



ECR Hub
EDU Core Research

Panel Discussion

Career Formation in STEM Undergraduates via Research and Design Experiences

Regency B

Tuesday, 9:00 – 10:15 am

2026 ECR:Core and ECR:BCSER Awardee Meeting

Presenters

Panelists

- Cedrick Kwuimy, University of Cincinnati
- Philip Vieira, California State University, Dominguez Hills
- Yuko Okado, California State University, Fullerton

Moderator

- Jing Zhang, University of Nebraska-Lincoln



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Career Formation Through Transformative Learning

Opening the Black Box of Engineering Co-op Experiences

Cedrick A. K. Kwuimy, Ph.D.

University of Cincinnati | NSF ECR Award #2500693

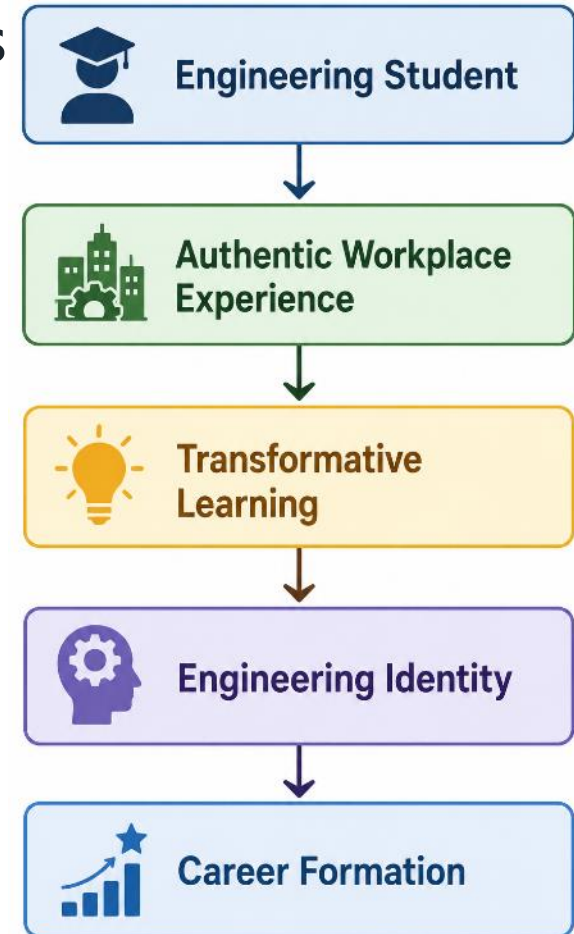
2026 ECR:Core and ECR:BCSER Awardee Meeting



[#2500693](#)

When Do Students Become Engineers?

- "We often assume that engineering students become engineers by completing coursework. But when does a student actually begin to think, act, and see themselves as an engineer?"
 - Classroom?
 - Research Experience?
 - Design Project?
 - Workplace Experience?
- Career formation emerges through transformative learning during authentic engineering work experiences.

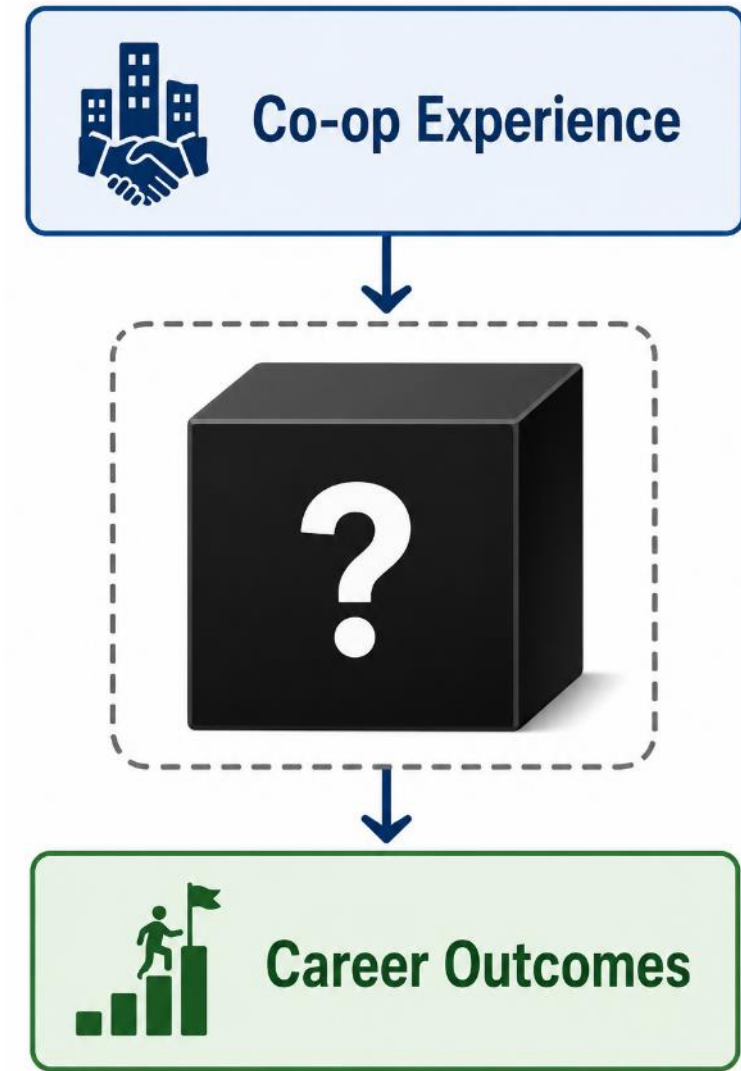


We examines how first cooperative education experiences serve as transformative learning environments that shape engineering identity, career aspirations, and professional formation.



Opening the Black Box of Co-op

- What We Know About Co-op
 - It improves employment outcomes
 - It improves workforce readiness
 - It strengthens professional confidence
 - It supports career success
- What We Don't Know About Co-op
 - What experiences actually drive growth?
 - How do students develop professional identity?
 - What makes a co-op transformative?
 - Why do students respond differently to similar experiences



The Black Box of Co-op



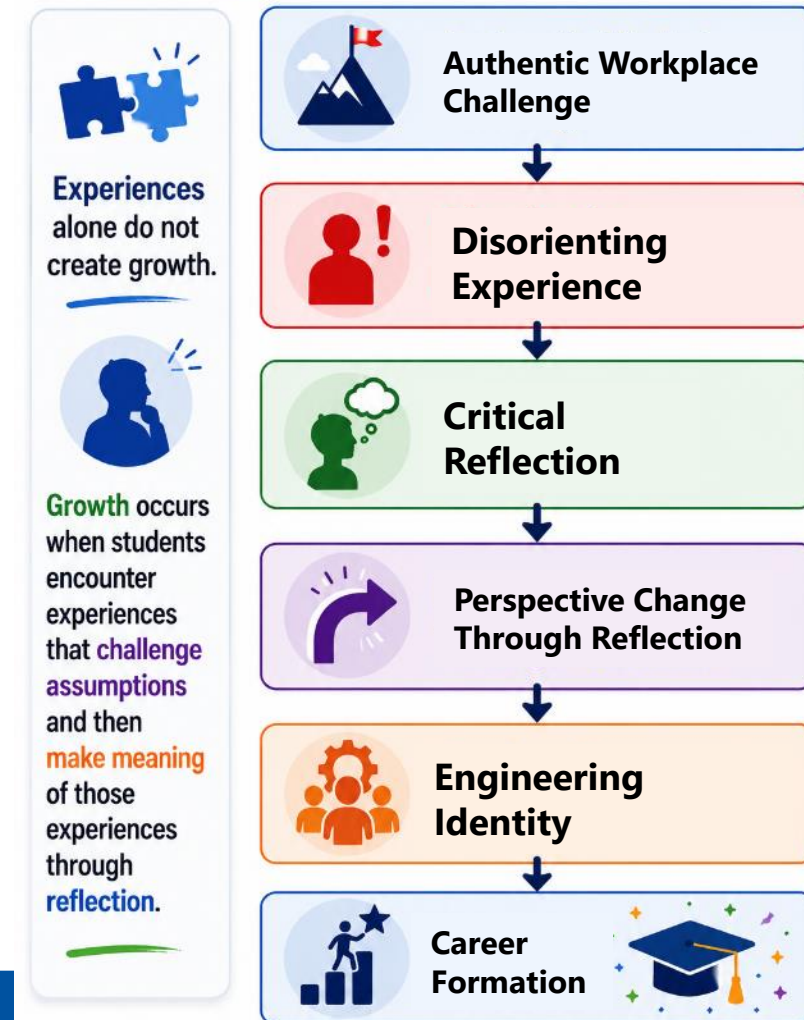
Transformative Learning as a Mechanism of Career Formation

