Mentoring Deaf Students in UREs: The Value of Cultural Competency

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Cultivating Scientific Curiosity
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Outline

How I got into science education research
Why diversify STEM?
What does a typical Deaf student look like?
What makes for a good mentoring experience for Deaf students?
Deaf scientist leadership in research on ASL and the Deaf community
How I got into science education research

2010: Tim Esch and Rebecca Hull

2011: Abbi Simon, Sarah Gluck, Jenna Greene, and Brienna Herold

2012: Tom Wankum and Brienna Herold

2013: Lauren Burton, Kristin Parker, and Jennifer Chin

2014: Eric Epstein, Samir Jain, and Christine McBride

Beth Craft
Why Diversify STEM?
Why Diversify STEM?

Diversifies research directions
Genetic diseases in Ashkenazi Jewish people
Women’s medical issues
ASL research and its impact on neurolinguistics

Better problem solving
Diverse teams consider more varied solutions
Ultimately choose better solutions

Science education “weeds out” by being unwelcoming
No difference between stayers and leavers
Stayers seem to have a better sense of identity and belonging
What does a “typical” deaf student look and act like?
Introducing.. the typical deaf student

Often does not fit a mold or preconception
Preconceptions come from:
  • Limited experience with one deaf individual
  • Depictions on television or in movies

Great variation in communication, residual hearing, and identity
Some variation in accommodations
Our Starting Point

What We Knew
1. Deaf students have long reported barriers to mentoring\(^1\)
2. Deaf students do better with deaf mentors\(^2,3\)

What We Wanted
1. Identify the key variables in successful mentoring of Deaf students
2. Develop a meaningful measure for examining mentoring effectiveness

The Deaf Mentoring Survey: A Community Cultural Wealth Framework for Measuring Mentoring Effectiveness with Underrepresented Students

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ABSTRACT

Disabled individuals, women, and individuals from cultural/ethnic minorities continue to be underrepresented in science, technology, engineering, and mathematics (STEM). Research has shown that mentoring improves retention for underrepresented individuals. However, existing mentoring surveys were developed to assess the majority population, not underrepresented individuals. We describe the development of a next-generation mentoring survey built upon capital theory and critical race theory. It emphasizes community cultural wealth, thought to be instrumental to the success of individuals from minority communities. Our survey targets relationships between deaf mentees and their research mentors and includes Deaf community cultural wealth. From our results, we identified four segregating factors: Being a Scientist, which incorporated the traditional capitals; Deaf Community Capital; Asking for Accommodations; and Communication Access. Being a Scientist scores did not vary among the mentor and mentee variables that we tested. However, Deaf Community Capital, Asking for Accommodations, and Communication Access were highest when a deaf mentee was paired with a mentor who was either deaf or familiar with the Deaf community, indicating that cultural competency training should improve these aspects of mentoring for deaf students. This theoretical framework and survey will be useful for assessing mentoring relationships with deaf students and could be adapted for other underrepresented groups.
The **STEM Mentoring Model** combined traditional capitals with **Community Cultural Wealth**

<table>
<thead>
<tr>
<th>Traditional Capital Theory</th>
<th>Community Cultural Wealth</th>
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<tbody>
<tr>
<td>1. Academic Knowledge</td>
<td>4. Navigational Capital</td>
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<tr>
<td>2. Discipline Knowledge</td>
<td>5. Aspirational Capital</td>
</tr>
<tr>
<td></td>
<td>7. Resistant Capital</td>
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<tr>
<td></td>
<td>8. Linguistic Capital</td>
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Research Questions

1. Does the STEM Mentoring Model explain the variable experiences of deaf mentees?
2. Are deaf scientists better mentors for deaf mentees?
3. What’s important for a good mentoring experience for deaf mentees?
Examples of Survey Items: Traditional Capitals

Academic Capital
4. [Name] taught me how to work independently.

Discipline Capital
5. [Name] taught me how to use the tools, techniques, and methods of my field.

