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Reported Goals of Instructors of Responsible Conduct of Research for Teaching of Skills

Dena K. Plemmons and Michael W. Kalichman

University of California, San Diego

Abstract

The National Institutes of Health (NIH) training grant requirement to provide training in the responsible conduct of research (RCR) is now more than 20 years old. Implicit in the requirement is that this training will have an impact not only on what trainees know, but on what they know how to do. There is, however, a range of responses about what skills are seen to be necessary for the ethical practice of science. As part of a larger, earlier study examining RCR instructors' overall goals in teaching RCR, we asked 50 RCR instructors from 37 different institutions what their goals were for teaching skills in their RCR courses. The responses about what constituted necessary skills were wide ranging, from a focus on teaching the skill of ethical decision making to the perceived importance of ensuring that trainees understand the importance of the community in some research relationships. This diversity in responses about what skills should be taught in RCR courses is not especially surprising, given the variation in instructors, formats, instruction, goals, and outcome measures for RCR courses, but it does reinforce the necessity of giving more thought to what goals are to be achieved. This is true not only of skills to be learned, but of any other objectives one might have for research ethics teaching and learning.

Keywords

responsible conduct of research; skills; RCR; education; teaching; research context; ethics

A widely accepted assumption is that ethics training/education should have an impact on not only what one knows, but on what one knows how to do. This was implicit in the NIH training grant requirement (National Institutes of Health [NIH], 1994), now more than 20 years old, to provide training in the responsible conduct of research (RCR). In a report of the IOM Committee on Assessing Integrity in Research Environments (Institute of Medicine [IOM], 2002), one of five defined objectives important to promote integrity was that such training would “enable participants ... to develop abilities that will help them to effectively manage concerns related to responsible conduct of research as they arise in the future” (p. 85). The IOM report goes on to cite Mentkowski et al. (2000, p. 10) who had defined abilities as “complex combinations of motivations, dispositions, attitudes, values, strategies, behaviors, self-perceptions, and knowledge of concepts and of procedures.” While there is some evidence that knowledge can be improved through RCR educational efforts (Plemmons, Brody, & Kalichman, 2006; Powell, Allison, & Kalichman, 2007; Plemmons & Kalichman, 2007; Schmaling & Blume, 2009), the evidence for an impact on skills, strategies, and behaviors is confounded because there is no commonly accepted idea for what is meant by teaching skill development: skills to do what?

The skill most frequently studied is the skill of ethical decision making or moral reasoning, which has often been shown to improve (Bebeau et al., 1995; Bebeau, 2002; Mumford et al., 2008), but not always (Heitman, Salis, & Bulger, 2001; Schmalings & Blume, 2009; Antes et al., 2010). However, there are also many other academic skills that may be important to the responsible conduct of research. These include giving effective presentations, writing good papers, performing a successful job interview, or managing stress, time, or people. Should these be part of the discussion of what should be covered in the teaching of research ethics? And where are the boundaries between behaviors (e.g., keeping good records, giving appropriate authorship credit), skills (e.g., having the ability to keep records), and strategies (e.g., the negotiation of competing interests in authorship challenges)?

To better understand the place of “skills” in research ethics courses, we asked RCR instructors about their goals for teaching skills.

Methods

This study was reviewed and approved by the University of California at San Diego Institutional Review Board (Project #040541SX). The methods are described in detail elsewhere (Kalichman & Plemmons, 2007; Plemmons & Kalichman, 2007). The purpose of the broader study from which this paper derives was to better define the status of research ethics education by surveying instructors about their goals for instruction.

Respondents

In brief, the authors contacted 116 principal investigators of training grants awarded in 2002 to ask for names of those who were teaching their NIH-required RCR courses. This yielded successful contacts and interviews of 50 RCR instructors. Figure 1 illustrates the portion of the survey addressing skills goals. The seven items listed under “General Categories,” as well as the open-ended questions, were generated based on responses provided in an initial informal survey of 20 instructors (Kalichman & Plemmons, 2007).