Examples During Co-op

- First exposure to workplace culture
- Interactions with practicing engineers
- Discovering gaps between school and practice
- Negotiating competence and confidence
- Developing professional belonging

The question is not whether students participate in co-op. The question is how students interpret and make meaning of those experiences.

Transformative Learning Theory

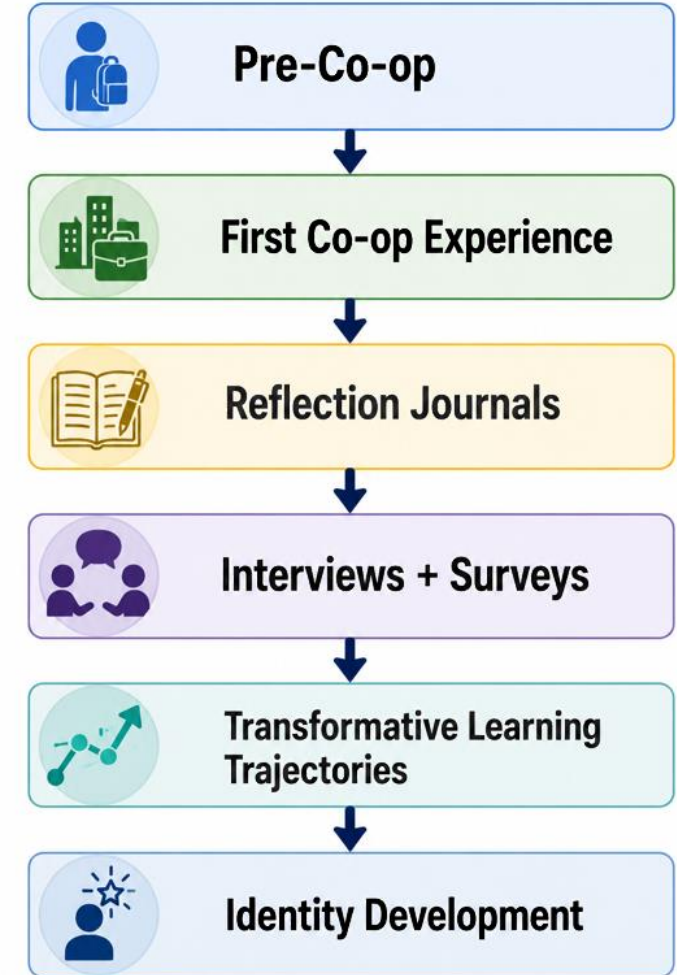


Exploring The Journey

Research Questions

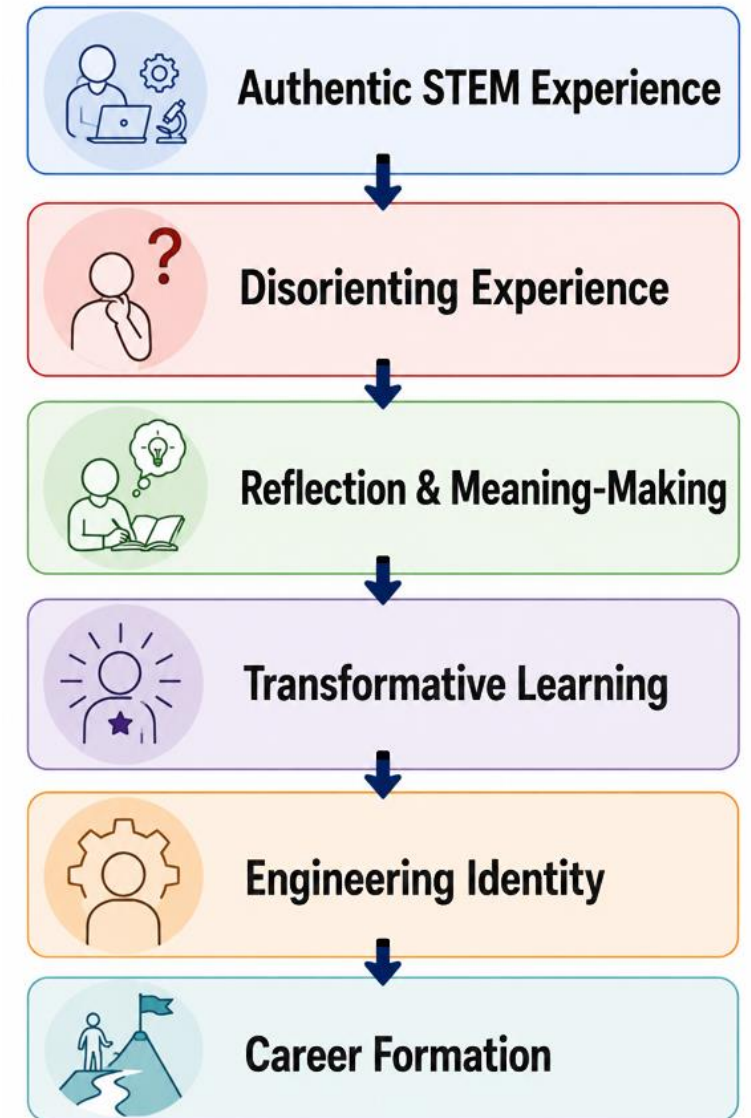
1. RQ1. How do students experience transformative learning during their first co-op?
2. RQ2. How does transformative learning influence engineering identity development?
3. RQ3. Which workplace conditions support or inhibit professional growth?

Study Design



Implications for STEM Career Formation

1. Emerging Proposition
2. Career formation is not simply a function of exposure to industry.
3. Career formation depends on how students make meaning of workplace experiences.
4. What Matters
5. ✓ Reflection matters
6. ✓ Mentorship matters
7. ✓ Workplace climate matters
8. ✓ Challenging assignments matter



