A Plea for Pursuing New Dimensions of Assessment in the Teaching and Learning of Research Integrity

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Our basic thesis is simple: There are abundant research opportunities involved with the need to assess the teaching and learning of research integrity. In one sense this thesis is a cliché. Research opportunities are abundant everywhere; more research can be conducted on almost anything and everything—even in quite narrowly defined areas such as the quantitative assessment of teaching and learning about research integrity.

It is nevertheless possible to interpret our thesis in a broader and more provocative sense and to argue for breaking out of a restricting if well established, four-sided system of constraints. The teaching and learning of research integrity is, after all, concerned with integrity—from the Latin integritas, which signifies not only purity or correctness but also and more fundamentally soundness or completeness, the undiminished or unimpaired wholeness of a thing. Integrity is related to *integritas,* bringing together. There is more to ethics than what has been going on in research ethics, and research ethics will profit from more extensive connections than heretofore pursued.

Before making an effort to move beyond the constraints, it will be useful to describe in slightly greater detail the two-dimensional box in which this issue of assessing the teaching and learning of research integrity is currently confined.

Narrow Interpretations of RCR Education

It is increasingly common at research universities to teach courses or modules on research integrity or the responsible conduct of research (RCR)—as is now required by National Institutes of Health and Public Health Service grant award guidelines, and as has been reported more generally in Michael Davis (1). To date, however, efforts to measure the effectiveness of RCR curricula have been limited if not anecdotal. Nicholas Steneck's bibliographic background report for the present proceedings volume begins to identify such limits (2), although he is not as critical as we are of the present state of affairs.

Constituting a first restriction, the whole literature on research integrity is highly concentrated in the biomedical field. There are modest exceptions, but the most prominent instances of teaching and

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learning about RCR—and thus of possibilities for RCR assessment—are found in the health care fields, from general medicine to dentistry and diverse medical research specialities. Given the emphasis on informed consent issues in both research and clinical practice, and the public profile of regulations related to the treatment of animals in research, this is perhaps to be expected. It need not, however, be accepted without question.

A second restriction is that research ethics teaching focuses heavily on what may be termed internalist over externalist issues. Issues concerned with doing things right crowd out all discussions about what might be the right things to do; process overshadows substance. Questions of precisely how to handle data management, treat human and animal subjects, pursue publication, deal with conflicts of interest, and mentoring protocols dominate, at the expense of critical reflection on the proper ends to pursue with these methods (see the NIH Bioethics Resources on the Web at nih.gov/sigs/bioethics/researchethics.html, especially the NIH supported link to Resources for Teaching Research Ethics at medicine.ucsd.edu/research/ethics/resources).

Still a third restriction is that although formal RCR instruction obviously raises questions about whether such teaching makes a difference—whether it reduces research misconduct—confirming evidence remains slight. In fact, there is scant agreement even on the immediate goals of RCR teaching and learning, thus making it difficult to decide what would count as evidence for or against short- or long-term success. In consequence, many assessments of RCR education have produced ambiguous results.

Finally, a fourth restriction is that what unambiguous assessment results do exist have relied almost exclusively on the utilization and adaptation of two specific instruments, the Defining Issues Test (DIT) developed by James Rest (3) and the Sociomoral Reflection Measure (SRM) developed by John Gibbs (4), both of whom had studied with, and in their work attempted to more readily operationalize moral development theorist Lawrence Kohlberg's Moral Judgment Interview (MJI). A clutch of studies generated by Muriel Beabeau at the University of Minnesota and her colleagues (5-7) and Donnie Self at Texas A&M University and his colleagues (8-10) all observe measurable if modest correlations between ethics education and moral reasoning skills, and some possible implications for attitudes or behaviors. Michael Kalichman and colleagues at the University of California at San Diego (11, 12) have developed an independent instrument that shows similar correlations, although other studies (13) raise doubts about the full significance of such correlations.

