© *Journal of Higher Education Outreach and Engagement*, Volume 8, Number 2, p. 89, (2003)

Beyond the Binary: Approaches to Integrating University Outreach with Research and Teaching

Anna Sims Bartel, Marianne Krasny
Ellen Z. Harrison

Abstract

The "publish or perish" reward system and the difficult balance of research and teaching are familiar to university faculty. But faculty in some fields are also experiencing a newer, less familiar pressure that may challenge those traditional binaries. Starting in the 1990s, the National Science Foundation and other funding agencies began asking faculty to address the social impacts of their research, and to conduct outreach to K–12 and other audiences. How can university faculty balance the seemingly disparate responsibilities of research, teaching, and outreach? One possibility is to undertake collaborative efforts that combine outreach with research and teaching. We present three case studies of outreach programs, each of which explores a different strategy for contributing to research and teaching and for impacting society. However, universities can systematically address the demands for more social engagement only by exploring new reward and administrative structures.

According to Rita Colwell, director of the National Science Foundation, "We cannot expect the task of science and math education to be the responsibility solely of K–12 teachers while scientists, engineers and graduate students remain busy in their universities and laboratories. There is no group of people that should feel more responsible for science and math education in this nation than our scientists and engineers and scientists- and engineers-to-be" (NSF 1999). How can universities, with their emphasis on publish or perish, respond to this call for involvement beyond the laboratory and lecture hall?

Introduction

Most universities include service, in addition to teaching and research, as part of their mission. However, the activities that "service" denotes vary widely, ranging from membership on university committees and short-term volunteer

efforts to major, time-consuming outreach programs. These more substantive programs include cooperative extension, service-learning, university-industry partnerships, and professional development programs for K–12 teachers. Regardless of the type of outreach, these efforts are seldom seen as contributing to the core mission of the university, and are almost always devalued relative to teaching and research. We contend, however, that outreach is valuable not only because it addresses social and environmental issues, but also because it can enhance and advance many teaching and research efforts. In short, although the traditional university mission is described as having three components, the real pressures on faculty are often binary: research and teaching. We offer models that move beyond that binary through integration of multiple core functions and purposes.

Historical Background

The three core functions of the university reflect the historical roots of higher education in America. To offer some gross over-simplification: colleges were traditionally teaching institutions, aimed at the training of teachers, clergy, and the wealthy elite. Universities, in contrast, were designed more in keeping with the German model of the research university, intended to create new knowledge. Starting in the late nineteenth century, land-grant universities with a specific outreach function were created in each state, and many other colleges and universities took up the challenge to use higher education for the betterment of society. These multiple origins have produced varying and often conflicting ideas regarding the purpose of the university: advancement of knowledge, training of students, healing of social ills (*Boyer 1990, Dewey 1916, Edgerton 1999, Harkavy 1998, Rhodes 2001, Rice 1995, Shapiro 1997)*. Indeed, this journal offers many relevant articles on historical, theoretical, and practical treatments of this broad issue.

Over the last fifty years, we have seen a trend toward increasing emphasis on research, publication, and disciplinary specialization at universities, and away from teaching and the public sphere. Perhaps in reaction to the increasing isolation of academics, and to growing societal concerns about problems related to K–12 education, urban decay, and environmental degradation, universities recently have been called on to "reengage" with society. For example, in the 1990s, the National Science Foundation (NSF) implemented "Criterion 2" as part of its review process, requiring grant applicants to address the broader impacts of their

research, particularly in relation to education and enhancing diversity. In related efforts, the National Campus Compact and the Kellogg Commission on the Future of State and Land-Grant Universities called on universities to redirect their efforts toward social and community engagement (see opening paragraph).

"We contend . . . that outreach is valuable not only because it addresses social and environmental issues, but also because it can enhance and advance many teaching and research efforts."

