Investigating Approaches for Supporting Communication Skills to Foster Students' Physics Identity Development and Sense of Belonging

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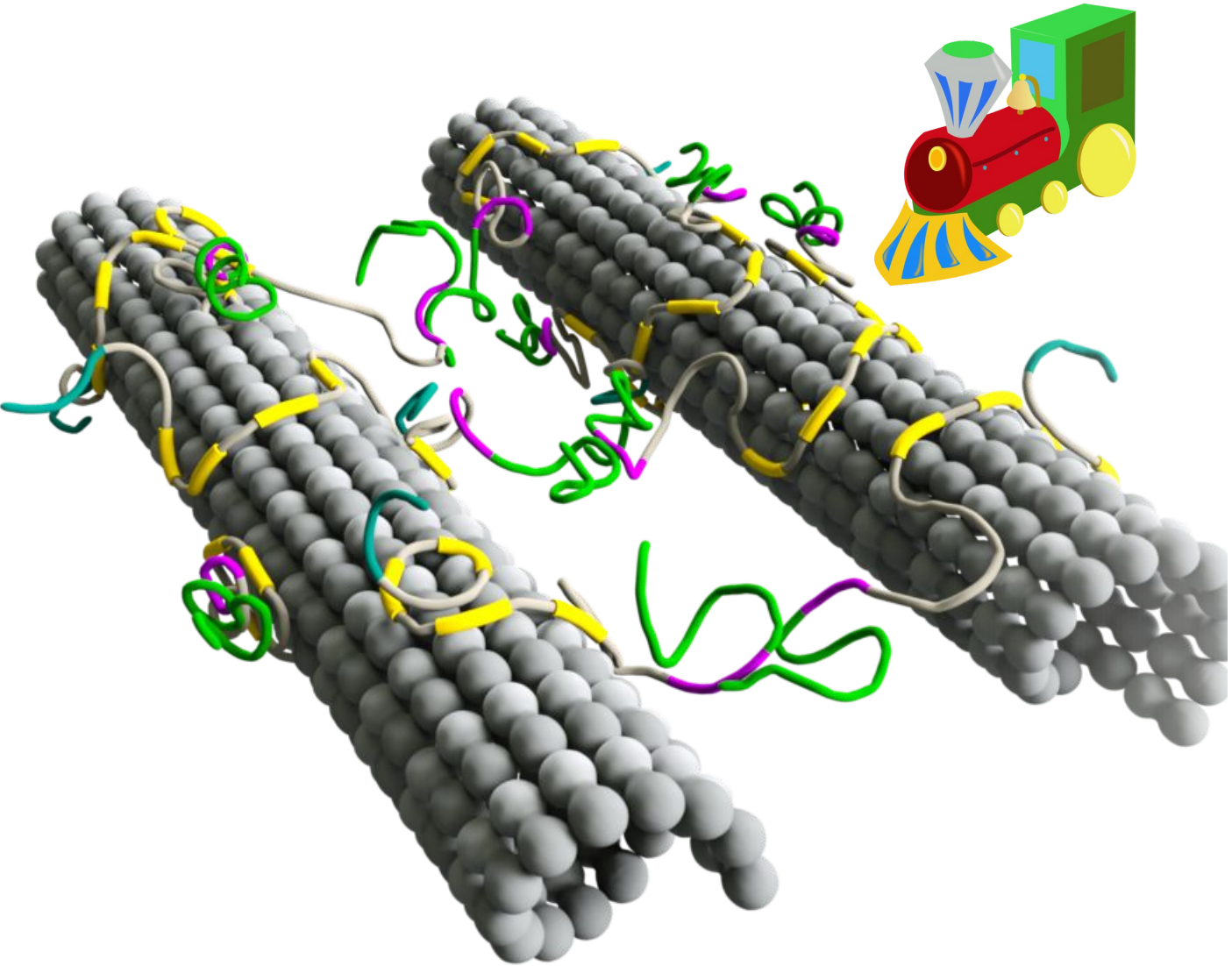
Transitions and Research Across INterfaceS (TRAINS)



What is TRAINS?

TRAINS is an intense, 15-month research program to transition undergraduates from California community colleges to earning STEM degrees at baccalaureate-granting institutions.

