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CUR Opinion

It's Time to Take the Next Step

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The history of the Council on Undergraduate Research (CUR) is marked by change. While CUR began as an organization that embraced undergraduate research within a single discipline (chemistry) and in a subset of U.S. colleges and universities, CUR's mission today is to encourage faculty-mentored research for all students in all disciplines at all institutions. Because of its ability to change, CUR finds itself a leading national and global voice for revolutionary reform in undergraduate education.

What the council has ardently supported since its inception, and what it must continue to support, is its founding idea that the best education and the greatest impact on students' lives occur when faculty members work one-on-one with their students on projects that create new knowledge. Representatives of CUR and its member institutions must increasingly walk the halls of Congress, federal agencies, and state capitols to ensure that decision-makers understand, value, and support these one-on-one faculty-mentored experiences. Through efforts such as Posters-on-the-Hill and similar events in state capitols and through the Congressional briefings it now organizes, CUR is working to support and advance this important teaching and learning paradigm.

CUR must also work with other professional societies to expand the availability of research experiences for all undergraduates, just as CUR's Division of Physics and Astronomy did in 2009 when it worked with other organizations in these disciplines to formulate position statements that supported the idea that all undergraduate physics and astronomy majors should engage in research.

Should *all* undergraduates engage in research? While this has been a hotly debated topic both in CUR and in the larger academic community, for me, nothing less than the reputation and credibility of U.S. higher education are at stake in how we answer this question. In their recently published study *Academically Adrift: Limited Learning on College Campuses* (University of Chicago Press, 2011), Richard Arum and Josipa Roksa ask, "Are undergraduates actually learning anything?" Arum and Roksa's findings are extremely troubling and should be a wake-up call to higher education. Their report notes that many of the students who participated in their study graduated without knowing how to sift fact from opinion, make a clear written argument, or objectively review conflicting reports of a situation or event. Students could not, for example, determine the cause of an increase in neighborhood crime or how best to respond without being swayed by emotional testimony and political spin.

The study finds that 45 percent of undergraduates made no significant improvement in their critical thinking, reasoning, or writing skills during the first two years of college and that, after four years, 36 percent showed no significant gains in these "higher order" thinking skills. With results like these, how long can the U.S. remain globally competitive? With results like these, how long can we continue to think that the U.S. public will continue to support higher education? While Arum and Roksa point to some exceptions, broadly speaking one can only conclude that undergraduate education, as it is now being practiced, is not working.

Involving undergraduates in research would help address many of the deficiencies in critical thinking, reasoning, and communication skills found by Arum and Roksa. The challenge, of course, is bringing undergraduate research to all students. While it is a powerful learning paradigm, the current approach of engaging undergraduates in one-on-one, out-of-class, faculty-mentored experiences is not the answer at most institutions. The numbers simply do not add up. At my home institution, Murray State University, there are approximately 400 faculty members and 8,000 undergraduates. If every faculty member mentored three independent student projects every year, an ambitious undertaking by anyone's standard, 1,200 students would receive one-on-one research experiences annually. Over the course of four years, 4,800 students would be men-

tored; 3,200 students would not. Given the number of students left out, one wonders how Murray State would fare in a study like Arum and Roksa's.

CUR's mission is "to support and promote high-quality undergraduate student-faculty collaborative research and scholarship." While some in CUR will read this to mean "in one-on-one mentored experiences," interestingly, the mission statement allows for a much broader interpretation. To reach *all* students, we will need to work in the arena where we have *all* students—our classrooms. CUR and its members must work as hard at bringing research into the classroom as it has worked over the years to develop one-on-one, out-of-the-classroom research experiences.

To achieve this, CUR needs the same kind of visionary thinkers and innovators today that it had in 1978 when the organization was founded. I am pleased to report that some of our colleagues have already seen the need to change and have begun to invest time and effort in bringing research into the undergraduate curriculum. At Murray State, for example, chemistry professor Bommanna Loganathan's 300-level analytical chemistry course now engages students in analyzing water quality in the local watershed. While learning fundamental analytical skills in a meaningful context, students are also engaging in genuine field experiences and in wide-ranging community discussions about environmental quality.

At Michigan State University, Douglas Luckie, an associate professor of biology, takes students into the world of research even earlier in their undergraduate experience. "Freshmen taking my introductory cell and molecular biology course are deputized as interns in my cystic fibrosis research lab," Luckie explains. After teaching them how to perform a few techniques such as genome extraction, polymerase chain reactions (PCR) and agarose gel electrophoresis, his students work in teams to find a disease caused by a gene mutation. They are then expected to design a PCR-based diagnostic assay to detect if someone has the mutation. Because his students have the opportunity to do actual research, Luckie says that he no longer faces the odd situation of having to explain to interested students that, as practicing scientists, they will never have to do anything like the rote exercises that most introductory science students must complete in their initial laboratory experiences.

Bringing research into the curriculum is not solely the province of the sciences. At the University of North Carolina at Greensboro, students in Patrick Lee Lucas' architectural design classes do not simply read about creating exhibits; they actually create sophisticated architectural models for the Greensboro community. As Lucas explains, "The exhibits they create as a result of this process make material their own values and the values they observe in their own community, considering both present-day and historical views of place."

"As students move to the actual construction of the exhibits," Lucas notes, "their roles shift, with assignments in the wood shop, in graphics at the digital studio, in the creation of the marketing and public relations strategies, in the coordination of materials from the various other courses, and in the development of content within the exhibit." Lucas adds, "The experience is as real as we can make it."

At Occidental College, the English department has integrated research throughout its curriculum. "Four years ago, the department decided to move to a research-based curriculum for all of its majors," says John Swift, a professor of English and comparative literary studies. "The new curriculum, which includes two research seminars beyond the department's lower-level research methods courses, shifted the primary emphasis of our major from the acquisition of discrete pieces of literary knowledge to participation in the process of professional literary scholarship," Swift says.

