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Models and Resources in Ethics Education

The material in this chapter is based primarily on presentations and discussion during and after Session II, *Pedagogical Methods and Materials.* Presenters and respondents were asked to address the following issues:

> There is quite a variety of both methods and materials in effect. More than a few consortia provide online tutorials; conferences are common. What kinds of contents and range of techniques are in use? What are their strengths and their limitations? Whom do they reach, and with what results? What information do we have that enables us to judge their merits? What's missing?

The moderator of this session was planning committee chair John Ahearne, and speakers were Julia Frugoli, associate professor, Department of Genetics and Biochemistry, Clemson University; Kelly Laas, librarian, Center for the Study of Ethics in the Professions, Illinois Institute of Technology (IIT); Caroline Whitbeck, professor emerita, Case Western Reserve University and founder of the Online Ethics Center; and Sara Wilson, professor, Department of Mechanical Engineering, University of Kansas. Respondents were Jason Borenstein, director of Graduate Research Ethics Programs and Co-Director of the Center for Ethics and Technology at Georgia Institute of Technology; J. Britt Holbrook, assistant professor, Department of Philosophy and Religion Studies, University of North Texas; and Simil Raghavan, a graduate student then completing her dissertation in the Department of Biomedical Engineering, Johns Hopkins University.[1]

[1] Dr. Raghavan completed her Ph.D. requirements in fall 2008.

Kelly Laas reminded participants that in 1980 the Hastings Center project on teaching ethics education in colleges and universities concluded that programs should have five goals: stimulating the moral imagination; recognizing ethical issues; developing analytical skills; eliciting a sense of moral obligation and personal responsibility; and tolerating and resisting disagreement and ambiguity. As indicated below, more recent projects have extended and refined, but not diminished the value of, those goals.

In his research, Charles Huff of St. Olaf College distinguishes between decision-oriented approaches to teaching ethics and approaches that are intended to develop ethical behavior over the course of an entire scientific or engineering career. Research by Michael Mumford, University of Oklahoma, identifies strategies for engaging students, postdoctoral fellows, faculty, and administrators in developing knowledge and skills to respond to ethical challenges.

The presenters agreed that institutions and researchers need a menu of programs, ranging from university-level to in-lab, informal, bench-level interactions, from which they can select the type of program most appropriate for their circumstances. In addition, as participants reminded each other throughout the workshop, institutions and researchers need guidance that is easy to follow and not overly time consuming. Several suggested that checklists might be an efficient way to call attention to ethical parameters in research practice (such as lab guidance about authorship and credit requirements), but others noted that a list would always leave out some important issues.

In this session, the presenters described instructional approaches to ethics education and provided examples and suggestions about materials appropriate for different fields or disciplines and different audiences. They indicated a range of pedagogies in courses and

workshops: face-to-face and online; lectures and guest lectures; case discussions led by faculty or by students in small or large groups; case writing; video cases; formal debates; and reflective journal writing among them. In addition, participants reiterated the importance of having support for ethics activities and materials development from the National Academies, Council of Graduate Schools (CGS), and AAAS, as well as from professional societies, individual institutions, and institutional groups.

INSTRUCTIONAL APPROACHES

Julia Frugoli explained that her university (Clemson University) sponsors ethics education in the form of both courses and workshops. The former can be most useful for students, she said, and the latter for faculty. Workshops, especially if they are offered throughout the year, can reach more people and more departments than in-course ethics material. Both address similar topics, but courses can explore more of those topics in depth.

At Clemson, the genetics and biochemistry departments have a required, for-credit course on professional-development skills in the molecular sciences for all incoming graduate students. The course addresses many topics, such as lab rotations and mentoring issues, lab notebooks and graphical presentations, peer review, and research ethics. Frugoli noted that the professional-development approach reinforces the idea that faculty and students are professionals, not just individuals "alone in the lab." Although few faculty members attend the classes, some take part when students ask, for instance, for examples of lab notebooks to take to class for discussion.

Students can also improve professional practices. For instance, in Frugoli's department students produced electronic notebooks tagged by date; faculty members

subsequently showed an interest in adopting that procedure. The department has also sponsored one-day workshops for faculty and students, who received certificates for participating.