TRAINS students conduct research in the cutting-edge fields of biophysics under faculty mentors.

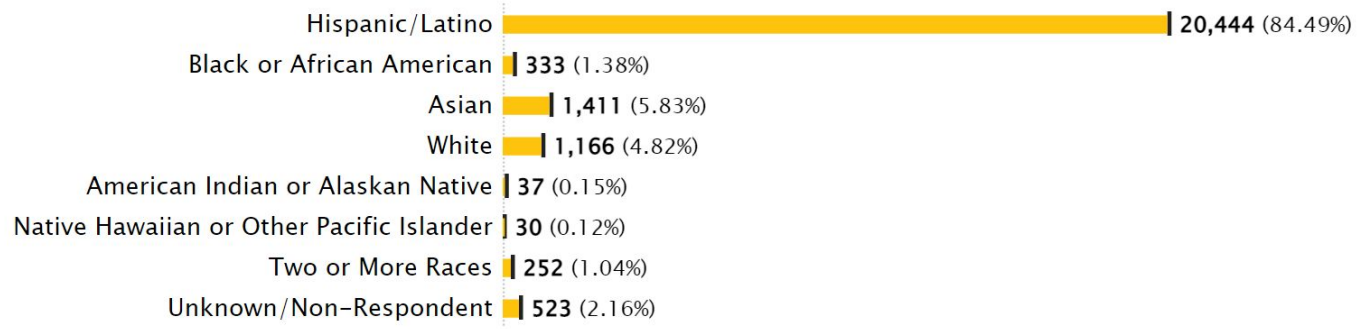
TRAINS direct mentors receive training to support students before, during, and after their transition.

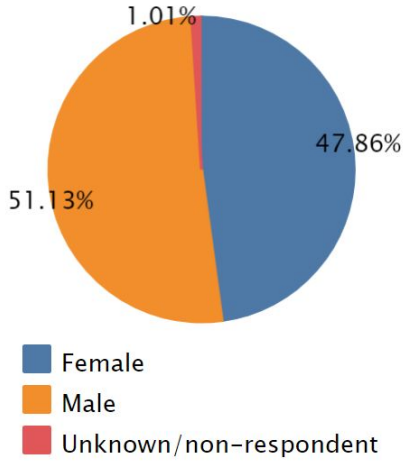
Purpose

TRAINS is designed to increase the success of **students** at minority-serving community colleges that educates students traditionally marginalized in STEM fields.

TRAINS focuses on preparing direct **mentors** - graduate students, post-docs, and early career faculty in STEM - who will continue working with traditionally marginalized students and systematically improve inclusive practices in the community itself, rather than solely changing the students to fit STEM communities.

Community College demographic breakdown





Goals

- In what ways does mentoring influence sense of belonging in STEM communities…

…and help students integrate personal identities with their STEM identities?

1 **Mentoring:** Early interviews suggested that specific communication skills with mentors (e.g., knowing when to ask questions, feeling comfortable reaching out, and making valuable contributions) helped students feel like they belong in STEM.

2 **Communication:** What communication practices do community college students perceive as positive and negative influences on their sense of belonging in STEM following an intensive summer research experience?

Background: Mentoring

- **Mentoring Impact:** Mentoring leads to noticeable increases in retention for STEM undergraduates (McCavit & Zellner, 2016).

- **Varied mentor roles:** While mentors act as a guide to undergraduate programs, they also advise students on what courses to take, whom to do research with, how to balance academic and non-academic responsibilities, and how to apply for financial support, scholarships, and jobs (Thomas, 2021).

- **Mentors as cultural brokers:** Cultural brokers are necessary as resources to cross borders between competing worlds (Cooper, Chavira, & Mena, 2011). The teacher, by acting as a cultural broker, has the potential to help their students negotiate border crossings and succeed in science (Jegede & Aikenhead, 1999).

Background: Mentoring and Identity

- **Mentoring and STEM identity:** How students are perceived by others is a part of their identity (e.g., Hazari, Sadler, & Sonnert, 2013) and mentors can both provide a balance in perceiving mentees as capable, yet still having more to learn. Mentors can also help students navigate their perceptions of others and others' perceptions of them as capable learners.

