

Engaging Undergraduates in the Responsible Conduct of Research Training

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What do we mean by the Responsible Conduct of Research?

- Develop or identify best practices in proposing, performing, reporting, and reviewing research.
- Apply best practices consistently and habitually.
- Communicate best practices across the scientific enterprise, holding them up as standards to peer scientists and to scientists-in-training.
- Take action on transgressions.

RCR Education

Why teach RCR?

Who gets taught?

What do we teach?

What's out there?

What are our objectives?

How do we teach it?

How do we measure success?

Why teach RCR?

Science as a profession: laws, policies, best practices, professional culture of right and wrong

Codes and norms must be learned and applied

Amount and complexity of material not randomly assimilated or effectively learned by trial and error

Public domain cases and media reports illustrate some scientists do lie, cheat and steal

Practicing and teaching RCR critical to the veracity of the scientific enterprise

Our peers and our public must trust us and our work

In summary: Why teach RCR?

Our obligation

Their requirement

Update on the Requirement for Instruction in the Responsible Conduct of Research

Notice Number: NOT-OD-10-019

Key Dates
Release Date: November 24, 2009

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required to complete a certification that the institution has a plan to provide appropriate training and oversight in the responsible and ethical conduct of research to undergraduates, graduate students, and postdoctoral researchers who will be supported by NSF to conduct research.

Who gets Taught?

What are the undergraduate audience characteristics?

- Transient
- Available time for RCR training limited
- Little or no research experience
- Motivated to learn
- May be reluctant to engage
- Others?

What do we teach?



Components of an appropriate plan for the RCR may include:

Subject Matter of Instruction (Multiple Topics)

- Conflict of interest
- Data sharing
- Responsible authorship and publication
- Policies for handling misconduct
- Policies regarding the use of human and animal subjects
- Data management
- Peer review
- Mentor/trainee responsibilities
- Collaborative science

<http://www.nigms.nih.gov/Training/responsibleconduct.htm>

What else might we teach?

Science, Technology, and Society

Discovery and Use of New Knowledge

Social Responsibilities of Scientists

Biomedical:

Stem cell science

Neuroethics

Genetic data: use and privacy issues

Human Behavioral Research

Technological:

Nanotechnology

Computers and Information Technology

Environmental:

Impact and Protection

Dual Use Dilemma

What do we teach to undergraduates?

1. Time is limited
2. Students lack experience
 - Does Content Matter?
 - Are there priority areas?
 - What are they?

What's out there?



http://ori.hhs.gov/education/products/rcr_general.shtml



<http://www.onlineethics.org/>



<http://www.ethicslibrary.org/>



<http://www.umass.edu/sts/digitallibrary/>



<http://www.scholarlyintegrity.org/>



<http://research-ethics.net/>

What are Our Objectives?

Whatever we might hope about the future ethics of our students, their moral righteousness is not a legitimate course goal

Judy Stern & Deni Elliott: *The Ethics of Scientific Research: A Guidebook for Course Development*. 1997. University Press of New England, Hanover, NH. p.33

Don't confuse pedagogical hopes
with instructional objectives !

Knowledge

- Rules and Regulations
- Guidelines - Written
- Guidelines - Unwritten
- Resources

Skills

- Ethical Decision making- Critical Thinking
- Time and Stress Management
- People Management
- Conflict Resolution, Arbitration, Mediation

Attitudes-Behavior-Community

- Importance of RCR, norms and accepted practices
- Continued learning and keeping current
- Obligation and responsibility to promote responsible conduct and discourage misconduct/questionable practices
- Increase awareness
- Refine standards
- Define standards

Sample Course goals:

Provide a learning experience for trainees and faculty that will enable them to:

1. Develop and refine skills needed to solve problems involving relevant topic areas of responsible scientific conduct
2. Be able to clearly articulate ethically and legally acceptable solutions to problems posed about scientific conduct
3. Develop a positive attitude towards lifelong learning in the matters of responsible research conduct

Sample Course Objectives:

Students successfully completing this course will:

1. Be familiar with relevant guidelines, policies, and laws bearing on the conduct of scientific research including those dealing with scientific authorship, use of humans and animals in research, conflict of interest, and collaborative research.
2. Be familiar with policies and laws that govern the ownership, protection, and use of intellectual property in the arena of scientific research
3. Be able to describe conventions and normative behavior related to responsibilities in the scientific mentor-trainee relationship
4. Be able to describe the conventions of scientific record keeping and have a clear understanding of data ownership issues

How Do We Teach It?



- Combination of didactic and small-group discussion (e.g., case studies)
- Research training faculty participation
- Online courses may be used as adjuncts to supplement RCR instruction, not usually adequate as the sole means of instruction
- Attendance is required and monitored
- Substantive contact hours
 - A series of programs or seminars is ideal, as it allows learning over longer periods of time and links individual programs to a broader picture
 - A one-time exposure (seminar, one-day workshop) is generally considered inadequate and lacking sufficient depth
- Opportunities for Continuing Instruction
- Individual Mentoring

<http://www.nigms.nih.gov/Training/responsibleconduct.htm>

How Do You Teach It?

