INVOLVING FACULTY IN TEACHING THE RESPONSIBLE CONDUCT OF RESEARCH

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INTRODUCTION

Two challenges for the effective teaching of the responsible conduct of research (RCR) are (1) clearly conveying to trainees and faculty that education in RCR is essential not simply because it is required (or, put another way, it is “required” for a reason), and (2) recruiting the participation of faculty and other senior researchers in the teaching of RCR. These two issues are inter-related. Faculty are unwilling to participate in non-essential activities that compete with their research for their time and attention, and they are equally reluctant to allow, never mind encourage, their students and trainees to do so. Unless faculty understand that explicit education in RCR is inherently valuable to their trainees and, even indirectly, to themselves, they are difficult to recruit. At the same time, the involvement of research faculty in RCR education is important for a number of reasons, including the credibility it provides the process in the eyes of trainees and often other faculty and colleagues.

RCR WORKSHOPS

In the early 1990s, the Massachusetts Institute of Technology (MIT) initiated a series of workshops called Research Practice Seminars. They were designed to address the concern that, although MIT graduate students and postdoctoral trainees were receiving a good education in scientific concepts and research techniques, they were not necessarily being adequately prepared to be independent researchers and colleagues. It is apparent that if one only knows the science, one will not succeed as a researcher. One must also know how to write and review manuscripts, obtain funding, manage a research group, communicate with colleagues and with trainees, and an array of other skills. In addition,
and just as important, one will be expected, by colleagues, trainees and society alike, to know and conform to accepted professional standards of the discipline, and of the society of which the research community is a part. As they become colleagues, trainees need to become explicitly aware of the values and standards inherent in research practice, whether they are the widely touted intended values of openness and integrity, the values of the scientific community such as the fair allocation of credit and the responsibilities of authorship, or the values of society that must be reflected in research practice such as the humane treatment of research subjects.

It was felt that observing the examples provided by senior scientists and research supervisors was not sufficient to ensure that trainees would be adequately informed of the values, standards, and expectations of their soon-to-be colleagues in the discipline. Learning from observation requires interpretation and can reflect misunderstanding and confusion. The rationale underlying even exemplary behavior is not always obvious. This concern motivated the initiation of “Research Practice Seminars” which were designed to provide an opportunity to make explicit assumptions and expectations that are usually implicit through discussion of problematic situations that can arise in the practice of research.

A key aspect of these workshops was the involvement of both senior and junior faculty from all disciplines in science and engineering. Workshops usually included 70 to 100 participants and consisted of one-third faculty, one-third postdoctoral associates and one-third graduate students (and occasionally upper class undergraduates engaged in research). Faculty are an essential component because they are the experts with regard to their expectations of their colleagues, and because, by their behavior, their own practices and through their participation in the discipline as educators, research supervisors, reviewers, authors, editors, presenters, and as members of professional societies, they set the standards for their professional community. Different disciplines generally have the same values (e.g., fair recognition of the contributions of various members of the research team) but there can be different conventions and mechanisms for addressing these common values. For example, with regard to authorship practices, there is wide variation across disciplines (and even within the same discipline) with regard to criteria for authorship and order of authors (e.g., physics versus neuroscience versus mathematics) even while there is a shared sense of the importance of authorship in recognizing professional contributions.
Active involvement of faculty from different disciplines in RCR workshops provides an opportunity to discuss explicitly both common values and differing conventions. Postdoctoral associates bring recent experience and a different perspective that can be more immediately relevant to graduate students, and that complement the experience and perspective of faculty.

Goals

A widespread assumption among researchers that frequently must be addressed is that, by the time they reach graduate school, the moral development of students is in place and they cannot be taught to behave ethically if they do not already do so. Fortunately James Rest (1986; 1988), Muriel Bebeau (1991) and others have shown that moral development continues throughout formal education as individuals learn about and appreciate their personal and professional role in society.

With this in mind, the primary goals of MIT’s Research Practice Seminars, like those of teaching RCR in general, were to

- Increase awareness and knowledge of professional standards, i.e., identify and clarify professional standards and ethical values of scientific research as well as conventions by:
  - identifying and clarifying the range of acceptable practices, i.e., the continuum from preferred practices through acceptable, discouraged, and prohibited conduct
  - identifying and examining assumptions that underlie accepted practices
  - assessing the immediate and long-term implications of accepted practices
- Increase awareness of the ethical dimensions of research
- Provide experience in making and defending decisions about ethical issues, developing approaches to problems and identifying resources for making decisions
- Promote a sense of professional responsibility to be proactive in recognizing and addressing ethical issues associated with research.