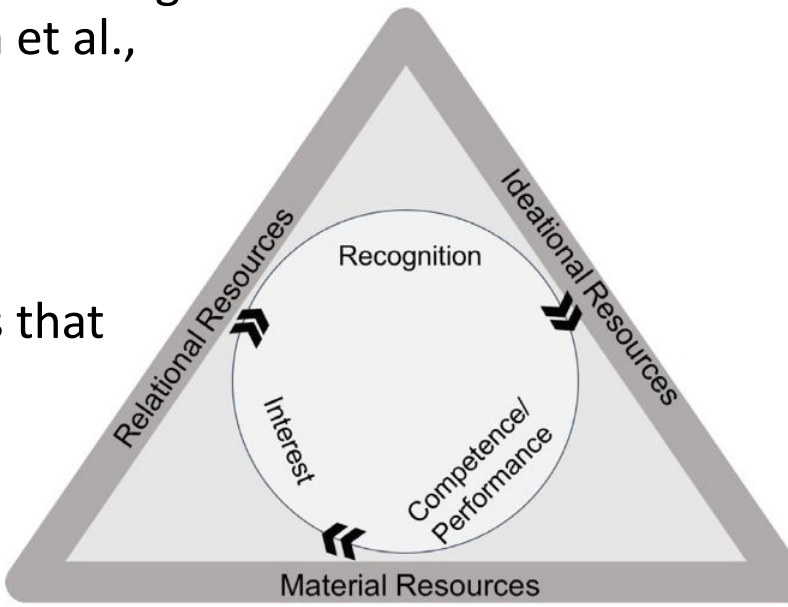
- **Identity Framework and Resources:** A critical identity framework (Hyater-Adams, Finklestein, & Hinko, 2018) allows researchers to identify and give weight to specific experiences and resources that influence students' identity as it develops including resources provided by mentoring.

Background: Communication and Identity

- **Mentors as cultural brokers:** Cultural brokers are necessary as resources to cross borders between competing worlds (Cooper, Chavira, & Mena, 2011). The teacher, by acting as a cultural broker, has the potential to help their students negotiate border crossings and succeed in science (Jegede & Aikenhead, 1999).

- **Identity and Communication**: Communication skills are situated in cultures, so learning to communicate is integrated with participating effectively in that culture (Hora et al., 2019)

- **URM students and Communication**: Advocate-centered mentoring, critical for supporting URM students, requires mentors and students to build relationships that foster open communication and dialogue (Harris & Lee, 2018).

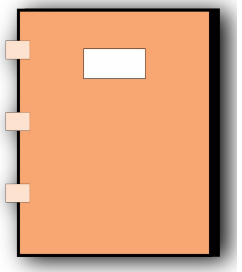


Identity framework from Hora et al., 2019
https://journals.aps.org/prper/pdf/10.1103/PhysRevPhysEducRes.14.010132

Research Question

What communication practices do community college students perceive as positive and negative influences on their sense of belonging in STEM following an intensive summer research experience?

Methods



- **Data collection** - a qualitative approach including digital journaling, interview methods, surveys, and institutional data from undergraduate TRAINS participants, their early career mentors, and other URM physics undergraduates recruited from HSI campuses.

