# NSF and Ethics Education in Science and Engineering

Professional Development Workshop–
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## Science and Engineering Ethics Education: Recipes for Success

Philip J. Langlais, Ph.D.

Vice Provost for Graduate Studies & Research

Old Dominion University

# "Ethical Problems in Academic Research" Swazey JC, Anderson M, Lewis S, *American Scientist*, 31:543-553, 1993.

Survey of 2,000 doctoral candidates and 2,000 of their faculty in chemistry, microbiology, civil engineering and sociology

- Approx. 50% of faculty and 44% of students had "exposure" to misconduct or misbehaviors
- Nearly 43% of the faculty knew of peers making inappropriate assignment of authors
- Almost 50% of students and faculty either observed or had direct knowledge of faculty exploiting others
- Marked disciplinary differences were observed among the misbehaviors and misconduct as well as the ways in which these problems were dealt with.

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# "Scientists Behaving Badly" Martinson, B.C., Anderson, M.S. and de Vries, R., *Nature*, 435:737-738, 2005

Surveyed: 3,409 mid-career scientists-1,768 responded (52% response rate) and 3,475 early career scientists-1,479 responded (43% response rate).

- 15.5% admitted to changing design, methodology or results of study in response to pressure from a funding source.
- 15.3% had dropped observations or data points from analyses based on a gut feeling they were inaccurate.
- 27.5% had inadequate record keeping related to research projects.
- Overall, 33% of respondents said they had engaged in at least one of ten top "mis-behaviors" in the past three years.

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# AMERICA Competes Act, signed into law in 2007

**SEC. 7009. RESPONSIBLE CONDUCT OF RESEARCH.**

- The Director shall require that each institution that applies for financial assistance from the Foundation for science and engineering research or education describe in its grant proposal a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduate students, graduate students, and postdoctoral researchers participating in the proposed research project.

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# New NSF Requirements

- **Effective January 4, 2010** all *new* proposal submissions must certify that the institution has in place an RCR training & oversight plan for undergraduates, graduate students and postdoctoral researchers supported by NSF.

- Training plans need not be submitted with the proposal, however, they must be provided for review upon request.

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# New NSF Requirements

- Institutions are responsible for verifying that their undergraduate students, graduate students and postdoctoral scholars receive training.
- Institutions are provided maximum flexibility in creating and implementing RCR programs to meet this new requirement.
- These requirements do not apply to existing NSF awards.

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# New NIH Requirements*

**Effective Jan. 25, 2010** all trainees, fellows, participants, and scholars receiving support through any NIH *training, career development award (individual or institutional), research education grant, and dissertation research grant* must receive instruction in responsible conduct of research.

- Substantial face-to-face discussions - faculty training & participation - substantive contact hours between the trainees/fellows/scholars/participants and the participating faculty/mentors/

*http://grants.nih.gov/grants/guide/notice-files/NOT-OD-10-019.html

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# New NIH Requirements

**Subject Matter**:

- conflict of interest – personal, professional, and financial
- policies regarding human & animal subjects, and safe laboratory practices
- mentor/mentee responsibilities and relationships
- collaborative research including collaborations with industry
- peer review
- data acquisition and laboratory tools; management, sharing and ownership
- research misconduct and policies for handling misconduct
- responsible authorship and publication
- the scientist as a responsible member of society, contemporary ethical issues in biomedical research, and the environmental and societal impacts of scientific research

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# Factors Affecting Establishment of Effective RCR Training Programs

- Faculty Workloads
- Institutional Priorities & Reputation
- Promotion & Tenure criteria
- Competition for funding
- Pressure to publish frequently
- Cultural and Disciplinary Diversity
- Resources