Social Capital
11. [Name] encouraged me to meet other people working in my field.
Examples of Survey Items: Community Cultural Wealth

Navigational Capital
15. [Name] made sure my communication needs were met.

Aspirational Capital
22. [Name] gave me a role model(s) to look up to.

Familial Capital
27. [Name] encouraged me to participate in the deaf community.

Linguistic Capital
29. [Name] had a positive attitude about ASL.

Resistant Capital
34. [Name] thought that hearing people should meet deaf people halfway.
The pilot survey felt like an **EPIC FAIL** 😱😢

**Design**
Derived from other published surveys and our focus group

**Results**
Clear satisficing
Much missing data
Items about traditional capitals were highly multicollinear
Respondents who’d had multiple mentoring experiences appeared to conflate these experiences together.
SPSS refused to complete the factor analysis! 😞
We gleaned what we could from the data, learned from our mistakes, and tried again….

Interviews
Identified communication access as a potentially important variable that was missing from our model

Second Survey
Added new items based on interviews
Greatly shortened survey by reducing items about traditional capitals
Used strategies to reduce satisficing and the missing data problem
Explicit throughout the survey about focusing on just one mentoring relationship
Results from factor analysis

Factor I: Being a Scientist

Factor II: Deaf Community Capital

Factor III: Asking for Accommodations

Factor IV: Communication Access

Traditional Capitals + Aspirational Capital
(Academic, Discipline, Social and Aspirational)

Community Cultural Wealth
(Familial, Linguistic, Navigational, and Resistance)

Specific Items
(from Navigational Capital)

Specific Items
(from Navigational and Social Capital)

We divided mentors into three categories: **deaf**, **deaf-know**, and **deaf-unaware**
Deaf mentors were the best…

But we found that deaf-know mentors were almost equally effective!
“Everyone Was Nice...But I Was Still Left Out”: An Interview Study About Deaf Interns’ Research Experiences in STEM†

Megan Majocha, Zachary Davenport, Derek C. Braun, and Cara Gormally*
Department of Science, Technology, and Mathematics, Gallaudet University, Washington, DC 20002

Science, technology, engineering, and mathematics (STEM) undergraduate research experiences improve success, persistence, and promote a feeling of belonging to a community. Like their hearing peers, deaf STEM majors often participate in undergraduate research experiences. However, deaf students typically interact with hearing faculty lacking experience with deaf students and awareness of Deaf culture, which unintentionally impacts their research experiences. This interview study sought to understand deaf students’ research experiences and their relationships with hearing mentors. Findings indicate that lack of awareness of Deaf culture and lack of communication access impact students’ experiences. We make recommendations on improving deaf students’ research experiences.

INTRODUCTION

Minority culture mentors have improved outcomes, including...
Interview data reinforced these four factors and uncovered a **fifth variable: a cohort of Deaf peers**

<table>
<thead>
<tr>
<th>First Study</th>
<th>Interview Study</th>
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<tbody>
<tr>
<td>① Being a Scientist</td>
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<tr>
<td>② Deaf Community Capital = Deaf Awareness</td>
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<tr>
<td>③ Asking for Accommodations = Self Advocacy</td>
<td></td>
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<tr>
<td>④ Communication Access = Mentor’s Advocacy</td>
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<tr>
<td>⑤ Internship Cohort</td>
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</table>

6. Majocha M, Davenport Z, Braun DC, Gormally C. “Everyone was nice...but I was still left out”: An Interview Study About Deaf Interns’ Research Experiences in STEM. J Microbiol Biol Educ 2018 Apr 19(1). doi: [10.1128/jmbe.v19i1.1381](https://doi.org/10.1128/jmbe.v19i1.1381)
Conclusions

1. Mentees self-reported the greatest benefit from Deaf and Deaf-know mentors. Hearing status of the mentor wasn’t important. Experience with deaf students was.

