TEACHING ABOUT PROFESSIONALISM AND ETHICS IN A COMPUTER SCIENCE COURSE

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I. **Introduction.** Professionalism and ethics are topics that are rarely discussed in a computer science course, yet they must be dealt with on a daily basis by professional computer scientists. I believe that computer science educators have a responsibility to teach about and discuss the ethical dimensions of computer science. Please note that I am not a philosopher and that this paper is not intended to be a philosophical treatise. Instead, it is intended to provide an outline that can be used to incorporate the topics of professionalism and ethics into a computer science course.

The motivation for teaching about professionalism and ethics is two–fold. Primarily, it is to provide a sound basis for ethical decision making as a professional. Secondarily, it is to try to eliminate incidents like the recent Internet worm.

Ideally, computer ethics should be a required course in the undergraduate computer science curriculum. This paper takes a more pragmatic approach by discussing a suggested outline for introducing the topics in one or two class periods.

II. **Suggested Outline.** This section of the paper contains a suggested outline for introducing the topics of professionalism and ethics. It has been successfully used in classes ranging from 20 to 130 students. These students ranged from first–semester freshmen to graduate students.

The time spent on ethics will be beneficial if the students understand that there are very few clear-cut answers and if they are encouraged to participate in the discussion. Pedagogical treatment of these topics is boring for both the instructor and the students.

The following outline contains four areas (labeled A– D) that should be discussed. It is important to keep in mind that this is merely an outline. Effective presentation of this material involves the use of 'real–world' examples that help to make the abstract notions more concrete.

A. Define and Discuss Professionalism.

Many students, when asked, say that they are aspiring to become professionals. They will also admit to having a very fuzzy notion about the definition of a professional. The following material, excerpted from [1], is intended to help students better understand what it means to be a professional. It should be presented in a way that helps motivate the students to learn about professional ethics.

The major characteristics of a professional are:

1. *Theoretical Knowledge and Skill.*

The theory needs to be internally consistent and the basis for all professional action while the skill should be a direct application of the theory. Generally, this theoretical knowledge (and, ideally, some of the skill) is acquired in an academic setting.

Possession of the skill without the underlying theory is not sufficient for professional status. An army medic who acquires the ability to perform emergency surgery on a battlefield cannot call himself a doctor, nor would he be allowed to practice surgery in a less hostile environment (even though he might possess the skill to do so). Similarly, an individual who has the ability to write computer programs cannot call himself/herself a professional computer scientist based solely on this ability.

2. *Judgmental Authority and Independence.*

The client defers to the judgment of the professional in the client–professional relationship. It is useful to differentiate between a customer and a client. A nonprofessional occupation has customers who maintain complete judgmental authority when deciding which goods or services are best. A professional has clients who defer to his/her judgment.

The characteristic of independence insures that the professional will make judgments based only on relevant facts and not on outside influences, such as monetary reward. Although this is sometimes difficult to do in a corporate setting, it is, nevertheless, a goal to strive for.

3. *Public Recognition and Sanction.*

Professions exist to serve the public. In turn, the public recognizes and sanctions the professions (i.e., by restricting the use of certain titles such as M.D. and Professional Engineer). The esoteric knowledge of the professional disallows the general public from passing judgment on the professional with respect to his/her area of expertise. Therefore, the public expects the profession to be self–policing via a code of ethics.

4. *A Code of Ethics.*

A code of ethics provides meaning, purpose, and control to both the profession and the professional. This is usually regarded by the public as an acknowledgment by the professionals to use their knowledge and skill to benefit humanity.

If the students are computer science majors, then this would be a good place to introduce and discuss the code of ethics from the Association for Computing Machinery (ACM) or the Institute of Electrical and Electronics Engineers (IEEE).

5. *Altruistic Nature.*

The primary motivation for a professional should be altruism. Serving humanity should be considered above all else (including personal aggrandizement and monetary compensation). Of all the characteristics mentioned in this paper, this one tends to be the least acceptable to the students. Many of today's students are entering the professions with the (less noble) motivation of making a lot of money.

6. *Mandatory Continuing Education.*

The dynamic nature of knowledge (especially in technological areas) makes it essential for a professional to keep abreast of new developments. This continuing education can be accomplished via short courses, formal academic classes, or a variety of other means.

7. *Formal Association or Society.*

The formal association or society is usually the source for the profession's code of ethics. It also provides a means for disseminating information about the profession to professionals. Once again, if the students are computer science majors, then this would be a good time to encourage membership and participation in ACM and/or IEEE.

B. Briefly Introduce Ethical Theory.

A discussion of ethics will be most beneficial if the students have some understanding of the underlying ethical theory. This part of the discussion can be omitted if the students have already studied ethical theory. If not, then try to get an ethicist from the Philosophy Department to give a brief introduction. If this is not possible, then briefly discuss the following:

1. *Deontological Theories:* The motives of an action or potential action determine ethicality.

2. *Teleological Theories:* The consequences of an action or a potential action determine ethicality.

Unfortunately, hundreds of years of philosophy cannot be condensed into a few lines in a paper or into ten minutes of classroom discussion. At best, this part of the discussion will provide a simplistic framework for couching ethical decisions.

C. Give an Outline for Dealing with Ethical Issues.

The following exercise is highly recommended for students who are at an early stage in their academic development.

1. Determine personal set of ethical beliefs.

2. Examine the code of professional ethics for your profession.

3. Attempt to resolve any differences between steps 1 and 2.

The nearer a student is to graduation and a job offer, the less objective he/she is likely to be regarding conflicts between personal and professional ethics (money tends to cloud the issues). This is why the exercise is recommended for students at an early stage of academic development.

After becoming a professional, the following process can be used for determining the ethicality of an action or potential action:

1. Examine the code of professional ethics.

2. Ask the question, "What does my employer say?"

It is imperative to instill the notion that the primary responsibility of a professional qua professional is to serve humanity. Realistically, professionals must perform a balancing act between duty to humanity and duty to employer. If these duties ever appear to be in conflict, then the professional should choose to satisfy the duty to humanity.

D. Propose and Discuss Scenarios.

The most interesting part of the discussion is when scenarios are proposed and the students are given an opportunity to discuss the ethical dimensions. Generally, scenarios related to the specific course topic are fairly easy to develop. For additional scenarios, see Parker [2].

It is quite common for some of the students to begin discussing legal responsibility instead of ethical responsibility. Without discouraging partipication, the emphasis should be kept away from legalities as much as possible (ethical responsibility tends to be much greater than legal responsibility).

The instructor should assess his/her relationship with the class before deciding on the level of involvement in the discussion. If a controversial subject is proposed, then the instructor should act as a facilitator instead of a participant (unless he/she is fairly certain that students with opposing views will not be inhibited from participating).

III. **Conclusion.** It is important for the students to realize that virtually all decisions are value–laden. This fact is not inherently bad. The goal should be to recognize when values are incorporated into a decision and to base professional decisions on the ethical foundations of the profession.

Teaching about professionalism and ethics should be an integral part of any computer science curriculum. The outline given above is a practical guide for developing a short section on ethics for any computer science course.

Professional ethics is not a subject that is studied for a short time and then put on the shelf. It requires constant evaluation and introspection. Spending class time on ethics should be viewed as helping students take the first few steps on the lifelong path of ethical decision making.

References

1. L. V. Edmondson, "Development and Analysis of Professional Ethics for Computer Simulation," Unpublished M.S. thesis, University of Missouri–Rolla, 1985.

2. D. B. Parker, *Ethical Conflicts in Computer Science and Technology*, AFIPS Press.