



Office of
Undergraduate
Research

Mentoring Undergraduate Students in Research

Winnie Dong

Director, Office of Undergraduate Research
Professor, Chemical and Materials Engineering



Office of
Undergraduate
Research

Benefits of Mentoring Students in UR

- Meaningful/productive contributions to research
- Provides opportunities for faculty-student collegiality and professional relationships
- Platform to motivate, inspire and contribute to the educational experiences and professional development of future researchers
- Longer-term professional and social relationships with students



Office of
Undergraduate
Research

Benefits to Students in Engaging in UR

- Understanding the research process
- Learning research techniques, developing skills in analyzing data and interpreting of results
- The ability to integrate theory and practice
- Having tolerance for obstacles
- Learning to work independently
- Understanding how knowledge is constructed
- Self confidence
- Clarification of a career path



Evidence of the Impact of UR

Sample

8,660 completed surveys

6,654 unique student responses

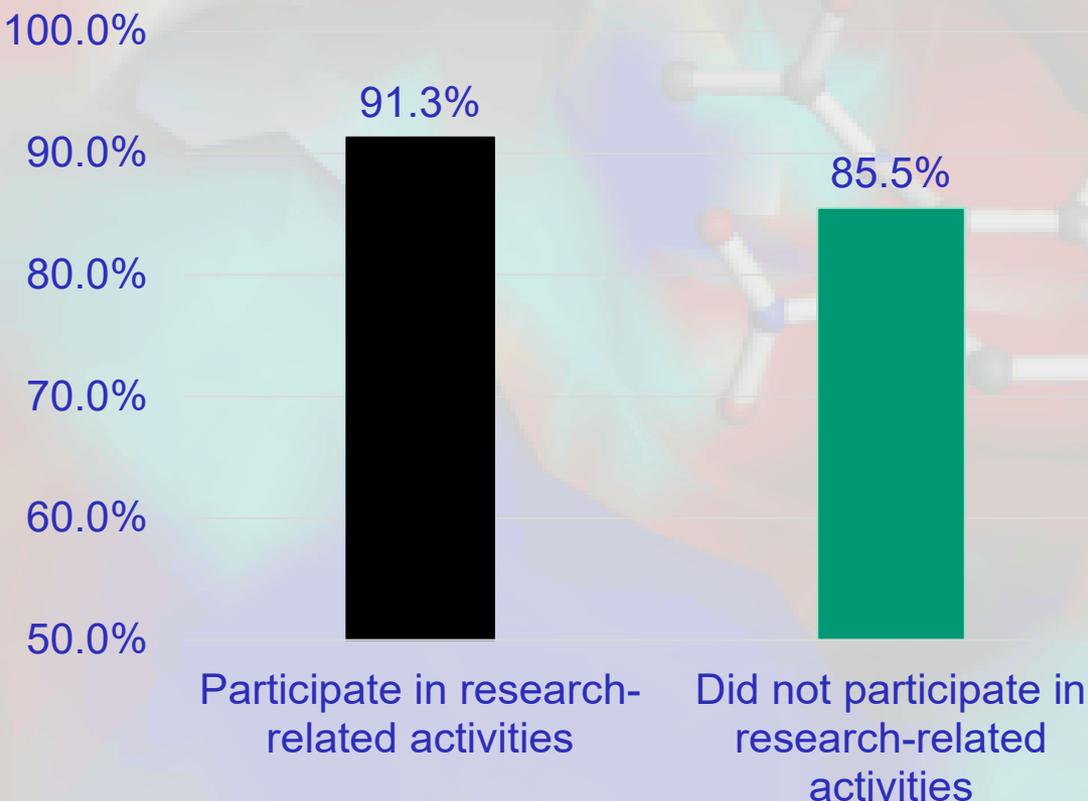
Participant demographics varied slightly from CPP population

- 57.8% female (47% at CPP)
- 64.5% entered as first-time freshmen (55% at CPP)
- 58.5% first-generation college students (58% at CPP)
- 53.6% non-URM (44% at CPP)
- 61.2% low-income students (46% at CPP)



Study Results

4-year (Transfer) & 6-year (FTF) Graduation Rates



- Students who participated in research-related activities were roughly twice as likely to graduate.
- The more UR activities the students participated in, the higher the likelihood of graduation.
- First-generation and URM students were less likely to participate in UR.