Data Analysis

The data presented below (Figure 2) are means and standard errors of the mean for rankings of each of the seven proposed categories of skills. The authors independently reviewed open-ended responses to questions about skills, identifying common themes, which are summarized below.

Results and Discussion

Responses to both forced choice (ranking of skills) and open-ended (other skills and goals for teaching ethical decision making) survey questions suggested many different ideas about what skills actually are, and what skills can and should be taught in research ethics courses.

Ranking of Skills

In answer to the question “How do you rank the importance of teaching the following skills?” the seven general skills areas were each ranked by 47–49 of the 50 individuals interviewed. One individual did not rank the second category (critical thinking and/or problem solving) because it is “taught separately from RCR in a one day survival course for grads and post-docs,” and another individual did not rank the fourth category (people management) because “[this] is a vague question—these are gaps in understanding. People management vs. not understanding communication.” One respondent didn’t provide rankings for any of the seven general skills areas, replying instead that “Each student learns

differently, by seeing, interacting, doing, etc.” No responses were excluded as unusable, and many (24) of the respondents provided commentary with their rankings.

As seen in Figure 2, the skills given the highest average rankings were “ethical decision making” and “critical thinking,” while stress management was deemed the least important skill to teach in an RCR course, with an average ranking of less than 2. However, not all respondents considered critical thinking skills to be an important emphasis:

- The students can do this themselves.
- These are very intelligent grad students and wouldn’t be here unless they already have this ability. At least we hope this is the case.
- Not really the responsibility of the course.

These respondents expect students to arrive already equipped with this skill—it is expected that the skill of critical thinking will be used in the service of other goals of the course, but critical thinking is not itself a primary goal.

And the final category, “strategies for finding and evaluating RCR information and resources,” drew this response from one instructor: “The wording glorifies the question. We don’t teach strategies, we identify resources.”

Several instructors indicated that people management, stress management, and communication skills are important generally, but not in regard to RCR or ethics. Several respondents indicated that these skills should be taught separately from an RCR course:

- The main course goal is to provide knowledge. These skills are concerned with personality and career development. It’s not that they are less important than knowledge, but they should be acquired elsewhere. I advise students to take an in-depth course in communications, for example, but it doesn’t belong in an RCR course.
- [Stress management] should be a separate course, not related to RCR.
- Since they’re students without seniority or power, there aren’t many alternatives for people management. We don’t emphasize this.

A few respondents did note the importance of teaching communication skills, a goal that was further articulated in responses to the open-ended questions. These responses were varied and multifaceted, indicating both a richness to the goals these instructors have for teaching RCR skills, and some blurring of the distinctions among knowledge, skills, and methods (see Plemmons & Kalichman, 2007).

Other Skills

In answer to the question “Are there any other general categories that should be included?” half of the respondents (25) thought that our list of general skills categories was comprehensive, and two additional respondents merely reiterated categories already provided. Eleven (11) respondents identified *topics*—authorship, data management, animal subjects, grants and contracts—as being “other skills areas” that were important to teach. It isn’t clear why the respondents conceived of these as skills—some of the respondents noted that students didn’t understand or know about relevant requirements and policies in those areas, but this is arguably not a “skills” concern. Conversely, one respondent answered, “Those 9 areas listed by ORI [Office of Research Integrity]—students should have both content and skills in these areas.”

Being able to acknowledge (or simply identify) the community as a vested partner in the research endeavor—with all the rights, obligations, and responsibilities that entails—was noted as a possible additional skill in a few responses, though that skill was messily caught up in ideas about what these instructors want their students to know or grasp:

- Community rights v. individual rights. Understand that research on individuals can impact the community, especially when dealing with environmental health issues.
- To be able to identify appropriate collaborators in the community. To know what organizations there are out there doing this kind of work—either national organizations like Community Campus Partnerships or federal agencies like NIH OBSSR, or other research centers. I want them to know where this stuff is being done and to have a grasp on the literature that comes out of those places.