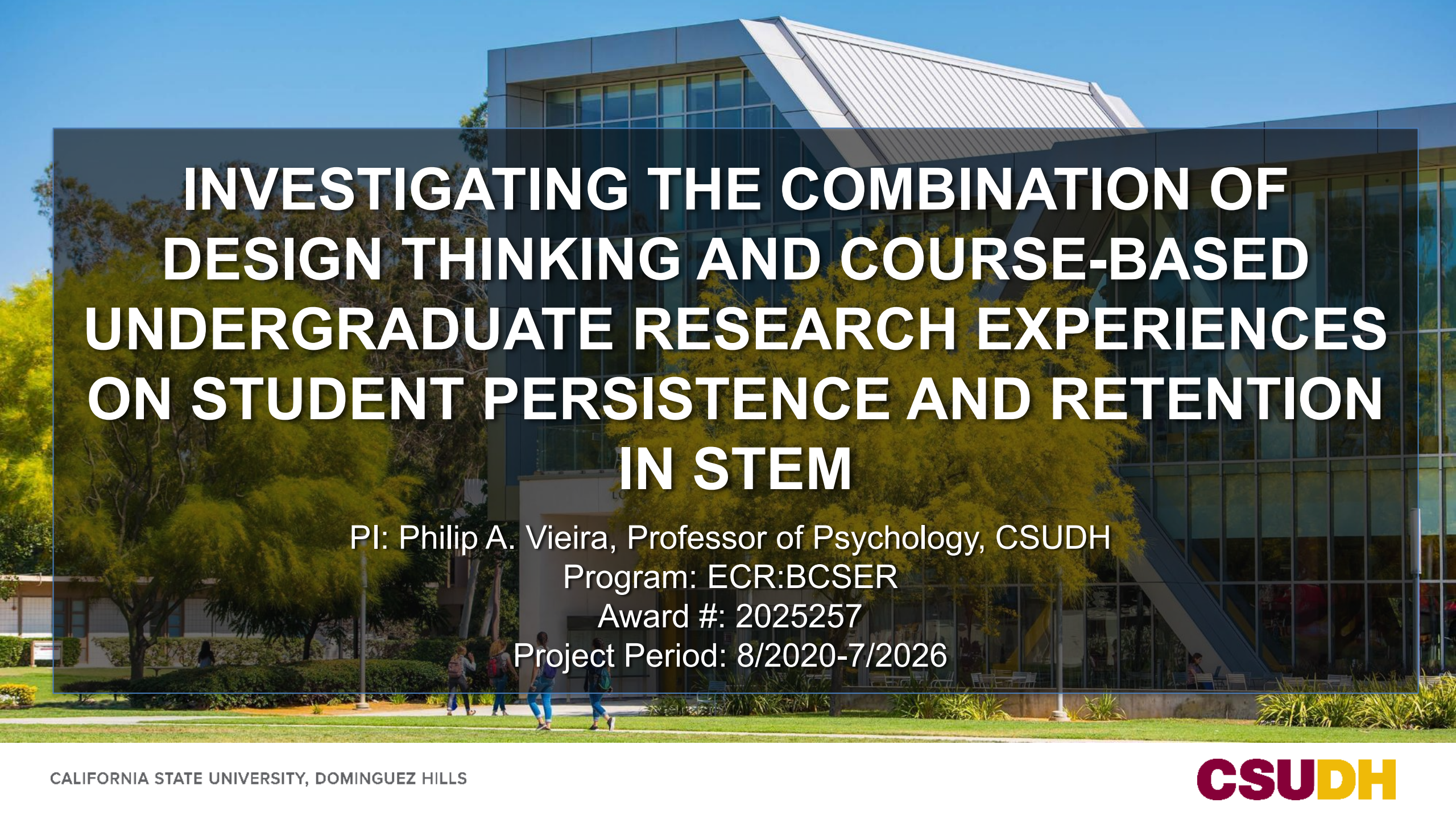
Our Team





Cedrick A. K. Kwuimy

Associate Professor Educator
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INVESTIGATING THE COMBINATION OF DESIGN THINKING AND COURSE-BASED UNDERGRADUATE RESEARCH EXPERIENCES ON STUDENT PERSISTENCE AND RETENTION IN STEM

PI: Philip A. Vieira, Professor of Psychology, CSUDH

Program: ECR:BCSER

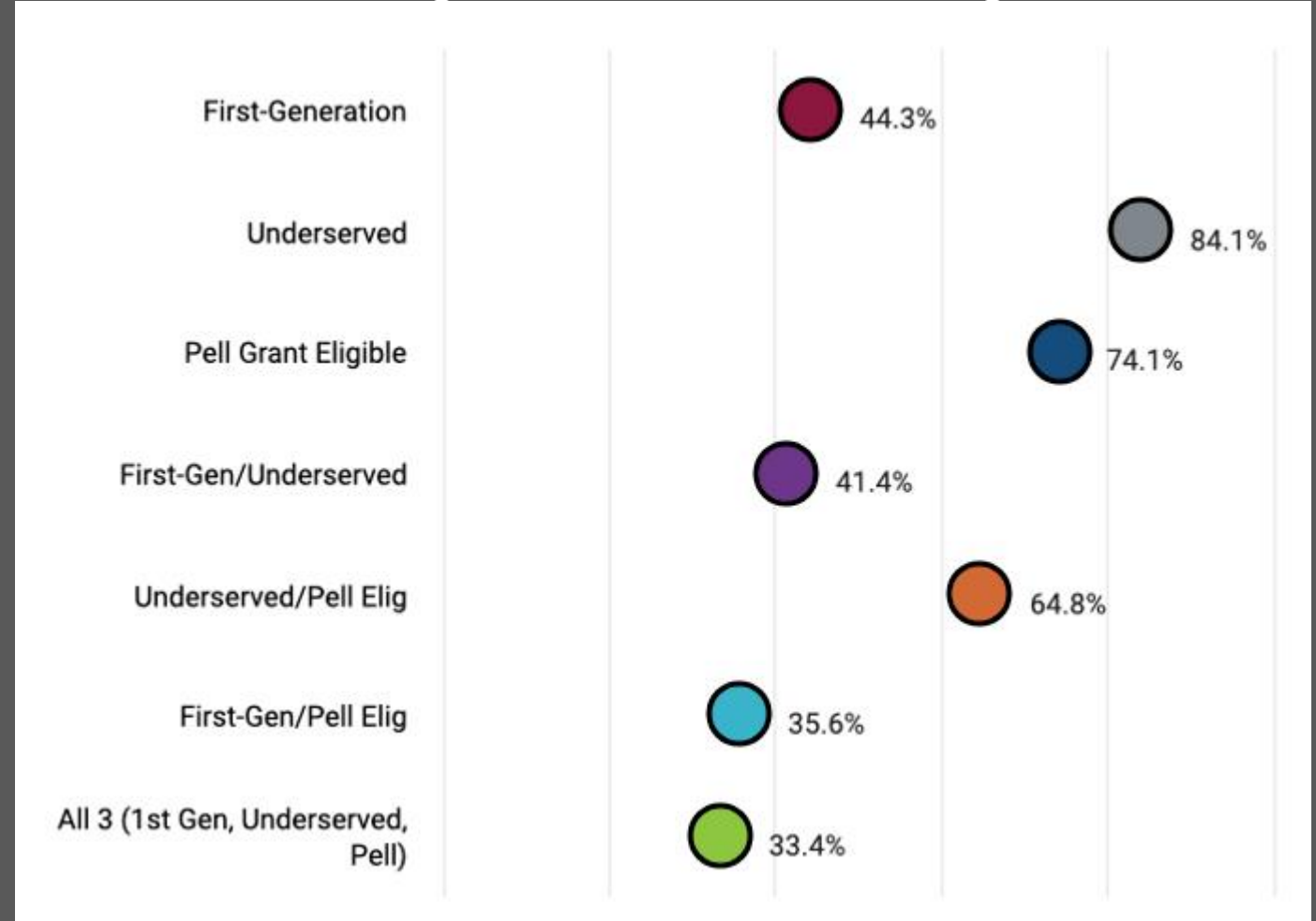
Award #: 2025257

Project Period: 8/2020-7/2026

THE CHALLENGE

1. STEM education and workforce needs more people
2. Lack of persistence and retention of college students in STEM majors
3. Potential resource of underserved students