The courses and workshops at Clemson can meet NSF and other training-grant guidelines, and students have indicated that they liked both types of activities, although for different reasons. At the present time, however, participation in a workshop is not required. Thus the people who participate may not be those who most need this type of training. Sara Wilson of the University of Kansas pointed out differences between engineering and science to which ethics education must be sensitive. Kansas offers an introductory course for graduate students in a number of related scientific fields in chemistry, pharmacology, and nursing that focuses on science topics, such as data integrity and appropriate reporting of statistical methods. Another course, for bioengineering graduate students, emphasizes appropriate engineering analysis, computational error, and model sensitivity. However, because engineers conduct research both in "science mode" (hypothesis-driven, often experimental) and engineering mode (design, forensics, modeling), they must address issues in both areas. By the same token, scientists operating in "engineering mode" might find a focus on engineering topics useful. Each course is offered for one credit.

> We really want to get to . . . having [ethics or professional development] integrated into all kinds of programs, from the lab meeting to core courses, as a module or part of a discussion group, to what your thesis incorporates . . . like a section on . . . ethical and social implications."
> —*Julia Frugoli, Clemson University*

Wilson then compared topics related to (1) RCR in both science and engineering with topics related to (2) RCR and practice in engineering alone. Topics in the first category would include data integrity, appropriate reporting of statistical methods, conflicts of interest, publication and openness, allocation of credit, authorship practices, confidentiality, fabrication, falsification, plagiarism, mentorship, and the use of human/animal subjects. Topics in the second category would include all of those, particularly in the engineering-in-science mode, as well as topics specific to engineering, which, she said, can be divided into three groups: (1) professional practice and business, (2) design, and (3) modeling.

Topics in the *professional practice and business* group include: working within areas of competence; client/employer/agent relationships and avoiding conflicts of interest; business practices; public statements; and licensure. Topics in the *design* group include: goals and trade-offs; human health and welfare considerations in the design of devices, structures, and constructs; global and social impacts of engineering design; appropriate engineering analysis (expecting the unexpected); and codes and standards. Topics in the last group, *modeling,* include: assumptions; validation; computational error and model sensitivity; and extrapolation.

Caroline Whitbeck, Online Ethics Center, noted that research supervisors are critical to the articulation of standards in their fields. Although some ethical questions are multi- or transdisciplinary, she said, some are discipline-specific and require different answers for different fields. In addition, new standards, norms, or values sometimes have to be developed in response to new conditions or problems, or even disciplines.

In all of these cases, supervisors play a critical role in helping graduate and postdoctoral students identify requirements for good practice and interpret the behavior of others. Whitbeck believes that, although experienced investigators often have a "sophisticated understanding of how to behave. . . [they] may not know how to talk about what they have learned." Therefore, programs to assist faculty and assess mentoring activities are also important.[2]

Simil Raghavan, Johns Hopkins University, expanded on that idea. She described an annual faculty retreat sponsored by her department, during which students lead discussions on case studies they have developed. The program has two parts. In the first part, students meet in small groups to discuss the cases; in the second part, each group presents a case to the entire department for discussion. This activity provides students with "memorable interactions," she said, although questionable positions are not always challenged, especially if they are advocated by high-status faculty members.

INSTITUTIONAL APPROACHES

Dartmouth University

In Session I, Joseph Helble, Dartmouth, described the university-wide ethics program for graduate students at his university. The program, which began in 2004, was developed in collaboration with Dartmouth's Ethics Institute. It includes a broad-based ethics training course for all new science and engineering students. The course begins during orientation and continues throughout the term. Faculty and senior graduate students act as facilitators during orientation, which encourages community building. In

[2] Whitbeck describes a method of involving supervisors, focused on 10 topics for the responsible conduct of research at *www.onlineethics.org/cms/13008.aspx*.

the ethics course, instructors use a case-based approach, focused on issues of professionalism, mentoring, data collection, and authorship.

After taking the course, a majority of graduate students surveyed reported having a clearer understanding of their ethical responsibilities and insight into issues that they had not previously considered. The survey results also indicated that the program promotes a strong sense of community among graduate students. Dartmouth is currently tracking the incidence of honor-code violations to see whether the program has made a difference in this regard. The initial data are positive, but determining their significance will require comparison with data for several more years.

Helble reported that program weaknesses include the lack of cases relevant to some fields, a lack of interest on the part of some students, and difficulty in demonstrating the relevance of some concepts to students who have not yet begun working in laboratory or research environments. In addition, some international students, who have been educated in academic environments in which getting the right, praiseworthy solution is the highest priority, do not understand problems related to sharing and copying from other students. Helble asked how such ideas can be challenged without appearing to demean other cultures.