These comments perhaps imply a necessary relationship between acknowledging the community as a partner in collaborative research relationships, and having the skill to act on that knowledge in appropriate and respectful ways in the design and conduct of such research. At the very least, it is noteworthy that these respondents were effectively acknowledging the relationship between the researcher and a broader social world.

There were several suggestions for “additional” skills that seemed to echo two of the categories listed for ranking: ethical decision making and critical thinking. However, the responses indicate that the instructors thought they were talking about something distinct, referring to a rather large and amorphous area of identifying or recognizing “ethical situations” or applying “ethical principles”:

- Issue identification, which requires a broad overview of the subject matter and experience using it, and applying the rules to the facts.
- To recognize the situations that call for ethical behavior, to know how to deal with those—we really emphasize communication because a lot of the problems ... arise from a lack of communication. Within this framework, making the correct ethical decisions.
- Gain skill to step back and be objective—keep feelings from getting in the way as they think about the ethical response to a situation. Teach objectivity.

Goals for Teaching Ethical Decision Making

In answer to the question “What goals do you have for teaching the skill of ethical decision making?” two of the respondents indicated that teaching ethical decision-making skills wasn’t part of the course, and one respondent answered “none.”

Some of the responses to our second open-ended question were very specific, and directly addressed the issue of goals vis-à-vis teaching the skill of ethical decision making:

- To dissect a situation at a fairly broad level in order to: (1) know the principles that apply; (2) identify the types of questions that come up so they can look for resources and assistance.
- Teaching students to identify the stakeholders in any ethical problem, what those people have to gain or lose based on different decisions that are made, and to maximize the wins for everyone given performance of ethical behaviors.
- To stress the thought process you use in ethical decision making.

One interesting response appears to simply reiterate the process of ethical decision making, so that for this instructor, the goal of teaching the skill of ethical decision making is presumably simply learning the skill of ethical decision making:

- (1) recognize when they have an ethical problem; (2) know how to analyze the problem; [and] (3) come up with strategies for resolving it.

In some responses, the goal for teaching the skill of ethical decision making was to increase “skills” generally, without a very clear articulation of what those general skills might be, although it seemed these instructors thought general skills were necessary:

- To help develop these skills and reinforce them in whatever environment students find themselves in—many are new to the lab setting.
- To generally get students on the right track so they can grow and strengthen their skills.

Additionally, some of the responses seemed to broadly address RCR rather than the specifics of skills in decision making:

- My ultimate goal is to take some of the mystery out of the area of responsible conduct of research and to clarify and set up a certain number of fairly well recognized touchstones and guidelines that students may come away with and say “this is a proper way of handling this issue” or “this is an improper way.” So at the very basic level, it is demonstrating what is acceptable vs. what is not acceptable, what is the experience of the institution and of former students as they face some of the issues of proper conduct of research.
- To be able to enhance student’s abilities to conduct research in a way that is ethical and conforms to policies, but also serves their scientific goals—science of good quality, and integrity. And enhance their careers.
- Greater sense of awareness of the ethical dimension to RCR, that the individual bears considerable responsibility to conduct themselves in an ethical manner with great integrity.

Some responses spoke more to conveying knowledge, not necessarily helping students develop skills:

- Make them aware of policies and regulations.
- Know where to go for clarification.
- To provide them with enough background information that they can seek counsel and have a rough idea of how to go about it.

