighting a few possibilities for life paths while obscuring others. One schema that emerges in Lisa's talk, the binary division between college-goers and non-college goers, is not particularly flexible in the subject positions offered. For example, it does not allow much space for someone interested in a vocational path eventually but who also wants to go to college or someone who happens to like science but is seeking a career path that does not require college.

These schemas seem to have a more constraining effect in Aileen's case than in Lisa's. While Lisa seems to be able to occupy the available subject positions with some comfort, Aileen does not often see her own desires and interests reflected. The lack of flexibility in subject positions is one factor that could aid in understanding why students such as Aileen, who have an interest in science topics such as biology, still face obstacles in developing an identity associated with science learning. Aileen may not perceive as many advantages for science learning and participation as Lisa does, since she cannot see a direct pathway to one of the depicted subject positions and associated life outcomes. Further, it is likely that Aileen felt that she and her family were positioned as ''non-college bound people who does not need science,'' which is not a desirable social location. Such a division reinforces inequalities associated with differential access to knowledge, of which Aileen has direct experience. It is not surprising that Aileen does not want to settle for a subject position that entails learning ''a different kind of science.'' Yet although Aileen can resist this dichotomy in her talk, she still may not be able to easily see other options. Students such as Aileen who do not see viable subject positions in the official school discourse may not perceive a group centered on science learning with which to identify, and therefore may have less incentive for learning the skills, language and knowledge for participation.

In City Magnet, developing an identity associated with school science may be more likely if the student identifies as college-bound or is willing to align with a privileged group in an unequal economic system. If the identities of school science and high-status hang together in school discourse, and if learning science is associated with separating those who belong at City Magnet (and in college, and in more prestigious occupations) from those who do not, this could be problematic for some students, particularly students from working-class or poor families. Some students may not feel inclined to pursue their own learning, or may resent their or their family's exclusion from science, yet not feel empowered to address it. In the context of income and education inequalities between Whites and Blacks in Philadelphia, discourses regarding learning, achievement, and life paths can become laden with race as well as class biases.

Possibilities for self-definition

This study indicates some potential for everyday talk serving as a route toward agency and resistance to limited subject positions depicted in dominant discourses. While the dominant discourses reflected the disciplinary practices of the school choice system and the high status of science, supporting the classification of students and the differential allocation of rewards, they also served as resources for students to draw from in their efforts to define themselves and resist categorization. In this study, the idea that ''everyone must learn science'' was sometimes experienced by Aileen as oppressive, since her low performance in science was an issue that contributed to her inability to attend the school she wanted. Yet in the conversation with Lisa, Aileen drew on the same idea that ''everyone must learn science'' in order to resist the way that she and her family have been positioned in a discourse that conveys the idea that knowledge should be allocated based on one's anticipated occupation.

Applying Holland et al.'s ideas, Aileen was ''improvising'' given the discursive resources she had, making the space within which she was able to author herself. Holland et al. write, ''as we use artifacts to affect others, we become, at some point in our growing up, aware of and capable of using artifacts to affect ourselves...We achieve self-control, albeit of a very limited sort, by the mediation of our thoughts and feelings through artifacts.'' In this conversation with Lisa, Aileen may have gained control of her thoughts about herself through the strategic use of the dominant discourse surrounding the importance of everyone learning science. She used it as a tool for her to redefine herself as someone who deserves all the resources that the school can offer, regardless of her anticipated life path. In doing so, she made the claim that she is part of a community that needs science, and that science is therefore a part of her identity.

Aileen's opposition to Lisa's statements can be seen as not only about who should learn science, but as resisting a world where the only subject positions offered are college bound and non-college bound people, with only the college bound students having an interest in science, a need to know science, and respect from the outside world for their knowledge of science. There is the possibility that in directing her talk toward a more positive self-definition in the face of limited subject positions, she is also on the way toward envisioning a more just world in which there are more options for her family and herself. Holland et al. write ''Vygotsky's formulations in short direct us to attend to people's collective ability to imagine themselves in worlds that may yet be scarcely realized, and to the modest ability of humans to manage their own behavior through signs directed at themselves'' (p. 281).

However, it is possible in Aileen's case, resistance may not be accompanied by a sense of empowerment or an ability to make changes, particularly given the limited influence that she has on the settings where decisions regarding schooling are made, and given the extent of the societal inequalities that are impacting her experiences. In addition, awareness of contradictions and gaps in hegemonic discourse and/or resistance may not necessarily entail the creation of new subject positions that can facilitate students meeting their goals and pursuing their learning. At City Magnet, her uncertainty about going to college may have affected the extent of her efforts to achieve in science class, even as she resisted the association between science and college in her talk with peers.

Conclusions

While City Magnet administrators and teachers have described the school as encouraging excellence and providing opportunities for all students to succeed, Aileen's experiences suggest that perhaps the school could do more in establishing an environment that is more conducive to all of the students' learning. The problems described in this paper are not likely unique to City Magnet, as in any school with extensive tracking there may be similar discourses that convey limited subject positions regarding the purpose of learning, and may therefore alienate students who do not see themselves and their interests reflected. This study highlights the necessity of these types of schools considering issues of identity in evaluating how well they encourage all of their students to be academically successful. It suggests that the goal of ''science for all'' might be more reachable if schools attended to whether there were a greater variety of subject positions for students to assume.

The problem of the limited subject positions delineated by the dominant school discourses is a larger issue than can be addressed within Ms. Loman's or within any one teacher's classroom. However, awareness of how these discourses relate to students' identity development in science could still be helpful for science teachers. In making statements about the purpose of learning science, teachers could consider differences in how these statements might be perceived depending on students' past experiences and anticipated life trajectories. They could avoid statements that could be perceived as exclusive, such as conveying a view of science as high status. Teachers could also incorporate into the curriculum critical views of the role of science knowledge in society, such as how the prestige accorded to science relates to wage inequalities such as the ones that Aileen's parents experienced. Clearly there are options other than either identifying with an elitist group centered on science or not identifying with school science at all. It is possible for students to acquire the skills and knowledge for participation in science-related communities, yet maintain a critical attitude and a desire to change how science knowledge connects to societal hierarchies. There is the hope that the increased awareness from explicitly talking about such issues could facilitate students' agency in defining themselves in relation to science learning. Schools such as City Magnet that intend to serve all of their students might benefit from future research that explores the possibilities for changing school discourses to better reflect diversity in students' experiences, and that investigates the impact of these changes on student identity formation in science.

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Stacy Olitsky currently works as a researcher for the Math and Science Partnership of Greater Philadelphia and is a lecturer at the University of Pennsylvania. She has a doctoral degree in Education and Sociology from the University of Pennsylvania. She has spent the past several years working on a longitudinal, ethnographic study of science education in an urban magnet school. Her research interests include the relationship of identity and science learning, interaction rituals in classrooms, in-field and out-of-field science teaching, the influence of social capital and cultural capital on science learning, activity theory and classroom change, and students' experiences with school choice.