> What are the broader impacts of the proposed (research) activity? How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? . . . What may be the benefits of the proposed activity to society?
>
> *(NSF 2002, review criterion 2)*

> The purpose of this statement is to articulate the commitment of all sectors of higher education, public and private, two- and four-year, to their civic purposes and to identify the behaviors that will make that commitment manifest.
>
> *(NCC 1999)*

> We commit our institutions to wide-ranging examinations of our civic and democratic purposes through curricula and extracurricular activities, socially engaged scholarship, civic partnerships, and community-based learning and research.
>
> *(Kellogg Commission Foundation 2000)*

The Challenge

University faculty are responding to social and funding pressures for greater public engagement. For example, principal investigators of NSF-funded science and technology centers, long-term ecological research sites, and many smaller research efforts are incorporating educational programs into their grants, including teacher workshops, research opportunities for high school students, and schoolyard ecology. Sometimes these activities are seen as "service"—that is, as providing benefits for

K–12 students, teachers, and other audiences—that offers little to the university other than a feeling of altruism or enhanced town-gown relationships. Universities may also view outreach as a means to recruit future students or as a way to build public support for their research.

As practitioners and scholars of outreach, we believe that outreach can offer more to the university than service, student recruitment, and public relations. Through critically examining the relationship of outreach to research and teaching, we are developing models for outreach programs that contribute to these other functions and have significant impacts on society and communities. Most interestingly, our work has also taught us that within such models, students and faculty are often more effectively engaged than in traditional endeavors in research or teaching alone, because their work can address the broader social or public concerns that traditional disciplinary practice may not, and because they experience enhanced interactions with other interested people both within and outside the university.

In this article, we examine three programs, each illustrating a different approach to linking outreach with research or teaching, and to social change. The first case, the Cornell Waste Management Institute, explores how cooperative extension programs can expand their audiences and activities beyond farmers and other practitioners to involve policymakers and university researchers. The second example, Garden Mosaics, takes a novel approach to balancing the interests of community members and university researchers in a youth science education program. The final case, the Cornell Science Inquiry Partnerships shows how outreach can provide professional development for graduate students while improving high school science teaching.

Off- and On-Campus Collaboration: The Cornell Waste Management Institute

The Cornell Waste Management Institute (CWMI) seeks to address a social need—improved decision making in regard to managing wastes—through research and outreach. In each of its programs, CWMI links the university to "the real world" of policy and practice.

Over the last fifteen years, CWMI has addressed a number of issues, including reducing waste generation, the use of wastes in agriculture, and recycling yard trimmings, food scraps, and other

organic wastes. Before getting involved in a project, CWMI examines what Cornell can uniquely contribute, based on faculty interests and on its role as a public institution rather than a for-profit corporation. CWMI puts together work teams of researchers and extension educators from different disciplines and a wide array of stakeholders, including government agency staff, elected officials, environmental advocates, farmers, and business people.

"As practitioners and scholars of outreach, we believe that outreach can offer more to the university than service, student recruitment, and public relations."

CWMI provides a bridge between researchers and the public sphere. As part of a university, it is well situated to play such an "honest broker" role. In part to protect that "honesty," CWMI does not accept funding from anyone with a financial stake in the outcome of the work. CWMI also provides a brokering role for faculty who find it stimulating and rewarding to see their work address societal needs, but whose research and teaching responsibilities prevent them from developing their own outreach programs. Because many of the issues addressed cross disciplinary and departmental boundaries, CWMI programs can also approach problems more holistically than a single faculty member would.

> I have found my work in the last five years since becoming part of the CWMI work on land application of sewage sludges to be the most exciting and satisfying in my career. I can see the relevance and impact.
>
> *Cornell soil chemist professor*

In 1999, CWMI identified the need to develop environmentally sound means of disposing of dead animals. Farmers, faced with expensive disposal methods and difficulties in finding rendering companies to take dead livestock, were using environmentally questionable means of getting rid of animals. Passively aerated, static pile composting appeared to be a good alternative. However, regulatory officials were resistant to this idea, citing concerns about pathogens. Farmers also were concerned about pathogens, and were unsure about composting costs and methods.