Relatedly, many responses indicated that these instructors were thinking more of how they teach ethical decision making, not necessarily why they were teaching ethical decision making. Even many of those who were able to address why they were teaching ethical decision making skills also mentioned how. It’s not impossible to tease out the goals part of these answers, but it is interesting how often those were subsumed in the how:

- To facilitate their ability to make ethical decisions, do this through case studies to give them experience with situations.
- To begin learning the skills of ethical decision making through the generation of discussion, debating outcomes, case examples, and using resources that we present in class to come to a conclusion on them. It’s a case based approach—knowing when an ethical issue arises, looking at the problem, knowing where to go and what resources there are, what basic rules there are, to discuss the points and come to an ethical conclusion.
- Do this through didactic teaching, classroom interaction, and field experience.

- We incorporate case studies as much as possible to try to get people to think about some of the complications.

We suspect that these instructors teach the skills via teaching the information, and often use skill-oriented learning to convey knowledge.

And, as we discovered in our analysis of instructor goals for teaching knowledge (Plemmons & Kalichman, 2007), a few responses often seemed more an expression of hope rather than expected outcomes from something planned, directed, and intended:

- A broadening of their attitudes, understanding, and sensitivity for what kinds of things should be considered when making these kinds of decisions.
- Another goal is raising the level of accountability and again this isn't something you can turn around and teach very easily.
- To decrease the amount of unethical behavior going on in the world.

Ethical Decision Making

Some instructors responding to the open-ended question about goals for teaching the skill of ethical decision making didn't always answer about goals per se. Some responses were about *conveying knowledge* and about the methods used for teaching. Other instructors answered the question about the goal of teaching the skill of ethical decision making by simply describing a *process* for ethical decision making. While it is possible that the question was not sufficiently clear, it may also be that these instructors were unclear about what it means to teach the skill of ethical decision making or what that might look like, in both approach and outcome.

This is where we might step back and ask whether learning how to make an ethical decision should be a primary goal of research ethics courses. Since measures of ethical decision-making ability tend to increase with age and education (e.g., Rest, Davison, & Robbins, 1978; Rest & Thoma, 1985), and since graduate students and postdoctoral researchers tend to be particularly skilled in critical thinking, it is worth considering the possibility that the skill of ethical decision making is not one that warrants our primary attention. The fact that this skill can be increased in adult learners (Rest et al., 1978) should not be confused with whether further education in such a skill is in fact needed or, if it is needed, that the resulting change is of enough magnitude to justify the enterprise of RCR teaching.

Therefore, is teaching the skill of ethical decision making enough reason for teaching courses in research ethics? Alternatively, is it possible that this skill should not be taught as an end in itself, but in the service of some other, larger goals, if at all? It may be, in fact, that a modest increase in the skill of ethical decision making is all that might be accomplished with a brief course or workshop. If so, it is important to question whether that is sufficient rationale for dedicating the time and resources needed.

If ethical decision making is not the primary skill, or one of the primary skills, to be taught, then what should be? One possibility is the skill of people management. However, as noted above, one individual stated: "Since they're students without seniority or power, there aren't many alternatives for people management. We don't emphasize this." Several questions might be asked about this statement, but perhaps the most fundamental is: If not now, in a course about conduct in science, then when and where? And if it's true that students have no power, are there ways to help give them some power through knowledge, skills, resources, etc.? Perhaps research ethics courses should help students recognize and exercise the limited power they do have to make good choices—and not just ethical decisions, per se? And if courses were designed with this goal in mind, would our focus be best characterized as

separate from and in addition to imparting knowledge and skills? Or are all of these components inextricably bound to one another? How can we, in our teaching, pay attention to the interplay of knowing and doing, and especially in ways that acknowledge the more implicit skills that we must have as scientists?

