

Summarizing the National
Academy of Science's booklet:
“On Being a Scientist: A Guide to
Responsible Conduct of
Research (3rd ed.)”

Amy Drahota, PhD
Implementation Science Seminar
11/4/2015

Learning Objectives

- Describe the range of important issues for scientists, including:
 - Issue #1: Advising and mentoring
 - Issue #2: (Mis)treatment of Data
 - Issue #3: Mistakes, negligence, misconduct, and violating professional standards
 - Issue #4: Responding to misconduct
 - Issue #5: Human subjects
 - Issue #6: Authorship and allocation of credit
 - Issue #7: Intellectual property
- Discuss case studies of these important issues

Purpose of Booklet

- “Presents an overview of the professional standards of science and explains why adherence to those standards is essential for continued scientific progress” (p. ix)
- “Scientific knowledge is achieved collectively through discussion and debate” (p. xv)
 - Primer to important issues related to responsible conduct of research
 - Encourages regular discussion of ethical issues during mentoring and advising sessions

Introduction to Responsible Conduct of Research

- Science is exciting. Scientific discovery is richly satisfying to scientists and beneficial to society
- However, research requires difficult decisions about research design, presentation of results, and interactions with colleagues
- Failure in these areas may lead to
 - Wasted time
 - Wasted resources
 - Slowing advancement of knowledge
 - Undermining professional and personal trust

Scientific Norms and Scientific Standard

- Scientific Norms
 - Researchers have an obligation to honor the trust that their colleagues place in them.
 - Researchers have an obligation to themselves.
 - Researchers have an obligation to act in ways that serve the public.
- Consideration of these obligations guide responsible choices
- Scientific Standard is the application of ethical values:
 - Honesty, fairness, objectivity, openness, trustworthiness, and respect for others

Important Issue #1: Advising and Mentoring

- What it is?
 - Advisor oversees the conduct of research, offering guidance and advice on matters connected to research
 - Mentor takes a personal as well as a professional interest in the development of a researcher
- Why is it important?
 - The main role is to help a researcher move along a productive and successful career trajectory
 - Considerable influence over the lives of beginning researchers

Important Issue #1: Advising and Mentoring

- Challenges
 - Given the influence over beginning researchers, advisors and mentors must be careful not to abuse their authority
 - Often complex relationships involving an imbalance of power and a level of dependency
 - Problems may occur over allocation of credit, publication practices, proper division of responsibilities
- Possible solutions
 - Advisors/Mentors should maintain and model high standards of conduct
 - Beginning researchers should develop clear expectations concerning availability and meeting times
 - Beginning researchers should seek out and work with mentors

Important Issue #2: (Mis)treatment of Data

- “Researchers have a fundamental obligation to create and maintain an accurate, accessible and permanent record of what they have done in sufficient details for others to check and replicate their work” (p. 9)
- What is mistreatment of data?
 - Manipulating data in ways to deceive others
- Why is it important?
 - Violates basic values
 - Violates widely accepted professional standards of science
- Why is it done? Often due to:
 - Poor experimental design or careless measurement
 - Improper manipulation

Important Issue #2: (Mis)treatment of Data

- Challenges
 - Beginning researchers often receive little or no formal training in recording, analyzing, storing, or sharing data
- Possible solutions
 - Data collection and management policies and procedures identified and followed
 - Publishing adequate procedural details
 - Regularly scheduled meetings to discuss data issues and policies within labs and institutions
 - Allowing access to data and research materials
 - Proper citations of literature in peer-reviewed publications

Important Issue #3: Mistakes, Negligence & Misconduct

- All scientific research is susceptible to error due to taking risks for innovation, human error, negligence or misconduct
- Possible solutions for mistakes (solutions for negligence and violations covered in issue #4)
 - May be corrected by subsequent work
 - If appeared in journal article or book
 - Erratum (for production error)
 - Corrigendum (for an author's error)

Important Issue #3: Mistakes, Negligence & Misconduct

- What is negligence?
 - Work that does not meet scientific standards or practices of a discipline
- Why is it important?
 - Devalues reputations of the researcher and colleagues
 - Damages public confidence in science
 - May negatively impact health and public impact

Important Issue #3: Mistakes, Negligence & Misconduct

- What is misconduct? As defined by the U.S. Office of Science and Technology Policy:
 - Fabrication: “Making up data or results.”
 - Falsification: “Manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.”
 - Plagiarism: “The appropriation of another persons’ ideas, processes, results, or words without giving appropriate credit.”
 - “Significant departure from accepted practices”
 - “Committed intentionally, or knowingly, or recklessly”
 - “Must be proved by a preponderance of evidence”

Important Issue #3: Mistakes, Negligence & Misconduct

- Why is it important to know about misconduct?
 - Wasted time and resources
 - Violates fundamental research standards
 - Violates basic societal values
 - Damages public confidence in science
 - May negatively impact health and public impact
- Challenges
 - Intent can be difficult to establish
- Solutions coming up...