In an effort to address the regulators' and farmers' concerns, CWMI is working with state agencies, veterinarians, farmers, agricultural educators, and researchers to simultaneously conduct field research and outreach. At sites around New York State, CWMI and its collaborators are composting cows, goats, chickens, and butcher wastes in controlled settings. Faculty also are conducting research into pathogen control and composting processes at the sites. As results become available, they are shared with all the stakeholders through field days, meetings, publications, consultation, and technical assistance.

Providing venues for informal interaction among the various players has helped to build understanding and overcome hostilities among farmers, researchers, and regulators. For example, farmers and regulators have developed an appreciation for the time and expense involved in conducting research, and scientists have come to understand the urgency of addressing problems facing farmers and regulators. In the course of this collaborative process, other relevant research topics have surfaced, such as the fate of pathogens, and new avenues for research funding have emerged as agencies that are not focused on research but on solving public issues become involved. Researchers can now conduct investigations in field settings, which provides them with both access to sites and with collaborators who can manage the field sites on a daily basis more effectively than university-based personnel. This collaboration also provides an opportunity for interdisciplinary research and problem solving.

This coupling of research to practice greatly increases the probability that research will be used to inform policy and will be employed by practitioners. Many university researchers find significant satisfaction in seeing the results of their research used in developing policy and practice. In short, through providing opportunities for multiple stakeholders to work collaboratively, CWMI affects not only farmers' practices, but also government policy and faculty research priorities.

Garden Mosaics: Balancing Community and Researcher Interests

Whereas the CWMI programs focus on the interaction between researchers, policymakers, and farmers, the Garden Mosaics program explores ways that youth and scientists can develop mutually beneficial collaborations. Funded by the NSF Informal Science Education program, Garden Mosaics engages

youth in conducting research into planting practices and social and cultural activities in urban community gardens (see opening paragraph). The primary purpose of the youth research is educational—youth learn to conduct investigations, including interviews with adults and observations in gardens. However, we also anticipate that the research the youth conduct will be useful to scientists and community members. Currently, community educators from cooperative extension, non-profit greening organizations, and universities are implementing Garden Mosaics at eleven sites across the United States.

Garden Mosaics Core Investigations and Action Projects: Garden Mosaics youth conduct three core investigations to learn about gardens, gardeners, and their neighborhood. They first take a "Garden Hike," during which they interview a gardener and make observations about plants, structures, and activities in the garden. Through the "Gardener Story," youth document a gardener's planting practices. "Neighborhood Exploration" takes youth on an investigation of green space and food accessibility in their community using maps, aerial photos, and a ground-truthing walk. The youth share the results of these investigations through the Garden Mosaics Web site.

"Providing venues for informal interaction among the various players has helped to build understanding and overcome hostilities among farmers, researchers, and regulators."

Faculty and associates with interests in K–12 education determined the initial scope of the core investigations. Based on our pilot efforts, we have redefined the activities so that they readily engage youth. In addition, we are working with the American Community Gardening Association and horticultural scientists to define research projects that will contribute to the community gardening and civic agriculture movements. For example, the baseline information about plants and cultural and social activities in gardens will be used to build a case for support of gardens in the face of development pressures.

Although we tried to develop investigations that would be fun and relevant for youth, some older youth questioned the value of the research. Thus, Garden Mosaics programs also include

"Action Projects," in which the youth and gardeners conduct an action to benefit the gardens (e.g., host a garden banquet, share information they have gathered with policymakers). In needing to see social impacts of their research, these youth are similar to faculty who want to conduct research that is relevant to society.

We view Garden Mosaics as an experiment in balancing the needs of youth and other community members with the interests of scientists in a collaborative research project. Perhaps the best-known research projects in which youth and scientists collaborate are the citizen science programs of the Cornell Lab of Ornithology *(2002)*, and student-scientist partnerships such as GLOBE (Global Learning and Observations to Benefit the Environment). These programs generally originate when scientists need data from a large geographic area, but do not have the resources to collect such data. They call on students and other volunteers to make observations and share the results with scientists. One of the strengths of these efforts is that scientists are willing to contribute their time because they have an interest in the students' data. A challenge for such programs is providing educational enrichment for the youth that goes beyond collecting data for someone else's research *(Rock and Lauten 1996)*.