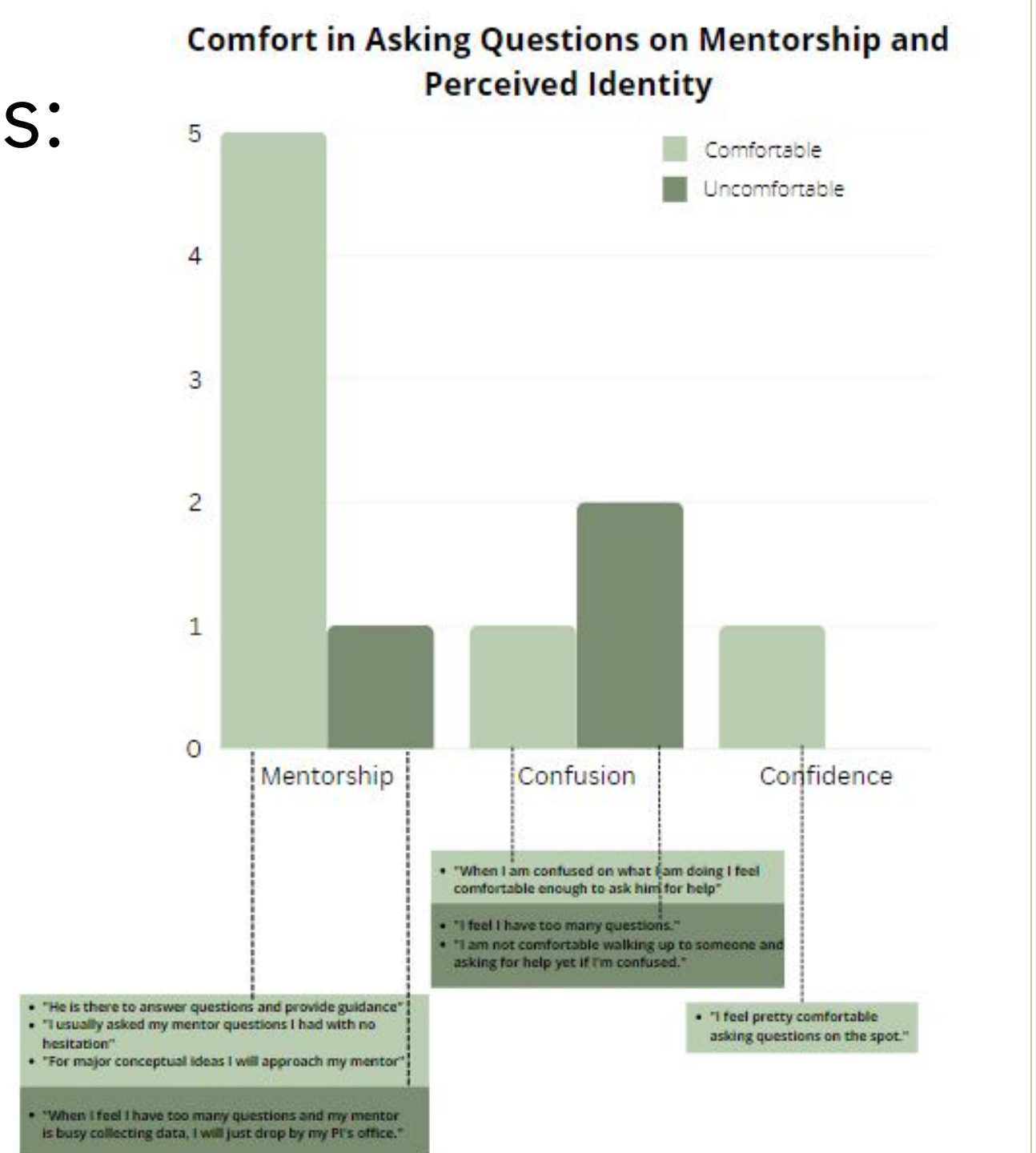
- Because of **under representation** in physics and in PER for students from HSI campuses, qualitative research approaches offer systematic ways of understanding student experiences.

- This presentation focuses on written journaling with **4 TRAINS community college students.**

