



## 1.a. Assessing student learning – Overview

- How can we assess student learning?
- How can we assess student learning in research ethics?
  1. understand central concepts
  2. construct coherent moral arguments
  3. recognize moral problems and examine them in a rational way (Bulger and Reiser 1993:S8, quoting Callahan and Bok 1980:81)

Jimmy Carter joke. “Are you building the B-1 bomber? Yes.”

Obstacle: Morality as a characteristic you have versus a skill and/or knowledge you learn

### Define your goals

- “Instructional objectives” vs. “pedagogical hopes” (Elliott and Stern 1996)
- Hastings Center Project on the Teaching of Ethics: “The most appropriate methods for evaluating ethics instruction are the traditional methods used in the humanities, including assessment of the students’ ability to (1) understand central concepts, (2) construct coherent moral arguments orally and in writing, and (3) recognize moral problems and examine them in a rational way” (Bulger and Reiser 1993:S8, quoting Callahan and Bok 1980:81).
- What can you actually measure? What standard of proof do you require?

### Unrealistic goals

- Change unethical students into ethical researchers
- Root out all ethically questionable behavior
- Solve all ethical problems before they arise

- Prevent misconduct in science

**Realistic short-term goals**

- Prepare students for ethical (and regulatory) complexity
- Prepare students for the trauma of witnessing misconduct
- Improve students' moral reasoning skills

**Realistic long-term goals**

- Improve the ethical climate by increasing communication
- Decrease incidents of unethical research by raising awareness and encouraging responsibility (including whistle blowing)

## Define your goals

- What will you assess?
  - “instructional objectives” vs. “pedagogical hopes” (Elliott and Stern 1996)
- Unrealistic goals
- Realistic short-term goals
- Realistic long-term goals

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## **Scope of assessment**

- One exercise (activity, discussion)
- One session (class period)
- Day-long event (workshop, seminar)
- Series of workshops (seminars)
- Undergraduate or graduate class

Assessment can be aimed at short or long events.

Assessment of long-duration events should use frequent assessments of shorter-duration events.

## **Types of learners**

- Undergraduate students
- Graduate students
- Postdoctoral researchers
- Lab technicians
- Research administrators (sponsored research, IRB, IACUC, etc.)
- Junior and senior faculty

The way you teach and assess learning varies with the population.

The more advanced, autonomous, and professional the population, the less control you have over them, the more incremental the change, and the more the burden is on them to learn (rather than you to teach).

## **1.b. Moral Reasoning in Scientific Research**

- Introduction to the approach
- Instructions on using the materials
- “Developing a Well-Reasoned Response to a Moral Problem in Scientific Research”
- Six short case studies, accompanied by “Notes for Discussion and Assessment” and an evaluation checklist

### **Case discussion example**

The Moral Reasoning booklet is a good resource that can be

- used in its entirety as the backbone of an entire class,
- scavenged for one or two cases,
- or read for tips on using cases.

### **Elements of moral behavior (James Rest)**

- moral sensitivity
- moral reasoning
- moral commitment
- moral perseverance

### **Defining Issues Test (DIT)**

#### **“Developing a Well-Reasoned Response to a Moral Problem in Scientific Research”**

- Issues or points of conflict
- Interested parties

- Consequences
- Obligations

### **Process**

- Initial response to case
- Case discussion
- Second response to case
- Written feedback on responses
- Next case . . .

### **Actual responses**

“Of course the researcher should photocopy the lab notebooks! It is data she generated for her research training. No confidentiality agreement was signed, and apparently no representation was ever made to her that she could not keep a copy of the data for her files. Any graduate student has the right to make and keep copies of their laboratory notebook.” (Science online, 1995)

“Banks should not photocopy the notebooks until she can get agreement with her former mentor. These issues should be decided at the beginning of the training period; the P.I. should initiate a discussion with each new student stating explicitly what his/her policy is regarding data, materials generated in research, lab notebooks, etc. so that students understand from the beginning where they stand and what to expect at the conclusion of the graduate training period (this is applicable to postgraduate training as well). In this specific scenario, one solution Banks could discuss is the possibility of continuing a collaboration with the lab in her new position at the small teaching college. It is unlikely she will be able to undertake major research projects but could recruit undergraduate students to carry out portions of the project. This could lead to opportunities for summer sabbaticals, etc.” (Science online, 1995)

### **Suggestions for written feedback**

## Moral Reasoning checklist

### The Jessica Banks Case Evaluation Checklist

Student's name:

Side 1 position (yes or no)																				
Side 2 position (yes or no)																				

**Issues and Points of Conflict (5 points; 4=5; 3=4; 2=3; 1=1)**

Banks's vs. Hayward's right to notebooks																				
Banks's right to pursue research she has already worked on vs. Hayward's right to control research initiated in his lab																				
Banks's interest in establishing independence vs. her interest in maintaining collegiality and personal integrity																				
Banks's obligation to respect mentor vs. her obligation to warn other students																				
<b>Subtotal:</b>																				

Estimated Points (5=5; 4=4; 3=3; 2=2; 1=1)

Assessment / Pimple

10

- Identifies the key issues and points of conflict.
- Identifies the interested parties.
- Identifies the most likely and the most serious potential consequences.
- Identifies the protagonist's key obligations.
- Uses ethical principles appropriately.
- Writes in clear sentences.

## 1.c. Short in-class or written exercise

- “Report Reviews” (Pimble 2007)
  - How would you respond to each team’s conclusion?