"In needing to see social impacts of their research, these youth are similar to faculty who want to conduct research that is relevant to society."

In part because the Lab of Ornithology and GLOBE already have developed sound models for engaging youth in research projects that are defined by scientists, we are attempting to create a different model—one in which the educational activities are developed first, taking into account the interests of youth and community members. Now that we have developed the educational activities, we are using a variety of approaches to involve and provide benefits for scientists conducting research.

For example, at our North Carolina A&T University site, we are collaborating with two extension faculty members. They are working with their research colleagues to develop a university field station at one of the community garden sites where youth are conducting Garden Mosaics activities, thus providing opportunities for youth and scientists to interact. We also have begun

collaborating with a Cornell weed scientist who is interested in the diversity of weeds in urban gardens, and in new audiences for his teaching materials. Youth at several of our sites learned about weeds this summer and collected data on weed distribution and weed management practices in collaboration with this scientist. Several scientists also have expressed interest in using the information the youth are collecting on community gardens and immigrant gardening practices to learn about crops that might be grown by farmers for the urban ethnic market, or to learn about food access issues in low-income neighborhoods. Furthermore, we have hired and trained Cornell undergraduate summer student interns to guide the youth in these and the other Garden Mosaics research and educational activities, thus also contributing to the educational experience of students. Through documenting the types of interactions that develop among scientists, educators, youth, and non-profit organizations, we hope to create a new model for university-community research collaborations.

Cornell Science Inquiry Partnerships: Linking Graduate Training, Research, and High School Science

Whereas the previous two examples focus on the relation of outreach to research, the Cornell Science Inquiry Partnerships program (CSIP) focuses primarily on integrating graduate student training with outreach. CSIP provides funding for graduate student fellows to teach and develop curricula for high school students. In general, fellows are engaged in two types of activities in high school classrooms, both of which draw from the fellows' research interests. Where classes are not constrained by statewide tests and thus have flexibility, fellows lead students in authentic research projects. For example, a fellow working at an alternative school led students in research focusing on the impact of invasive worms on soils. In classes where teachers must cover a standard curriculum to prepare students for statewide tests, fellows use their research to enhance standard labs. For example, a fellow whose research focused on dolphin muscles added an inquiry component and upgraded the science content of a unit on respiration.

> CSIP is one of over one hundred NSF Graduate Teaching Fellows in K–12 Education (GK–12) programs across the US. GK–12 fellows must be graduate students in the sciences. They receive full NSF fellowships in exchange for working fifteen hours per week preparing curricula and teaching in K–12 classrooms. GK–12 programs

> vary widely across the United States. Examples include the Clarkson University engineering program where fellows lead middle school students in environmental problem solving, and a University of Washington program where fellows assist teachers in implementing the new math standards. Several GK–12 programs, including CSIP, link the work in K–12 classrooms to university science research.
>
> In addition to positively impacting K–12 science and math education, NSF hopes that the GK–12 program will be instrumental in creating cultural change within universities. For example, in a discussion with Rita Colwell at the 2000 meeting for GK–12 principal investigators, "One participant wanted Dr. Colwell's view concerning the stigma attached to being a Fellow involved in education. Dr. Colwell explained that one reason that the GK–12 Fellow stipend was higher than the stipend for other Graduate Fellows was to emphasize the importance of education and outreach. She discussed the need for a paradigm shift in education and asked for ideas on how to change the culture to recognize the importance of education and outreach in the research community." *(NSF 2000)*

CSIP has a number of impacts on schools, the fellows, and the university. Teachers felt that the most important impact of having fellows in the classroom was providing students with role models who are young and excited about science. One teacher spoke about the importance of students' "seeing people not much older than themselves doing high-level research—real people with lives outside a lab." The teachers also spoke about how fellows made it possible for classrooms to engage in research projects. Some teachers commented that they previously had wanted to engage their students in research but didn't know how; after having observed the fellows they were ready to change their teaching practices *(Trautmann, Krasny, and Avery 2002)*. Interestingly, a Cornell faculty member also indicated that she planned to use more inquiry-based teaching with undergraduates, after learning from her advisee about his experiences in CSIP.