University of Oklahoma

Michael Mumford of the University of Oklahoma described a two-day, 16-hour course developed by his research team. The course, which is separate from normal coursework, focuses on what these researchers call "sensemaking" in ethical decision making—an approach that uses case

> We are not teaching people ethics. .. . We have to cover too many fields. Rather, we are teaching them strategies by which to construct a viable response.

studies, social reinforcement through interactive, cooperative learning emphasizing the social nature of ethical problems, and strategies to help students identify and think through them. Students are encouraged to recognize the dimensions of problems, ranging from their origins to their relevant values; to seek outside help; to question their own judgment; to deal with emotions; to anticipate the consequences of actions; to analyze personal motivations; and to consider the perspectives of others. This course, which is being taught to graduate students in all departments on the Norman campus, requires a significant commitment of university resources.

Council of Graduate Schools

Daniel Denecke of the Council of Graduate Schools in Washington, D.C., described ongoing projects sponsored by the council. In 2004, CGS began an RCR project, with a grant from the Office of Research Integrity and received a grant from NSF for a second project in 2006. The goal of both projects is to develop a cadre of knowledgeable graduate deans, as well as to gain experience in best practices for the start-up and institutionalization of ethics education in graduate schools. CGS will document its results, so that they can be adopted by others. A third project that began in 2007 focuses primarily on biomedical and behavioral sciences and emphasizes comprehensive approaches to promoting and institutionalizing scholarly integrity and a national dialogue on resources and models for ethics education among senior administrators in the nation's graduate schools.[3]

In the first project, the Council of Graduate Schools identified several "best practices" for start-up activities: (1) establishing an advisory board that includes core

[3] For information on the CGS activities, see *http://www.cgsnet.org/Default.aspx?tabid=336*.

research faculty; (2) providing public forums; (3) offering two-tiered instruction (both disciplinary and trans-disciplinary); (4) addressing ethical reasoning and deliberation; (5) making RCR training mandatory; and (6) developing and conducting multilevel assessment (e.g., on both individual and institutional change).

In the second project, CGS identified "best practices" for institutionalizing programs on campuses. These practices included: (1) identifying differences between student and faculty perceptions of training in ethics and ethical climate; (2) using survey data to motivate the proposed activities/programs; (3) linking to mandatory requirements and/or documenting the completion of training; and (4) scanning available resources for gaps when developing new content in-house.

> You don't want to send the message this is just about bad people . . . behaving badly . . . But it's about setting the . . . bar high for scholarship to be encompassing right conduct. . . . And that's part of . . . mentorship too.
> —*Daniel Denecke, Council of Graduate Schools*

Persistent challenges for ethics education and mentoring for graduate students and postdoctoral fellows, Denecke said, include faculty buy-in, professional development for students, and assessments of academic climate. Support from graduate deans is essential for these initiatives. In project documents, the Council of Graduate Schools uses the language of scholarly or research integrity to discourage a "compliance mentality" and encourage an understanding of research integrity as the way things are done.

Workshop Discussions

One theme that emerged in discussions throughout the workshop was the need for institutional change. Charles Huff of St. Olaf College had pointed out that many people

who want to do the right thing need resources, including best practices and recommendations for measuring progress. Measurements should assess organizational structures and processes, he said, and the results may lead us to ask questions, such as whether the moral imperative to include underrepresented groups, for instance, is based on the rights of individuals or on the potential to change research environments and institutions for the better.

Another reason for institutional change, according to J. Britt Holbrook of the University of North Texas, is the difficulty of linking instruction in research ethics to tenure. Holbrook noted that incorporating ethical considerations in the criteria for NSF funding might encourage that linkage.

A number of participants argued that programs on ethics and science, technology, and society on a broader level than research practice should also be recognized. Holbrook described a Ph.D. Plus option in nanotechnology and society at Arizona State University for which engineering Ph.D. students add a chapter to their dissertations about the societal implications of their work. In fact, he said, humanitarian service is now included in numerous undergraduate and graduate engineering programs.[4]

As many participants noted, all of these additions and changes to the curriculum require trade-offs. Reaching many students or covering many topics may come at the expense of in-depth examination of the issues—"trade-offs of quality for quantity." Some of them pointed out that large numbers of students can participate in online training, but, given limited time and resources, fewer can participate in face-to-face

[4] Linda Abriola, NAE Member, Dean, School of Engineering, Tufts University and Kevin Passino, Electrical and Computer Engineering, Ohio State University described programs at their schools at the NAE CEES Workshop on Engineering, Social Justice, and Sustainable Community Development, October 2-3, 2008, at the National Academy of Sciences.

interactions. Others noted, however, that the online training might not be as effective because of the absence of direct interaction and limited exposure to the material. In addition, all of these alternatives need better assessment methods.