NSF BIO REU Meeting survey

--76% reported doing RCR Training

--Typical motif:

- 2 hour seminar
- book reading
- video watching
- discussion

How Do We Measure Success?

Student evaluations of courses may help you:

- identify problems in course delivery
- see trends over time
- help you get promoted

...they are of little help in telling you whether your students learned anything or can apply what they learned

How Do We Measure Success?

Engage

Challenge

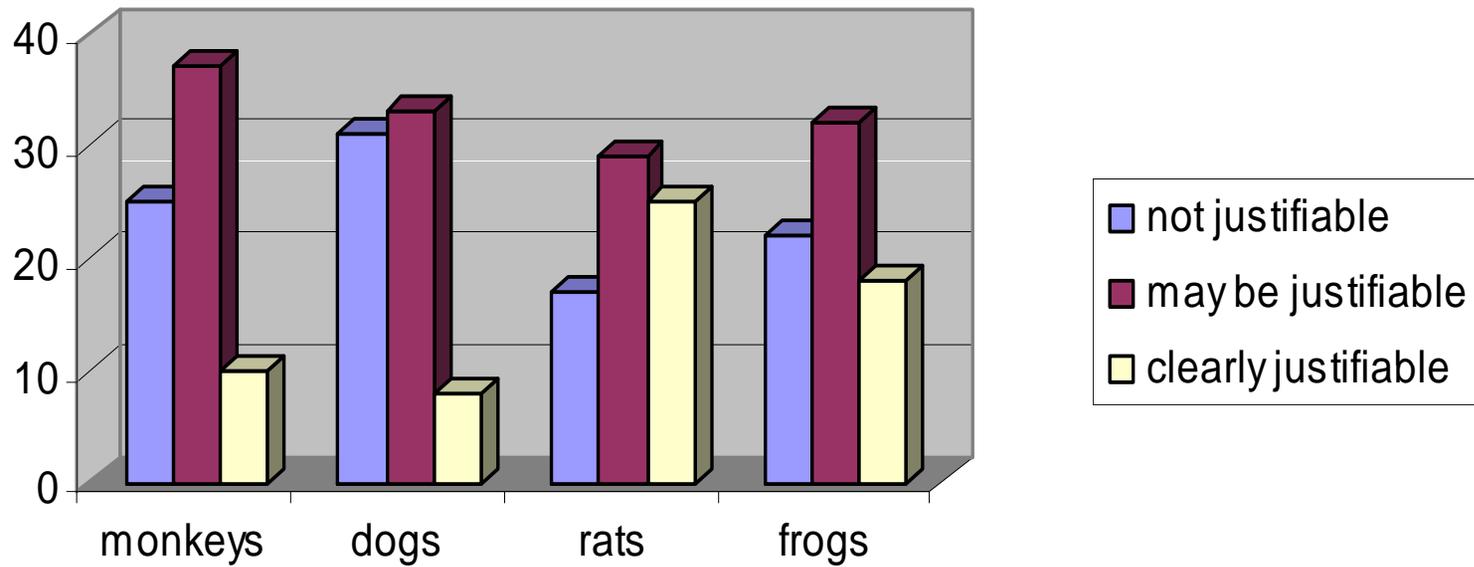
Evaluate

Cases

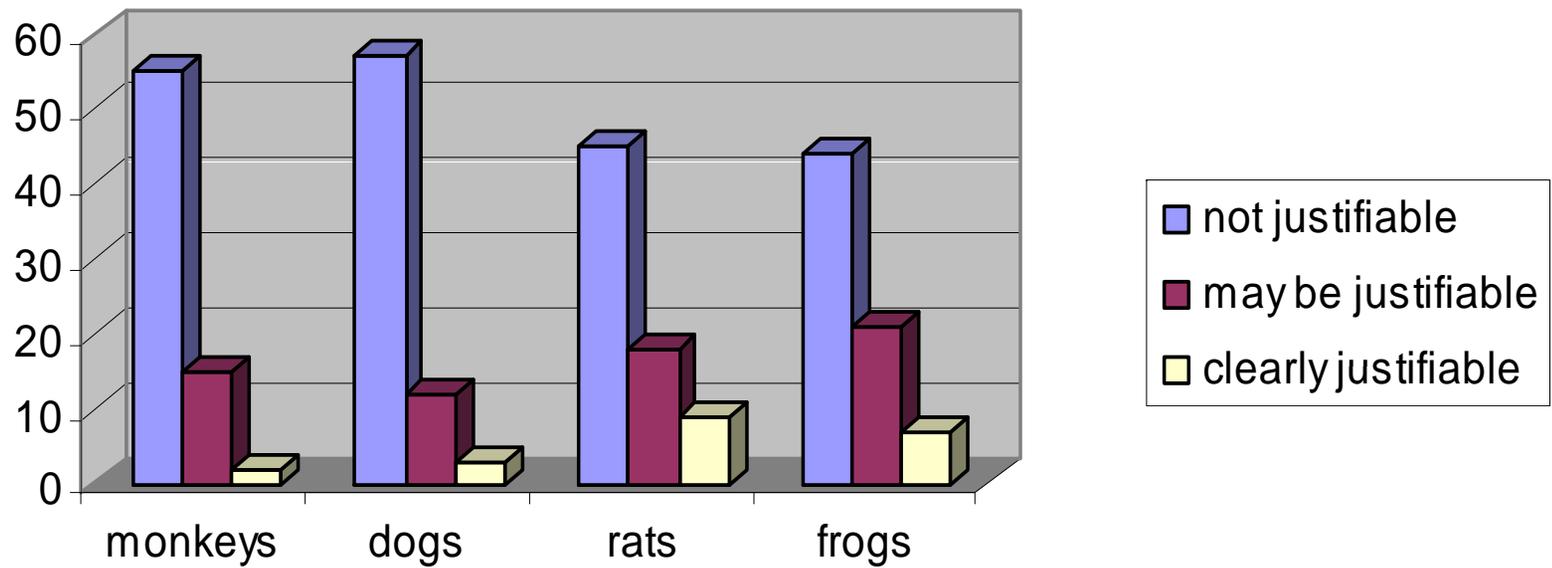
While doing field work, predoctoral student, Will Tanana uses a digital camera to make images, a digital voice recorder to rapidly record observations, as well as a spiral-bound field notebook to make general notes. Upon return from the field he organizes the data from all three of these sources into a bound notebook, which he considers his definitive research data book. He prints relevant images and attaches them to the data book pages. He also makes verbatim transcriptions and detailed notes into the bound note book using this digital voice files and the notes made in his field notebook. Will tells you that he knows his bound data book is the property of his institution, and it must stay with his dissertation mentor when he leaves. He plans to ask his mentor's permission to make a photocopy of it for his use after he graduates. However, he plans to maintain custody of all of his digital images, recordings, and field notebooks when he leaves. He says this will provide an additional backup of the data, and because of their personalized nature, they are meaningful only to him anyway. He asks you to comment on his plans. What do you tell him?

Survey analysis

Cancer Research: justifiable pain



Cosmetic Safety: justifiable pain



Writing assignments

Dear Research Advisor,

I'm writing to request that I be listed as the primary author on our research lab's latest and greatest paper entitled: "Determination of predoctoral candidate's dissertation success is mediated by awesomeness of proximal post-doctoral fellows." Put simply, I was the single most significant contributor to this study's inception, execution, and manuscript preparation. If you remember, I also helped you write the grant that enabled our lab to perform this research. I led our research group through the