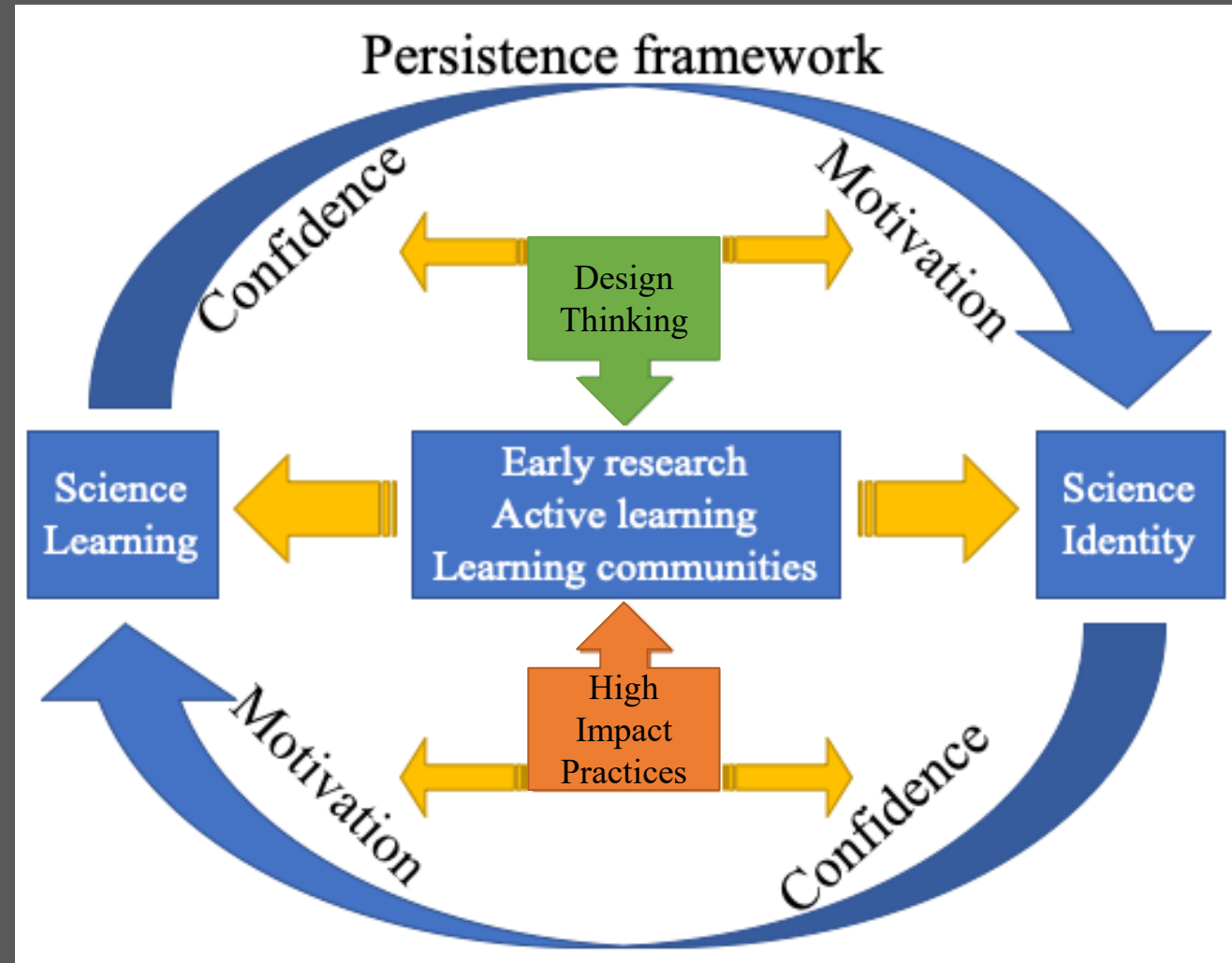
Intersection of 1st-gen, underserved, Pell eligible at CSUDH



PERSISTENCE FRAMEWORK

How to support student success in STEM?

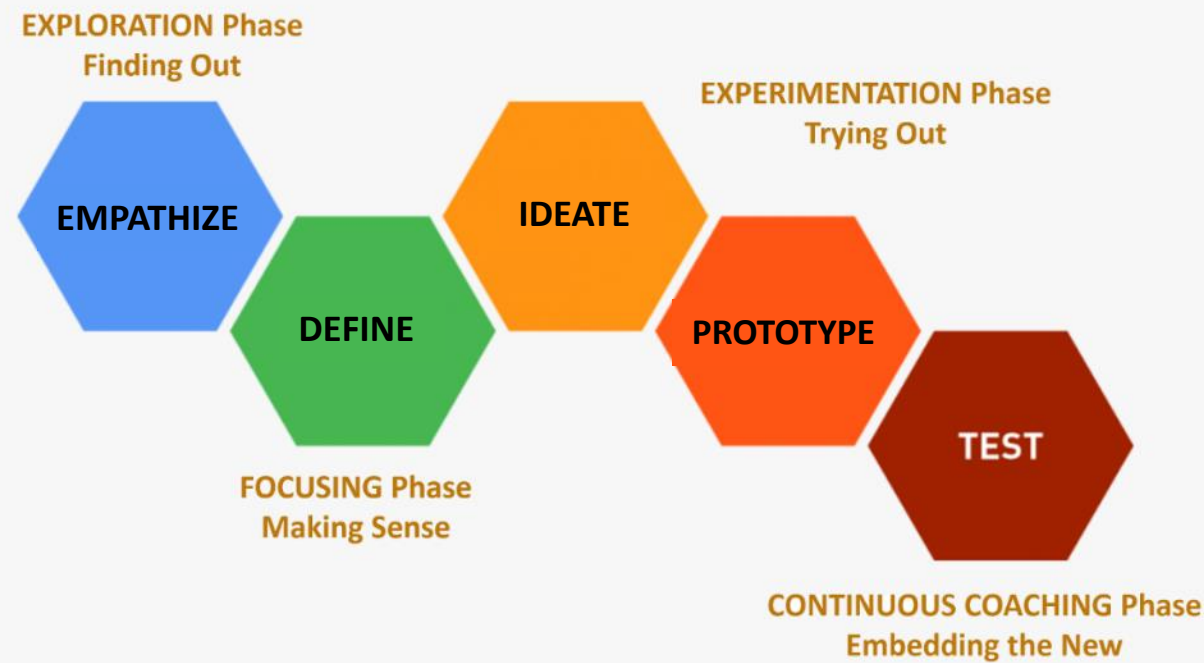
- Increase confidence/motivation
- Build identity
- Learn how to do science



Modified from Graham et al., 2013

DESIGN THINKING & STRENGTHS-BASED COACHING

DESIGN THINKING PROCESS STEPS



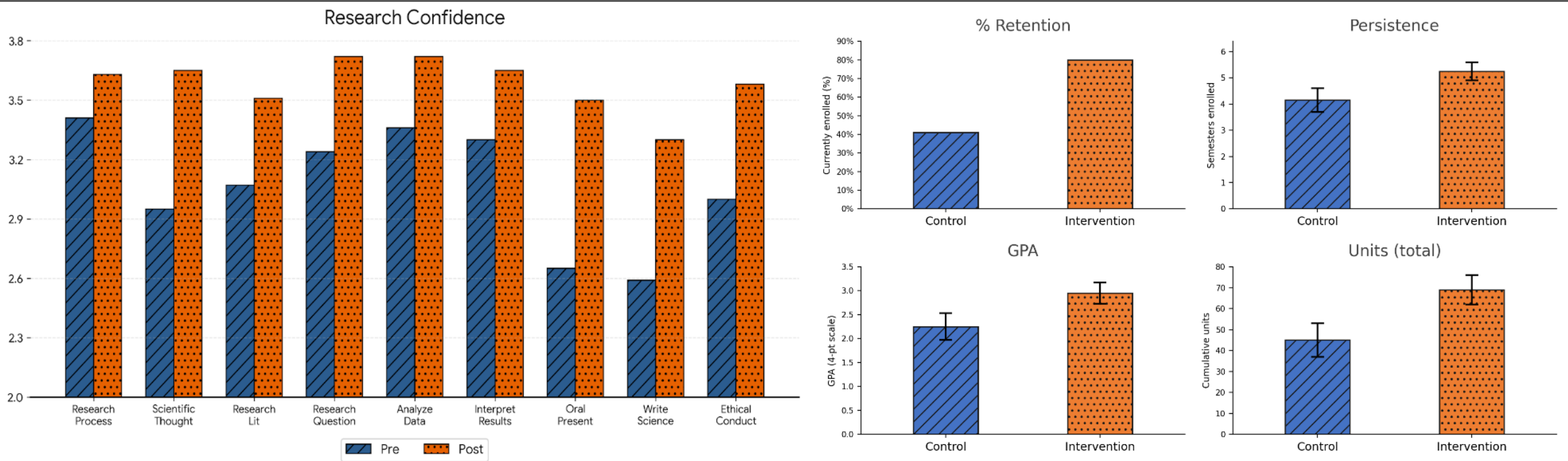
Acknowledgement:
IDEO, Stanford Design School

