ETHICS ON THE SIDE: AN INTEGRATED APPROACH

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Introduction

Side dishes are currently a popular fad in restaurants; at our local barbecue shack, patrons can order diet-conscious sides, such as salads and vegetables, or calorie-laden favorites: baked beans with brown sugar, sweet potato fries dusted with sugar and cinnamon, or hush puppies with honey dip. Depending on the choice, sides can alter the flavor of the entree.

The same is true of college curricula; we often include sides, such as writing or speaking components, in technical courses. Adding a side changes the character and, to some extent, the content of the class, for if instructors require written or oral assignments, they should devote some class time to discussing it. Ethics on the side works the same way.

ABET criterion 3f requires that students demonstrate an understanding of ethical and professional behavior. To address the ethics piece, a technical department could decide to farm it out to the campus philosophers, as an entree, or integrate it into existing technical classes, as a side. Given the very packed nature of technical programs, however, finding room for another entree may pose a problem. As a side dish, however, ethics tidbits can provide a tasty complement to technical information, sliding into core knowledge just as those baked beans ooze into the spareribs, surprising the taste buds and enhancing the flavor of the entree.

This paper discusses advantages associated with an integrated approach—ethics as a side dish—and offers concrete suggestions for technical instructors, focusing on an applied approach, rather than the abstractions of moral philosophy.

Advantages

While stand-alone courses in ethics certainly have value, including ethics in the technical curriculum helps students understand the relevance of ethics to their own field of study and closely ties it to core course material. Although the amount of time devoted to ethics in any class varies, depending on course goals and objectives, the side dish approach allows for a seamless integration.

Inherent to Engineering

Ethics and engineering go together like baked beans and brown sugar. Indeed, ethics is endemic to engineering, as Michael Davis, at Illinois Institute's Center for the Study of Ethics in the Professions, states: “Knowing engineering ethics is as much a part of knowing how to engineer as knowing how to calculate stress or design a circuit . . . insofar as engineering is a profession, knowing how to calculate stress or design a circuit is in part knowing what the profession allows, forbids, or requires.”

In fact, good engineers and technologists are proficient in several areas besides engineering per se: they must be able to competently deliver technical information orally and in writing to a variety of audiences; they must persuade potential clients to accept proposals; they must demonstrate effective teamwork skills.
that allow for productive work; they must be honest with clients and uphold the integrity of the engineering profession. In short, ethics is another element of the “soft skills” gab bag that students must master through academic practice. Former ASEE president Eleanor Baum has noted that the “ultimate benefit” of soft skills mastery is “engineers who will better satisfy the needs of the workplace and whose best humanitarian instincts will prevail.”

Engineering and technology thus provide a context for ethical deliberation and decision-making: including ethics sides in technical classes helps underscore the symbiotic relationship between the two: a good engineer or technologist is also, to some degree, an ethicist. “To understand moral problems,” Michael Davis states, “we must see them in context. To understand problems of engineering ethics, we must understand the engineering context.”

Critical Thinking

Including ethics automatically introduces a critical thinking component into any course. In engineering and technology curricula, ethical inquiry and deliberation can allow students to examine the consequences of their designs. In many ways, technology is a two-edged sword: each new technological invention is laden with a host of unintended societal impacts and ethical concerns. Television, for example, brought the world into our living rooms but affected how we interact. Cell phones have allowed for instant communications but have afforded students new avenues for cheating. The Internet has brought information literally to our fingertips, but it has also allowed unsavory characters an easy pathway into our homes through social networking sites. Computers have revolutionized how we work, play, teach, and conduct business, but e-waste is becoming an environmental nightmare in developing countries used as dumping grounds for obsolete electronics. Leading students to an understanding that design is not an end unto itself, that design impacts not only our own lifestyles but those of others as well, is an essential part of the educational process.

And it is a small skip from engineering problem-solving to ethical inquiry; indeed, they are kith and kin. But whereas the former focuses on the “how,” ethical problem-solving examines the “why,” with an eye to the future. Caroline Whitbeck, a noted engineering ethicist, examines several areas where engineering problem-solving and ethical inquiry intersect, all related to the open-ended nature of the problem:

- A problem may have multiple potential solutions.
- These solutions exhibit some variation: some are clearly wrong and others, while not necessarily right, are preferable.
- Problems may have two equivalent potential solutions.
- The preferable solution must fulfill a specific end, adhere to criteria or specifications, and “be consistent with background constraints.”

