

The Benefits of Undergraduate Research: The Student's Perspective

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The undergraduate experience is greatly enriched by attaining research experience early and often. Recently this has been demonstrated empirically and discussed at length in a variety of disciplines, including but not limited to engineering (Narayanan, 1999), medicine (Murdoch-Eaton et al., 2010), biology (Reynolds, Smith, Moskovitz, & Sayle, 2009), physiology (Desai et al., 2008), neuroscience (Frantz, DeHaan, Demetrikopoulos, & Carruth, 2006), psychology (Wayment & Dickson, 2008), as well as in multidisciplinary discussions in prestigious journals (e.g., Carrero-Martinez, 2011; Russell, Hancock, & McCullough, 2007). However, while the benefits of undergraduate research are numerous and far-reaching, the majority of articles on the topic focus on a retrospective viewpoint of undergraduate research initiatives at specific universities. This paper looks forward, offering the students' perspective on how academic advisers can advocate for undergraduate research and engage junior and senior undergraduates in research, as well as how advisers can promote undergraduate research within the faculty.

How does undergraduate researcher experience benefit the student?

There are numerous benefits for undergraduate students who get involved in research. Research experience allows undergraduate students to better understand published works, learn to balance collaborative and individual work, determine an area of interest, and jump start their careers as researchers. Through exposure to research as undergraduates, many students discover their passion for research and continue on to graduate studies and faculty positions.

First and foremost, a direct benefit of research starts in the classroom. When investigating any phenomenon in class, it is useful to know how the original study was performed. By engaging in research firsthand, students find it easier to understand the rationale underlying others' research. For example, only after forming one's own hypotheses does one truly understand the nuances of research designs and better conceptualize course material. Additionally, undergraduate research can provide students with an ongoing source of one-on-one mentorship that is otherwise unheard of in the undergraduate curriculum.

A less direct benefit, and one that is more difficult to teach in the undergraduate curriculum, is the balance between independence and collaboration. Research is often performed in teams, and one must learn to balance a collaborative effort in the laboratory with what one is capable of accomplishing independently. Interdisciplinary work is difficult to teach in the classroom, and on-the-job experience with teams is a bonus for any workplace environment. The nature of research today is such that interdisciplinary teams are becoming the norm, and gaining firsthand experience in teamwork should be promoted in the undergraduate education.

Exposure to an area of research undoubtedly also helps students explore career fields. If one is considering research as a career path, experience in a research setting is invaluable. Exposure to research guides some students toward research after graduation, as well as allows other students to make informed decisions not to pursue careers in research. Additionally, the earlier students become

involved, the more experience they attain, which enhances their career choice. Many students considering careers in medicine will also benefit greatly from exposure to research. Many medical schools value research experience for admissions. Perhaps more importantly, a solid basis in hypothesis-driven research is what evidence-based medical practice is built upon. Experience in this area can enhance an understanding of both the medical curriculum and the medical literature.

Exposure to research as undergraduates can also increase the likelihood of becoming successful researchers in the future. Some undergraduates, unsure what to do upon degree completion, proceed to graduate school with the ill-fated idea that it is the next logical step after undergraduate studies. If they have undergraduate experience in research, they are more likely to know if they actually enjoy research. Usually, however, undergraduate students discover a passion for research they did not know existed. Institutions of higher education have a way of attracting the most curious minds, but asking questions and finding answers is a calling that many discover only after they first test the research waters.

How the adviser should engage undergraduates

Awareness is first and foremost the key to success in engaging the undergraduate student. Academic advisers need to be aware of their students' potential interest in research as a career, as a work-experience opportunity, or in the classroom. The adviser can intermittently gauge interest in research during students' meetings, and when necessary, provide the right guidance about getting involved. On the students' part, they first need to be aware of advising services, as well as know academic advisers are able to provide research connections, in addition to general course/degree advice. This is a little known fact and can be fixed by advertising campaigns: *"Interested in research? Your academic adviser can help!"*

Faculty, administration, and academic counselors often overlook the level of "unawareness" among undergraduate students. For someone in an institution of higher education, it often seems obvious what research is and that undergraduates play a key part in it. However, a quick poll of undergraduate students paints a very different picture. Many are open to the idea of doing research but do not know the first thing about attaining a student research position. Again, institutions should look to change this mindset early, both in the classroom and in the academic advising office.

Junior undergraduates often do not really know what the research process is. We suggest that faculty make a point not only to incorporate primary research into their junior courses, but also to highlight research conducted at their own universities. Professors should also provide junior undergraduates with some guidance on getting involved in research, perhaps incorporating this information in a short lecture. If possible, professors should also describe their own research on a more detailed level within their courses. Professors should also be open to attending and aiding in organizing "Meet the Prof" nights held by the department. Advisers should expose those with even a passing curiosity to faculty research.

Advisers can also recruit senior students to help mentor their junior colleagues. Peer education can help senior students explain their mistakes and successes and detail how to go about getting the experience necessary to succeed in academia and industry. Such a mentoring system would also have benefit in the classroom, representing yet another way advisers can help junior undergraduates get the most out of their education.

Conclusion

A significant number of first-year students are overwhelmed by the academic process and do not even know that research is an option for them, let alone how to get involved. This is a tremendous opportunity for the adviser to help to open the doors to a research experience. By explaining the process and available employment opportunities, academic advisers can help to de-mystify the procedure and ignite a passion for research. Many students get involved in research late in their undergraduate careers, often by chance and learning the hard way that there are opportunities for determined students. Any academic institution can enhance its undergraduate curriculum by promoting research to those who show an interest but who might not otherwise know how to get involved.

References

- Carrero-Martinez, F. A. (2011). Rethink summer student research. *Science*, 334, 313.
- Desai, K. V., Gatson, S. N., Stiles, T. W., Stewart, R. H., Laine, G. A., & Quick, C. M. (2008). Integrating research and education at research-extensive universities with research-intensive communities. *Advances in Physiology Education*, 32, 136–141.
- Frantz, K. J., DeHaan, R. L., Demetrikopoulos, M. K., & Carruth, L. L. (2006). Routes to research for novice undergraduate neuroscientists. *CBE Life Sciences Education*, 5, 175–187.
- Murdoch-Eaton, D., Drewery, S., Elton, S., Emmerson, C., Marshall, M., Smith, J. A., ... Whittle, S. (2010). What do medical students understand by research and research skills? Identifying research opportunities within undergraduate projects. *Medical Teacher*, 32, e152–e160.
- Narayanan, R. M. (1999). Use of objective-based undergraduate research project experience as a graduate student recruitment tool. *Journal of Engineering Education*, 88, 361–365.
- Reynolds, J., Smith, R., Moskovitz, C., & Sayle, A. (2009). BIOTAP: A systematic approach to teaching scientific writing and evaluating undergraduate theses. *BioScience*, 59, 869–903.
- Russell, S. H., Hancock, M. P., & McCullough, J. (2007). Benefits of undergraduate research experiences. *Science*, 316, 548–549.
- Wayment, H. A., & Dickson, K. L. (2008). Increasing student participation in undergraduate research benefits students, faculty, and department. *Teaching of Psychology*, 35, 194–197.

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