Clifton Strengths Assessment

EXECUTING	INFLUENCING	RELATIONSHIP BUILDING	STRATEGIC THINKING
People with dominant Executing themes know how to make things happen.	People with dominant Influencing themes know how to take charge, speak up, and make sure the team is heard.	People with dominant Relationship Building themes have the ability to build strong relationships that can hold a team together and make the team greater than the sum of its parts.	People with dominant Strategic Thinking themes help teams consider what could be. They absorb and analyze information that can inform better decisions.
Achiever Arranger Belief Consistency Deliberative Discipline Focus Responsibility Restorative	Activator Command Communication Competition Maximizer Self-Assurance Significance Woo	Adaptability Connectedness Developer Empathy Harmony Includer Individualization Positivity Relator	Analytical Context Futuristic Ideation Input Intellection Learner Strategic

OUTCOMES

Compared to the control group, students showed increased confidence in scientific research and academic success





THANK YOU

NSF, CSUBIOTECH, CSUDH

CAREER: Improving Persistence of Underserved Students in Psychological Science Using an AI-Based, Personalized Career Exploration Platform

Award #: 2237924

PI: Yuko Okado, PhD (Associate Professor of Psychology, CSUF)

Subaward: USC Institute for Creative Technologies

Programs: Co-funded by ECR & HSI programs

Program Officer: Dr. Regina Sievert

Project Period: 9/2023 – 8/2028



Challenges We're Trying to Address



Psychology Pathways Intervention

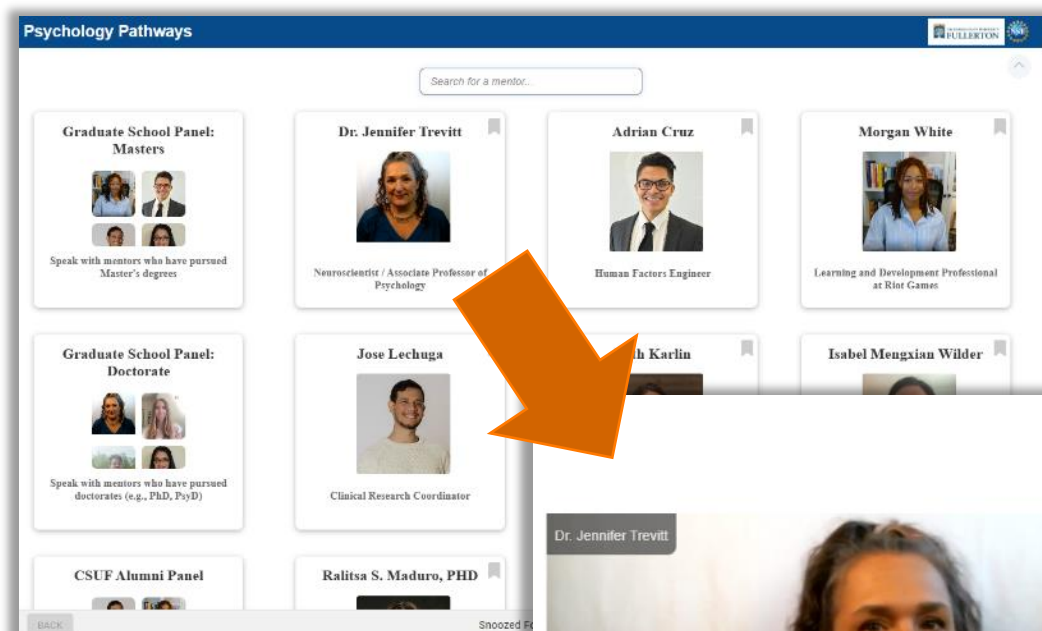
1. Explore Available Mentors



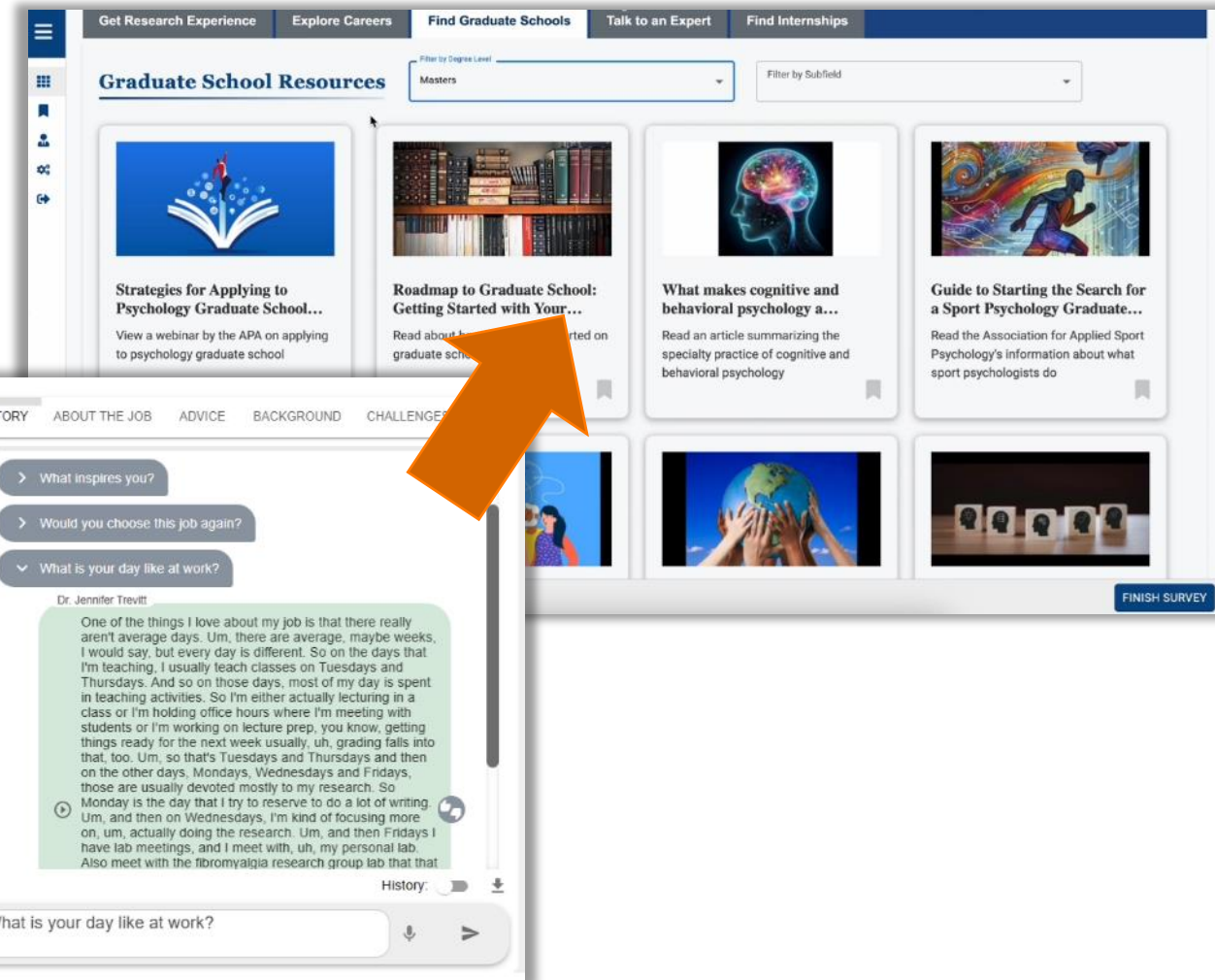
2. Learn from Mentors



3. Get Personalized Resources



Email Mentor



HISTORY ABOUT THE JOB ADVICE BACKGROUND CHALLENGES

> What inspires you?