CSIP fellows enhanced their teaching abilities, in particular related to inquiry-based science, which is an important priority in science education reform *(NRC 1996)*. They also improved their ability to communicate about their research to non-scientists.

Some fellows even learned more science from teaching on this level and from working with other graduate students *(Krasny, Trautmann, and Avery 2002)*. According to their graduate advisors, the fellows gained more teaching skills through CSIP than through a university teaching assistantship, even though the time commitments are roughly equal. Several aspects of CSIP may contribute to the fellows' professional development, particularly in teaching: fellows create their own curricula, are mentored by their cooperating teacher and the CSIP coordinator (a former high school science teacher), work with a variety of students (from non-college bound to AP), receive peer feedback on their lesson plans, and participate in discussions of education theory and practice during the CSIP weekly seminar.

"Teachers felt that the most important impact of having fellows in the classroom was providing students with role models who are young and excited about science."

Do CSIP and other GK–12 programs actually change university culture so that it becomes more supportive of outreach? Initial evidence from the Cornell program suggests that the fellows' faculty advisors, a number of whom are not strong supporters of outreach, value the program. They appreciate the funding as well as the professional development opportunities, and the advantage the teaching experience gives students who pursue careers that involve undergraduate teaching. Their experiences with CSIP, may thus lead some faculty to become more supportive of outreach. As increasing numbers of GK–12 fellows enter the academic workforce, we will learn whether the next generation of faculty becomes more engaged in meaningful outreach.

Conclusions

In the three preceding examples, we have illustrated how scientific research and graduate training can be linked with outreach. Certainly, there are many more examples of how outreach contributes to, draws from, and bridges the teaching and research missions of the university: in one, a Cornell program conducted by the Department of City and Regional Planning, undergraduate students, faculty, and community members engage in neighborhood planning efforts, providing invaluable experiences for the

students and research projects for the faculty. Like the examples described in this paper, this project uses university research to help communities, and the community members help to inform the research. Furthermore, in the city planning project, faculty conduct research on their own outreach efforts. Although outreach is not a research focus for scientists in Garden Mosaics and CSIP, education faculty and students are conducting research evaluating those programs. These collaborations provide another example of how outreach can contribute to university research and graduate student training across disciplines.

"Currently, the funding culture at NSF and other foundations seems to be ahead of academic culture in regard to outreach."

As faculty develop new models of conducting outreach that link with research and teaching, university administrators are challenged with creating new promotion policies and administrative structures to support such work. Currently, the funding culture at NSF and other foundations seems to be ahead of academic culture in regard to outreach. Whereas NSF and other funding sources pressure scientists to include outreach in their research, the university has not yet developed a tenure and promotion system to recognize these efforts. Similarly, university administrators are searching for means to provide leadership and coordination for the growing number of outreach activities at their institutions. Developing and implementing multistakeholder research and outreach is time consuming, and depends on individuals who have the ability and commitment to work with faculty and off-campus audiences. How to fund such individuals and where to place them within departments and administrative structures is a continuing challenge.