Treichel 1999

Take home quiz in 2nd semester chemistry (Chemistry 104)

“**[Directions]** The students were directed to select the case study in which the described actions were least defensible and to construct a paragraph identifying the ethical issue and explaining their choice. **[Scoring]** Only one point would ride on their selection; they would get two points for a well-constructed argument supporting their choice, and seven points for a well-written paragraph. They were encouraged to discuss their thoughts with other students.” (p. 1327)

## 1.d. Rubrics

- Creating and using a rubric
- Moral Reasoning in Scientific Research
- Elliott and Stern 1996 pp. 357-360

### Creating and using a rubric

- Define your goals
- Create the rubric
  - Use any reasonable scale
  - You might not be able to grade each paper on a 100-point scale, but you can certainly use a 3- or 5- or 10-point scale.
  - no pass, pass, high pass
  - unacceptable, poor, satisfactory, good, excellent
- Give your students a copy; discuss it
- Ask the students to write an assignment
- Use the rubric to assign a grade
- Return the assignment and the rubric

<b>Exercise – Report Reviews</b>			
<b>Evaluation rubric</b>			
Student name:			
	Did not state or imply	Implied	Stated explicitly
			Assigned
<b>Points for style</b>			
Uses complete sentences		0-5	
Builds a coherent argument		0-7	
<b>Subtotal (12 possible)</b>			
<b>Subtotal from Points for substance</b>			
<b>Total (50 possible)</b>			
<b>Points for substance</b>			
A is falsification	0	1	2
B is fabrication	0	1	2
C is falsification	0	1	2
A – Failing to report dropped points in the article is unacceptable	0	2	4
A – Calling point 12 “way off the line” is questionable	0	1	2
B – Making up a value is unacceptable	0	2	4
B – Failure to even speculate on a cause is questionable	0	1	2
C – Failing to report adjustment in the article is unacceptable	0	2	4
C – Difference in calibration should be shown, not assumed	0	1	2
C – Devising the correction factor is praiseworthy	0	1	2
A and C – Hypothesizing a cause is praiseworthy	0	1	2
Unexpected results can be the most important results	0	2	4
Recording data correctly in research reports is praiseworthy	0	1	2
Reporting changes in research report is praiseworthy	0	1	2
Additional experiments may be needed in some cases	0	1	2
<b>Subtotal (38 possible)</b>			
<b>Grade scale</b>			
46-50 points	A		
40-45 points	B		
35-39 points	C		
25-34 points	D		
0-24 points	F		
Assessment / Pimple			
16			

I have not used this rubric; since it has not been field-tested, it should be used only as a rough example.

A serious drawback to this rubric is that it should not be given to students before the exercise because it gives away some of the key answers.

On the other hand, it could be given to students after the case discussion.

## 1.e. Pre-test / post test example

- Elliott and Stern 1996
  - Objectives
  - Original test
    - Outcome
  - Improved approach
    - Post-test instructions

### Objectives

At the end of the course, students will

1. be able to clearly describe relevant scientific conventions including: laboratory practice, institutional responsibility, etc.;
2. be able to describe what leads to ethical problems including causes inherent in the social context of the practice of science;
3. be able to identify ideal scientific practice and consider how to bring scientific conventions more in line with the ideal;
4. be able to separate behaviors into four categories: morally prohibited, required, permitted, and encouraged, thus illustrating an understanding of the role of the scientist in society. [Elliott and Stern 1996:349]

### Original test

At the beginning and the end of the course, students read an edited article on an actual case of research misconduct and wrote a response.

**Assignment:** “Identify the ethics problems in this case. Discuss what the individuals involved did right. Discuss what the individuals involved could have or should have

done differently” (Elliott and Stern 1996:350).

### **Outcome**

- No inter-rater reliability.
- “There was no significant difference between how students approached the vignette at the beginning of the term and how they approached it at the end.”
- “Few students made any attempt to integrate the three questions and to evaluate the responsibilities of individual moral agents as complex people.”
- “Even if students had learned the material they had not been encouraged to express what they had learned [because] the post-tests were not graded.”
- “We did not provide the students with any explicit instruction in conducting systematic moral analysis. We instead expected students to intuit the process by examining a series of cases.”
- The course did not prepare the students in any way to write an explicit moral analysis.
- Moral analysis is one skill; expressing moral analysis in writing is another.
- The test did not in any obvious way match the objectives.

### **Improved approach**

1. We provided [three] short vignettes. . . . Two contained issues of ethical importance (from the faculty’s perspective) and one did not.
2. More explicit instructions were given for the pre-test and students were told that a “high quality” response [was required to pass the course].
3. At the time of the post-test, students received back their pre-tests, with instructions to analyze how well they had responded to the pre-test. [Elliott and Stern 1996:351-352]

### **Post-test instructions**

1. Please review the case, the instructions you received at the beginning of term and your responses.
2. Analyze your initial response. Describe how your thinking has changed. Be sure to discuss understandings or information that you have now that you didn’t have at the beginning of the term.  
This is your opportunity to consider how your thinking has changed. Please notice changes in HOW you think as well as any changes in WHAT you think. It may be that you reach the same conclusion now than you did in the beginning of the term, but that you think about the situation in a different way.
3. Please attach your diagnostic test to the final exam.

Please keep in mind that you are NOT being asked to repeat the assignment from the beginning of the term. You are being asked to analyze how you initially responded to that assignment. [Elliott and Stern 1996:362, emphases in original]