

FORUM: Giving oneself over to science – Exploring the roles of subjectivities and identities in learning science

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Abstract In this piece, Elizabeth Moje discusses with the authors of FORUM: Giving oneself over to science: Exploring the roles of subjectivities and identities in learning science (Tucker-Raymond, Varelas, & Pappas) the challenges and potentials of theorizing about the role of identities in learning science. The authors debate how identities and subjectivities should be conceptualized, and whether learning science requires people to change identities and/or subjectivities. In particular, the authors discuss the potential for thinking about how identities are enacted in practices, and how teachers might construct practices that evoke the identities associated with science as a way of developing opportunities for deep science learning.

Keywords Science · Identities · Subjectivities · Practices · Learning

Elizabeth: Identity seems to be a ubiquitous construct in education research these days; sometimes it feels as though everyone is trying to define identity, everyone is pluralizing or destabilizing it, everyone – including me – is conceptualizing learning in terms of identities and, more importantly, shifts in identities. My first response to reading your piece was to argue against identities as pure narratives; my stance is that identities are *enacted* in times, spaces, and relationships (Moje, 2004). I also think that Gee's (2000/2001) notion of identities as *recognized* by others is critical to theorizing how identity matters in learning. And both of these points may have important implications for your work. Ultimately, however, arguments over whether identities are narratives (all discourse) or actions (all doing), while fascinating, may obscure the point of studying identity and learning in the first place, the point of trying to articulate that learning involves more than people slotting bits of information into proper slots in their schemata, the point that learning requires people to think about who they are in relation to the concepts, activities, and goals they are encountering and pursuing.

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Eli, Maria, and Chris: The concept of identity is definitely one that has been defined and used in various ways. In our study we think of identity as a narrative, a story that reflects and refracts many enactments – enactments in times, spaces, and relationships, as you have written about. We do not see enactments of identities and identities as narratives as antithetical concepts. We believe identities *are* enacted (as a narrative, Bruner, 1991), but the actual enactment is not an identity. We see moment-to-moment interactions as subject positionings, or what we refer to in the paper as subjectivities. Identities are used in positioning selves and others, but they are not the actual positioning itself. They are conceptions of oneself and others built through experiences that are used to mediate that positioning. Identities as narratives capture the experiences that shaped them. We do not think of narratives as “pure” ones, all “discourse” and no “action.” First, as we presented in the paper, we see identities as *multimodal* narratives, in our case both discourse- and drawing- based enactments (of course, other enactments use other modalities). And second, we see these narratives as enactments of actions, interactions, and transactions.

You also highlighted “Gee’s (2000/2001) notion of identities as *recognized* by others” and pointed out that this “is critical to theorizing how identity matters in learning.” We very much agree with this notion. Of course, identity and learning are related in many different ways. In the particular study we shared, we explored how two forms of scientist identity (actual and designated) played out against each other, and we also examined the relationship between this interplay and the science curriculum and instruction that these children experienced. That “identities are recognized by others” was important in our study in three ways. First, it was a central feature of our conceptualization of the interview. Our posing the question may have been the first time students ever thought of themselves, even *possibly, maybe*, as scientists, and could very well *never* have thought of it had we not asked. In the interview, each subject, the child and the adult, must have recognized the other as a certain kind of person (not necessarily how that person saw him or her self) in order to engage in the activity. It was crucial to the division of labor, or who got to do what in the activity and how that got negotiated between the subjects.

Second, it was critical in juxtaposing the two forms of scientist identity, actual and designated. Scientists out in the world must have had recognized identities by the children in order for them to answer our questions about similarities and differences between what they showed in their pictures, and told us about, and what scientists do in the world. The “I don’t know” answer that some children gave us to this question may very well be due to the fact that they had not yet constructed a designated scientist identity. And the child’s answer “I’ve never been a scientist” also speaks to the need for identities to be recognized by others. Third, as the post interviews showed, in more than half of the instances, children associated the experiences they had in the curriculum (ISLE) with being a scientist. They were scientists, and they had a scientist actual identity when they were engaged in the ISLE activities that they were recounting in words and in pictures. We are currently exploring in other studies how the scientist identity gets constructed and recognized by the children and their teachers in the various classrooms during the ISLE activities.

