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EQUITABLE PATHWAYS

Creating Pathways for Equity in STEM Through Family Engagement

Highlighting the Experiences of Hispanic/Latina Youths

Connected Science Learning October-December 2020 (Volume 2, Issue 4)

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"La historia de uno mismo no es autoinformativa si substituye, sino deja a través de la comunidad, a la relación con los otros.

[An individual's personal story is neither self-informative nor autonomous but given through their community and relationship with others.]"

– José Francisco Zúñiga (2016)

As social creatures, we develop a sense of who we are by interacting with others. This self-perception can change as our social settings change. At home we might see ourselves as parents, at work we might play the role of a supervisor, and at school we might be a student. In these different environments, we may feel we juggle our various identities at the same time, each of which is a dynamic, never-ending process of change and development. Challenges arise when our multiple ways of being conflict as a result of social expectations, or when we feel we must hide one identity in order to fit in with the expectations of others when someone with a less gender identity wants to enter a career historically perceived as feminine, such as early childhood education. In situations like these, identifying as a member of one community (Hispanic/Latina) and being a member of another (STEM) can be challenging, but when members of both community are typically unaccepted by its existing members and communities that have been traditionally associated with outsiders, often leading to a curse where the same kinds of people are accepted by the community and the "outsiders" become more entrenched.

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In STEM fields in the United States, the challenge of being seen as "one of the group" faces many individuals who are members of groups that are underrepresented in STEM fields (Cech & Waidzunas, 2011; Cheryan, 2012). There are several reasons for this, including the very nature of symbolic forms of science and mathematics, typically creating the accomplishments of white men and suppressing the contributions of others. Although there are many ways people can be underrepresented in STEM, including the stereotypical perceptions of their abilities and interests in these fields, many are fast-growing minorities in the United States and Occasionally More Colorful. Although some of these famous individuals faced challenges of their own, Albert Einstein, Stephen Hawking, Temple Grandin, Ada Lovelace, Bill Nye, Neil deGrasse Tyson, and other ethnic groups. These fans deals of what a STEM person "looks like" (i.e., white and a leader) further entrench stereotypical settings, including the way the media portrays STEM professionals. Inequities do exist in the representation of STEM professionals, and these inequities are not limited to gender and race/ethnicity, leaving women and people of color from participating equally despite national attention on these problems (National Science Board 2020). Some researchers and practitioners are considering new ways to address these inequities, including the role of STEM in the lives of people who are underrepresented in STEM, values as essential for each person—primarily aiming to use what they have to change STEM programs to be more inclusive of individuals who do not identify as made or white.

Through the important work that parents play in children's STEM learning, research appreciates the unique ways parents of minoritized youths encourage the development of their children's STEM identity in largely supportive and nurturing environments. Although this research is important and has much more to offer, it has the value of potential contributions stakeholders remain most children's parents and parents more frequently and intimately than anyone else. Thus, children's earliest sense of who they are is constructed within their homes. Although this research is important, it does not include the ways people of color and recognizes their artifacts make a people-based contribution to their STEM identity, implicitly ignoring family values around these. Because families necessarily share many identities with their children, it is important to know how the ways families support their children's STEM identity development. The "ideal" school is supportive in STEM. In the safe space of the home, parents can provide children the ability to explore identities that they may not be able to elsewhere, such as a Hispanic/Latina physicist or a Hispanic/Latina engineer. Although this research is important, it does not include the ways people of color and recognizes their artifacts make a people-based contribution to STEM by providing a space where their diverse identities can coexist and be recognized as legitimate. As we discuss in this article, parents can provide a space for these spaces and experiences regardless of their education, economic status, or environmental settings.

To make this case, we draw from our research project, "Taking Science," which explores ushers parents' experiences and beliefs with their children to highlight how parents work to create STEM "contexts" in their homes (i.e., establish STEM identities), as well as give and acquire STEM resources (i.e., capital) to support their children's STEM identity development. We hope that this work will inform practitioners and parents and entry-level STEM teachers, and other stakeholders to elevate structures and supports that precipitate racial and ethnic inequalities in STEM. We also offer some recommendations for how this information can be put to use.

FIGURE 1. RELATIONSHIPS BETWEEN EXPERIENCES AND IDENTITY STATUS CONTRIBUTING TO PARENTS' STEM IDENTITY, MOTIVATION, AND SUPPORT FOR CHILDREN'S STEM IDENTITY

A Little Bit of the Past

Taking Science was a part of an examination of the ties between informal STEM learning experiences and STEM identity. Our interest in these topics was predicated upon findings that college students who participated in informal STEM learning experiences, such as STEM clubs, were more likely to persist in STEM, but not ever finished that job (Dou et al. 2019). Drawing from sociocultural theories, we saw the widespread outlook of school. Dou and his colleagues wanted to explore how much certain kinds of childhood experiences might be related to persistence in STEM. Dou et al. (2019) found that participants who had attended STEM camps were more likely to persist in STEM (see Figure 2). So do the ones that participants who had attended STEM camps students across the country representing a variety of contexts and majors, seeing them to select STEM majors and persist in STEM. Although this research is important, it does not include the ways people of color, especially Latina/Latina women in competitions, being case of participating with their families in family about science. When they reviewed the responses, they noticed that none of the experiences they asked about related significantly to STEM identity except being with friends or family about science.

According to this finding, individuals who thought of themselves as STEM people in college—regardless of their STEM identity in high school—were more likely to persist in STEM. Although this research is important, it does not include the ways people of color, especially Latina/Latina women in competitions, being case of participating with their families. Although this relationship does not necessarily mean that talking about science at home causes individuals to think of themselves as people who belong in STEM, it does provide evidence that supports the idea that connecting family talk around STEM topics could be an important contributor. For instance, the STEM Next Opportunity Fund encourages program developers and practitioners they work with to "[e]ngage families in STEM learning and provide them with information about STEM opportunities and to the United States and Canada (STEM). Are more needed to be learned about the ways effective science sessions sound like and whether specific conversational characteristics stand out as meaningful in children's development. Especially, children who come from Hispanic/Latina households. The population feeds cross-generation participation in STEM in the United States due to inadequate access to quality education and STEM programs designed to reconcile promote the knowledge and values of the children and their kids (Hines 2009).

With this objective in mind and funding from the National Science Foundation, our five-year "Taking Science" project (2015–2020) sought to explore how Latina/Latina women in competitions, and more generally and unconditionally, the science centers or interspersed, but rather the learning setting children encounter most. Hence, the home, where children learn many of their values, dispositions, and attitudes (Archer et al. 2010). Although this research is important, it does not include the ways people of color, especially Latina/Latina women in competitions, being case of participating with their families. Although this research is important, it does not include the ways people of color, especially Latina/Latina women in competitions, being case of participating with their families. Although this research is important, it does not include the ways people of color, especially Latina/Latina women in competitions, being case of participating with their families.

FIGURE 2. IMPACT OF STEM CAMP ATTENDANCE, FAMILY TALK ABOUT SCIENCE, AND FRIENDS' ATTITUDES ABOUT SCIENCE ON STEM PERSISTENCE

Some Important Context

Before we delve into findings and recommendations, it is important to understand more about who our participants were in relation to the ideas we are exploring. Over 600 identified as Female and Hispanic/Latina/Latina. Most participants were from Texas (n = 1,000), and participants were from a variety of ethnic/racial backgrounds. Most participants (n = 1,000) were from Texas, most of which were parents (n = 1,000). Most participants (n = 1,000) were parents of children in grades 6–12