Discipline-based Undergraduate Research from a Teaching and Learning Perspective

Bonnie Jacob

January 21, 2016
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.

*Clip art licensed from the Clip Art Gallery on DiscoverySchool.com*
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?

- Work early for interpreters
- Consult with experienced faculty
- Students don’t always think about the practical things (IDs, receipts)
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


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.