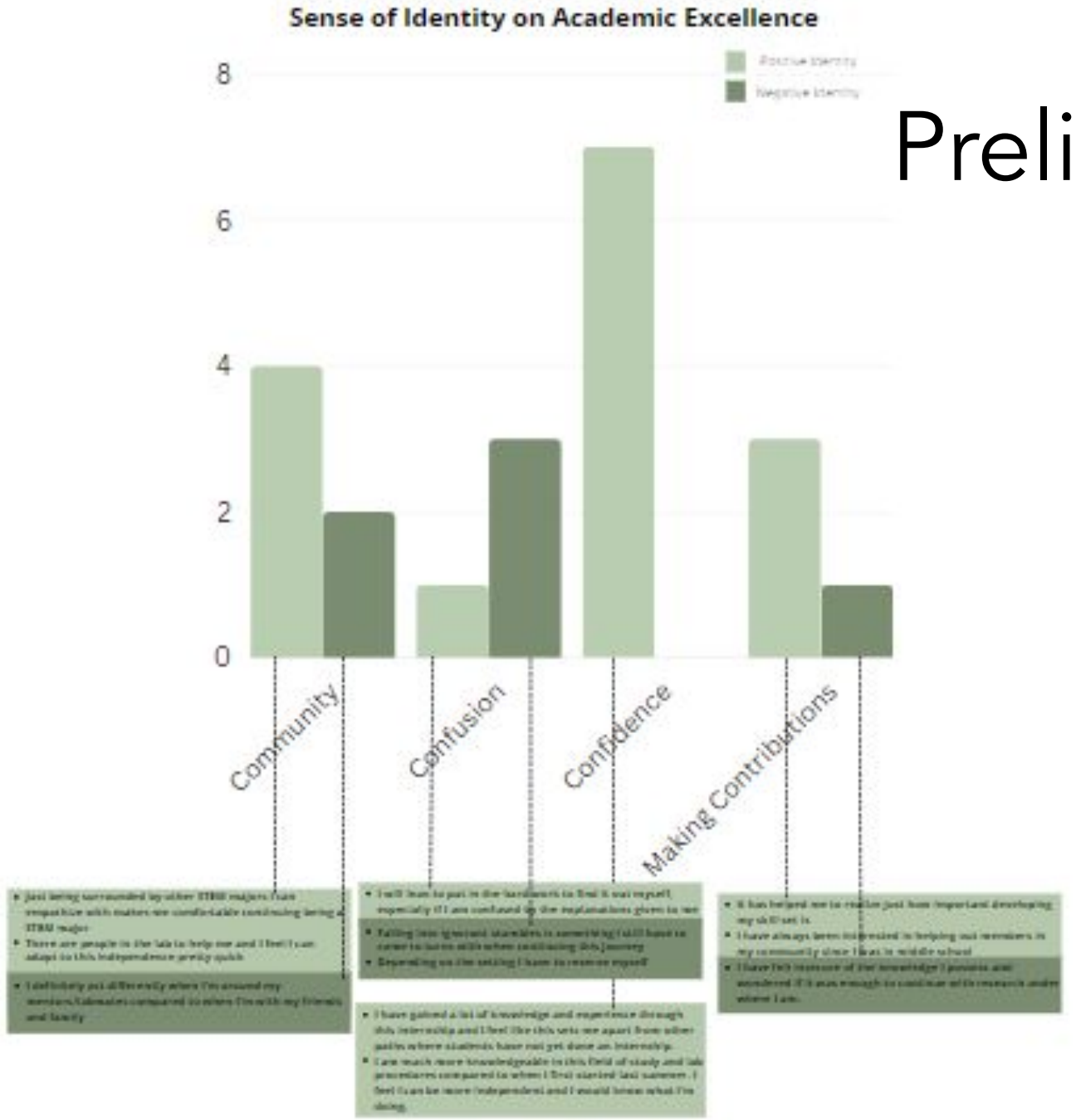
- **Journaling Prompts** focused on barriers to asking questions and how they have felt their identities as researchers expand and change since the beginning of their STEM journeys.

Preliminary Findings: Asking Questions

- Comfort levels is essential in building relationships with mentors
- Feeling uncomfortable asking questions relates to students feelings of confusion
- Feeling more comfortable asking questions relates to students to feel more confident



Preliminary Findings: Iden



- Having people in the community one feels they can turn to for support leads to a more positive identity in STEM
- Feeling confused relates to participants having a more negative physics identity, which is why fostering question asking is so important
- Both feeling confident and making contributions relates to a more positive identity

Conclusions

- Asking questions is very important in both fostering a positive identity, but with building relationships with mentors and community

- Preliminary findings from data collection suggest that fostering a positive relationship with your mentor can lead to making other meaningful connections in your field, and can lead you in the right direction when they don’t know the answers, such as to other P.I.s or researchers

Next Steps

- We need to understand underserved students' mentoring needs in order to better support them through transitions
- We need to guide mentors with the suggestions of students so they can help foster a stronger sense of belonging and STEM identity. This means improving the community (pipe) and not just the students (water)
- Questions and Suggestions!
- **Visit our PERC Poster Wednesday, 7/19/23 @5pm in Exhibit Hall A**

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