Chron Higher Ed, 2004

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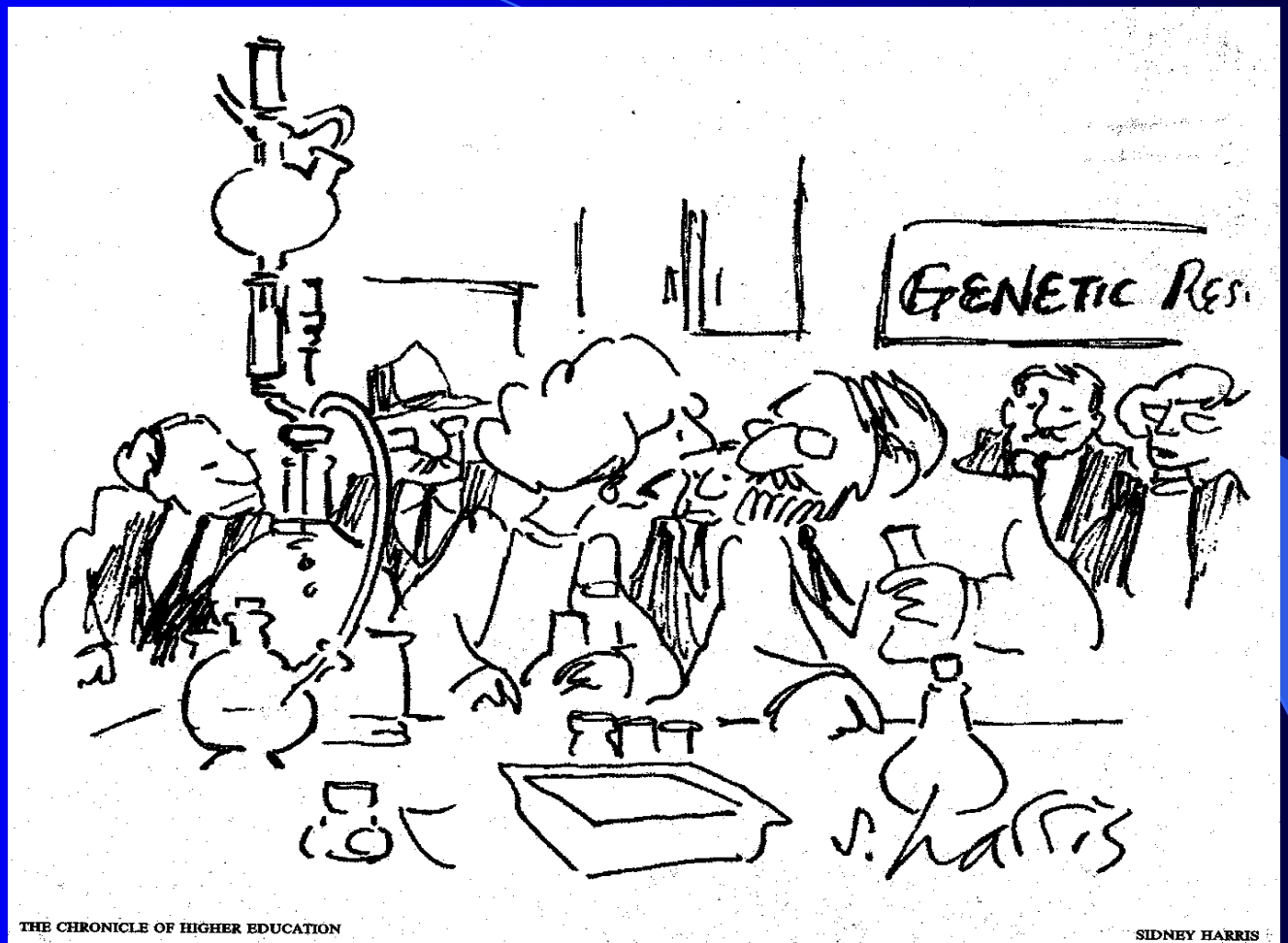


THE CHRONICLE OF HIGHER EDUCATION

SIDNEY HARRIS

*"I find it harder and harder to get any work done with all the ethicists hanging around."*

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# Keys to Success

- Commitment of faculty and upper administration
- Fair and consistent application of rewards and punishments
- An RCR Committee of faculty , students and staff that develops and implements a comprehensive institutional program that:
  - Guides RCR training at both university and departmental levels
  - Covers a wide range of regulatory, professional, financial and ethical topics
  - Promotes widespread sharing of effective tools and resources
    - Formal courses, Seminars & Workshops
    - Web-based tutorials, Lecture series
  - Provides training programs for RCR instructors and for faculty mentors (PFF, PFP)

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# RCR "Best Practices"

- University RCR Education Committee – Supported by the Provost and Chief Research Officer
- Two-tiered instructional program:
  - University (Grad School, Research VP, Grants & Contracts)
  - Department/School/College
- Establish formal university-wide programs that:
  - Assess & discuss current RCR practices and attitudes
  - Cover a wide range of regulatory, professional, financial and ethical topics
  - Involve faculty and students from different disciplines
  - Promote widespread sharing of effective tools and resources
  - Use a variety of delivery methods (one size does not fit all)
    - Formal courses, Seminars & Workshops
    - Web-based tutorials, Lecture series

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# RCR "Best Practices"

- Strong emphasis on Mentoring, the Research Environment and Culture:
  - Establish a clear set of expectations of what mentors are to accomplish
  - Establish clear set of policies and procedures for dealing with FFP, QRPs, and "whistleblowers"
  - Expose students and post-docs to more than one mentor
  - Shared responsibility among instructors, mentors and administrators
  - Provide training programs for RCR instructors and for faculty mentors (PFF, PFP)

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# Specific Approaches

Establish an RCR Committee/Task Force that is supported by Academic Affairs and Research Office and composed of respected faculty researchers/scholars/investigators, students and administrators from across the institution.

Charge the RCR Committee with the following:

- Assessing institutional and departmental attitudes, perceptions and practices in RCR training – use findings to inform and guide development of an institutional training program.
- Guiding RCR training at both university and departmental levels
- Promoting widespread sharing of effective tools and resources
  - Formal courses, Seminars & Workshops
  - Web-based tutorials, Lecture series

Provide training programs for RCR instructors and for faculty mentors

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# Specific Approaches

:

- Make RCR Training a University requirement
  - Students, postdocs and faculty supported by NSF or PHS grants
  - All students conducting theses or dissertations
  - All graduate students and honors students
- Establish an introductory level of instruction delivered via Web-based tutorials, e.g., CITI modules or a course or series of seminars and workshops delivered by RCR committee
- Incorporate ethics and RCR topics into:
  - Theses/dissertation – chapter, prospectus and defense
  - Research methods and design courses
  - Agreement between student and thesis/dissertation chair
  - Certificates and Preparing Future Faculty/Professional Programs
- Promote discussions of topics within departments/colleges using case-studies, vignettes, etc. and led by trained faculty

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# Specific Approaches

- Incorporate RCR and professional standards guidelines into department policies and student handbook
- Establish a clear set of university policies and procedures for dealing with FFP, QRPs, and “whistleblowers”
- Include RCR training in new faculty orientation and faculty development programs
- Establish rewards for faculty /investigator participation in RCR training and fostering academic and research integrity
  - Mentoring Awards
  - Workload credit
  - Considered in making promotion and tenure decisions by department, college and university

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