No doubt partly as a result of the restrictions in, if not the inconclusiveness of, existing assessments, it has been argued that the goals of ethics education should not be attitudes or behaviors at all but simply skills and knowledge (14). Indeed, the most common classroom assessments of research ethics teaching emphasize solely the learning of ethical reasoning skills, with little attempt to gauge the potential for long-term changes in behavior. Arguments have even been made to the effect that much more effective than RCR teaching in the promotion of scientific integrity would be the establishment of clear behavioral guidelines followed by some form of monitoring such as data audits (15). When education fails, try social control.

Broader Interpretations of RCR Education

Quantitative assessment of teaching and learning about research integrity in the academic classroom is thus boxed in on four sides. Such constraint reflects the analytic and reductionist strategy of modern scientific methodology, which is based on the demand for and promise of metrical results; this is a strategy that must continue to be pursued. At the same time, there is no need to completely restrict approaches to such a flat plane. Indeed, especially given the wealth of issues associated with moral education, there are grounds for stepping beyond such constraints—that is, for expanding our horizons in the assessment of the teaching and learning of research integrity.

First, boundaries may be extendend slightly by recognizing the limits of particular instruments such as the DIT and SRM. One modest movement in this direction would be to consider the relevance of other instruments for assessing cognitive or intellectual development such as the Reflective Judgment (RJ) scale developed by Patricia King and Karen Kitchener (16) on the basis of the work of William G. Perry, Jr. (17). It may be noted, for instance, that the RJ instrument has been pioneered at the Colorado School of Mines (18) and repeated at Pennsylvania State University (19) as a tool to assess the intellectual development of engineering students. Although not focused on moral development, RJ has potential implications for ethics learning that deserve exploration.

Second, precisely because RCR education raises research questions about long- as well as short-term effectiveness, the goals of the teaching and learning about research integrity should themselves become themes for research. This would constitute, as it were, an initial step off the flat place of quantitative research. Research into goals, as opposed to research on the effective implementation of goals, calls for more than quantitative or empirical study. It calls for historical and philosophical analysis and reflection. It may be noted, for instance, that current assessment strategies tend to carry forward, more or less uncritically, the applied ethics movement that arose during the 1980s.

At the very beginning of this revival Daniel Callahan (20) proposed five goals for the teaching of ethics in higher education: (a) stimulating the moral imagination, (b) recognizing ethical issues, (c) eliciting a sense of moral obligation, (d) developing analytic skills, and (e) tolerating and reducing disagreement and ambiguity. Viewed against the background of the analytic meta-ethics dominant at that time, these were all worthy and even modestly revolutionary goals. Historically, however, the focus has increasingly narrowed to simply developing analytic skills. The teaching and assessment of research ethics has largely accepted this narrow inheritance, as is reflected in the very terminological emphasis on "responsible conduct of research." Philosophically, there are even deeper historical issues to be raised if RCR education is examined in the light of such classic reflections on the moral life as those present in the works of Plato, Aristotle, and Augustine, not to mention the Upanishads, the Sutras, the Torah, or the Gospels.

Third, reflective reconsideration of the goals of teaching and learning about research integrity may stimulate recognition that as much if not more pertinent teaching and learning goes on outside the classroom as well as within it. This recognition may, in turn, promote a search for ways to assess meta-classroom learning. One meta-classroom context is the professional association. Yet lack of assessment is also common among scientific professional societies. Although most societies have codes of ethics that clearly bear on research integrity, Mark Frankel, director of the Scientific Freedom, Responsibility and Law Program at the American Association for the Advancement of Science (AAAS), has concluded that few scientific societies are able to tell whether these codes are working (21, 22).

