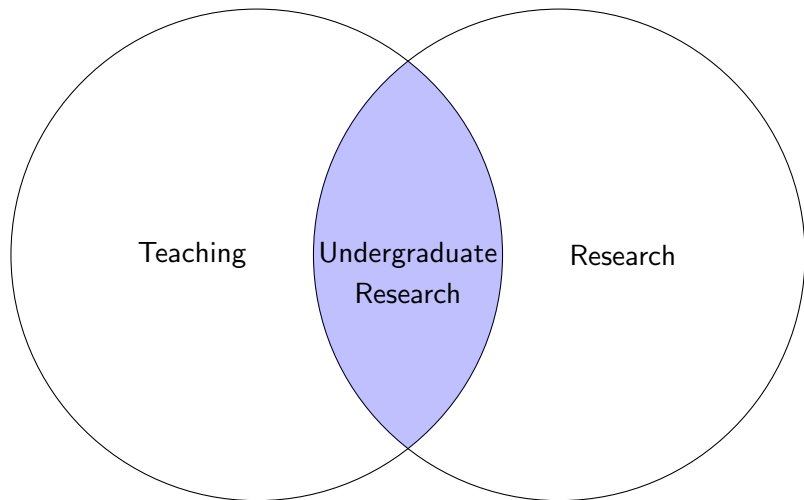


Discipline-based Undergraduate Research from a Teaching and Learning Perspective

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Teaching and research need not be independent



Why mentor undergraduate (UG) research?

- ▶ It's fun for us
- ▶ UG students have interesting ideas
- ▶ UG students are exposed to our “other” job
- ▶ It is really good for students (more later!)
- ▶ Isn't this part of our mission?
- ▶ We can be the “gateway” to later research experiences



Bad reasons to do UG research

- ▶ To get students to write papers for you
- ▶ To make your job easier
- ▶ To use for all your mundane tasks (data entry, making copies...)

Student Researcher \neq Student Assistant

So what are the benefits to students? [Russell et al., 2007]

- ▶ Confidence
- ▶ More likely to stay in college
- ▶ More likely to get good grades
- ▶ More likely to pursue STEM careers (for STEM research)
- ▶ More likely to go to grad school
- ▶ Find out what graduate school is like



UG research a MUST for graduate school. Our students are not getting as many opportunities.

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Best practices from the literature

[Hunter et al., 2007, Russell et al., 2007]

- ▶ Important:
 - ▶ involve students in culture of research (conferences, mentoring other students, writing journal articles)
 - ▶ Be enthusiastic
 - ▶ Work on organizational, interpersonal, and research skills
 - ▶ Pick students interested in research (don't bribe)!
- ▶ Unimportant:
 - ▶ Your ethnicity, gender
 - ▶ Tailoring the program based on students' gender or ethnicity
- ▶ Longer experiences more effective

Increasing K-12 students' interest in academic disciplines (e.g. STEM) will make them good candidates for research.

Our math research group: students

- ▶ one AAS student
- ▶ seven BS students
- ▶ one hearing MS student



Our math research group: setup

- ▶ Financial support
 - ▶ Five students supported by external funds (CURM)
 - ▶ some others by internal funds (GWBC, GWSP, NTID President's office)
 - ▶ Some support for me through CURM, internal
- ▶ 2-3 meetings per week, 1 without me (if group)
- ▶ Students work 7 hours per week
- ▶ My philosophy: let the students guide as much as possible
- ▶ Mostly academic year, one remotely during summer

How to get started

- ▶ Just dive in
- ▶ Look for mentor(s) and resources for you in your discipline
- ▶ Pick students you can work with
- ▶ Pick an open problem in your area
- ▶ Could you progress in “a lazy afternoon?”
- ▶ Look for funds, think about course credit
- ▶ Start with firm expectations (syllabus/contract)
- ▶ Have students keep track of their results regularly
 - ▶ Monthly presentation?
 - ▶ Written reports?

As you progress

- ▶ Tweak problems to student strengths
- ▶ Old students mentor the new
- ▶ What to do when students don't work out
- ▶ Are students keeping record of findings?
- ▶ Find a conference
- ▶ Hands off the students' problem! Parallel problem for yourself
- ▶ Students may pursue odd directions, but that's okay
- ▶ Writing the paper
 - ▶ Set aside time for you to write up results
 - ▶ Undergraduate research journals
- ▶ Socialize! Students like food

Taking students to conferences

- ▶ Place: interesting and/or local
 - ▶ Student-friendly conferences are nice
 - ▶ How much do you help the students with their presentation?
 - ▶ Look for funding: students' home college?
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- ▶ Work early for interpreters
 - ▶ Consult with experienced faculty
 - ▶ Students don't always think about the practical things (IDs, receipts)

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congrats to @IGMRT alumnus @myrecomint for her @Digital_Fo...

Not everyone's cup of tea

- ▶ Not PhD students: UG research blends teaching, research
- ▶ UG research takes a lot of time and patience.
- ▶ You write the paper; this takes time
- ▶ It will not be perfect, but that's OK
- ▶ “Don't sell yourself cheap”

Points to ponder

- ▶ Students of some underrepresented ethnicities benefit more than Caucasians [Russell et al., 2007]. Do deaf and hard-of-hearing students benefit more than hearing students?
- ▶ A single mentor's race/ethnicity/gender did not matter, but students who had a diverse group of mentors benefitted more. Does having deaf/hard-of-hearing mentors increase benefit to students?
- ▶ How can we make this sustainable at NTID? Some ideas:
 - ▶ Course release for x number of students mentored?
 - ▶ Count student research mentoring as contact hours?

Thank you!

References

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For more information, see the website of CUR, the Council on Undergraduate Research at <http://www.cur.org/> as well as resources on undergraduate research within your discipline.