

Conceptual Issues about Undergraduate Research

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A topic that consistently seems to characterize discussion of the involvement of undergraduates in research is how to define “undergraduate research.” When the Council on Undergraduate Research (CUR) first created a listserv, the question of how to define undergraduate research was one of the most active discussions. In 1997, while chairing a session titled “What Constitutes Undergraduate Research” at a CUR Dialogue meeting, my group of about 25 individuals decided to develop a definition, which is provided below. This definition has since been adopted by CUR.

Undergraduate research is an inquiry or investigation conducted by an undergraduate that makes an original intellectual or creative contribution to the discipline

There are two items in this definition that I particularly like. The first is that it requires that the work be original, meaning that the project must be aimed at creating new knowledge. It is not research when a student repeats something that is already known, even if it is presented in an inquiry-based format. The second is the expectation that the work represents a contribution to the discipline. This means that the research, if successful, should be disseminated among the relevant community through established means, which usually entails peer-reviewed publication of the work in an appropriate disciplinary venue. Also, there are things that are not prescribed by the definition. For example, it allows disciplinary flexibility by not forcing scholarship into one model. Furthermore, it makes no judgment on the relative value of mentor- or student-initiated work and allows for student-faculty and student-student collaborations.

I believe this definition creates an important distinction between having undergraduates participate in research (i.e., original work aimed at peer-reviewed publication in an appropriate disciplinary venue) and in other inquiry-based activities that may occur when a student is repeating something that is already known or is doing a project where there is no intent whatsoever of publishing the outcomes. These other inquiry-based, research-like activities often take place in the laboratories associated with structured courses or as other course assignments.

Having undergraduates participate in research has other benefits besides the creation of new knowledge. The most obvious is the student learning that occurs through the experience. The value of original work rests on the supposition that it is more difficult to create knowledge than it is to learn something that is already accepted by people in the field. If so, then creating

knowledge has the potential to take learning to a heightened level. Thanks to thorough studies of undergraduate research done over the past decade [1,2], we now have assessment data to support what faculty mentors of undergraduates involved in research have always recognized – undergraduates do realize important and beneficial learning outcomes from participating in research. In addition to benefitting the discipline and student, having undergraduates involved in research also has benefits to the faculty and to the institution. In fact, it is essential to have faculty members buy in to the value of undergraduate research if they are to provide enough experiences for students. Such buy-in will be more likely if faculty members advising undergraduates in research feel that they are benefitting from the experience. Finally, among other things, the institution can use undergraduate participation in research as a recruiting tool and to further its mission of educating students.

Considering the various goals and purposes of undergraduate research, I believe that an important conceptual question is how to structure the experience. In part, the structure will depend on what the participants ultimately decide as the most important goal (for example, a research program aimed at published outcomes may have a different structure than one only aimed at providing a beneficial student learning experience). This raises a question about whether students ought to be working collaboratively with the faculty member, such that a published outcome would be coauthored, or whether it is considered acceptable to have the student work on an independent project with a faculty member who oversees it. The former model is more common in the sciences. The latter model is more common in the humanities and many of the social sciences.

Another question concerns how we provide enough capacity for all undergraduates to be able to participate in research. The classic model is to have the student work one-on-one with a faculty advisor. This is a labor-intensive activity for faculty members and rarely is there enough faculty capacity to be able to provide such one-on-one experiences for every undergraduate student. Some people are interested in developing undergraduate research experiences for larger numbers of students, potentially within existing courses. These types of experiences, while often inquiry-based, may not conform to the key aspects of the definition provided above (e.g., original work intended for publication) and are often research-like activities. The research-like aspect does not necessarily diminish the educational value to the student, but in my opinion ought to be thought of as something that is different than original research intended to make a contribution to the discipline. Nevertheless, since it is unlikely that we will ever have sufficient faculty capacity to provide one-on-one mentored research experiences for all undergraduates, the development of what is often called a research-rich curriculum that incorporates research-like experiences throughout the required and elective courses is desirable [3].

The last issue I will raise is how we support undergraduate research. Undergraduate research costs money and it costs faculty time. Sources of support can come from internal funds made available through the college or university. In addition, undergraduate research experiences are often supported through external sources of support. Some of these external sources are research agencies who mostly value the research outcomes of the work. Others may be more

interested in the educational experience gained by the student participants. Ultimately, the source of support may lead to constraints on how a program is designed to meet the primary goals of the funding source, and people seeking support need to be aware and comfortable with the goals of the funding entity.

More information about my activities aimed at promoting undergraduate research is available at the following two web sites.

Undergraduate Research Summit: <http://www.bates.edu/x50817.xml>

Copies of some talks I have given on aspects of undergraduate research:
<http://www.bates.edu/x159120.xml>

References

[1] Laursen, Sandra, Anne-Barrie Hunter, Elaine Seymour, Heather Thiry, Ginger Melton. 2010. Undergraduate Research in the Sciences: Engaging students in real science, San Francisco: Jossey-Bass.

[2] Lopatto, David. 2009. Science in solution: The impact of undergraduate research on student learning, Tucson, AZ: Research Corporation for Science Advancement (http://www.rescorp.org/gdresources/downloads/Science_in_Solution_Lopatto.pdf) (accessed October 8, 2010).

[3] Karukstis, Kerry K., Timothy E. Elgren. 2008. Developing and sustaining a research-supportive curriculum, Washington, DC: Council on Undergraduate Research.