TECHNIQUES FOR TEACHING COMPUTER ETHICS

Florence Appel
Department of Mathematics and Computer Science
Saint Xavier University
Chicago, Illinois 60655
appel@sxu.edu

Keith Miller
Department of Computer Science
University of Illinois at Springfield
Springfield, Illinois 62703
kmill2@uis.edu

Michael Quinn
School of Electrical Engineering and Computer Science
Oregon State University
Corvallis, Oregon 97331
quinn@cs.orst.edu

Abstract

Many computer science educators are interested in introducing computer ethics issues into their curricula, but are unfamiliar with effective pedagogy in this important area. This panel will address diverse methods of computer ethics instruction: the integration of ethics across the computer science curriculum, the development and delivery of an online computer ethics course, and techniques for improving students' critical thinking abilities in the context of addressing computer ethics issues. Each panelist will focus on one of these topics, and then the floor will be opened for questions and general discussion about computer ethics pedagogy.

1 Florence Appel

Dr. Appel will discuss the "ethics across the curriculum" pedagogy, specifically describing her on-going project entitled ***Integrating Ethics Into the Database Curriculum***. This work, which will result in the development of educational resources for database educators, involves the systematic introduction of privacy issues throughout an introductory database course. Her presentation will touch on the following topics.

1.1 The "ethics across the computer science curriculum" approach

Computer science programs that incorporate ethics content into their curricula contribute to their students' development into well-rounded, successful professionals who are grounded in the theory of computer science and as well as in an appreciation of the larger social and ethical context of computing, i.e., the people and organizations whose lives are impacted by technology. Computer science educators who address ethical issues demonstrate that ethical concerns about computing are appropriate and important to the study and profession of computer science. When ethical theory is applied in the context of traditional computer science courses, students are encouraged to view ethical decision-making and conduct as important professional skills that are relevant to the computing field. Rather than deflecting attention away from the significant theoretical and technical content of a course, considerations of the larger context of computing can actually enhance the study of a computer science topic.

1.2 Privacy as a database topic

Widespread development of databases in nearly every sphere of modern life has opened the door to a number of questionable practices that pose serious threats to personal privacy. Technological advances facilitate the routine collection, access and sharing of personal data, but at the database design level, little attention is given to the harm these politically and economically driven data-intensive activities may cause.

The collection and manipulation of personal data are established by public and private-sector organizations to address their agendas, and are viable not only because the technology allows them to take place but also because *databases are designed with little attention paid to the sensitivity of their contents*. In fact, there is an *expectation* that all electronic data is fair game for sharing, selling and global transmission.

By addressing the topic of privacy within the database curriculum, computer science educators can introduce their students to a design approach that motivates concern for privacy and the building of privacy safeguards into a database. This approach is intended to sensitize future database design professionals to the ethical issue of privacy, motivate them to be proactive in their protection of personal data, and provide them with knowledge of meaningful technical and non-technical privacy safeguards.

1.3 Weaving privacy content throughout database design instruction

The introductory database syllabus is typically organized as a methodical treatment of the concepts of database design theory, with each design concept then implemented as a step in the database design process. These stages include conceptual design, database implementation, query construction, normalization and security measures.

A privacy module is being designed for each of these steps, with content tailored to reflect appropriate privacy concerns for each design stage. Further, the expected resolution of the privacy issues recognized at a given design stage is consonant with the level of technical sophistication the student has reached at that point in the course. The introduction of privacy concerns at each step of the database design process is intended to promote the idea that privacy safeguards are sufficiently important to be built into a database system from the ground up, and should not be relegated to optional treatment once the project is near completion. This approach has the additional benefit of integrating ethical content into the core of the course and enhancing essential course material. This is significant because many computer science educators interested in addressing ethical issues in their traditional curricula have great concerns about adding material to already packed syllabi.

The modules under development include discussion questions and exercises, in-class and homework assignments, group project suggestions, test questions and faculty resources. The components of the modules are grounded in applied ethics teaching methodologies, and include techniques such as ethics scenario analysis, role-playing, and interviews with database professionals.

2 Keith Miller

Dr. Miller will share his experience in the development and delivery of an online computer ethics course. He has offered this course at least once a year for the past six years. His presentation will focus on four aspects of his experience teaching computer ethics online.

2.1 Practice quizzes and honor quizzes

Online courses are often criticized for lacking safeguards against cheating. It can be especially daunting to try to police students taking online quizzes. In my course on computer ethics, I try to take advantage of this disadvantage by making quiz-taking a lesson about “cyberethics.” For each chapter of the required textbook, I make a pool of about 30 questions, a mixture of multiple choice, true/false, matching, and so on. I construct two quizzes from each chapter pool: a practice quiz and an “honor quiz.” Both

quizzes are a random selection of questions from the chapter pool. Students are instructed to take the practice quiz as often as they'd like, using the book and online sources. The scores on a practice quiz don't count in a student's semester quiz. When the student feels confident about the questions for that chapter, they can take the honor quiz. They only get one chance with the honor quiz, and that score does count in a student's semester average. The students are on their honor not to use the book, notes, online resources, or help from anyone else during the honor quiz. Partly as an incentive to not cheat, and a reward for honest effort, I put a random selection of questions from all the chapter pools on the final exam, a policy I announce at the start of class.

The practice quiz / honor quiz system is designed to accomplish two goals. First, I want students to master some factual and definitional information about ethics and computing, and those topics are covered in the pools of questions. Second, I want the practice quiz / honor quiz system to be essentially a lab experience where students can introspect about their own behavior when repeatedly faced with the opportunity to cheat.
Comments from the students (both anonymous and otherwise) are generally favorable about this quiz system. Results from the final exam (described in more detail below) suggest that student do learn the pool questions well, at least by the end of the course.