Finally, extending such reflection even further, it reasonably may be argued that such internalist issues as data management, the treatment of human and animal subjects, publication protocols, conflicts of interest, and mentoring standards cannot in reality be separated from the focused externalist issues of science and technology policy. Indeed, international recognition of the immoral behavior of some members of the medical research establishment during World War II stimulated adoption of the Nuremburg Code for free and informed consent in human subjects research; political concern in the United States during the 1980s about the improper behavior of scientists using public funds has been one of the primary drivers to promote RCR education. Surely both of these historical points deserve to be taught along with the norms of data management and peer review.

Three (Intentionally Provocative) Suggestions

Without attempting to draw definitive conclusions from this four-fold unsystematic expansion of the RCR educational context, we would like to pose three summary pleas for the pursuit of new dimensions in assessing the teaching and learning of research integrity. In this way we seek to make common cause with others such as J. Andre (23) who have also called for not limiting professional ethics courses to moral reasoning analyses.

First, in light of the public policy roots of RCR education and the larger philosophical and religious traditions of ethics, is it appropriate to focus on reasoning or analytic skills in ways that slight attitudes and behavior? Would it not be possible to develop, for instance, an instrument for assessing cynicism and idealism among students, and indeed to attempt to counteract a too common passive cynicism? Social idealism is an honorable heritage of the scientific tradition, as exhibited by scientific leaders from Francis Bacon to Albert Einstein. In a talk to scientists and engineers at the California Institute of Technology in 1931, for instance, Einstein argued that

> Concern for man himself and his fate must always form the chief interest of all technical endeavors . . . in order that the creations of our mind shall be a blessing and not a curse to mankind. Never forget this in the midst of your diagrams and equations (24).

Contemporary witnesses to this tradition of idealistic science can be found in the public interest activism of International Pugwash founding member and Nobel Peace Prize winner Joseph Rotblat (25) as well as SunMicrosystems co-founder Bill Joy (26). Introduction to such moral heros of what may be termed scientific social idealism should not be slighted to carve out time for parsing moral dilemmas in conflict of interest or authorship adjudication, as important as these may well be.

Second, does research ethics need to be conceptualized as distinct from engineering ethics, as it has been so far? Does the engineering/science separation not perpetuate stereotypes of the pure scientist versus the applied engineer—images at odds with reality in a world in which virtually all science is dependent on complex technological instrumentation? Moreover, is it not the case that scientists have something to learn from engineers regarding ethics? Long before scientists, engineers formulated ethics codes at the beginning of the 20th century; they also began taking them into the classroom well before scientists (26).

In the engineering education community today, considerable attention currently is being given to ABET Criteria 2000, the new set of accreditation guidelines developed by the Accreditation Board for Engineering and Technology (available at www.abet.org). Criterion 3, for instance, contains 11 attributes that graduates should possess, including "understanding of professional and ethical responsibility." Many engineering programs are developing methods to assess student progress in this area, including the use of such instruments as the DIT. There are also unexplored possibilities for assessing teaching and learning in engineering ethics by correlating results from the Fundamentals of Engineering (FE) and Professional Engineering exams required of all professional engineers.

Research integrity should not be separated from academic integrity in the research university setting. The practical RCR educational potential of student honor codes–some specific to schools of engineering–perhaps deserves as much attention as relations to engineering ethics codes.

Finally, does the assessment of teaching and learning itself not also deserve some assessment. An assessment of teaching and learning assessment requires both community engagement and critical analysis. The practice of any assessment should be guided by the principles developed by the Assessment Forum of the American Association for Higher Education (28), which include the following:

- Assessment is most effective when it reflects an understanding of learning as multidimensional, integrated, and revealed in performance over time.
- Assessment works best when the programs it seeks to improve have clear, explicitly stated purposes.
- Assessment works best when it is ongoing.

It is our contention that assessing of the teaching and learning of research integrity has only begun. This is true not only in the narrow senses associated with quantitative investigation of RCR, but also in the much broader senses of attempts to develop relations between RCR and idealistic science activism, engineering ethics and academic codes, and the reiterative assessment of assessment itself.

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