Elizabeth: And this is a point where we disagree a bit, for I would use these terms in exactly the opposite way! I don’t think that identities are either enactments or narratives; I think that they are enacted and talked about or written into life, but they are neither of those things. I think that identities only exist inside relationships, times, and spaces; without someone to recognize as a certain type of person (here I’m invoking Jim Gee’s ideas heavily), we are not enacting identities. I agree that people are positioned in particular ways and take up those subject positions in particular ways, but I would add that as they do so, they enact identities that get recognized (and subsequently valued, devalued, or ignored). For me,

subjectivities are the stories we tell to ourselves, about our selves. I would agree, however, that the story told in an interview is an enactment of identity. The interview sets up a time, a space, and relationship. The interview allows a sense of self to be recognized as an identity. I would suggest, then, that the identities you documented in your interviews are identities because you make them identities. The students, in expressing a sense of self through different modes of representation, enact particular identities that you recognize. That's why I like your multi-modal interview format so much, because it allows for many, possible recognitions of identities.

This argument over what we call identity and what we call subjectivity, while important, is not, however, my main concern. In fact, what I find really interesting – and why I raised the question about theorization – is that, in the end, despite our different interpretations of the terms, we agree on the importance of this work. So what I really want to play around with is the idea of the relationship between our theorizations of identity and your participants' lived experiences in science classrooms as they build a sense of self and a sense of who scientists are and what they do.

As an educator with a long-term commitment to deep and meaningful science and literacy learning, I do not raise this issue in an attempt to dismiss the importance of science education, literacy education, or of the relationship of identity and learning. And in that spirit, I commend you for this fascinating investigation about how children think about science, scientists, and themselves. Your extensive theoretical treatment of identity was both fascinating and enlightening; it made me think about identity in new ways, and it should make an important contribution to the literature. I wonder, however, whether you felt as I sometimes do, that we – as education theorists – are starting to lose the forest in the trees? Are we getting so caught up in defining abstract constructs that we have lost sight of our original goals? I have often myself mired so deeply in my theoretical musings over what constitutes *identity* that I have lost sight of what I'm trying to do and often end up with pages of text that have helped me think about identity as an abstraction, but that haven't necessarily furthered my understanding of what identity means in the everyday lives of youth learners.

Eli, Maria, and Chris: Yes, we agree that the students' expressions of self and others are in fact identities because we recognize them as such. Underlying our thinking is the idea that identities are semiotic practices of self that include intentional (goal-oriented) choosing of ideological elements. Identities shape and are shaped by practices that include material dimensions, such as driving a car. But they also include symbolic dimensions, such as driving a HUMMER in downtown Chicago. Whatever we call them, subjectivities or identities, they are *symbolic* selves that individuals construct and use to negotiate situations. The arrangement of semiotic elements (always ideological) may be, and much of the time is, constructed as a narrative. It is by no means the only meaning-making frame when it comes to identity.

In our research we too, like you, worry about disturbing the delicate balance between theoretical abstractions and empirical embodiments. But we deeply believe that both the "forest" and the "trees" are important if we want to explore and understand the complex ways kids act, behave, feel, socialize, perform, argue, think in science classes. We need to organize our thinking in a big "whole" or multiple "wholes," as at the same time we need to examine how this whole, the system of abstract ideas, the concept, the theory (the "forest") helps us see the "trees" in new ways. And the "trees" help us see the "forest" in new ways too. This, of course, is what the theory-data dialectic is all about – a dialectic that, as we have noted in this paper and elsewhere, is at the heart of scientific practice.

Thinking about this further relative to our study, our theoretical stance of seeing identities as multimodal narratives led us to collecting data from the children in the ways we did. Furthermore, the data we collected, analyzed, and synthesized helped us sharpen our

theoretical perspective. The data showed us how the children's narratives capture actions and interactions they have experienced in the classroom, in the school, in the world. And they also showed us the children's ways, reasons, and rationales for representing in their multimodal narratives particular dimensions of their actions and interactions and not others. Some of these ways relate to the action of storytelling either through words or pictures, and others relate to the salience that various elements of the activities that the children were recounting had for them.

