# Using Role-Play to Teach Ethics in Engineering and Science

Michael C. Loui
Department of Electrical and Computer Engineering, and
Coordinated Science Laboratory
University of Illinois at Urbana-Champaign

June 9, 2011

## Introduction

The students in my course on professional ethics are playing the roles of characters in the "Parkville" case in the textbook by Harris et al. (2005, pp. 333–334):

> CDC Corporation wants to construct a new manufacturing plant near a recreational and wildlife area in the town of Parkville. Jim, a manager at CDC, learns that Elizabeth, one of his engineers, lives in Parkville. Jim asks Elizabeth to talk with members of the Parkville city council, to seek their approval for CDC's plan. Elizabeth snaps, "You're my manager, not my pimp!"

As the student who played Elizabeth demonstrates, during a role-play activity, students can make surprising statements that do not normally occur in an engineering or science classroom.

Since the 1990s, I have used role-play to teach ethics in engineering and science. In this essay, I provide some advice for other instructors who might consider using role-playing activities.

## Why use role-play?

Role-play is a powerful teaching technique that engages students. While playing the roles of the characters in a scenario, students must understand the viewpoints of the characters.

Consequently students learn to consider seriously the values and beliefs of different stakeholders. When the scenario is realistic, students recognize that the scenario's issues are relevant to their lives, and they become motivated to participate fully. As students improvise a dialogue, they might find the experience slightly stressful. Furthermore, as students exercise their imaginations, they can also have fun, as implied by the word *play* (Barkley, 2010, p. 232). Because the role-play can be stressful and fun, students can remember the role-play experience and the lessons of the scenario for a long time.

Several research studies have confirmed that role-playing can benefit students both cognitively and affectively. For brief reviews of research on the pedagogical effectiveness of role-play, see the articles by Loui (2009) and by Seiler et al. (in press).

## Four examples of role-playing to teach ethics

For a course on engineering ethics, I organize role-plays in a seventy-five minute class session (Loui, 2006). I select two short cases in the textbook by Harris et al. (2005). For each case, I ask students to volunteer to speak for one of the three characters. Each student who does not have a speaking role serves as a coach for one speaker. Then each of the six speakers caucuses for twenty minutes with three or four coaches to prepare for the role-play of the case. Together, the students in each group formulate questions to ask other characters, anticipate questions from other characters, and prepare answers. Then the students in one group role-play their case: speaking students engage in a dialogue about the case. Sometimes I direct a provocative question to one of the speakers. After the role-play runs for ten minutes, I start a general discussion of the case. The fifteen minutes of discussion end with the lessons of the case. We

repeat the process for the other case: ten minutes of role-play and fifteen minutes of discussion.

To teach research ethics in an undergraduate course in sociology, Rachel Kraus (2008) organizes a role-play activity in which every student has a speaking role. In one class session, she divides the students into nine groups, each with two or three students. She assigns one principle of research ethics to each group, and the students in the group plan a brief skit to show how a researcher might violate that principle. For example, a researcher might change the hypothesis to match the data. All groups meet simultaneously for ten to fifteen minutes. After the planning phase, each group, in turn, presents its skit in two or three minutes, and the rest of the students try to identify the principle that the researcher violates.

A role-play can extend for more than one class session. In a course on technology and society for a small number of honors students, I organize a role-play in which each student plays the role of the same character for two weeks (Loui, 2009). As residents of a fictional community in the near future, the characters negotiate decisions that involve macro-ethical issues at the level of public policy, rather than micro-ethical issues at the level of individual relationships: the local university proposes to begin stem cell research with human embryos; a manufacturer proposes to construct a nanotechnology plant near wetlands that host an endangered species of birds; a nursing home proposes to implant radio-frequency identification tags (RFIDs) into residents who have Alzheimer's disease. Before the role-play begins, and after each role-play session, students write entries in private reflective journals. After the final role-play session, we discuss what students learned.

