UNPAK

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INVESTIGATING THE RELATIONSHIP BETWEEN UNDERGRADUATE RESEARCH AND THE DEVELOPMENT OF SCIENCE CAPITAL

BACKGROUND

CONTEXT

Increasing calls to improve and diversify participation in science, technology, engineering, and mathematics (STEM) (NRC 2011).

As of 2010, underrepresented racial and ethnic minorities (URMs) made up 29.4% of US population but only 13.3% of the STEM workforce (NSF 2013).

Research participation has been posited as a way to support and retain students in STEM, especially URMs (NRC 2011).

PROGRESS

Our prior work has investigated how unPAK undergraduates use and develop different forms of "capital" to access research opportunities and lay the foundation for their development as scientists (Thompson et al. 2015).

- Human capital: skills and knowledge (What you know.)
- Social capital: social ties that expand access to opportunities (Who you know.)
- Cultural capital: enculturated norms, values, attitudes (How you know.)

THEORY

The concept of "cultural capital" has been under-theorized in the literature on the development of scientific identity and success.

- Often reduced to measures of exposure or participation in "high culture" activities (DiMaggio 1982).
- Broadly described this as "learning to think and work like a scientist" (Hunter et al. 2007).
- Bourdieu describes cultural capital in science as "a practical sense of the problems to be dealt with, the appropriate ways of dealing with them, etc." (2004, p. 38).

RESEARCH OBJECTIVE

Our current work takes a life course approach to characterize how undergraduates, especially those from groups underrepresented in the sciences, develop cultural capital.

METHODS

COLLECTION

1 **Life course approach** > a focus on individual experiences embedded within social and historical contexts, and change/development over time.
Interviews: We invited participants to tell us their stories about early and college experiences with science and research through phone or face-to-face interviews with 15 students from 5 institutions. Interviews lasted approximately 60 minutes and were audiorecorded and transcribed verbatim

ANALYSIS

2 **Preliminary analysis & visualization:** Detailed maps were created for several interviews visually connecting important themes and actions within interviewee's experiences.

3 **Identified themes shared across interviews**

4 ATLAS TI, a qualitative data analysis software, was used for sytematic data anaylsis

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DEVELOPMENTAL EXPERIENCES

Chemistry I can tolerate, but bio, I like this a lot. And so my senior year, ***I took Bio again with the same professor I had in the 10th grade and I was like you know what, this is awesome.*** I love this class, this is great. I can do more of this. "

- STUDENT A

So she was a little bit less confident per se about what we should do. ***I designed a project and I was like 'this should work. If it doesn't work, then we'll just, scratch it try it again.'"***

- STUDENT C

[Although a group of scientists] may have found something that is different or done something different, science can't be defined in terms of 'success' ***because doing anything with science is going to lead you somewhere."***

- STUDENT B

THEMES:

The following themes were common among all research participants who plan to continue their trajectory as scientists.

REASONS TO PURSUE CAPITAL

1 SURVIVAL
2 SOCIOECONOMIC SECURITY
3 STATUS
4 PERSONAL ACHIEVEMENT
5 COLLABORATIVE ACHIEVEMENT
6 COMMUNITY OUTREACH
7 GLOBAL PHILANTHROPY

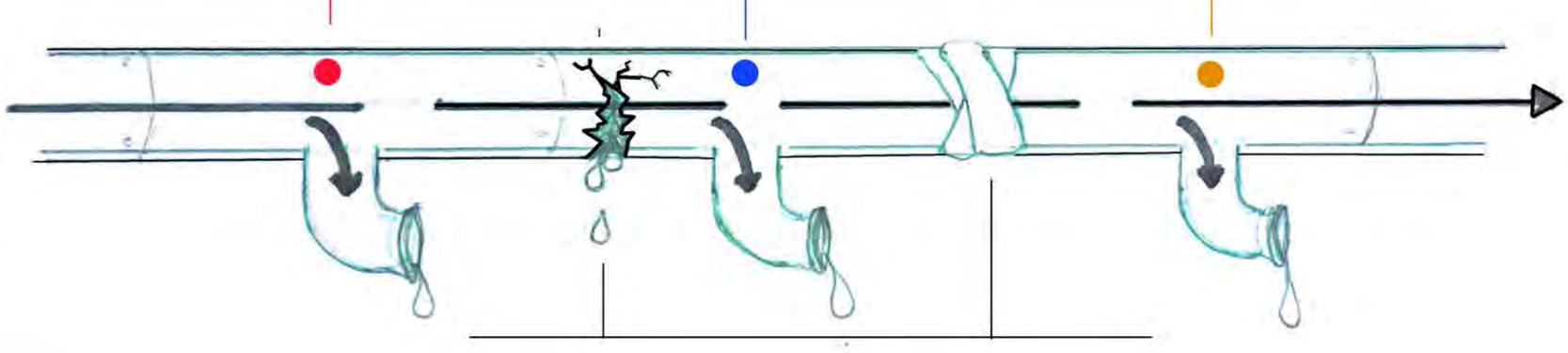
LOCAL DEMAND
GLOBAL SUPPLY

WHERE EVERY INDIVIDUALS SCIENCE CAPITAL ACTS AS A COMPLEX PUMPING SYSTEM THAT CHANGES WITH TIME

1
Recognition of science identity: middle school or high school, often as a primary interest. Affirmed in a social context.

2
"Eureka" moment the nature of science - including its tentativeness and tediousness, often through research experiences and not in traditional class-based learning settings. *Anti-climax around the production of knowledge*

3
Late ownership of science identity : Ownership of science identity in college, often in the form of independent research and responsibility for teaching or mentoring junior students. Indicates agency and control over capital



Because of the importance of these themes to all of our research participants, we have identified these as 3 "stops" (that is, sites to exit the STEM pipeline)

We have created the following model to help visualize the complex relationship between STEM trajectory and the development of capital:

INSTITUTIONAL FACTORS :

Critically important to the infrastructure of the STEM pipeline are institutional factors including: the availability of physical and cultural resources, lab organization and functionality, and general institutional support.

REFERENCES:

1 Bourdieu, P. (2004). Science of Science and Reflexivity, University of Chicago Press.
2 DiMaggio, P. (1982). Cultural capital and school success: The impact of status culture participation on the grades of US high school students. American Sociological Review, 47(2), 189–201.
3 Hunter, A.-B., et al. (2007). "Becoming a scientist: The role of undergraduate research in students' cognitive, personal, and professional development." Science Education 91(1): 36-74.
4 National Research Council (2011). Expanding underrepresented minority participation: America's science and technology talent at the crossroads. Washington, DC, The National Academies Press.
5 NSF (2013). Women, Minorities, and Persons with Disabilities in Science and Engineering: 2013. National Center for Science and Engineering Statistics. Arlington, VA, http://www.nsf.gov/statistics/wmpd/.