Enskillment

We noted previously (Plemmons & Kalichman, 2007, p. 63) the “perceived inter-relatedness of goals specific to knowledge and those which are directed toward teaching skills or changing behavior. These responses suggest the inextricability ... of knowing and doing.” The responses summarized in this article reinforce this perceived relationship between knowing and doing when it comes to research ethics education. Perhaps it is useful here to consider *enskillment* as defined by anthropologist Tim Ingold (1993, p. 463): “a process ... in which learning is inseparable from doing, and in which both are embedded in the context of a practical engagement in the world”; a related and useful idea is that of “understanding in practice” (Lave 1990) and situated learning, where knowledge comes not from simply being a passive recipient of speech or text but from engaged and active practice in a particular context. Further, Ingold (1993, p. 462) has this to say about teaching and learning knowledge and skills:

The novice becomes skilled not through the acquisition of rules and representations, but at the point where he or she is able to dispense with them. They are like a map of an unfamiliar territory, which can be discarded once you have learned to attend to the features of the landscape and can place yourself in relation to them. The map can be a help in the beginning to know the country, but the aim is to learn the country, not the map.

While we aren’t proposing to abandon the map, or the rules, completely, it is noteworthy that we often do not have good maps for much of what we do in science, and the rules aren’t rules at all, but guidelines. The important learning takes place when what we want our students to know is taught in conjunction with what we want them to know how to do, and this kind of learning may not necessarily best happen in a classroom. A brief letter in *Science* (Peiffer, Laurenti, & Hugenschmidt, 2008, p. 1186) echoes the need for a better contextualized knowledge/practice goal, specifically identifying laboratory behavior as a “hidden curriculum” in science, and advocating for having discussions about ethical practice take place in the research context. This particularly contextualized space of science, with the everpresent stress of time constraints and demands of different relationships, might indeed be the point at which knowing good science and doing good science become one and the same; one learns not just “things” but also how to manage time/people/stress in the process of making use of what has been learned.

If these skills are in fact important, then some of the instructors’ responses to questions about time, stress, and people management were discouraging. Many instructors found no need, for instance, to teach communication or stress management skills in RCR courses. While it is also true that these instructors weren’t denying a general importance of these skills, there didn’t seem to be recognition that leaving these skills to be taught in courses outside of an RCR course not only divorces them from the scientific context but also doesn’t guarantee that the ethical implications of time management, stress management, or people management will be conveyed along with the practical reasons for training in these areas. In other words, we argue that it’s not simply having the skills that matters. Being taught about the importance of time management or stress management or communication skills by the scientist who is teaching you about ethical research is presumably a different matter than being taught how to communicate in a communications course.

Arguably, there is a risk in compartmentalizing or fragmenting the pieces of knowing good science and doing good science. To some extent distinguishing knowledge from skills is problematic. “Abilities,” as defined above by Mentkowski et al., are “complex ... dynamic and interactive ... acquired and developed through both education and experience” (Mentkowski, Loacker, & O’Brien, 1998, p. 13). Importantly, the authors note that the word “skill” could substitute for abilities, but only if “there is no dichotomy between knowledge and skill, and skills are defined and discussed in the context of learning in the disciplines” (2000, p. 10). This reaffirms the sense that the relationships between knowledge/practice, and learning/ doing, are essential to ethical science. Perhaps the best model for our students is to teach about the ethical dimensions of science in the places where we do our science.

Educational Implications and Research Agenda

An essential outcome of research ethics education should be that students learn how to situate themselves in the larger landscape of science, and come to see themselves as practicing within a complex web of relationships, each with its own responsibilities and rights. This is where context becomes tremendously important—the classroom is certainly not the only place for students to come to recognize themselves as part of those relationships, nor is it simply enough to learn the practice of their science. The practice of science includes not just methodology and analyses, but the creation, negotiation, and care of relationships with many different kinds of others. Many responses to our open-ended question about what other skills should be taught highlighted, some perhaps inadvertently, this social context of science, recognizing that research is not typically done by a lone scientist devoid of contact with a wider audience. It is arguable therefore that the research environment is an especially salient, and perhaps essential, arena for learning about ethical practice.