2.2 The Importance of a Face-to-Face Final Exam

I feel an obligation to reward honest effort in my online course and to enforce consequences on people who take advantage of online teaching in order to cheat. Furthermore, I think devices like the honor quizzes described above are more effective if students know their learning (or not learning) during the semester will have an effect on their grades. Requiring that the final exam be face-to-face and closed book helps me in both these intentions. Because many of my online students are remote (this semester, as far away as Hawaii, and at other times Iraq and Korea), the students are not all face-to-face with me. Instead, if students don't attend the final exam at my university, we arrange for a proctor near the student's location. But be it a proctor or myself, the person administering the final exam is a human face connected to my online course. I think that human touch is important to any course, but perhaps even more so in a course that studies conflicts in human values.

2.3 Grading Rubrics for Essays

Many of my students in the computer ethics class are computer science majors. Our majors are comfortable with objective answers and often uncomfortable with the subjective aspects of writing an essays based on ethical analysis. To help students understand that subjective analysis and subjective grading are not arbitrary or mere whims of the instructor, I use a detailed grading rubric for each essay. Each student gets the rubric with the assignment, and then gets a score based on the rubric during the grading process. I have found that grading rubrics reduce students' perception that the grading is "unfair" or "biased." In a course on applied ethics, I try to not only be fair in

my grading, but also to appear fair to the students. Unless I'm seen to be modeling ethical online behavior, it seems unlikely that students will be receptive to my teaching about online ethics. An example rubric will be presented at the talk.

2.4 Online Discussions Can Enhance Student Engagement

One disadvantage of online courses is the lack of face-to-face discussions between the students and the instructor, and among the students. However, "conversations" do take place in the online course; they are computer-mediated, but that can be a blessing as well as a curse. The "curse" is the low bandwidth of computer-mediated communication. (I'll discuss here asynchronous bulletin board discussions, not real-time chats with video.)

The "blessing" is that many students appreciate the added time for considering their replies. One group that seems far more likely to contribute to class discussions online is students for whom English is a second language. An asynchronous environment allows them to correct grammar and spelling. Freed from some of their discomfort with public English speaking face-to-face, many of these students write long, thoughtful (and sometimes passionate) postings to online bulletin boards. I have rarely seen similar participation in face-to-face classes from students unsure of their English skills. As I point out to my students, computing has been accused of causing a digital divide between the cyber-haves and the cyber-have nots; but computing also has the potential for leveling the playing field in some situations. If skillfully facilitated, asynchronous online class discussions can help encourage students who many have more difficulty participating in a face-to-face discussion.

In summary, online courses offer challenges and opportunities. Especially in an online course about computer ethics, I've found that students respond positively to experiments that take advantage of online opportunities in a way that exploit the technology instead of the students. By carefully modeling online ethics, we can lead students in that direction.

3 Michael Quinn

Dr. Quinn, the conference keynote speaker and author of the computer ethics textbook *Ethics for the Information Age*, will explain how he uses his computer ethics course to help students improve their critical thinking skills. In particular, he will describe the effectiveness of the following common-sense strategies.

3.1 Asking follow-up questions

Students typically give superficial responses when asked to evaluate a moral issue. In my experience, classmates are reluctant to challenge each other, even when they disagree with what has been said. They are far more likely simply to state their own point of view. Without the intervention of the instructor, it's easy for discussions to meander and the

level of analysis to remain shallow. Follow-up questions are an effective way to help students flesh out their arguments and make them more substantial.

3.2 Using the blackboard

Simply listing the points supporting a particular ethical evaluation helps reduce repetition in the class discussion. It also provides opportunities for students to judge the relative merit of the supporting points and identify points that support or contradict each other.

3.3 Creating role-playing exercises

Asking students to take the position of various characters in a hypothetical scenario helps ensure that a variety of points of view are presented. I put unassigned students on a jury that evaluates the merits of each person's position. In my end-of-term evaluations, students usually pick role-playing exercises as their favorite course activity.

3.4 Staging debates

I divide the class into small groups. Each group is responsible for coming up with arguments supporting or opposing a particular position on a moral issue. Asking students who support a position to come up with arguments opposing it, and vice versa, can be particularly effective. Often students have strong emotional attachments to one side of an issue. When they are asked to argue the opposite side of the issue, they are more likely to develop an argument based solely on facts and logical reasoning. Students put the points supporting their positions on the blackboard. I encourage students to find opportunities to rebut the points made by the other side.

3.5 Giving writing assignments

My classes are larger than they ought to be, and grading writing assignments is a time-consuming activity. Still, asking students to write essays is essential. In an oral presentation, the nonverbal communication can be more important than the actual words spoken. In a written presentation, the words dominate. It's easier to see the flaws in an argument when it is presented on paper. I ask students to use both consequentialist and non-consequentialist ethical theories to evaluate a moral problem related the information technology. After receiving feedback, they revise their work and resubmit it.

3.6 Creating multi-faceted quizzes and examinations

Students must be knowledgeable enough about the subject matter being discussed that they can bring the appropriate facts to bear when crafting their arguments. To help ensure students actually read the material, I give them a one-question quiz whenever we begin the discussion of a new chapter. If the students have read the chapter, the question should be easy to answer. My midterm and final examinations contain multiple-choice and fill-in-the-blanks questions, to test their knowledge of facts, as well as essay questions, to test their ability to reason about the issues.