2. We identified five variables for mentoring success. Being a Scientist, Deaf Awareness, Mentor’s Advocacy, and having an Internship Cohort

3. We have a survey that is reliable and partially validated It will be useful for measuring mentoring relationships with deaf mentees
1. Academic & Discipline Capital, and Social Capital, factored together
   We really thought some mentors would be social butterflies and teach more social capital than others

2. Aspirational Capital factored with Academic & Discipline & Social Capital!
   Are Deaf / other minority role models really that important?
   Our data didn’t support that.
Breakout Question:
① How can cultural competence be taught and learned?
Breakout Question:

② What are the practical ways that you can make your URE welcoming to Deaf mentees?
Deaf Scientist Leadership in ASL and the Deaf Community

Cultural and Linguistic Knowledge
Affects research design
Affects interpretation of data
Affects usefulness of research

Example: An all-male research team studies women’s reproductive issues. What happens?
Breakout Question:

③ Why should research groups studying a minority group always include scientists from that group on their team? Think of potential examples.
More In-Depth Resources for Mentoring Deaf Students


Welcoming Deaf Students into STEM: Recommendations for University Science Education

Derek C. Braun,† M. Diane Clark,‡ Amber E. Marchut,‡ Caroline M. Solomon,‡ Megan Majocha,‡ Zachary Davenport,† Raja S. Kushalnagar,‡ Jason Listman,§ Peter C. Hauser,§ and Cara Gormally†*

†Department of Science, Technology, and Mathematics, Gallaudet University, Washington, DC 20002; ‡Deaf Studies and Deaf Education, Lamar University, Beaumont, TX 77710; §National Technical Institute for the Deaf, Rochester Institute of Technology, Rochester, NY 14623

ABSTRACT

Scientists are shaped by their unique life experiences and bring these perspectives to their research. Diversity in life and cultural experiences among scientists, therefore, broadens research directions and, ultimately, scientific discoveries. Deaf individuals, for example, have successfully contributed their unique perspectives to scientific inquiry. However, deaf individuals still face challenges in university science education. Most deaf students in science, technology, engineering, and mathematics (STEM) disciplines interact with faculty who have little to no experience working with deaf individuals and who often have preconceptions or simply a lack of knowledge about deaf individuals. In addition to a lack of communication access, deaf students may also feel unwelcome in STEM, as do other underrepresented groups. In this essay, we review evidence from the literature and, where data are lacking, contribute the expert opinions of the authors, most of whom are deaf scientists themselves, to identify strategies to best support deaf students in university STEM education. We describe the journey of a hypothetical deaf student and methods for faculty to create a welcoming environment. We describe and provide recommendations for classroom seating and layout, accommodations, teaching strategies, and research mentoring. We also discuss the importance of including deaf scientists in research about deaf individuals.

Deaf Visiting Student Researcher Nancy Barker Allegedly Denied Services by Disabled Students’ Program. —Headline from the Daily Californian (Shrivatsa, 2017)

OVERVIEW

Scientists, like all people, are shaped by their life experiences, and they bring their unique perspectives to their research. Diversity and cultural experiences among scientists broaden research directions and, ultimately, scientific discoveries. For example, genetic diseases among the Ashkenazi Jewish population are well studied, because many prominent geneticists were Jewish themselves and took an interest in their own population (Carmeli, 2004). Women’s medical issues were largely ignored until recently, when female investigators became better represented among medical researchers and began researching these areas (Keville, 1994). Likewise, work by deaf scientists regarding American Sign Language (ASL; Stokoe, 1980; Padden et al., 2014) led to a paradigm shift in neurolinguistics (Thompson et al., 2013; Olulade et al., 2014; Williams et al., 2015).
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Jason Listman

Thank you for watching!
Breakout Questions:

① How can cultural competence be taught and learned?

② What are the practical ways that you can make your URE welcoming to Deaf mentees?

③ Why should research groups studying a minority group always include scientists from that group on their team? Think of potential examples.