In the opinion of Joseph Whittaker, Morgan State University, advocates for ethics activities and programs must acknowledge these quality-control issues. He believes that to be effective future programs must do the following:

- Expand "trainer of trainers" capabilities.
- Facilitate benchmarking, that is, finding, learning, and adopting best practices.
- Develop centralized information databases to encourage/facilitate knowledge transfer, sharing, and implementation.
- Consider ethics knowledge an asset, and promote it as a product or service that the university provides.
- Identify challenges and barriers to training, implementation, and knowledge sharing.

Given their particular circumstances, Whittaker suggested that responsible institutions assess their current culture or state of environment; determine how their leadership, strategies, and demographics impact the practice, choices, and information-transfer initiatives that affect ethics practices; identify the best approaches—a grand design or small, scalable, progressive start-up; develop plans that maximize existing resources; and determine if better results would be achieved with coordinated governance or oversight.

INSTRUCTIONAL RESOURCES

On Being a Scientist, a publication of the National Academies (now in its third edition), is a welcome resource, particularly for faculty and students in the natural and physical sciences and engineering. Another basic resource is *Advisor, Teacher, Role Model, Friend: On Being a Mentor to Students in Science and Engineering* (National Academy Press, 1997).[5] The AAAS Program on Scientific Freedom, Responsibility and Law has produced many publications and videos on scientific integrity and maintains an online AAAS-NAS compilation of resources on research integrity.[6] Participants provided citation resources before the meeting.[7] During the workshop, participants also mentioned two other types of resource: train-the-trainer and ethics-across-the-curriculum activities. Noted among these programs were the annual Teaching Research Ethics workshops at Indiana University.[8]

Workshop speaker Kelly Laas of IIT addressed the issue of electronic resources. She noted that students find blogs, wikis, and social networking sites most useful, but faculty members need websites to help them quickly find resources for teaching students. Practitioners may find an interactive case-discussion site (e.g., *www.ethicscasediscussions.org*) most useful.

Lass indicated that to stimulate students to develop the intellectual, social, and emotional resources they will need to recognize and respond to ethically challenging professional circumstances, online environments should put users in active roles, helping them to use their knowledge and skills in life-like situations. Online resources should

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[5] Available at *http://www.nap.edu/catalog.php?record_id=5789*.
[6] *http://www.aaas.org/spp/sfrl/projects/research_integrity/scientific_integrity/*. This resource is being transferred to the CGS Scholarly Integrity project; it will be available at *http://www.scholarlyintegrity.org/Resources.aspx*.
[7] The list is available at *http://www.nae.edu/?ID=10430*.
[8] *http://poynter.indiana.edu/tre/*.

also put students in contact with others on sites where they can discuss and share ideas, and they should encourage students to seek out answers and find new resources (e.g., through online tutorials, case libraries, or ethics resource centers).

Online tutorials, such as CITI (Collaborative Institutional Training Initiative)[9] and the Columbia University online training modules,[10]Lass said, can quickly and effectively convey information to busy students and researchers. Tutorials can also promote the creation of "ethics communities." The OpenSeminar in Research Ethics,[11] for example, has initiated a blog.

However, maintaining and updating these sites has been difficult. Laas noted that online resource sites could be improved if materials were indexed in various ways (e.g., by ethical issue, discipline, cases, or audience) and if site managers continue to solicit new case studies and materials to update their sites.[12] As a result of the America COMPETES Act, demand for online resources may increase, especially for well-organized databases of available ethics materials, developed syllabi and full texts of readings, experts or experienced instructors in RCR and science and engineering ethics, and an online discussion forum for information exchange among instructors. In addition, all of these sites should incorporate new technologies and content as they become available.

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[9] Found at ***www.citiprogram.org*** , the CITI Program is a subscription service that provides research-ethics education to the research community. To participate, learners must be affiliated with a CITI participating organization.

[10] ***http://www.fhcrc.org/science/education/courses/research_ethics/training/online/***.

[11] ***http://openseminar.org/ethics/screen.do***.

[12] For a general resource on research ethics and engineering ethics, see ***www.onlineethics.org***. For a resource on bioethics, see ***http://www.ethicshare.org/***. Codes of ethics for many scientific and engineering societies are available at ***http://ethics.iit.edu/codes/coe.html***. For general background as well as a wide range of materials on ethics and ethical controversies, see ***http://ethics.sandiego.edu/***.

Laas pointed out, and numerous participants agreed, that new technologies and learning evolve together. Online resources must not only solicit new material and review the quality and relevance of uploaded material, they must also find ways to shorten retrieval time and allow users to personalize their sites. She suggested that educators develop ways to facilitate searches for materials most relevant to a discipline, problem, role (e.g., student, teacher, or employer) and promote interactive learning environments.