Format

The format of MIT’s Research Practice Seminars consisted of a brief didactic portion, case presentation, and case discussion. Workshop participants were seated at round tables of eight to ten people. The
The didactic portion presented a framework for examining the topic, including the primary concepts or points of contention (e.g., credit and responsibility associated with authorship and criteria for authorship). This was followed by a case presentation of a real-to-life situation in a dialogued scenario (see Appendix A for an example, “Late One Night” by Eve Nichols). Case presentation was frequently, but not necessarily, accompanied by brief presentations (three to five minutes) by a panel composed of a senior faculty member, a junior faculty member, a postdoctoral associate and a student, each examining an aspect of the scenario that seemed especially significant from his or her own perspective and experience. The purpose of the panel presentation was to provide some specific ideas to catalyze further discussion in small groups. The bulk of the workshop consisted of discussion in small groups followed by a moderated discussion of the whole group that was designed to harvest and critique the ideas of the small groups. Small groups were led by facilitators who had been trained to draw out workshop participants regarding their assumptions, expectations, ethical concerns, attitudes and relevant experience, as well as their perception of potential ambiguities in the scenario. If necessary, discussion was held just in the large group as a whole, but it tended to be less productive because many people are reluctant to speak in a large group. In either case, the discussion highlighted the point that there is usually more than one solution to an ethical problem (including more than one acceptable solution and one or more bad solutions), and that what qualifies as a “good” solution varies with point of view.

In this type of workshop, participants are encouraged to adopt the perspective of the “agent” rather than the “judge” (Whitbeck 1998), that is, to identify various courses of action for each character as if they were that character, and to examine the implications of each choice. Participants are asked to make explicit why a particular course of action may be preferable or unacceptable. General discussion is designed to critique the ideas presented, and to examine the implications of different courses of action both for the individuals in the scenario and for the profession. At the end of the workshop, participants are provided with “A Checklist for Ethical Decision-Making”, a useful tool for evaluating and addressing ethical issues that they might encounter in the future (see Appendix B). This format can be readily adapted (and has been) not only for intra-institutional workshops and departmental seminars in any discipline, but also for professional meetings as part of the program of a professional society.
Not long after the National Institutes of Health called for pre- and postdoctoral trainees to receive formal education in the responsible conduct and reporting of research (National Institutes of Health, and Alcohol, Drug Abuse, and Mental Health Administration 1989; National Institutes of Health 1992), it attempted to identify the elements of effective programs (Glowinski 1993). The six features that they noted were that (1) programs are required, consistent with the notion that students are required to learn what is thought to be essential for the profession; (2) effective programs emphasize interactive discussion, thereby providing an opportunity to obtain experience thinking through problems and cases; (3) many different faculty and senior professionals are involved, demonstrating that the community as a whole values responsible behavior; (4) they include topics relevant to the discipline; (5) programs start early and continue at all levels in the course of graduate and postgraduate education, acknowledging both that standards within the community are evolving, and that, with increasing experience, students and trainees become more sophisticated in their recognition of the complexity of the problems; and (6) professional standards and ethical values are reinforced through a variety of programs and activities from courses to lab meetings to departmental seminars.

The goals and format of RCR workshops that evolved from the MIT Research Practice Seminars are consistent with these features in that they are centered around interactive discussion of a range of topics immediately relevant to research in all disciplines whether engineering, the physical and life sciences, or the social sciences. They can involve junior and senior faculty either from a variety of fields, or a number of faculty from a single department. These workshops can be a required, recurring component of departmental or institutional graduate and/or undergraduate education and are compatible with, and complementary to, RCR education in other formats including formal courses in RCR, RCR modules embedded in core courses, departmental seminars, laboratory meetings, journal clubs, and individual research projects (Bird 1993; 1999; Hirsch et al. 2003). These workshops also incorporate the recent findings of education research and the key tenets of effective adult education (Bransford et al. 2000).
SUMMARY

Teaching the responsible conduct of research is an essential component of the education of researchers. Central to the process, ethical issues must be addressed explicitly—good role models are necessary but not sufficient. Moreover, the involvement of faculty and senior researchers is critical because they provide their expertise and experience in articulating professional standards and values, and in presenting and clarifying their own expectations of their colleagues. They also provide a disciplinary context for the information and emphasize the importance and the legitimacy of the practice of identifying professional values and ethical standards.

Interactive discussion of cases in workshops and courses is the most effective approach and complements other elements of graduate education and postdoctoral training in research, including laboratory meetings, formal courses, and as a part of a research project itself. Students (as well as researchers at all levels) learn from identifying and discussing issues inherent in their own projects (Hirsch et al. 2003; Bird 2004).

Explicit discussions of the responsible conduct of research, the range of ethical issues associated with research, and the professional values and standards of the research community constitute an acknowledgment of the complexity of the issues and the need to address them. Specifically discussing responsible and ethical conduct also reaffirms the responsibility of the community, individually and collectively, to provide this information to its new members. Identifying and examining the ethical issues associated with the application (or misapplication) of research findings emphasizes our responsibility as professionals and as citizens.