Office of
Undergraduate
Research

Before We Start...

“Effective mentoring can be learned,
but it can not be taught.”

Every mentor is different, every mentee is different.

“Entering Mentoring”, Handelsman, Pfund, Lauffer, and Pribbenow, University of Wisconsin, 2005.

“Adviser, Teacher, Role Model, Friend: On Being a Mentor to Students in Science and Engineering”, National Academy of Sciences, 1997.



Questions for Yourself

How do I relate to others? (Am I a listener or a sharer?)

How does my mentee relate to me?

What are my constructive/destructive behaviors in a group?

What are some of my most successful experiences as a mentee?
Why were they successful?

What are some of my most successful experiences as a mentor?
Why were they successful?



Recruitment and Selection

Share with your students different programs offered on campus

Advertise flexible options (remote work, self-paced, etc.)

Being conscious of your implicit biases

Deviate from traditional selection criteria (GPA and/or test scores)

- Interest in research
- Motivations to join
- Commitment to projects

Representative of campus demographics

Ahmad, A.S., Sabat, I., Trump-Steele, R., & King, E. (2019). Evidence-based strategies for Improving Diversity and Inclusion in Undergraduate Research Labs. *Frontiers in Psychology* 10: 1305. <https://doi.org/10.3389/fpsyg.2019.01305>



A Good UR Project

- Is it reasonable based on the student's skills and knowledge?
- Is it reasonable based on the time the students has for the project?
- Does the student see the relevance or impact of the project?



Clear Expectations

- How often do you meet? For how long?
- What should the student accomplish on a daily and weekly basis?
- What should they be doing during “down time” - when an experiment is running?



Office of
Undergraduate
Research

Being Aware of Progress

- Are the tasks too easy?
- Is the student becoming frustrated?
- Are they staying on task and engaged in the project?



Office of
Undergraduate
Research

Understanding Your Students

Students work hardest when...

- They know you care
- They feel challenged but supported
- When there are clear goal posts



Motivating Your Students

Not all students are motivated by the same things...

- Is the research relevant to them?
- Do they feel a sense of belonging in your lab/group?
- Do they feel a personal stake in the success of the project?



Office of
Undergraduate
Research

A Thriving Research Group

Students will feel...

- I matter
- Somebody cares about me
- I am capable
- I can make a difference/impact

* Especially important if you have non-traditional students in your group



Constructive Group Dynamics

- Interested and respects the views and perspective of the entire group.
- Enlivens the group by encouraging participation and progress.
- Make issues clear by listening; summarizing; and focusing discussions.
- Encourage group cohesion through humor or social interactions.



Destructive Group Dynamics

- Takes too much time expressing self views and opinions, tells stories, rambles off-topic.
- Rushes the group to move on before task is complete.
- Removes self from discussions or decision making.
- Disregards or minimizes group or individual ideas or suggestions.
- Impedes progress, “This will never work because...”



Research Environment

- Science is not a bubble- we exist within the world and its social justice issues
- Clear structures to actively combat inequities
 - Normalizing and respecting pronouns
 - Allotted speaking time for all lab members
 - Zero tolerance for racist, sexist, homophobic, hateful, etc. behaviour.
- Think about conflict resolutions
- On-boarding can include the lab's statement regarding commitment to inclusivity along with all the other forms such as safety protocols.



Power Dynamics: Feedback

- Stereotype threat can affect underrepresented students' psyche and their performance in high stake environments
- Sense of belonging and identity
- Tone of your critique matters, emphasizes importance of building and nurturing dialogic relationships with your mentee
- “What is your preferred way of receiving feedback?”
- Reflect on a time you gave feedback and it went poorly. What methods do you use to give feedback?
- Emphasize feedback is an opportunity to grow and help professionally develop



Office of
Undergraduate
Research

**Mentoring is
rewarding!**





Office of
Undergraduate
Research

Mentoring Resources

<https://www.cpp.edu/our-cpp/mentors/mentoring-guidelines.shtml>