Learning and Teaching Ethics in Engineering: A Summer Workshop

The Leonhard Center
The Rock Ethics Institute
Engineering Instructional Services

Primary Author: John Christman,
Professor of Philosophy
Day 1: “The Basics”

- Introduction/Warm-up
  - Introductions
  - Goal setting activity

- “Tools” for the teaching and learning of ethics
  - Motivating students to think about ethics, and to think ethically
  - Frameworks for ethical problem solving
  - Strategies for implementing ethical decisions

- Output:
  - Application of tools to sample cases
Introductions

Please introduce yourself with the following information:

- Name
- Department
- Course that you will be working on and how ethics relates to that course.
Activity

Please take a few moments to reflect on the following question and jot down your thoughts on the worksheet.

- How do you hope to be able to enhance your course as a result of your participation in this workshop?

Discuss the answers with your neighbors.
Our Goals

Goals for participants:

- **Understand:**
  - A framework for designing ethics related activities
  - How to design a course to meet learning objectives related to ethics and how to assess related student work

- **Apply** this understanding to design ethics related activities for one of their courses

- **Integrate** ethics related activities into a course and report back on their results to their peers and to the workshop participants.
Scope of Our Discussions

- Ethics
- Social and global contexts in which ethical issues can arise for engineers.
Our Approach

- Active participation, with some “lecture.”
- Draw upon everyone’s experiences.
- Seek feedback for improving the workshop.
Day 1: “The Basics”

- What do we mean by Ethics?
- Motivating students to think ethically
- Tools for teaching and learning ethics

John Christman and Andy Lau
“Ethics”: Broadly Defined

Ethics: the positive guidelines we use to guide our behavior and the systematic study of those guidelines.
Ethics Should Be Distinguished From...

- Mere Prudence
  - self-interest narrowly defined
    - sometimes doing the right thing hurts

- Mere Legality
  - following the letter of the law
    - ethics is broader than legality

- Professional Guidelines and Codes
  - ethics fills in the gaps
Motivating Students to Think Ethically

- Codes of ethics are incomplete
- Foreseeing (and so avoiding) disasters
- Becoming an ethically aware professional
Codes of Ethics Are Incomplete

Hazardous Waste Case

- Ethical judgment needed to fill in the gaps
Engineers, in the fulfillment of their professional duties, shall:

1. Hold paramount the safety, health and welfare of the public.
2. Perform services only in areas of their competence.
3. Issue public statements only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation, and usefulness of the profession.
Foreseeing Disaster

Ford Pinto Case

(today’s routine decision may be tomorrow’s embarrassment (or shame))
Becoming an Ethically Aware Professional

Intrinsic Value of Personal Integrity

- Difference between doing my job and being proud of who I am
  - what would my children think…

Benefits of Ethical Thinking

- high school students who studied ethics showed 32-56% decrease in unethical behavior
  - South Dakota State Study
  (http://www.abs.sdstate.edu/abs/8-8-2001/study.htm)
The New Engineer

Evolving from occupation for technical advice, to profession serving community in socially & environmentally responsible way

- Social context
- Long-term impacts
- Ethics
- Economics
- Politics
- Human interaction
- Communication skills
- Leadership skills

From Sharon Beder, The New Engineer, 1998
Developing the Moral Imagination

Finding the (non-obvious) Ethical Issue

- You are helping to design a piping and pumping system for a new carpet manufacturing plant. The system needs to move 10,000 gallons per minute of water from a low-pressure boiler to a processing area. Pressure drop in the boiler is 15 feet and in the processing area, 10 feet.
- The design team must layout the piping, size it, and determine the necessary pump size (flow, head, and horsepower).
Is there an ethical problem?

Guiding Criteria:

- Is this an action you need to keep hidden?
  - Would you tell someone you trust and admire?
  - If secrecy is required, is there an ethically defensible reason?

- Does the situation smell?

- Are you passing the buck?

If so, ethical attention is usually warranted.
Sidebar: Is it all relative?

The Relativist Bogeyman

- “Ethics is irrelevant since there is no universal ‘right’ or ‘wrong’ – it’s all relative!”