If the research environment is seen as important, we might focus more effort on teaching faculty, across a wide range of disciplines, how to take advantage of already occurring and discipline-specific contexts for learning. Journal clubs, research meetings, and one-on-one mentoring are all opportunities to incorporate conversations about the ethical implications, for example, of methods, results, approaches, and relationships. This “hidden curriculum,” as described by Peiffer and colleagues (2008), is a space that has a particular context, and where the necessary skills might be best observed and learned. This approach has been advocated in proposals to integrate ethics education across the entire curricula of a university (Davis, 2004) and, more specifically, to an engineering lab environment (Herkert et al., 2009).

A strength of these approaches is that conversations about the ethical implications of doing science or being a scientist are not divorced from the science per se, and that the student comes to know that their PI is someone with whom she can talk about ethical practice, rather than solely in an isolated course. With a view to teaching research ethics in the context of the research environment, we recently consulted with RCR leaders from across the country to design a curriculum for faculty to train them to do this kind of contextualized teaching in the research environment (Kalichman & Plemmons, in progress). We identified five approaches of potential value across diverse disciplines and in many kinds of research contexts. The hope is that these will serve as effective starters for conversations about research ethics. Workshops to train faculty in using these approaches are being developed and the impact on conversations in the research environment will be assessed.

Best Practices

The teaching of RCR is increasingly a topic of conversation and concern throughout academia, but we remain far from consensus on the most basic questions of what we are

trying to accomplish and how best to achieve our goals. As noted here and previously (Kalichman & Plemmons, 2007; Plemmons & Kalichman, 2007; Kalichman, 2007), the variation in instructors, formats, instruction, goals, and outcome measures makes it difficult to talk about best practices. Defining the goals of RCR education remains the first and most fundamental need (Plemmons & Kalichman, 2007). While it seems self-evident that this most basic expectation, to set goals, should be our leading concern, there is no reason to believe it is common practice. Under the circumstances, if there is any one best practice we would encourage, it is to begin by giving more thought to what goals are to be achieved. This is true not only of skills to be learned, but of any other objectives one might have for research ethics teaching and learning.

Conclusion

The purposes for which we teach research ethics are diverse: to have impacts on knowledge, skills, attitudes, and/or behavior. The extent to which the enterprise has been successful in any of these domains remains unclear, but certainly one important goal is to have an impact on the abilities or skills of researchers. While the findings of the present study do not resolve which skills should be the purpose of our teaching, a first step to finding answers is to recognize the fundamentally important, but still highly diverse, perspectives found within the community of RCR teachers.

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Biographies

Dena Plemmons has been teaching and conducting research in the area of research ethics for the past several years, having made a mid-career shift from her field of anthropology. She works in the Research Ethics Program at UCSD, and is also the Director of the Division of Research Affairs at San Diego State University. She collaborated with Michael Kalichman on the data analysis and writing of the manuscript.

Michael Kalichman is the founding Director of the UC San Diego Research Ethics Program in 1997. Beginning in 1999, he created a Web-based resource to help institutions develop programs of instruction in the responsible conduct of research (<http://research-ethics.net>) and leads NIH- and NSF-funded research on the goals, content, and methods for teaching research ethics. He was responsible for the design and oversight of the research, supervised data collection, and collaborated with Dena Plemmons on data analysis and writing of the manuscript.

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QUESTIONS ABOUT GOALS OF INSTRUCTION

6A. If SKILLS are defined to include proficiencies or abilities, how do you rank the importance of teaching the following skills areas?

General Categories

1. Ethical decision making _____
2. Critical thinking and/or problem solving _____
3. Conflict resolution, arbitration, and/or mediation _____
4. People management _____
5. Stress management _____
6. Communication skills _____
7. Strategies for finding and evaluating RCR information and resources _____

6B. Are there any other general categories that should be included? (specify)

6C. What goals do you have for **teaching** the skill of **ethical decision making**?

FIGURE 1.
Questions about Skills Goals for RCR Instruction.



FIGURE 2.
Average Scores for Rankings of 7 Different Categories of Skills Goals for Training in RCR.
The error bars represent the Standard Error of the Mean.