NOTES

2  From Swazey and Bird 1995; Weil 1993; Velasquez 1992
REFERENCES AND ADDITIONAL READING


Bird, Stephanie J. (1999) Including ethics in graduate education in scientific research. In J.M. Braxton (Ed.), *Perspectives on Scholarly Misconduct in the Sciences*, Columbus, OH, Ohio State Univ. Press, pp. 174-188.


APPENDIX A - "LATE ONE NIGHT"

Participants: John Palant, Grad Student
Sandra Dunn, Post-doc
Professor Barbara Steel

(After a group meeting on Tuesday afternoon)

Professor Steel: Sandra, you were unusually quiet at group meeting today. I thought you'd planned to discuss the results of your last fractionation. I wanted to go over the data with you this morning, but when I checked at your bench at eleven o'clock you hadn't come in. Is something wrong?

Sandra: No, nothing's wrong. I was reading the gels late last night and I overslept. I have a meeting now outside the building, but I'll knock on your door when I come in tomorrow.

Professor Steel: I'll be here, but try to catch me before lunch. I have appointments most of the afternoon.

(Three days later, in the hallway)

Professor Steel: John, have you seen Sandra? She said she'd stop by on Wednesday to go over her data with me, but I haven't seen her since group meeting.

John: She hasn't been around much during the day, but I know she's been working at night. You know, it's strange. Monday she said she had an idea that might help me find the co-activator for my DNA binding protein. I asked her about it at the meeting, but she said she'd been wrong and I should forget about it. I've been so frustrated the last few weeks that I haven't been coming back in after dinner.

Professor Steel: I know it's been hard, but I'm sure you're on the right track. You found the DNA binding protein; you just need to find the co-activator to make the whole thing work. The changes we discussed at group meeting might do the trick. I've got a committee meeting now. Will you leave a note on Sandra's desk asking her to call me?

John: Sure. I'll let you know on Monday how things worked out.

(Monday morning in Professor Steel's office. A knock at the door.)
Professor Steel: Come in. Oh, Sandra, it’s you. I’ve been trying to reach you for three days. Where’ve you been?

Sandra: Take a look at these. (She hands Professor Steel some papers).

Professor Steel: What are they?

Sandra: I’ve drafted two papers. One describes the work we planned to talk about last week. I realized when I read the gels last Monday that I’d accidentally found the answer to John’s problem. Suddenly, it was clear that we had an entirely new class of DNA binding proteins and their partner-co-activators. I just needed one more experiment to confirm the results.

(Professor Steel quickly reads through the two papers.)

Professor Steel: This is terrific! I can’t believe we didn’t see this before! But Sandra, what about John? Why didn’t you tell him you’d found the answer to his problem? I mean, this is his thesis project. You could have done the last experiment together. He should be included in the final paper too.

Sandra: I don’t think so. I’ve thought about it a lot. I put his name on the first paper because I started with his technique for isolating the DNA binding activity, but the second paper on the co-activator and its implications for all regulation is mine. I want it to stand out in the journal with just two authors.

Professor Steel: I can’t force you to put John’s name on the paper, but I think you should consider it again. I like to think we all work together in this lab. Have you shown these papers to him yet?

Sandra: No. I thought I’d present them at group meeting tomorrow. What do you think?
APPENDIX B- A CHECKLIST FOR ETHICAL DECISION-MAKING²

STEP 1 Recognize and define the ethical issues (i.e., identify what is (are) the problem(s) and who is involved or affected).

STEP 2 Identify the key facts of the situation, as well as ambiguities or uncertainties, and what additional information is needed and why.

STEP 3 Identify the affected parties or “stakeholders” (i.e., individuals or groups who affect, or are affected by, the problem or its resolution). For example, in a case involving intentional deception in reporting research results, those affected include those who perpetrated the deception, other members of the research group, the department and university, the funder, the journal where the results were published, other researchers developing or conducting research on the findings, etc.

STEP 4 Formulate viable alternative courses of action that could be taken, and continue to check the facts.

STEP 5 Assess each alternative, (i.e., its implications; whether it is in accord with the ethical standards being used, and if not, whether it can be justified on other grounds; consequences for affected parties; issues that will be left unresolved; whether it can be publicly defended on ethical grounds; the precedent that will be set; practical constraints, e.g., uncertainty regarding consequences, lack of ability, authority or resources, institutional, structural, or procedural barriers).

STEP 6 Construct desired options and persuade or negotiate with others to implement them.

STEP 7 Decide what actions should be taken and in so doing, recheck and weigh the reasoning in steps 1-6.