- Variation: “You can’t teach me ethics – that’s just your opinion!”
Answering the Relativist Bogeyman

1. Being relative does not mean a standard is not valid
   - e.g. speed limits

2. Relativists can’t complain
   - if you think something is unfair, you’re not a complete relativist

3. Certain moral values are nearly universal
Answering the Relativist Bogeyman

Further discussion of Relativism:

http://ethics.acusd.edu/theories/relativism/
Shared Moral Values
from Rushworth Kidder, *Shared Values for a Troubled World*

- Love
  - compassion, caring
- Truthfulness
  - whole truth, trust
- Fairness
  - justice, Golden rule
- Freedom
  - liberty
- Unity
  - community
- Tolerance
  - human dignity, diversity
- Responsibility
  - you, community, future
- Respect for life
Frameworks for Ethical Thinking

Orientations to guide one’s judgment in making (ethical) decisions

Ordering of Ethical Considerations
  -consequences, duties, integrity, care for others

Making value considerations *salient*
Frameworks for Ethical Thinking

1. What will the effects of my actions be (for each of my choices)? (consequence-based thinking)

2. Are there any universal rules that apply here? (duty-based thinking)

3. What would a person with integrity do here? (virtue-based thinking)

4. What do the relationships (professional, personal) demand? (care-based thinking)
Frameworks for Ethical Thinking

1. Do what’s best for the greatest number of people. (consequence-based thinking)
2. Follow the applicable universal principle, e.g., do not lie. (duty-based thinking)
3. Do what a good (virtuous) person would do. (virtue-based thinking)
4. Consider what relationships demand (care-based thinking)
   - variation on virtue based thinking
1. Consequence-Based Thinking

- Utilitarianism
- Do what produces the greatest overall good for all affected
- Requires an assessment of consequences, a forecasting of outcomes.

Jeremy Bentham (1748-1832)
Consequence-Based Thinking, cont.

Consequences measured in various ways
- monetary costs and benefits
- human welfare (utility)
- pleasure or happiness

Maximize net benefits of all foreseeable outcomes
Possible Limitations of Consequence-Based Thinking

- Difficult to predict consequences of actions
- Can reduce ethics to economics
- People have different ideas of what makes them happy.
- Ends do not always (or ever?) justify the means if the means are morally unacceptable.
- As with most classical ethics, there is no attention to life other than human
2. Duty-Based Thinking

- Immanuel Kant
- Determining universal moral duties
- The Categorical Imperative
  - Do only that which you would want everyone to do
    - otherwise, there is a moral duty *not* to
  - Respect People as Ends in Themselves

Immanuel Kant (1724-1804)
Duty-Based Thinking, cont.

Ethics of duties and rights
- duty to obey universal principles
  - do not lie, harm, disrespect others, etc.
- rights to be treated with respect
  - not to be lied to, harmed, etc.

Ideally, ethics is universal and impersonal
- do that which everyone must do
  - no matter who they are, where they’re from, etc.
Possible Limitations of Duty-Based Thinking

- Difficult to form intentions into a rule and then test it for universality.
- Difficult to fully know intentions.
- Feelings and emotions may have a role to play.
- Sometimes consequences do matter (and perhaps override our initial duties).
- As with most classical ethics, there is no attention to life other than human.
3. Virtue-Based Thinking

- What does Integrity (virtue) demand?
  - Would a person of good moral character do this?
- Exercise appropriate virtue in every case
  - honesty, generosity, justice, etc.

Aristotle
4. Virtue-based Thinking, cont.

- Applicable Virtues Depend on Context
  - what is “honest” depends on social traditions, history, etc.
  - ethics relies on *judgment*, not precise formula (rules)

- Virtue Tied to Integrity / Character
Ethics of Care

- Exercise care for relations with others

- Shares much with Virtue-Based thinking
  - contextual
  - recognizes the “affective” aspect of ethics
  - responding to limitation of impersonal, objective rules

- Arises from Feminist Concerns
  - quality of human relations (care) rather than (impersonal) duties and rights
Possible Limitations of Virtue and Care

- Virtues are defined too loosely to guide decisions in difficult cases.
- Since virtues are defined in terms of social setting, morality becomes unduly relativistic.
- As with most classical ethics, there is no attention to life other than human.
Overview of Ethical Frameworks

- Consider consequences of one’s actions
  - what will produce the most overall good?

- Consider general ethical duties which apply
  - what if everyone did that?
Overview of Ethical Frameworks

Would a Virtuous person do this?
- is it the honest (generous, etc.) thing to do?

How does this affect valued relations with others?
- what are the intangible aspects of the situation?
Overview of Ethical Frameworks

Always keep in mind “limitations” of each framework

- is this a case where consequence-based thinking (duty-based, etc.) often goes wrong?
Overarching Moral Rule of Thumb

- Shorthand Principle which combines elements of all frameworks:
  
  Can I reasonably justify my actions and their consequences to all affected in a way that is consistent with my integrity and my relations with others?