Elizabeth: I value the link of theory to forms and sources of data collection. I couldn't agree more that how we theorize constructs shapes how we set about collecting data, and I think that your study makes a nice model for others for articulating the link between theory and research. Similarly, because I theorize identities as enacted and recognized, I collect data by following people and observing them in myriad times, spaces, and relationships. I, too, interview youth, and like you, I see those interviews as yet another time, space, and relationship. I see identities being enacted and recognized in the interviews; you see them being told and heard (or drawn and viewed). I wonder if our theoretical stances are so far apart after all? The bottom line, however, is what does the identity theorizing tell us about constructing opportunities for all students to learn science? And yet, each time I pick up a new piece on identity, I find myself recalling the words of Allan Luke, uttered in response to a paper I had given in a symposium on literacy and identity symposium: "Why does identity matter? What are the real, material consequences of identities?"

I won't try to respond to Allan – yet again – in this response (what a palimpsest that would be), but I will invoke his words, this time turning the question to you, Eli, Maria, and Chris: Why does identity matter to how first, second, and third grader students learn science? Why do scientific identities matter? *Should* children of this age see themselves as scientists? What should children of this age know about what scientists do, and why would such knowledge matter? Ultimately, why does identity matter to young children's learning? And once you've dealt with that simple little question, why would we expect that "identity building" would produce "better scientists" or help students become "better at science." Why would we assume that's what they want or see for themselves? You make the claim early in your paper that "developing scientific identities is important as it allows for participation in scientific activities, developing opportunities for ways of living." Can you say more about that claim? I find myself wondering if one must really take on a scientific *identity* in order to engage with scientific activities, or does one simply need to understand the epistemological stances of science, the attitudes, beliefs, values, and, ultimately, the discourses privileged in scientific inquiry in order to engage with science? Is that the same as taking on an identity? And what is required merely for achieving in school science classrooms? In other words, my query revolves around the questions of how far one must go. Does one give over her identity to science? Or can we navigate multiple discourse communities and identity enactments in daily life? What's the difference between identity building and developing a metadiscursive awareness of the shifts required in identity enactments? And what can we realistically expect of young children in this process?

Eli, Maria, and Chris: You are raising many important questions about why scientific identities matter, why identity matters to young children's learning, whether identity building is realistic for young children – issues we continue to ponder.

We think identities are important because they are mediational resources that people draw on to make meaning from and participate (or not) in activities. They help us to answer: who am I as a participant in this activity (part of which asks who the others are in the activity); And, what does this activity mean for who I am? The material consequences of identities, since you brought them up, include being tracked into hierarchical trajectories of schooled

learning that contribute to the perpetuation of oppression and inequality. Black, brown, and language minority children should see themselves as scientists because it is Black, brown, and language minority children who are not becoming scientists. Should they be any kind of scientist? We don't think so. They should not be developing chemical weapons or conducting racist ethnographies, for instance. What then will shape the kinds of scientists they become (or not) and the kinds of stances they take toward science? The kinds of experiences they have in classrooms and out in the world, and the kinds of meanings they make from these experiences.

Elizabeth: Wait, are you saying that if children see themselves as scientists, then they will be able to become scientists? I don't think this is what you mean, but I'm curious. I do think that how people see themselves and their futures, or "possible selves" in the language of Markus and Nurius (Markus & Nurius, 1986), plays a role in how they may take up the opportunities offered to them in classrooms and outside of school. But doesn't your reasoning implicate more the recognitions that others assign to children's identities? Wouldn't this reasoning suggest that we should study how teachers identify children as possible scientists, rather than how the children see themselves?

Eli, Maria, and Chris: We should be studying both. Children use their identities to mediate meaning making opportunities in classrooms, and this meaning making shapes their identities. In this way, they can imagine their place in past, present, and future activities. Therefore, an understanding of what scientists do and what scientific practice is (whatever that may be for the child and scientific practice, respectively) can be important for expansive zones, not only of development and learning, but also of imagination.