This paper offers some examples of programs that better integrate outreach with teaching and research, which are often viewed as more central to the university mission. As practitioners and scholars of outreach, we feel that collaborating with our primarily research- and teaching-oriented colleagues not only enhances our ability to positively impact society, but also enriches our own professional experience. Linking outreach with teaching and research also can help to sustain outreach programs in a university climate not supportive of outreach. Furthermore, our examples demonstrate how outreach can enhance the research

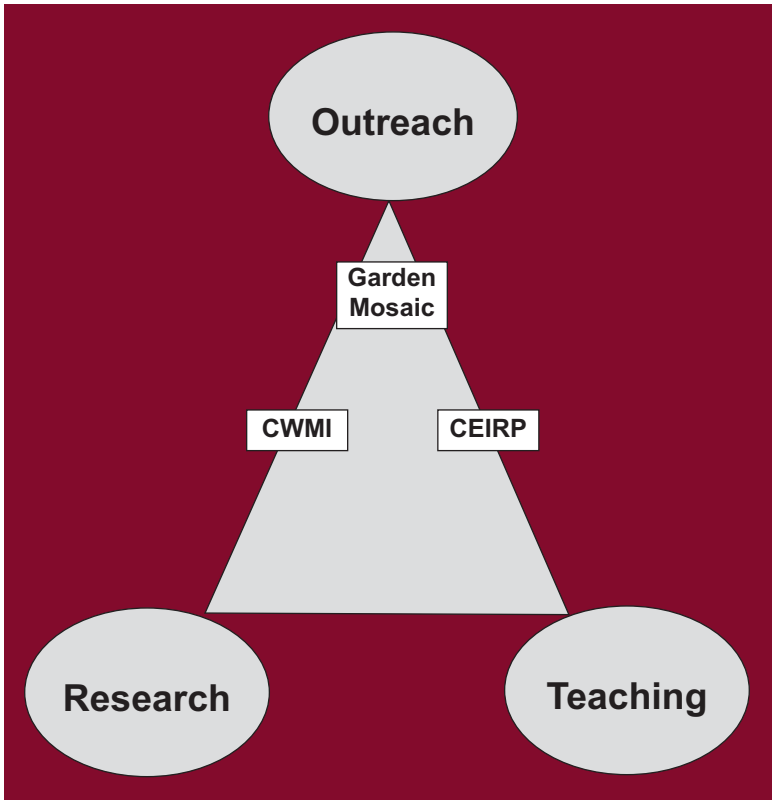

Figure 1

and teaching functions. We hope that instead of framing faculty work as three distinct functions essentially subsumed by the teaching-research binary, universities will create new models that envision the work of faculty as occupying different points in the space where research, teaching, and outreach intersect (Figure 1).

The work of university faculty may be viewed as occupying different points in the space where research, teaching, and outreach intersect. CWMI seeks to combine research and outreach but does not focus on teaching. Garden Mosaics is foremost a youth outreach effort, but seeks to engage scientists working with youth at its community garden sites. In addition to work described in this article, Cornell students have conducted teaching internships with Garden Mosaics youth as well as research on the program's outcomes. Thus, Garden Mosaics also contributes to the university teaching mission. CSIP focuses on graduate student training and youth outreach, and draws on university research to develop science curricula.

Acknowledgments

The work described in this paper receives support from the NSF GK–12 and Informal Science Education programs, Cornell Cooperative Extension, New York State Energy Research and Development Authority, Empire State Development, United States Department of Agriculture, and the College of Agriculture and Life Sciences at Cornell University.

References

Boyer, E.L. 1990. *Scholarship reconsidered*. Princeton: Carnegie Institute for the Advancement of Teaching.

Cornell Science Inquiry Partnerships. 2002. <http://csip.cornell.edu> (13 December 2002). Described Cornell GK–12 program.

Cornell Lab of Ornithology. 2000. Cornell Lab of Ornithology. <http://birds.cornell.edu/> (13 December 2002). Describes citizen science and other lab efforts.

Cornell Waste Management Institute. 2003. Cornell Waste Management Institute. <http://cwmi.css.cornell.edu> (15 September 2003). Includes technical resources and describes Cornell Waste Management Institute programs.

Dewey, J. 1916. *Democracy and education*. New York: The MacMillan.

Edgerton, R. 1999. *Education white paper*. Pew Charitable Trusts. <http://www.pewtrusts.com>.