> Would you choose this job again?

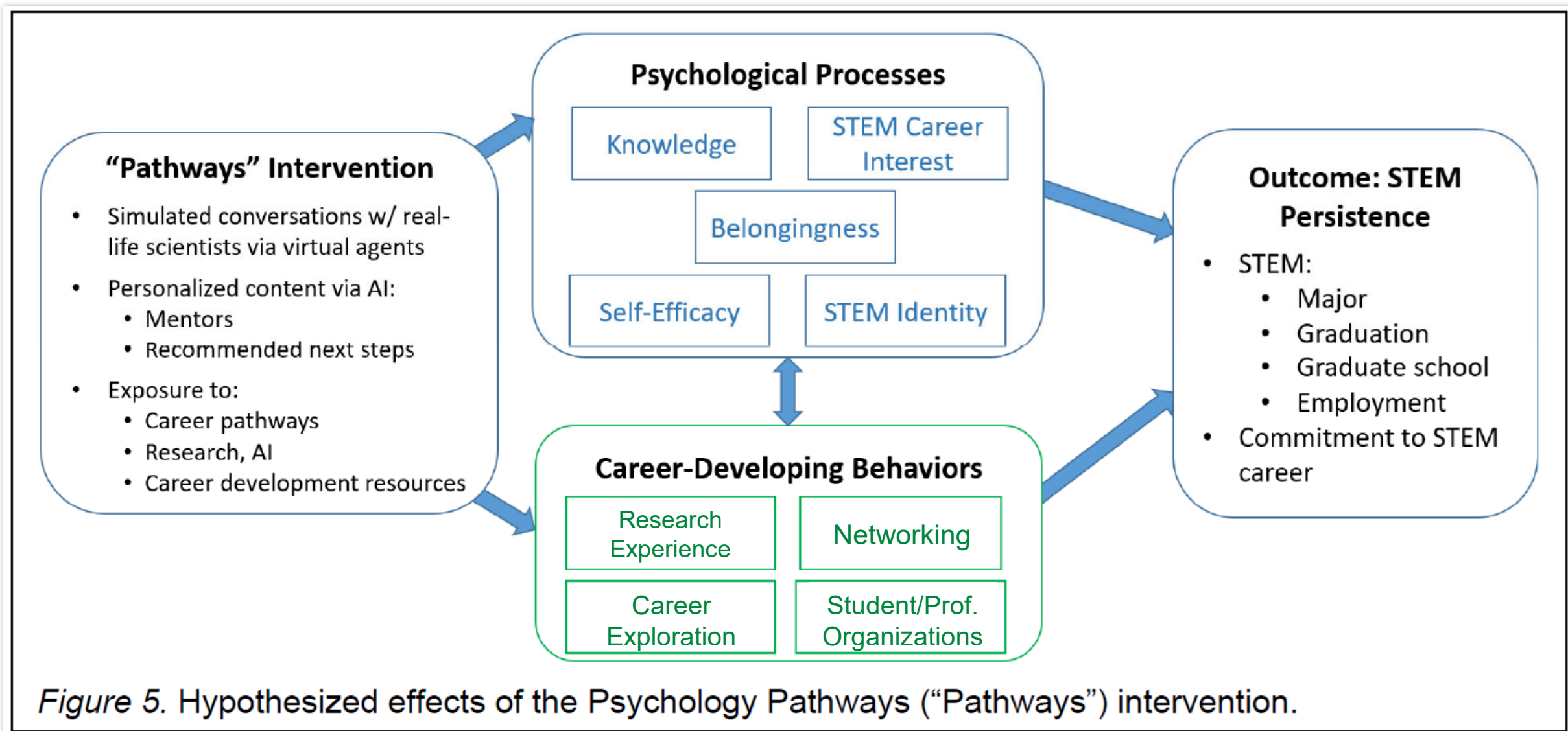
> What is your day like at work?

Dr. Jennifer Trevitt

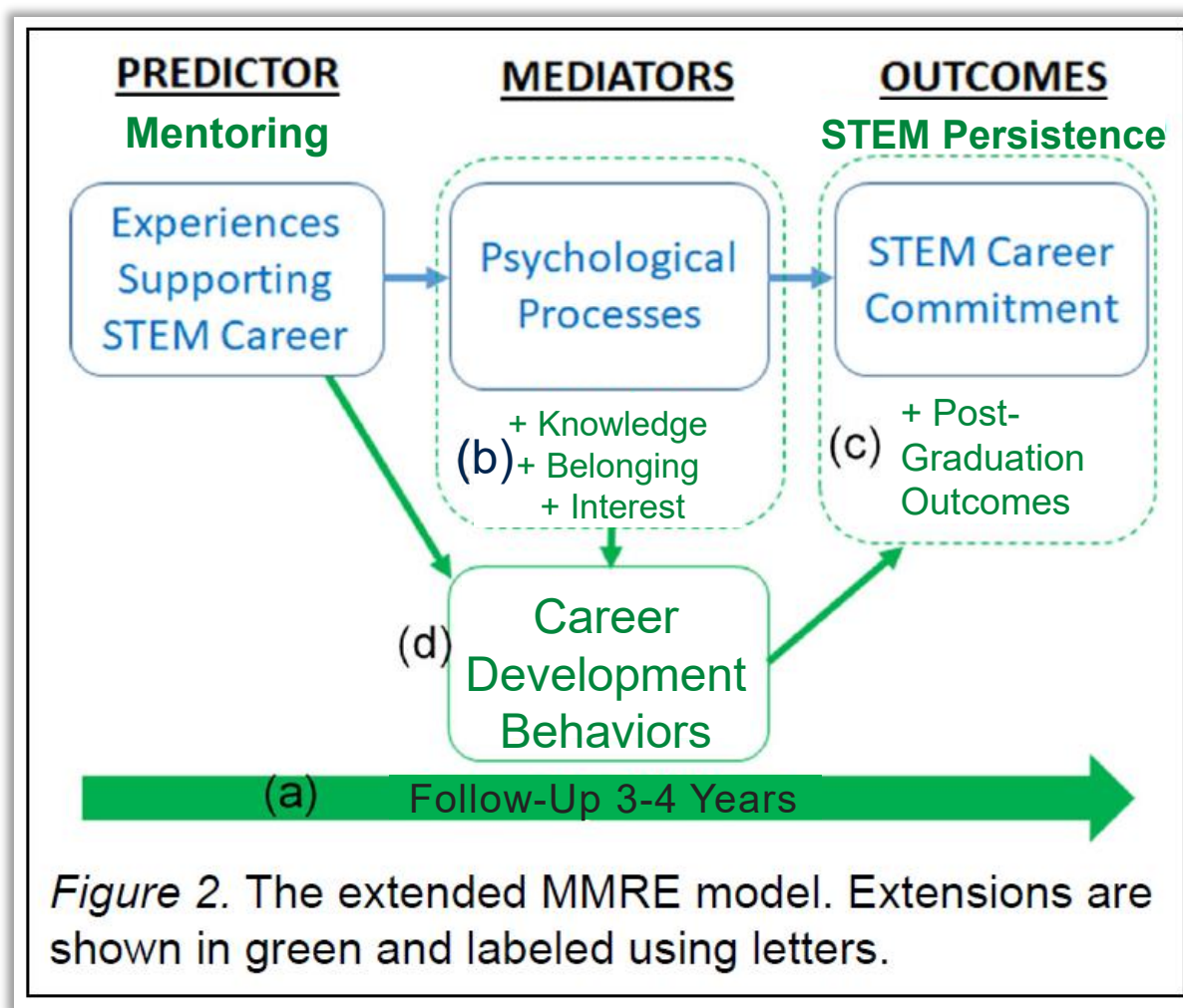
One of the things I love about my job is that there really aren't average days. Um, there are average, maybe weeks, I would say, but every day is different. So on the days that I'm teaching, I usually teach classes on Tuesdays and Thursdays. And so on those days, most of my day is spent in teaching activities. So I'm either actually lecturing in a class or I'm holding office hours where I'm meeting with students or I'm working on lecture prep, you know, getting things ready for the next week usually, uh, grading falls into that, too. Um, so that's Tuesdays and Thursdays and then on the other days, Mondays, Wednesdays and Fridays, those are usually devoted mostly to my research. So Monday is the day that I try to reserve to do a lot of writing. Um, and then on Wednesdays, I'm kind of focusing more on, um, actually doing the research. Um, and then Fridays I have lab meetings, and I meet with, uh, my personal lab. Also meet with the fibromyalgia research group lab that that