In the three preceding examples, I have described role-plays in small classes. But I also use role-play to teach responsible conduct of research (RCR) with large audiences—sometimes with more than one hundred graduate students in a departmental colloquium. I use one of the nine RCR role-play scenarios that I developed with C. K. Gunsalus and our students (Brummel et al., 2010). Based on an actual incident (or multiple incidents), each scenario has two speaking roles, a professor and a graduate student. The instructions for the two roles provide incomplete information about the same problem. First, I divide the students into small groups of two or three students. In each group, one student takes the professor role, one student takes the graduate student role, and when present, the third student serves as an observer. If time permits, students with the same role prepare for the role-play together for about ten minutes. Then all groups run the same role-play simultaneously for five to ten minutes; different groups may reach different conclusions. Finally, I lead a discussion of the scenario with the entire audience. Together we identify the ethical issues, articulate the stakeholders' perspectives, and evaluate potential solutions.

Some suggestions for organizing role-plays:

1. Determine the intended learning outcomes and plan the assessments of students' progress toward these outcomes. You may choose cognitive objectives, such as labeling ethical issues, applying case analysis skills, and designing responses to ethics problems that honor all relevant moral values. You may choose affective objectives, such as empathizing with the perspectives of different stakeholders.

2. Choose a meaningful scenario with an underlying conflict among multiple characters. The characters in the scenario should be familiar to students, even stereotypical, so that the students feel comfortable playing the roles of the characters.

3. Anticipate student resistance. In a small class, after students have developed rapport with each other, they might be willing to perform a role-play in front of the entire class. In a large class, you might allow students to perform role-plays simultaneously in small groups, so that no other students observe their performance.

4. Consider assigning roles so that students play characters that differ from themselves. For example, assign a quiet student to play a dominant leader. Allow students time to prepare and to ask you questions. Encourage students to be creative with their roles.

5. Set a time limit. Stop the role-play at a high point, before it languishes, to permit a lively discussion afterward (Davis, 2009, pp. 230–231).

6. Lead a discussion of the key issues. How was the role-play similar to or different from a real situation? Did the role-players find a viable solution to the underlying problem? What are other possible solutions? What might have happened if some facts were changed?

7. Encourage students to use their sense of humor and to have fun!

For detailed advice on planning, conducting, and assessing a role-play, see the book by Hertel and Millis (2002).

## Acknowledgment

This work was supported by the National Science Foundation under Grant SES-1045412. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the University of Illinois or the National Science Foundation.

## References

Barkley, E. F. (2010). *Student engagement techniques: A handbook for college faculty*. San Francisco: Jossey-Bass.

Brummel, B. J., Gunsalus, C. K., Anderson, K. L., & Loui, M. C. (2010). Development of role-play scenarios for teaching responsible conduct of research. *Science and Engineering Ethics, 16*(3), 573–589. doi: 10.1007/s11948-010-9221-7. The role-play scenarios are available online in the Ethics CORE site (http://www.nationalethicscenter.org/) and at the Online Ethics Center for Engineering and Research (http://www.onlineethics.org/).

Davis, B. G. (2009). *Tools for teaching*, 2nd ed. San Francisco: Jossey-Bass.

Harris, C. E., Pritchard, M. S., & Rabins, M. J. (2005). *Engineering ethics: concepts and cases*, 3rd ed. Belmont, Calif.: Thomson Wadsworth. The "Parkville" case is online at <http://wadsworth.com/philosophy_d/templates/student_resources/0534605796_harris/cases/Cases/case13.htm>

Hertel, J. P., & Millis, B. J. (2002). *Using simulations to promote learning in higher education: an introduction*. Sterling, Va.: Stylus Publishing.

Kraus, R. (2008). You must participate: violating research ethical principles through role-play. *College Teaching, 56*(3), 131–136. doi: 10.3200/CTCH.56.3.131-136.

Loui, M. C. (2006). Role playing in an engineering ethics class. Online Ethics Center for Engineering, 6/19/2006, National Academy of Engineering, Accessed: May 22, 2011 <www.onlineethics.org/Education/instructguides/loui2.aspx>

Loui, M. C. (2009). What can students learn from an extended role-play simulation on technology and society? *Bulletin of Science, Technology & Society, 29*(1), 37–47. doi: 10.1177/0270467608328710.

Seiler, S. N., Brummel, B. J., Anderson, K. L., Kim, K. J., Wee, S., Gunsalus, C. K., & Loui, M. C. (in press). Outcomes assessment of role-play scenarios for teaching responsible conduct of research. *Accountability in Research*, to appear.

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