Garden Mosaics. 2003. Garden Mosaics. <http://www.gardenmosaics.cornell.edu> (15 September 2003). Describes Garden Mosaics program.

GLOBE (Global Learning and Observations to Benefit the Environment). 2002. The GLOBE Program. <http://www.globe.gov/globe_flash.html> (13 December 2002). Describes student-scientist partnership.

Harkavy, I. 1998. School-community-university partnerships: Effectively integrating community building and education reform. Paper presented to Conference on Connecting Community Building and Education Reform: Effective School, Community, University Partnerships (Joint Forum, U.S. Department of Education and U.S. Department of Housing and Urban Development). Washington, D.C.

Kellogg Commission on the Future of State and Land-Grant Universities. 2000. *Renewing the covenant: Learning, discovery, and engagement in a new age and different world*. <http://www.nasulgc.org/publications/Kellogg/Kellogg2000_covenant.pdf> (25 September 2003).

Krasny, M. E., N. M. Trautmann, and L. M. Avery. 2002. Impact of Cornell GK–12 program on graduate student fellows. Paper presented at the Eighty-Seventh Annual Meeting of the Ecological Society of America, Tucson, Arizona.

National Campus Compact (NCC). 1999. *Presidents' Fourth of July declaration on the civic responsibility of higher education.* <http://www.compact.org/presidential/plc/plc-declaration.html> (25 September 2003).

National Research Council (NRC). 1996. *National science education standards*. Washington, D.C.: National Academy Press.

National Science Foundation (NSF). 1999. Graduate science, math, engineering and technology students can become K–12 teaching fellows. <http://www.nsf.gov/od/lpa/news/press/99/pr9912.htm> (25 September 2003). Press release.

National Science Foundation (NSF). 2000. GK–12 meeting proceedings. <http://www.ehr.nsf.gov/dge/programs/gk12/gk12mtg.asp> (25 September 2003).

National Science Foundation (NSF). 2002. Grant proposal guide. <http://www.nsf.gov/pubs/2003/nsf032/start.htm> (25 September 2003).

Rhodes, F. H. T. 2001. *The Creation of the future: The role of the American university*. Ithaca, N.Y.: Cornell University Press.

Rice, E. Forward. 1995. In *The disciplines speak: Rewarding the scholarly, professional, and creative work of faculty*, edited by R. M. Diamond and B. E. Adam, v-vii. Washington, D.C.: American Association for Higher Education Forum on Faculty Roles and Rewards.

Rock B. N. and G. N. Lauten. 1996. K–12th grade students as active contributors to research investigations. *Journal of Science Education and Technology 5*: 255–66.

Shapiro, H. T. 1997. Cognition, character, and culture in undergraduate education: rhetoric and reality. In *The American university: National treasure or endangered species?* edited by R. Ehrenberg, 58–59. Ithaca, N.Y.: Cornell University Press.

Trautmann, N. M., M. E. Krasny, and L. M. Avery. 2002. Graduate teaching fellow impacts on high school teachers. Paper presented at the Eighty-Seventh Annual Meeting of the Ecological Society of America, Tucson, Arizona.

About the Authors

•Anna Sims Bartel is visiting assistant professor of liberal studies and director of experiential education at Wartburg College. She wrote this paper while serving as consultant for special academic programs at Cornell University, focusing on the university's outreach and community partnership programs. Her degrees are in comparative literature, and she works on questions of higher education's role in society.

•Marianne E. Krasny is professor of natural resources at Cornell University. Her interests focus on linking K–12 education to scientific research. She develops and evaluates programs that engage high school students and educators in environmental sciences and participatory research. She also serves as director of graduate studies for natural resources and principal investigator for the Garden Mosaics and Cornell Science Inquiry Partnerships projects.

•Ellen Z. Harrison has been director of the Cornell Waste Management Institute since 1993. In that role she develops multidisciplinary projects involving faculty, Cornell Cooperative Extension staff, governmental and non-governmental organizations, and communities to address waste management issues. Most projects have both research and outreach components.