History:

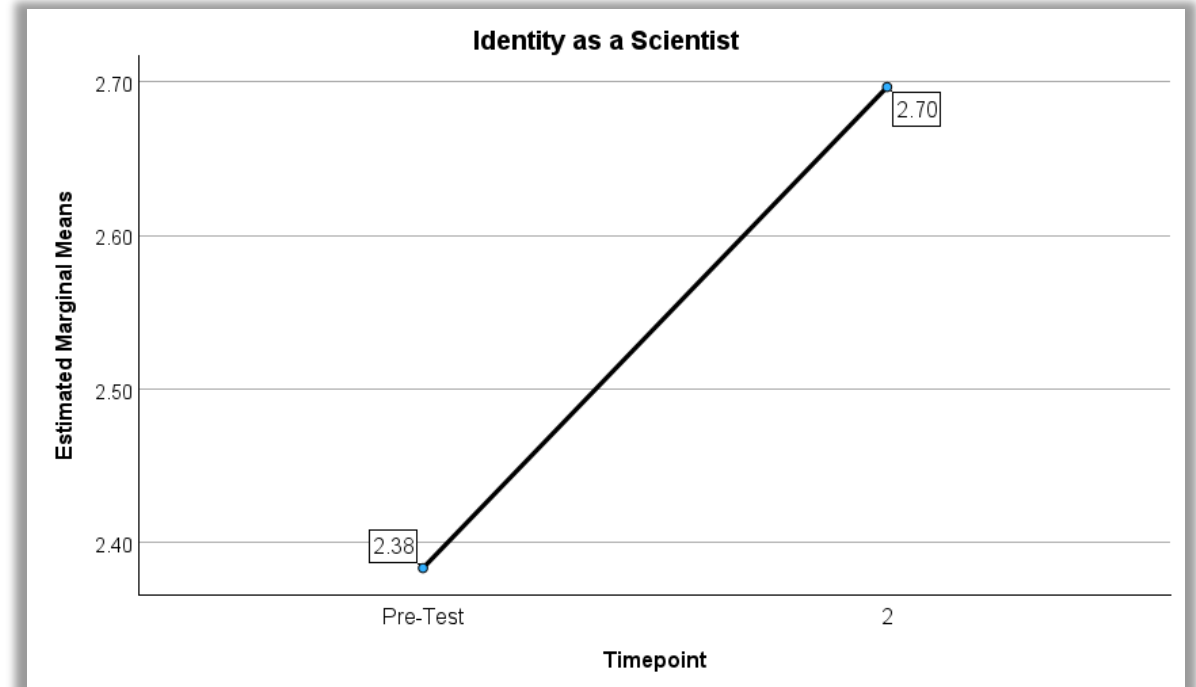
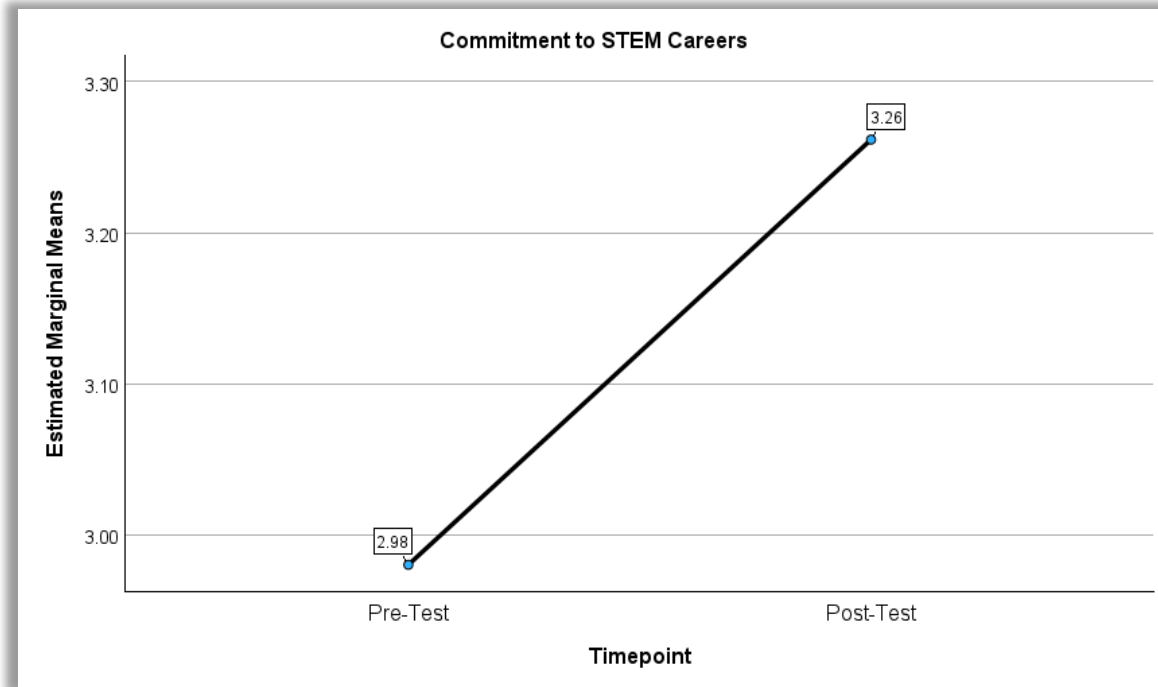
What is your day like at work?



Extending the Mediational Model of Research Experiences (Chemers et al., 2011)



Preliminary Results at Baseline (Current $N = 208$)



Intent to:	Pre-test mean	Post-test mean	Mean change	Partial η^2	Effect size
Major in a STEM discipline	2.83	3.16	+0.33	.142	Large
Minor in a STEM discipline	2.65	2.96	+0.31	.09	Medium to large
Take additional course(s) in a STEM discipline	3.09	3.25	+0.16	.04	Small to medium

Self-Reported Learning Gains / Takeaways

Having a mentor is really helpful. Mentors provided peace and clarity for questions that might be stressing students out.

I remember learning about the different resources offered by CSUF to enhance research experience.

