

Social Capital in Urban Youth in STEM Outreach Activities

Authors: John F. Drazan, Anthony D'Amato, Aaron Littlejohn, Max Winkleman, Chris Johnson, Laquana Cooke, Eric H. Ledet and Ron Eglash

In his study of education in France, Bourdieu (1979) introduced the concept of “cultural capital” to describe how the lack of access to upper class culture was used as a barrier to keep working class youth stuck in working class jobs. Eglash and Bennett (2009) extend that concept by introducing “computational capital”—the knowledge of algorithms, iteration and other math or computing concepts embedded in cornrow hairstyles, beadwork or other cultural materials in which underrepresented youth may feel a sense of ownership. Following that trajectory, I introduce two new types of social capital for early student engagement in STEM. “Experimental capital,” like computational capital, is an educational resource that lies nascent in the possession of youth. Unlike computational capital it is not a form of knowledge, but rather a sense of ownership over a domain of possible experimentation. “Credentialing capital” is a form of membership held by educators. Similar to credentials allowing entry into a secure facility, proper credentialing capital allows for an educator to engage students in authentic manner in regions of shared interest. In combination these two types of capital are particularly effective in engaging underrepresented urban youth in STEM fields.

In this case study, we focused on sports. Many educational attempts have been made to use sports as illustrative examples for STEM—most physics textbooks contain an illustration of parabolic trajectory as a ball in flight. Yet the use of sports as a real life, hands-on experimental context is rare. STEM outreach performed by scientists or engineers typically eschews this connection in favor of the role model concept: we ask them to enter the classroom as professionals in their field.

In summer of 2014 we experimented with the intersection of these two forms of social capital with 50 inner city high school students during a 5 week program called “The Science of Athletic Performance”. By using sports as a hands-on experimental context in which to use STEM topics, students were engaged with questions that naturally arose in their own pursuits. As the instructors, we brought in graduate students in biomedical engineering who are “credentialed” by a passion for sports. This created a meeting place in the gap between the STEM world and the world these students inhabit. Rather than the sense of “pandering” that can be offensive or disappointing when adults attempt to bridge that divide, each side had a sense of authenticity and legitimacy in the collaborative endeavor. Their shared interests allowed for a relaxed but immersive program where the students learned about how the human body worked in sports while gaining relatable role models in the STEM fields. The capstone for the program occurred at the Rensselaer campus where the student groups presented their work in a poster session to a professional panel that consisted of sports trainers, biomedical engineering professors and sports health professionals. These “sports science” professionals gave positive feedback to the students as a way to validate the student’s credentials as science practitioners. This credentialing was also reinforced by having the students present their posters to younger groups of students as relatable peer mentors. One of the goals of the program is to credential these students in STEM activities so they are available to be engaged with the traditional STEM pipeline programs.

By engaging students with outreach that is centered on shared interests where science is not the focus but a tool for understanding, more effective programming for urban STEM education can be created. Using the intersection of experimental and credentialing capital other scientists can create effective outreach programs that engage diverse students without a pre-existing interest in STEM.