

Integrating Ethics in CSc-105: Introduction to Computer Science

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Introduction

CSc-105: Introduction to Computer Science is the first course in the major's sequence in Computer Science. The course is typically composed of approximately 70% first year students who plan on majoring in Computer Science or Computer Engineering and 30% students of all years who have an interest in Computer Science. The course is taught in a linear, lecture fashion typical to other math, science and engineering classes. I decided to integrate a discussion of ethics into my introductory course because Computer Science is a subject matter which is rich in opportunities to discuss ethical issues. There are many different ethical issues which relate to Computer Science, from privacy to piracy and intellectual property. Importantly, most of these ethical issues are directly related to student's every day experiences. When we discuss piracy, nearly every student has first-hand knowledge of obtaining unlicensed digital media over the Internet. When we discuss violence in video games, they are games which the students have played. Consequently, I think Computer Science fits extremely well into the paradigm of everyday ethics.

Ethics in Computer Science Education

Unfortunately, traditional introductory classes have tended to focus almost exclusively on the technical subject of learning to program, ethical issues are rarely discussed in course syllabi or introductory textbooks. I think the reasons for this are myriad, from the fact that a student's first introduction to programming tends to be a challenging experience, to the mistaken perception that technical subjects are disjoint from the ethical issues that the use of technology may provoke. My *Ethics across the curriculum* grant spurred me to reconsider the absence of ethics in introductory computer science, and I have now come to believe that ethics is an important component of an introduction to computer science. In fact, I believe the discussion of ethics actually addresses some of the existing flaws in the pedagogy of introductory computer science.

Ethics not only has a place in introductory computer science but has a strong role to play. First, if we are truly introducing students to computer science, we should do more than simply introduce them to the technical subject of how to program. Twenty or thirty years ago learning to program might be sufficient, but we have reached a point now where the computer is so tightly integrated into nearly every aspect of our everyday lives that an introduction to computer science must also include educating students about the issues, ethical and otherwise, that this tight integration begets. In an era of increased use and reliance on technology, awareness of fundamental issues regarding the effect of technology on democracy, privacy, security and intellectual property is not just a matter of good education, they are necessity for an informed citizenry and consequently a functional democracy. We must teach students not just how the computer works, but also how computers change society.

The second reason that I think ethics is an important subject for introductory computer science is one of breadth. In traditional introductory computer science courses students see a very narrow slice of computer science related to the technical skill of programming. While this skill is very necessary for students to succeed in computer science, it does not provide a holistic view of what the larger field is truly like. I believe that by introducing ethics into introductory computer science, students are reminded of larger domain and impact of computer science that exists outside the narrow confines of introductory programming. Integrating ethics into my introduction to computer science ethics served both to broaden student's understanding of computer science, and renew their interest in the core fundamentals taught by the introductory course.

Course Structure

Structurally, I decided to include a short (15-20) minute discussion on a specific ethical issue in one class each week through out the course. I arrived at this structure after much thought, but it was spurred by the following motivations: First, the incremental of the information being taught through lecture was such that I think it would be difficult to break up the rhythm of learning with a week of classes dedicated exclusively to ethics. Second, there are many, many different possible subjects for discussion and I wanted to have the opportunity to provide students with exposure to the breadth of issues possible. Having many short discussions facilitated this approach. Finally, in accordance with the "everyday" portion of the Ethics Across the Curriculum effort, I wanted students to think of the ethical discussions as a core part of the introduction to computer science rather than an add-on section disjoint from the larger class.

In each of the discussions, I introduced the topic under discussion, inquired about student familiarity with the subject, provided background and explanation as needed, and then opened the floor to student discussion. When students were hesitant to offer opinions, I tried to encourage involvement by asking questions I had prepared before-hand. Class participation in discussion was a small component of the final grade. The subjects I discussed included:

- Securing electronic voting, paper-trails and legislation to require source-code examination and escrow.
- Intellectual property and honesty, this was both about sharing music as well as sharing solutions to course projects (a recurring issue in computer science).
- Privacy and security, eavesdropping on network traffic, data mining, hacking
- DMCA (Digital Millennium Copyright Act) Reverse engineering, anti-competitive behavior
- Violence and sexual representation in video games
- Censorship, including "The great firewall of China" as well as bandwidth shaping and BitTorrent blocking at Union.
- Issues surrounding the "digital divide", the one laptop per child program, issues of high-speed internet access in rural America and the developing world.

Challenges and future directions

I think the primary challenge was developing a discussion environment in the introductory class where students were interested in sharing their opinions. I think there are many reasons for this. First, the class is primarily structured as a lecture. Consequently, students are conditioned to sit and absorb information rather than participate in interactive discussions. I would like to develop a better method of bridging the transition between lecture and discussion. Secondly, I had trouble getting students to clearly take sides and elucidate their opinions. I think that having students prepare a short position piece ahead of class would significantly help in this matter. I also think that students would treat the section with more seriousness if they were required to prepare something for the class. The final problem was a lack of experience in leading discussions on my part. Discussions in computer science class tend to be question and answer sessions rather than open-ended discussions of opinions. Consequently I found myself to be ill-prepared on methods to get students to open up with their opinions and to keep discussion going. Additionally, at times I found myself speaking too much, and offering too much of my opinion which tended to stifle discussion.

At a structural level, I like the integration of the discussions into the lecture. In the future I plan on incorporating short background readings and writing a position statement as a component of the required work for the course. I hope that this will increase student awareness of the issues and facilitate greater discussion.

Overall, I enjoyed the experience and I believe it successfully got students to think about ethical issues in computer science that they would have otherwise been unaware. I hope in future iterations of this idea to integrate it more completely into the entire course. I think this would come from careful lesson planning to make the examples used in lecture line up more closely with the ethical topics under discussion.