And it is not that we think children should *only* see themselves as scientists. But the possibility must remain open. As Robert Moses (Moses & Cobb, 2001) argues, access to mathematics and science (and other disciplines for that matter) is a civil right. If children do not see themselves as able to engage in scientific practice, they will not. And they will be left out of an increasingly technologically driven job market. At the same time, scientific practice must change. We cannot be happy with widespread alienation of women, Black, brown, and language minority students across the diverse fields and disciplines of science. What is wrong with science that whole groups of people are not choosing to participate or are kept from participating in scientific activities? The answer to this question must go beyond the realms of science and scientific practice.

You asked, Elizabeth, "Why would we assume that's what they [children] want or see for themselves?" And we think that is an important question. From our end, as participants in scientific communities, we cannot assume that. But we can ask: Why is it that they do not want that for themselves and what do we have to do to change so that they do? Or how do we offer them opportunities to carve their own spaces? And it is okay not to choose to participate as practitioners in science, as long as they had the opportunity to consider this as a viable pathway for themselves, but decided to devote themselves to something different.

Much of the recent work on identity has been in adolescence. But identities do not start to build in adolescence. They start with our earliest subjectivities (Luke, 1995–1996). Understanding science and scientists does not start in high school. It starts when children first engage themselves with such concepts in primary school or earlier. For us, it is not about "having" or "achieving" a scientist identity in primary grades – it is about nurturing this "awareness," this "way of being," engaging in activities – not only science activities, but also telling stories, idealizing, reflecting on, and theorizing about these science activities. Furthermore, building an identity does not necessitate complete association with a practice. It could mean building differentiations between practices and finding a niche for oneself relative to that particular practice.

Elizabeth: I couldn't agree more with the point that if we're going to study identities and subjectivities, then we should study them in childhood as well as in adolescence. Developing a sense of self begins very young, and learning how and when to enact particular selves (or identities) is facilitated by moving through many different contexts. That's why, I believe, scholars have focused on identity development in adolescence, rather than in earlier periods, because they have assumed that what we see as different enactments of identity are young people's struggles to figure out who they are and to become some kind of person (or to "achieve" an identity). But I agree with you in arguing that this process of learning to enact selves begins at very early ages and should be studied.

It seems, as well, that you're really talking about building complex, or hybrid, identities or sense of self. In other words, it's not so much that you're suggesting students take on a scientist identity as it is that you're hoping to construct practices that students can recognize as important to the doing of science and that they can feel comfortable participating in. Does that seem like a fair way to represent your stance?

Eli, Maria, and Chris: Yes, like you, we are ultimately concerned about the kinds of practices students engage in. We think, too, that students should not only be comfortable in scientific practices, but risk takers as well. You asked earlier, must one "really take on a scientific *identity* in order to engage with scientific activities, or does one simply need to understand the epistemological stances of science, the attitudes, beliefs, values, and, ultimately, the discourses privileged in scientific inquiry in order to engage with science? Is that the same as taking on an identity?" We do not argue for the need to take on a scientist identity in order to do science. We think that a scientist identity, whether or not it is taken on, mediates through the various dimensions of science activities when we conceptualize them as historically, socially, and culturally-based, goal-oriented actions done within communities of people (Engestrom, 1987).

Elizabeth: At the risk of mis-interpreting your last statement, I think it relates to some work that I read recently from two different sets of scholars. One set is examining how *hybrid practices* in and out of classrooms (see Hall & Jurow, 2006; Kirschner & Geil, 2006) facilitate learning academic content, skills, and practices. The other set of studies, from Angie Barton and colleagues (Barton, Tan, Rivet, & Groome, 2006; Tan, Barton, & Rivet, 2006) argues for a conception of *identities-in-practice*. Both of these practice-oriented perspectives might be particularly generative for the work that we're all trying to do.

