

# **Integrating Undergraduate Science Research: A Commentary to Undergraduate Research Faculty**

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Nearly every academic discipline recognizes the value of undergraduate research opportunities. This trend in undergraduate education is so far-reaching, that the National Science Foundation (NSF) and other agencies are providing significant funding initiatives. Undergraduate research in the sciences, as well as in other disciplines, is now widely seen as the center of a first-rate liberal arts education, and may be one of the best measures of the overall quality of a college or university's undergraduate program. Additionally, an undergraduate research experience generally improves one's graduate school application. Consequently, colleges and universities, especially smaller, liberal arts schools, see undergraduate research as the guiding pedagogy for the 21<sup>st</sup> century (Dotterer, 2002 [1]).

In our experience as science faculty, one of the most overlooked, but potentially beneficial undergraduate research activities involves integration of various aspects of science in a single research project. Most faculty members are trained in single disciplines of science, and may be uncomfortable directing student research in problems that transcend traditional academic boundaries. This forces faculty members to offer students limited opportunities to conduct investigations that draw on the full spectrum of their

educational preparation. Most disciplines require some supporting curricula for degree programs, yet many of our research projects do not employ the skills we have encouraged our students to develop.

A successful method of addressing this issue is potentially available on every campus, and only requires that a faculty member explore the research being conducted by faculty beyond her/his respective discipline. When we want to conduct research that transcends the traditional disciplinary boundaries and provide opportunities for our students to conduct "real" research, we need to discuss our ideas with colleagues whose expertise may compliment our own. Each discipline utilizes the scientific method in devising research plans, but various disciplines may utilize different tools and methodologies that can be applied in new and innovative ways to integrated research. Collaboration by faculty serves to reinforce the concept of integration to students.

An example from our experience may serve to illustrate this point. We recently conducted a field research experience for undergraduate majors in biology, geology, and environmental studies. During the field experience, we initiated what we hope will be a long-term environmental monitoring project for students. In the design of our research

project, we employed the expertise of our diverse faculty, and the background of our students, to gather environmental data. The early indications are that this project was extremely valuable to our students. The field investigation provided the application of knowledge, and the research design included a peer-led, team-learning approach in order to provide an environment in which students interacted and discussed their understanding of the research objectives. Faculty members were available for consultation, but this approach to the field study provided a mechanism for self-expression in a student-centered environment, rather than an intimidating and passive experience often encountered by undergraduate students.

We feel that an integrated approach to undergraduate research not only enhances collegiality, but also provides the best opportunity for students to conduct research in a realistic setting. Take the time to initiate dialog and share ideas with colleagues. The symbiosis that results might just lead you and your students to new

levels of accomplishment and understanding of the scientific endeavor.

#### REFERENCES

1. Dotterer, R.L., "Student-Faculty collaborations, undergraduate research, and collaboration as an administrative model," *New Directions for Teaching and Learning*. **90**, pp. 81-90 (2002).

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