



**Washington, DC – 7/7/09** – Transformative research – experimentation driven by ideas that have the potential to radically change our understanding of an important existing scientific concept or leading to the creation of a new paradigm or field of study – was the subject of a recent conference of the Council for Undergraduate Research (CUR), in Snowbird, Utah.

CUR is a national organization composed of educators and researchers, representing over 900 colleges and universities of all types. CUR offers a variety of programs and services that support and promote high-quality undergraduate student-faculty collaborative research and scholarship. The purpose of the summit was to focus on contributions of smaller four-year institutions to transformative research.

Kerry Karukstis, past president of CUR and chair of the summit steering committee as well as professor of chemistry at Harvey Mudd College, noted that the summit was prompted in part by the renewed commitment of the National Science Foundation (NSF) to support transformational and paradigm-challenging research as described in the National Science Board report, *Enhancing Support of Transformative Research at the National Science Foundation* (2007). “As a consequence,” Karukstis indicated, “it is critical for the undergraduate research community to consider viable mechanisms to foster the type of critical and innovative thinking that is required for scientific research to be truly transformative.”

One of the main speakers at the event, attended by 35 scientists and educators, was Dr. James M. Gentile, president and CEO of Research Corporation for Science Advancement, a private foundation that for nearly a century has been a major funder of scientific innovation and research in American colleges and universities.

Gentile noted there are growing concerns among academic and government policymakers that U.S. science funding has become too conservative and risk-averse in an era when the nation is facing increasing competition from abroad.

He cited a major report by the National Academies of Science, *Rising above the Gathering Storm* (2007), warning, among other things, that the United States badly needs creative, out-of-the-box thinking and transformative research to develop new ways of fueling the nation’s transportation system as well as to develop high-tech innovations to expand the general economy.

“Risk taking is a mandatory prerequisite for transformative research,” Gentile said, quoting Reinhard Jahn, a neurobiology administrator at Germany’s Max Planck Institute.

“What’s needed today,” he said, “is innovative, high-risk – and potentially high-reward – research, bold research.”

Gentile said encouraging transformative research requires adherents of the various scientific disciplines to create space for ideas that challenge existing dogma, a process which would likely cause upheaval as investigators increasingly propose to look at things differently.

“This work may be incremental and may need more time and support, but it may not need that much more money than the existing grants,” Gentile said.

Gentile cited a National Science Board report calling for a new way of letting RFP’s and reviewing proposals. Among its recommendations, he said, is that grant organizations enroll three or four senior scientists to work with proposers through dialogue aimed at vetting and refining potential proposals; these scientists, Gentile cites the report as stating, should be senior people representing different disciplines. It also says there appears to be no need to eliminate the peer review process, according to Gentile.

Paula Dehn, vice president of academic affairs and dean of Kentucky Wesleyan College, told the group it’s clear the concept of transformative research is making its way, albeit slowly, into the federal government’s funding philosophy and operational directions. She added that having a portfolio of high-quality projects that approach a frontier from many different directions, a goal the NSF appears to be moving toward, is an effective strategy.

Dehn noted that given the pace of research today, “most of the initially transformative advancements – paradigm-shifts, new subfields of research, radically new technologies and such – are recognized *post hoc*.”

Thomas Wenzel, of the chemistry and environmental studies program at Bates College, asked, “Should we encourage faculty members at predominately undergraduate institutions (PUIs) to participate in transformative research? How could anyone answer no to this question?” Everyone – the institution, faculty, students and society – benefits from participation in transformative research, Wenzel said, noting, however, that substantial barriers exist in the colleges -- lack of infrastructure, a high teaching load, the inexperience of undergraduates.

“But substantial opportunities exist as well,” he said, adding that since PUI faculty are not driven by productivity expectations, as are many of their colleagues at large, research-oriented universities who are under constant pressure to maintain funding levels for their large labs, PUI-based researchers can more readily try high-risk, potentially high-gain projects.

To accelerate the process, Wenzel said, institutions must get serious about such things as limiting researchers to teaching four courses annually, lowering student-faculty ratios, providing a sabbatical every seventh semester, limiting committee responsibilities and granting meritorious research sabbaticals. He also called for special support for early career researchers, among other actions.

What will be required from philanthropy, Gentile said, is a program design giving the program officer ample personal contact and interaction with potential grantees.

He announced Research Corporation for Science Advancement is creating a program, Scialog, as an experiment in funding transformational research. Gentile described Scialog as “a major effort to recognize science as a collaborative endeavor while supporting transformational research at disciplinary boundaries.”

The program, generally focused on issues of global climate change, “will identify well-defined, large-scale, complex problems that need the catalysis of transformational ideas.” The first three-year cycle of the program is funding innovative research in solar energy conversion, he said. For more information on Scialog, he recommended checking the RCSA website at <http://www.rescorp.org/scialog/solar-energy-conversion>.

For more information about CUR, please visit the organization’s website at <http://www.cur.org/>.

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