conceptual stages of the study's hypotheses development. I suggested and defended what I believed was the most powerful study design to achieve our research objectives. I guided the predoctoral students in the acquisition of the data and provided encouragement and offered solutions when problems arose. Finally, I took the lead in delegating writing responsibilities for this manuscript and facilitated the integration all of the various parts of this manuscript.

As the individual who led this research effort through all phases of development, I am also ready to assume responsibility for the integrity of the research process that this manuscript represents. We are now ready to submit this manuscript for publication to the journal. I hope you weigh my contributions and give serious consideration to my request.

Respectfully,

Leading in-class discussion

The example you come up with should be specific and limited to the following assigned categories, which are made according to the case study discussion groups.

If you are a member of Section 1 or 5:
provide an example of a conflict involving an author on a submitted manuscript

If you are a member of Section 2 or 6:
provide an example of a conflict involving a grant proposal reviewer

If you are a member of Section 3 or 7:
provide an example of a conflict involving a predoctoral mentor

If you are a member of Section 4 or 8:
provide an example of a conflict involving a predoctoral graduate student doing dissertation research

You can work on your own or feel free to collaborate with other members of your section to come up with your example.

Thought assignments

If you are in discussion sections 1,2,3 or 4, I like you to do a little "ahead of class thinking" on something.

I will begin tomorrows class with a 10 minute news story video that aired in 1992. It describes the controversy surrounding the discovery of the virus that causes AIDS.

Why would I use such a video in a presentation on scientific record keeping?

An article in the NYT on the 2008 Nobel Prize in Medicine or Physiology might give you some guidance. But you may have to dig a little deeper.

Article at: <http://www.nytimes.com/2008/10/07/health/07nobel.html>

RCR Instruction

You must decide:

Where you're going

Who's going with you

How you're going to get there

How you're going to know when you've arrived