That is, what I saw in the studies I've mentioned was less of an emphasis on identities, and more on the types of practices that might expand possibilities for learning and participating across boundaries. I like the idea of focusing on the practices that we offer children and youth in classrooms, rather than on trying to change their identities in some way, which is what, I believe, your final sentence in the previous paragraph suggests. Identities are not taken on or up by people in order to learn practices; identities are taken on and up, as one engages in practices. It may, then, be less important that a student see herself as a certain kind of person (say, a scientist) than it is that she sees certain practices as linked to identities she recognizes (say, as scientific). Engaging in these practices may or may not generate scientific identities, but the practice nevertheless affords possibilities. I'm not quite ready to give up on identities quite yet, especially on working with teachers to think about how they recognize students as particular kinds of people, but I am interested in how focusing on practices, rather than on identities – which despite our best efforts to theorize, seem to always be conceptualized within the student, rather than as a product of space, time, and relationships – might construct new possibilities for classroom science teaching and learning.

Eli, Maria, and Chris: Your points, Elizabeth, relate, we think, to the actual/proximal and designated/distal distinction about identities that others have offered and we adopted in our

study. An intriguing question is how much of an overlap, if any, is needed between these two different types of identities (seeing oneself as a scientist and seeing others as scientists) of both the children and the teacher, so that new possibilities for classroom learning and teaching emerge. And, “new possibilities” is, of course, a loaded phrase as it could have multiple and different meanings. We did not take this question up in this study that had the much smaller and more modest goal of “playing around” with these two constructs and starting to explore what these constructs may look like for young children in urban classrooms engaged in particular science and literacy practices.

As we ponder another question you raised – “does one give over her identity to science?” – we hope (thinking of the work of Angie Barton (1998) and the young people she “did” science with) that science gives itself over to student identities at the same time students internalize and recontextualize what it means to do science as a scientist (preferably for a sustainable human ecology). We also hope that this includes the not yet known, the unimagined, possible future. We know, in the words of Vygotsky (1962), that development is both revolution and evolution; we must capitalize on both.

Elizabeth: One reason that I asked the question about “giving oneself over to science” is that I was struck by the one young man, Arturo, in your study who said explicitly in pre-curriculum interviews that science wasn’t his thing; he saw himself as “a singer and a dancer.” What I wondered was whether the curriculum or the teacher would have been indicted as failing in some way if Arturo had steadfastly maintained his sense of self as “singer and dancer,” in opposition to “scientist.” I predict that you would focus on Arturo’s practices, his willingness to engage in science activities, and how he positions himself in his drawings, rather than on his representation of self in such statements (i.e., “I am a singer and dancer.”). But that brings me back full circle to wondering whether we need to worry so much about identities and should perhaps focus more on whether or not students participate in the activities and practices of science. In fact, that is exactly what you said a few paragraphs ago, in response to the question of whether children should or do see themselves as scientists. If engagement in practices is what we really care about, then is all of our worry over identity shifting misplaced? And are our attempts to document identities, subjectivities, and identifications misplaced? Keep in mind that I’m questioning my own work here, as well. I’m thinking back to what I said in response to Allan [Luke] when he asked why identities matter. My response was that how one identifies shapes one’s choices about whether to participate in certain practices. And I can’t really give up that stance. And yet, identities are always enacted in or constructed in practices, and thus, are always open to change as long as multiple and diverse practices are made available to people. So do identities really matter?

This is, really, a rhetorical question. Education scholars will continue to worry about identities, subjectivities, and practices as we think about teaching and learning in and out of schools. We will continue to try to tease out what these constructs mean for curriculum development, for teaching practice, and for the organization of learning environments. We will continue to theorize what changing students’ identities or subjectivities means for the possibility of changing science, for attempting, ultimately, to generate a science that “gives itself over to students.” It’s exciting to think of the possibilities for developing not only learners’ identities but also the disciplines and professions themselves. That said, the challenges of building classroom spaces and practices that offer opportunities for science to change even as learners are changed, are vast, especially in the face of increasing demands for standardization and teacher accountability. And because these challenges are vast and difficult, we must continue to explore all avenues of study for supporting student learning. Your study makes an important contribution to that work.

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