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# A Professor's View of Undergraduate Research

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*"It didn't react, Dr. Duffy. What do I do now?"*

This is a question which I hear frequently in the undergraduate research lab. The answer is, "That's why we call it research!"

Many of our students carry out research as undergraduates under the direction of a Wheeling Jesuit faculty member. As an undergraduate researcher, students have considerable access to the faculty member and a chance to observe him or her problem solve.

Students have the opportunity to work alongside the faculty member. It is in research that the faculty member moves from "the sage on the stage" to "the guide by the side." The student learns techniques by observation and participation. The student sees their research director baffled, surprised and, occasionally, jubilant. The student gets to experience the joy of discovery and the frustration of instrument breakdowns, undelivered supplies and power supply failures.

Directing undergraduate research puts the faculty member in a very vulnerable position. With the student, the professor essentially unscrews the top of his/her head and invites the student in to see how the faculty member thinks. It can be a humbling process. It is frequently a process in which the student expresses an insight or makes a suggestion that indicates he or she is cleverer than the professor. I love those moments!

Research ethics is taught by example; what to do with the one experiment that "doesn't fit." Do you just repeat the experiment that doesn't fit or do you also repeat one that does as well? Precision and accuracy take on very real dimensions. Significant figures become significant.



Our very best students participate in research. Students who have carried out research under my direction have completed or are pursuing doctorates in chemistry at the University of Maryland, University of Cincinnati, Northwestern University and Texas A&M. Our goal is not simply to re-create ourselves: our research students also have gone onto medical school and pharmacy and physical therapy graduate programs. Their research experience adds immeasurably to their qualifications.

Their efforts have been successful and rewarded. Some of my students have experienced the exhilaration of preparing a compound never prepared before in the history of the universe! They have reported their results and regional and national meetings. They have co-authored publications with NASA scientists and, in a way, achieved a degree of scientific immortality as a published scientist.

Research at Wheeling Jesuit is not limited to the physical, clinical and social sciences. At the annual Undergraduate Research Day, we celebrate the accomplishments of our students in each academic discipline with significant contributions from the liberal arts. We rejoice in our desire to know and our ability to inquire.