Important Issue #4: Responding to Misconduct

- Challenges
 - Science is largely self-regulated
 - Regulation should be done by experience and qualified peers
 - For self-regulation to work, researchers must be willing to alert others when they suspect that a colleague has violated professional standards
 - Reporting is not easy and anonymity is not possible in all instances
- Scientific Standard related to Response
 - Someone who witnesses a colleague engaging in research misconduct has an unmistakable obligation to act

Important Issue #4: Responding to Misconduct

- Institutional Solutions
 - Established policies and procedures to investigate and report research misconduct that must be followed
- Laboratory Solutions
 - Laboratory policies and procedures should be established that must be followed
- Individual Responses
 - Raise suspicions in the form of a question (not allegations)
 - Discuss with good friend or trusted advisor who will ensure confidentiality

Important Issue #4: Responding to Misconduct

- If reporting:
 - Understand the standard being violated
 - Know the evidence
 - Think about the interests of everyone involved
 - Ask what might be possible responses of those individuals involved
 - Examine one's own motivation and biases (since others inevitably will do so)

Important Issue #5: Human Subjects Protection

- Overview
 - Common Rule (from U.S. government) specifies which types of research fall under its jurisdiction, provisions for obtaining informed consent, procedures needed to gain approval of a project, and training researchers
- Issues that arise when involving human subjects:
 - Should subjects be asked to participate in a study have involves risk without personal benefits?
 - How should consent be modified for vulnerable populations?
- Possible solutions
 - Formal training
 - Involving a bioethicist

Important Issue #6: Authorship and Crediting

- What is authorship?
 - Indicates who has contributed to the work
 - Establishes accountability when errors are found
- Why is authorship important?
 - Career advancement
 - Recognition of intellectual contributions and research conducted
- Actions to Prevent Authorship Problems
 - Laboratory guidelines re: authorship
 - Discussion about contributions as early as possible

ACT Lab

Authorship Guidelines

Several national foundations and institutions have developed authorship guidelines in order to provide clarification to the role of authorship credit and ordering of authors on manuscripts, posters, and presentations. Moreover, some journals provide guidelines or requirements to allow individuals to be contributing authors.

The ACT Lab has adopted the U.S. Department of Health and Human Services, Office of Research Integrity guidelines, in particular.

U.S. DHHS – Office of Research Integrity

Authorship is generally limited to individuals who make significant contributions to the work that is reported. This includes anyone who:

- was intimately involved in the conception and design of the research,
- assumed responsibility for data collection and interpretation,
- participated in drafting the publication, and
- approved the final version of the publication.

What this means

When conceptualizing a project or paper, it is important to:

- 1) Identify the goals, aims, or research questions of the project and data that will be used
- 2) Talk with Dr. Amy about your project idea(s) and get approval to continue
- 3) Figure out who might be included as authors or contributors to the project
- 4) Decide (at least preliminarily) who will be doing what to complete the project

Once a project or paper is done, review the work that was done to finalize the order of the authors for the project.

If any disagreements arise, please be sure to talk with the people who contributed to the project and Dr. Amy.

Important Issue #7: Intellectual Property

- What is intellectual property?
 - A legal right to control the application of an idea in a specific context through a patent
 - A legal right to control the expression of an idea through a copyright
- Why is it important?
 - Provide legal mechanism to help strike a balance between private gains and public benefits
 - Gives researchers the right to profit from a new idea
 - In return, the property owner must make the new idea public, which enables others to build on the idea

Important Issue #7: Intellectual Property

- Challenges
 - Copyrights protect the expression or presentation of ideas but they do not protect the idea themselves
 - Patent law differs between countries
 - Challenging issues arise between researchers and institutions
- Possible actions
 - Most research institutions have policies that specify how intellectual property should be handled
 - University technology transfer offices should be consulted at onset of new grant funding

The Researcher in Society

“The standards of science extend beyond responsibilities that are internal to the scientific community. Researchers also have a responsibility to reflect on how their work and the knowledge they are generating might be used in the broader society.”

“Researchers have a professional obligation to perform research and present the results of that research as objectively and as accurately as possible.”

- On Being a Scientist, p. 48

On Being a Scientist (3rd ed.)

Available as pdf free from:
National Academy of Sciences