

TEACHING COMPUTER ETHICS

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Introduction

The purpose of this paper is to suggest some ways to introduce the teaching of ethics into the computer science curriculum. While few deny the need for including ethics, many find it difficult to do so.

Teaching ethics has several important goals: increased sensitivity to ethical concerns and situations, the ability to reason about alternative courses of action, and the integrity to make moral decisions. To meet these goals we must discuss general ethical theories and provide a framework within which to apply them.

It is important to discuss ethical issues in a number of different courses. Certain specific topics, of course, will be more appropriate in some courses than in others.

The policies adopted in computer labs and the extent to which we enforce them also teach students about ethics. Weak or poorly-enforced policies teach that ethical behavior is not really important. Strong and vigorously enforced policies demonstrate a high regard for proper conduct.

Computer scientists are the ones who must teach computer ethics. While few of us are (or wish to become) philosophers, we can learn enough to provide valuable guidance to our students.

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Why Teach Ethics?

Most of us are aware of many of the ethical problems in computer science today. One can scarcely read a copy of

ComputerWorld or *InfoWorld* without being reminded of them.

One of the more publicized problems is the use of computers and telecommunications equipment for gaining unauthorized access to computer files or electronic data signals. Software piracy (which somehow sounds better than "software theft") is a serious problem among individuals, in businesses, and increasingly in academia. The issue of cloning software and/or hardware has been much in the news lately. While receiving little public attention, issues related to privacy and responsibility have the potential for being far more serious.

In spite of the apparent need, relatively little is being done to teach ethics within the computer science curriculum. According to a recent (Feb. 24, 1988) article in *The Chronicle of Higher Education*, half of the educational institutions applying for accreditation by the Computing Sciences Accreditation Board had to "bolster" their curriculum in order to meet a requirement that students receive instruction in the "social implications of computing."

What Should We Teach?

The main goal of teaching ethics is that students be able to make moral decisions. They must be sensitive to situations that present ethical dilemmas, be able to reason about alternative courses of action, and have the character to choose an appropriate option.

Moral sensitivity involves both a cognitive and a behavioral aspect. It is possible to have "head knowledge" concerning a given ethical dilemma but to be insensitive to it. The knowledge has little or no bearing on subsequent behavior. I believe that many of our students will become sensitive to moral issues if we give them a little guidance.

Moral reasoning, too, has a cognitive component. Reasoning about the moral

implications of an action requires some knowledge of ethical theories. One must have some idea of what is right and wrong. The difficulty is to present the theories within a framework that provides a basis for their practical application.

I suspect that it is at this point that most of us begin to hesitate. Few computer scientists have spent any significant time studying philosophy. Consequently, most are a little reluctant to teach ethical theories. There is also a hesitancy founded on the popular maxim, "A little learning can be a dangerous thing." It is hard to present a subject when you know that your coverage can only be somewhat superficial. To counter that I propose a new adage, "Total ignorance can be devastating."

At Asbury College we discuss two general categories of ethical theories. The first are teleological or consequentialist theories where an action is viewed as right or wrong on the basis of its consequences. For example, an action is right if it produces the greatest possible balance of good over evil. Among teleological theories, we focus on those that define good as the well-being of society.

In deontological theories an action is regarded as right or wrong on the basis of the nature of the act itself. Relationships are strongly emphasized. Actions are to demonstrate a regard for the rights and expectations of others. A central principle in such a theory is that we must never treat people as merely a means for accomplishing our own purposes.

Ethical theories can be act-based or rule-based. In an act-based theory, decisions are made after analyzing the circumstances in a particular situation. Under a rule-based theory, decisions are based on general rules. Given similar situations, these rules result in appropriate actions most of the time.

In our discussion we include the strengths and weaknesses of competing theories and of act-based and rule-based decision-making. It is beyond the scope of this article to go into more detail here.

Thus far we have discussed an approach that is very acceptable within the context of a liberal arts education. We have presented a number of competing theories and analyzed some of the strengths and weaknesses of each. However, one of our goals is to influence the behavior of our students. We want to help them learn to make moral decisions. This means we must show them how to apply the ethical theories.

No single theory is totally adequate. We encourage our students to first consider their actions from a deontological viewpoint. Do they demonstrate a regard for the rights and expectations of others, or do they treat people as objects? There may be situations where a deontological theory cannot clearly indicate which action is best. In those cases, we encourage the use of a teleological theory.

The third goal of teaching ethics is that our students make appropriate decisions when confronted with moral dilemmas. This is, of course, a long-term goal and one that is very difficult to evaluate. We can help our students achieve this goal in three ways. We can provide the necessary cognitive skills. We can encourage them to make sound ethical decisions. Perhaps most importantly, we can demonstrate ethical behavior in our personal lives.

Who Should Teach Ethics?

Most of us feel inadequately prepared to teach ethics. Few have studied ethics to any significant extent; perhaps (at most) one undergraduate-level course.

We must also face the territorial attitudes so common in academic settings. We certainly wouldn't want the philosophers teaching computer programming. Reading a book or two on programming doesn't prepare one to teach programming. It is perfectly understandable for the philosophy department to insist that similar preparation does not prepare one to teach ethics.

Unfortunately, traditional ethics courses seldom provide a practical framework within which to apply the theories. There is a tendency to discuss the various theories in an impartial manner leaving many students with no real basis for making decisions.

There is another drawback to letting the philosophy department be totally responsible for the teaching of ethics. Just as we know little about ethics, they (typically) know little about computers. As a result, such courses can not meet our goal of increased sensitivity to computer-related ethical issues.