  If not, can I live with that?
General Guide to Ethical Thinking

**Thinking/Acting Ethically**

- Reflect, choose, revisit decision
- How will relations be affected?
- What virtues apply?
- Identify relevant duties
- Consider consequences
- Identify optimal option
- Identify stakeholders
- Consult others
- Formulate options (creatively)
- Gather facts
- Use moral imagination

Slides Created by John Christman - Penn State
General Guide to Ethical Thinking

Thinking/Acting Ethically

- Identify relevant duties
- Use moral imagination
- Gather facts
- Identify stakeholders
- Consult others
- Formulate options (creatively)
- Consider consequences
- Identify optimal option

Reflect, choose, revisit decision

How will relations be affected?

What virtues apply?

Identify stakeholders

Consult others

Formulate options (creatively)

Consider consequences

Identify optimal option

Slides Created by John Christman - Penn State
General Guide to Ethical Thinking

think through ethical frameworks carefully

use moral imagination

gather facts

identify stakeholders

formulate options (creatively)

consult others

consider consequences - identify optimal option

identify relevant duties

identify stakeholders

reflect, choose, revisit decision

how will relations be affected?

what virtues apply?

Thinking/Acting Ethically
General Guide to Ethical Thinking

**Thinking/Acting Ethically**

1. **use moral imagination**
2. **gather facts**
3. **identify stakeholders**
4. **formulate options (creatively)**
5. **consult others**
6. **consider consequences - identify optimal option**
7. **identify relevant duties**
8. **what virtues apply?**
9. **how will relations be affected?**
10. **reflect, choose, revisit decision**

- **redo other steps**
General Guide to Ethical Thinking

Engage Stakeholders -as appropriate

Thinking/Acting Ethically

- use moral imagination
- gather facts
- identify stakeholders
- formulate options (creatively)
- consult others
- consider consequences - identify optimal option
- reflect, choose, revisit decision
- how will relations be affected?
- what virtues apply?
- identify relevant duties

Slides Created by John Christman - Penn State 44
Extending Ethics to Broader Contexts

- Social and Political Issues
  - engineering practice meets social policy

- Global and Environmental Factors
  - measuring consequences
  - identifying “stakeholders”
  - ecological / restorative ethic

- Inter-Cultural Communication
  - relativism revisited?
“Developing this process is, at best, difficult, …. But not to do so, …, risks moral and technological bankruptcy, threatens ecological sustainability in some cases, and prevents engineers from exercising their talents in ways that will benefit all of us.”

Applying Ethics Guidelines and Frameworks

Case Studies and Discussion

- Academic Integrity Case
- Hazardous Materials Case
  - Center for Applied Ethics and Program in Science, Technology, and Human Values
    - Duke University
Case Study Discussion: Notes

**Relevant Facts**
- nature of the assignment
  - clear duty not to consult with others
- source of answers: old textbook
- copying done in secret
- not all students have access to library material

**Identifying Ethical Issues**
- secrecy an indication of ethical question
- (at least) two sets of ethical decisions:
  - students generally and student who reports to professor

**Stakeholders**
- members of class, professor, those (e.g., employers) who rely on grades as indicators of competence, other students

**Analyzing the Decision(s)**

**Consequences** (of using old material)
- to others in class; future employers
  - positive/negative
    - grade does not reflect ability, students not fully trained
    - lower incentives to study in future

**Duties**
- not to work together
  - fairness: what if everyone did that?
    - grades would make no sense

**Virtues and Relationship Considerations**
- honesty, friendship, student integrity generally
- relationships with other students/professor harmed by deception
Feedback

Please use worksheet 4 to provide Feedback on Day 1
The following slides are the “answers” for the worksheets on Shared Moral Values and the Limitations of the different ethical frameworks.
Shared Moral Values
from Rushworth Kidder, *Shared Values for a Troubled World*

- **Love**
  - compassion, caring

- **Truthfulness**
  - whole truth, trust

- **Fairness**
  - justice, Golden rule

- **Freedom**
  - liberty

- **Unity**
  - community

- **Tolerance**
  - human dignity, diversity

- **Responsibility**
  - you, community, future

- **Respect for life**
Possible Limitations of Consequence-Based Thinking

- Difficult to predict consequences of actions
- Can reduce ethics to economics
- People have different ideas of what makes them happy.
- Ends do not always (or ever?) justify the means if the means are morally unacceptable.
- As with most classical ethics, there is no attention to life other than human
Possible Limitations of Duty-Based Thinking

- Difficult to form intentions into a rule and then test it for universality.
- Difficult to fully know intentions.
- Feelings and emotions may have a role to play.
- Sometimes consequences do matter (and perhaps override our initial duties).
- As with most classical ethics, there is no attention to life other than human.
Possible Limitations of Virtue and Care

- Virtues are defined too loosely to guide decisions in difficult cases.
- Since virtues are defined in terms of social setting, morality becomes unduly relativistic.
- As with most classical ethics, there is no attention to life other than human.