A Modest Proposal to Move RCR Education Out of the Classroom and into Research

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Requirements for training in responsible conduct of research have significantly increased over the past 25 years, but worries about the integrity of science have only intensified. The approach to training has relied largely on short-term experiences, either online or in person. Even if done well, such strategies remain separate from, and a negligible fraction of, the practice of research. A proposed alternative is to empower faculty, postdoctoral fellows, and graduate student leaders to foster conversations about research ethics in the research environment.

INTRODUCTION

Concerns about the integrity of the research enterprise have been raised for many years (e.g., 7, 8, 13, 18). One proposed remedy has been to promote training of new scientists in responsible conduct of research (RCR). This has been tried now for approximately 25 years (14, 23), beginning with a National Institutes of Health (NIH) requirement for RCR training (19) and more recently with a National Science Foundation (NSF) requirement (21). However, rather than having ensured the integrity of research, it is apparent that considerable room for improvement remains (1, 17). Presuming that there is a role for education in preparing new scientists with knowledge, skills, and attitudes consistent with ethics, then the questions to be asked are: What has gone wrong? And what might be done to do better?

CURRENT RCR EDUCATION

To meet federal requirements for RCR training (19, 20, 21), the research community has largely chosen between two models. The first is an “in person” format, typically in the form of courses, seminars, or workshops (e.g., 6, 11, 16). The second is an online training approach. The most widely used online tutorial is provided by the Collaborative Institutional Training Initiative (CITI) program (4). Each approach has its advantages. Well-designed “in person” programs can promote active learning, offer practice in negotiating difficult questions, and provide exposure to different viewpoints. On the other hand, online training is readily scaled up so large numbers of individuals can be exposed to a common core curriculum, meet their training requirements at any time without needing to wait for the next scheduled course or workshop, and readily be certified and tracked. While each of these approaches to RCR training has many of its own limitations, they share a significant flaw: both lie outside the context of the actual practice of research.

The problem with courses and online training is easily recognized when looked at as a question of time. Using current NIH guidelines (20), trainees should participate in a program of no less than eight hours and no less frequently than once every four years. Conservatively, graduates students or postdocs work in their research area for 2,000 hours per year or 8,000 hours over a four-year period. In those four years, a recommended RCR training of eight hours means that these trainees would spend 99.9% of their time experiencing and learning standards of conduct of research in settings other than any training they might receive to meet the RCR requirement.

Three amendments to this observation are sobering in other ways. The first is that if the experience of the research environment is one that devalues aspirations to the highest standards of research integrity, then it is probably naive to think that a single course will reverse the lessons being learned. The best that might be hoped for is to plant seeds of idealism in the next generation of scientists. However, those seeds may either fail to thrive in an inhospitable environment, or grow to be misguided and cynical. There is some data to support this hypothetical result, including some evidence for negative outcomes of courses (3, 10, 12, 22) and a stronger connection between behavior and the research environment than courses (2, 3, 9).

A second possibility is that some, even if not all, research environments are ones that explicitly draw
attention to RCR and its importance. The good news is that when this occurs it would mean a decreased risk of mismatch between a course and the experience of research. However, despite other advantages (e.g., cross-disciplinary discussion), this would also mean a decreased need for having RCR courses.

In addition to the possibilities that research mentors (note: although research advisors or supervisors are not always also good mentors, these terms are used synonymously here) will provide a particularly bad or particularly good training in research integrity, there is a third possibility: research mentors might say little or nothing about these topics. This is certainly plausible for many reasons: e.g., lack of rewards for effective mentoring, not enough time, lack of caring or interest, lack of knowledge. And, unfortunately, data suggest that this is in fact the case for many trainees (5, 10, 24). If faculty are failing to incorporate discussion of the ethical dimensions of science into their research environments, then encouraging faculty to take on this role may be a valuable adjunct to other approaches to promoting RCR.

**PROPOSED SUPPLEMENT TO RCR EDUCATION**

An ongoing NSF-funded project (15) was designed to help research faculty take a more active role in introducing conversations about RCR into the research environment (e.g., 25). The project began with a three-day conference during which a group of invited research ethics experts came to agreement about goals, content, and approach for workshops to better prepare faculty as RCR mentors. The resulting principles were incorporated into a draft syllabus, which was then refined based on review by the panel of research ethics experts. The workshop has now been taught for a wide variety of audiences in multiple institutions. However, while it was well received by the faculty participants, the number of faculty interested and willing to attend the workshop has been disappointingly small. In the final stages of the project, we will be (a) looking for ways to increase faculty interest in participation and (b) accumulating follow-up data on trainees to assess the impact of their faculty mentors having participated in the workshops. Unfortunately, based on what has been learned to date, this approach is most likely to be of use and interest only to a small subset of faculty: those already most attuned to and interested in promoting RCR.

Is it possible to reconcile the need to introduce RCR into the research environment with the experiences noted above? Although few would argue that there is a single solution, current approaches appear to be insufficient. An alternative, not tried to the knowledge of this author, is to institutionally empower students, postdocs, and faculty to establish ongoing activities that both (a) underlie the important connections between science and ethics and (b) are socially attractive. To do so may seem an insurmountable challenge. However, there may be a path to success defined by those trainees and faculty who are most attuned to and interested in promoting RCR.

While there are likely many ways the proposed goals might be accomplished, the following is a brief outline of one approach based on recruiting individuals highly motivated to pursue questions in research ethics:

1. “Train-the-Leader” course taught annually for up to 15 trainees (graduate students and postdocs) and faculty mentors.
2. Participants to be selected on a competitive basis and drawn from diverse disciplines; trainees paired with faculty mentors from their discipline.
3. Rigorous curriculum to address: 1) what is known about RCR education, 2) learning of advanced RCR knowledge and skills, and 3) methods for promoting conversations with peers about RCR.
4. Participants prepared to launch efforts including, but not limited to, journal clubs, book clubs, movie nights, a blog, or Facebook page for their peers.
5. Participants, with help from faculty mentors and course instructor(s), develop sustainable activities to engage their peers in discussions about RCR. (Note: Faculty mentors would serve a variety of possible roles on a case-by-case basis. These might include: assistance with finding support for proposed activities, planning and identification of topics to be covered or approaches to be used, facilitation of discussion, etc.)

It is plausible that such efforts could produce a cascading effect, drawing others throughout the institution into conversations about the ethical challenges of research, and thereby increasing conscious attention to RCR and ethical practices in science.

**NEXT STEPS**

Given the apparent need to foster a culture more hospitable to research integrity, it is worth testing approaches that would strengthen the current RCR education model. At UC San Diego, we will be testing models that might serve to move conversations about ethics and science from the classroom into the research environment. We invite other institutions to join us in trying similar approaches or developing alternative methods to framing ethics less as a required course and more as the foundation of doing good science.

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**DECLARATION OF INTEREST**

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