We face a real dilemma; a dilemma that often leads to inaction. A philosopher will want to explore the theories in too much depth and will be weak on specific issues of interest to us. We, in turn, will be strong on the issues but weak on theory.

One possible solution is team-teaching. There are certainly instances when such an arrangement is practical. To be successful, both teachers must be at least somewhat knowledgeable about the other's field. Also, the philosophy teacher must be able to present the basic material clearly. The disadvantage of this solution is that it isolates ethics into a one-term course. It becomes just another required course.

I'm firmly convinced that a better solution is to discuss ethical issues in as many of our courses as practical. That means we must learn enough about ethical theories to be able to present them and use them in our classes.

The distinctive advantage of this approach is that the students see that ethical issues arise in virtually all areas of computer science. Ethics is no longer relegated to another required course, but rather integrated throughout the computer science curriculum.

Pedagogical Concerns

We have begun to integrate the study of ethics into our computer science program by developing a number of relatively independent ethics modules. Most of the modules begin with some case studies involving ethical issues. The students write down their reactions to each situation. Following a discussion of the responses is a presentation of some factual and theoretical aspects that bear on the case-study situations. After this, the students discuss whether they would change their responses or not. In either case, they must support their positions on the basis of ethical reasoning.

The purpose of the first module is to introduce the ethical theories described earlier. The case studies center on a number of situations involving the copying of printed materials in an academic setting. This is a situation familiar to most students, yet one which few have analyzed from an ethical viewpoint.

After discussing the situations (one at a time) the students receive copies of the relevant sections of the copyright law and copies of the academic fair use guidelines. The ethical theories outlined above are also presented.

In light of this new information, the students discuss the case-study situations again. Most students say that the new information has caused them to change their minds in at least one of the situations. Following this, new case-study situations are presented and discussed by the class.

This particular module does not deal directly with computer-related issues. However, it does serve as a way to bring the student from an issue with which (s)he is familiar to issues that are new. At the present time we have modules covering the copying of music (more-or-less a transitional module), the copying of software, the cloning of software and hardware, and privacy. This is only a beginning and we hope to work on additional modules as time permits. (Indeed, time is the ultimate obstacle to the integration of ethics into the curriculum).

Where Should We Teach Ethics?

The advantage of having relatively independent modules is that they can be used in several different contexts. For example, the first three modules are used in a computer-literacy course as well as the first computer programming course. Cloning of software can be discussed in a higher level programming class. Cloning of hardware can be discussed in a computer organization or a computer architecture class. Privacy can be discussed in a systems analysis course or a database management course. The issue of responsibility for the correct operation of computer programs can be discussed in programming courses or in a systems analysis course.

At Asbury College we have also added a one-hour senior-level ethics seminar to the computer science requirements. This course serves as a capstone course. In it the student can tie all of the pieces together and explore some areas in more depth.

We also teach ethics in our computer labs (whether we intend to or not). We encourage moral decision-making when we adopt and enforce strict policies relating to copying software. We must prohibit the unauthorized duplication of copyrighted software. Ideally, we should also prohibit the use of illegally copied software. (I know it is difficult to enforce, but we can do our best.)

We must be very careful not to use questionable copies of software. It is very tempting to bend the law a little because of the expense of software and our limited software budgets. However, we can't get our message across to the students if our institutions encourage or permit unethical behavior.

Finally, we can teach ethics in our own personal lives. Our effectiveness will certainly be limited if it is common knowledge that we maintain a private library of illegally copied (stolen) software.

Conclusion

The need for teaching ethics as an integral part of computer science is as strong today as ever. We need to assume the responsibility of becoming familiar with ethical theories and an appropriate framework within which to apply them. We need to transfer that knowledge to our students and point out issues in computer science where ethical concerns arise. We must do this through-out the curriculum not in a special ethics course. We need to maintain the highest ethical standards in our computer labs and in our personal lives. Only then can we hope to instill in our students an ability to recognize ethical issues, to reason about alternative courses of action, and to make morally-justifiable decisions.

Bibliography

There are a number of helpful books in the area of ethics and computer ethics. The first three are especially good and I recommend you get all of them.

Frankena; Ethics, 2nd ed.; Prentice-Hall; 1973. An introduction to ethics.

Johnson; Computer Ethics; Prentice-Hall; 1985. A brief discussion of ethical theories followed by a chapter on codes of ethics and four chapters dealing with specific issues (responsibility, privacy, power, ownership).

Johnson and Snapper; Ethical Issues in the Use of Computers; Wadsworth; 1985. This and the preceding book are organized along the same lines except that this book does not contain any discussion of ethical theories. Each chapter consists of a

collection of readings about a given issue. A good reference book in conjunction with Computer Ethics.

Another book that may be of some use in preparing for classroom presentations is Parker; Ethical Conflicts in Computer Science and Technology; AFIPS Press; no date given. It contains a collection of scenarios involving computer professionals. Each scenario is followed by a few comments summarizing how a panel of selected professionals (including individuals from the fields of computer science, philosophy, psychology, and law) reacted to the situation described.

While an effort is made to list underlying general principles, they are usually quite dogmatic and no attempt is made to justify them on ethical grounds. Furthermore, the tone of the book seems to suggest that ethical decisions can be made on the basis of consensus.

Nevertheless, the book can be used as a source of case studies. You may want to present a case study and have students submit written responses. These should include a discussion of what is ethical and what is unethical and, perhaps more importantly, the reasoning behind the stands that are taken.

In addition to these books, I would suggest that you keep a file of clippings and/or references from professional journals and newspapers. There are often articles dealing with ethical issues in the weekly newspaper ComputerWorld. Such a file will provide you with real-world situations and keep you up-to-date on the issues and the attitudes prevalent in the computing profession.