I learned so much! How to find internships, what I could be doing during my summer, and how to stand out for grad school.

I learned that it is okay to be uncertain about career fields, and that a masters program or doctoral program is not always needed. I also learned that receiving experience in the research departments or labs is also a good way to boost your application for graduate school.

I learned that gaining hands-on experience and building strong communication skills are very important in psychology careers. I also learned that career paths in psychology can vary, and continuing education can help create more opportunities in the field.

Listening to the virtual mentors helped me better understand the education, training, and dedication required for different psychology careers. In addition, I learned about the importance of internships, scholarships, networking, and gaining real-world experience...

Changes in Perspective / Planned Behavior

I want to use the Psychology Pathways website to learn about different careers in my field but also to explore other fields in psychology.

I am planning differently, not about my career but my personal choices. Things like how to avoid burnout, how to connect with professors, how to stand out, etc.

Hearing the stories and advice from each mentor has given me a newfound sense of hope. It has helped motivate me to get the help I need in order to effectively work past current hurdles.

I am thinking more about joining labs and becoming more involved in the psychology research field overall

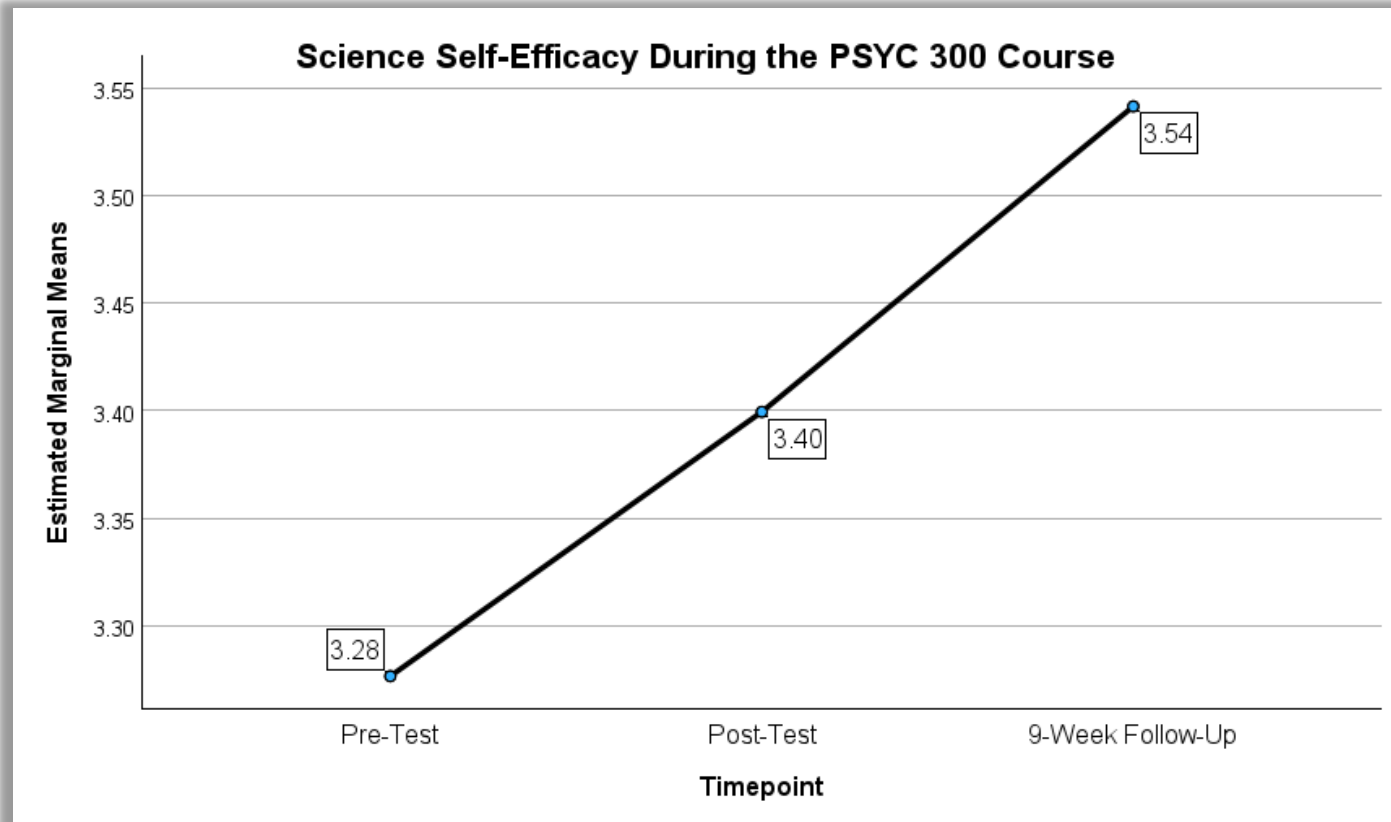
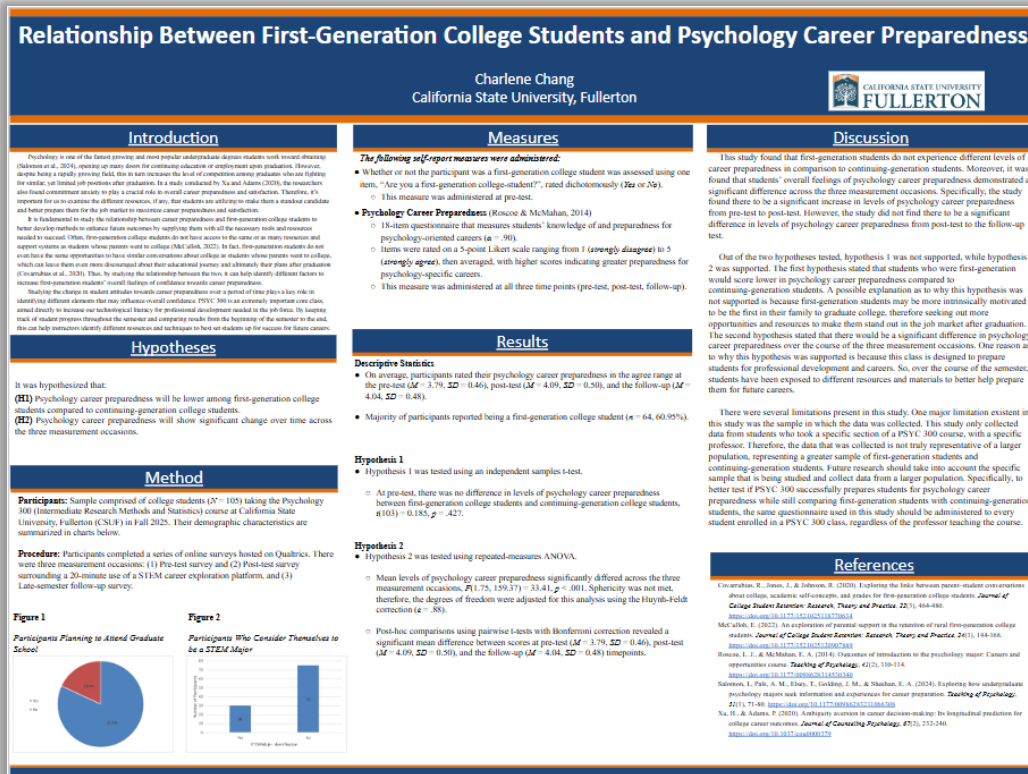
I really want to come back to this resource when looking at internships and future paths.

I plan to network more and talk to professors about internship opportunities. That way I have experience before applying to Graduate school.

I ... realize that career journeys can take time and do not have to follow a perfect or straight path to be successful.

Course-Based Research Experience

PSYC 300 (Intermediate Research Methods & Statistics)



Let's Chat!

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