"We have found tremendous enthusiasm among the students for the new model, and we have liked the camaraderie and confidence that develops in the seniors, including those (the majority) who are not going on to graduate school in English, but who develop all sorts of very marketable skills associated with problem-solving, organization, research, and presentation," he says. As a result, Swift notes that his department "is looking for ways to begin these experiences even earlier in the curriculum."

At Bridgewater State University, the Office of Undergraduate Research (UR) and the Writing Across the Curriculum (WAC) program have collaborated to better

integrate research in the curriculum. "UR and WAC are natural allies, as research and writing go hand in hand," write Lee Torda and Michelle Cox, the respective program directors. They have co-led workshops on scaffolding research projects, on integrating material into syllabi concerning how to apply for undergraduate research grants and propose presentations, and on using student writing from the campus undergraduate research journal as course readings.

"Some courses have gone beyond this to build an entire syllabus around a joint research project that resulted in a scholarly article and conference presentation," Cox adds. For example, in a first-year seminar on Women in Sports Media, taught by associate professor Maura Rosenthal, students read scholarly articles on the topic and then collaboratively researched the ways in which women in sports had been represented in the student newspaper, *The Comment*. Rosenthal's students sifted through newspaper archives in the library's special collections, designed a method for analyzing the findings, and collaboratively wrote a research article, with teams of students writing different sections of the draft. The project not only showed students how to carry out archival research in order to answer a research question, but also taught students how to read and understand the structure of a scholarly article and then to write one—skills students need to develop as researchers. "This project exemplifies the powerful connections possible when Undergraduate Research and Writing Across the Curriculum join forces," Torda says. When we envision research not only as a process, but also as tied to literacy, research is a natural fit in coursework," Torda and Cox went on to say.

What must CUR do and what must we, as members of the academy, do to bring research into the undergraduate curriculum? Changing undergraduate education in any kind of dramatic fashion will take leadership and considerable resources. It is already clear that CUR and its members can provide the kind of leadership that is necessary to facilitate major change. But CUR will need to marshal this talent and make it available to the larger community through the *CUR Quarterly*, its "how-to" publications, and its conferences.

CUR will also need to work with Congress and agencies such as the National Endowment for the Humanities, the National Endowment for the Arts, and the National Science Foundation to help ensure that resources are available so that faculty members can develop and incorporate new instructional ideas into the curriculum. As an example, CUR should work with the National Science Foundation and the appropriate science-education committees in Congress to see that funding for NSF's Transforming Undergraduate Education (TUES) program in the Division of Undergraduate Education is funded at a level that would enable it to have a true national impact (TUES was formerly called the Course Curriculum and Laboratory Improvement or CCLI program).

While dramatic changes are needed in today's undergraduate curricula for science, technology, engineering and mathematics, between 2000 and 2010 "real dollar" funding for TUES declined by approximately 12 percent. In inflation-adjusted dollars, this is a decline in funding of more than 30 percent. With this program functioning as NSF's primary vehicle for supporting innovation in undergraduate curricula, one can only wonder why funding has dropped and why none of the hundreds of millions of stimulus dollars that NSF received in 2009 were committed to this program. Pressing for increased funding for this program is one area where CUR can make a difference.

CUR is also well positioned to work with college and university accrediting agencies. We all know how seriously institutions take their accreditation—if accreditation is involved, the needed resources are found and changes do occur. CUR leaders need to discuss with leaders of accrediting agencies, possibly at jointly sponsored conferences, how to encourage incorporation of research experiences for all students into the curricula.

What can each of us do on our campuses to further curricular change? Modifying faculty attitudes and teaching habits is important. One might, for example, host faculty-development workshops that demonstrate how others are incorporating student research into their classes—which is what the Center for Teaching and Learning Technology, Office of Writing Across the Curriculum, and Office of Undergraduate Research and Scholarly Activity jointly organized at Murray State after learning how Bridgewater

State integrated its Writing Across the Curriculum and Undergraduate Research programs.

We can also make the involvement of undergraduates in research a more visible part of our institution's public image, thereby making it an integral part of how the institution sees itself. This can be achieved by celebrating the research accomplishments of our students and faculty—research conducted either inside or outside the classroom—in as many public venues as possible. In addition to the many "scholar day" events that now exist on campuses across the country, faculty-guided student research can be displayed throughout the year in libraries and student centers, admissions offices, Web pages, and trustee meetings. Joint student and faculty research can also be featured on local radio and television programs and described in campus papers and alumni magazines. It should also be prominently included in development activities.

Further, our tenure and promotion policies should recognize and reward the work faculty members do to provide undergraduates with research experiences. Individuals and committees involved in setting tenure and promotion policies need to be challenged to develop guidelines that encourage and then reward faculty members' work in this area.

We must also help our students better understand why change is needed and why they need to support and demand curricular and education reform. Student governments currently often do little more than set the student social calendars. We need student governments and students generally to be more integrally involved in establishing the academic tenor on our campuses. There are relatively few shining examples, but the student senate at the University of Wisconsin-Eau Claire stands out in this area. The Eau Claire Student Senate recently voted for an "extra tuition," of $1,200 annually per student. One million dollars of this revenue will be used to support a campus wide undergraduate research program.

Too much is at stake for the higher education community to simply continue its old ways. Major national reports calling for significant change have appeared roughly every five years for nearly three decades. Arum and Roksa's study is but another report that signals that something is desperately amiss.

References

Arum, Richard and Josipa Roksa. 2011. *Academically Adrift: Limited Learning on College Campuses*. Chicago: The University of Chicago Press.

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