While design is the primary calling of engineers and application that of a technologist, including course material that uses the engineering problem-solving methodology to look at ethical implications of design affords students an opportunity to become betters thinkers, better employees, better managers, and better stewards of the planet.

Preparation for Professional Life

In addition to arming students with problem-solving and technical skills, an unstated goal of technical curricula is helping students to develop as professionals. Knowing how to act and accepting the consequences of those actions is one element of being a professional; adhering to a commonly agreed-

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upon code of ethics is another.\textsuperscript{5} Including ethics as a natural part of engineering and technology results in students developing increased sensitivity to ethical problems, increased knowledge of professional conduct expectations, improved ethical judgment and will power.\textsuperscript{2}

\textbf{Integration Suggestions}

Given that students already have a nodding acquaintance with ethical problem-solving through their technical studies, creative and enthusiastic instructors can develop a number of techniques for including ethics as a side dish in virtually any technical class. The items suggested below are tried and true.

\textit{Cases}

Engineering ethics is littered with major cases routinely used in applied ethics courses to illustrate various issues, such as the Hyatt Regency walkways collapse (rubber-stamping design changes); Challenger State Shuttle disaster (whistleblowing, communications flow, groupthink); Bhopal (irresponsibility of American firms internationally); Exxon-Valdez oil spill (environmental devastation); Columbia Space Shuttle disaster (corporate climate, groupthink). While these high-profile cases are useful for showing the public consequences of ethically questionable decisions, smaller cases may be better suited to the side dish approach because they are less complicated and students can relate on a more personal level, exercising their critical thinking skills on a problem that is less overwhelming. Small cases also allow for an in-depth consideration of the context of the problem.\textsuperscript{7}

One lesser-known case that students can research to explore owner irresponsibility is the Boston Molasses Flood of 1919. Due to its relative obscurity, it is an exotic side dish. In a nutshell, the case involves the rupture of a 2.3 million gallon molasses storage tank, erected a few blocks from the Charles River. At that time, molasses was used in the armaments industry, and the tank had been leaking from the time it was built. To disguise the leaks, employees of the Purity Distilling Company painted the tank brown. However, on January 15, an unusually warm winter day, the molasses in the tank expanded and burst out; a 25-foot wave of sticky goo, moving at 35 mph, inundated the streets of North End Boston. Over 150 people were injured, and 21 died; numerous horses also perished. The scent of molasses lingered in Boston for more than 30 years.\textsuperscript{8}

In the several years that I have been using this case, not one student has heard of it. Yet all are fascinated as we explore the incident and aftermath. In fact, one term several students were so interested that they engaged in extra research and discovered that containers ruptures are not so rare at all; they just not as seductive for mainstream media as are dam breaches or building collapses.

Finding cases for classroom use is relatively simple. Most Web ethics centers include a section on cases, as do engineering ethics textbooks. For real life cases, the NSPE’s Board of Ethical Review cases are available at the NIEE website: http://www.niee.org/cases/index.htm. The Online Ethics Center for Engineering and Science, http://www.onlineethics.org/, also has a section devoted to cases, including some that are quantitatively based. An overlooked source of ethics cases is individual state engineering exam boards; in my state, the organization publishes accounts of code violations in its quarterly newsletter.

Using cases provides both a vehicle for ethical problem identification and a concrete instance for moral deliberation: “Through cases,” note Harris, Pritchard, and Rabins, “we learn to recognize the presence of ethical problems and to develop analytical skills necessary to resolving them.”\textsuperscript{9}
Assignments

Some instructors may decide to formalize ethics side dishes as evaluated parts of the course, perhaps assuming that students will be more engaged if they are being graded on their work in this area. Numerous assignments are possible, the choice depending on course objectives:

**Codes examination.** This assignment is appropriate for any level of class, from freshman to senior, and takes minimal preparation on the part of the instructor. In my professional ethics course, which includes students from all curricula, students locate their professional code, read it, and generate a memo which explains the following:

- Currency (Does the code need updating?)
- Professional boundaries (What are you supposed to do?)
- Prohibitions (What are you not supposed to do?)
- Reactions (Do you think this code is realistic? Can you adhere to it?)

Instructors may simply evaluate the memo or conduct a discussion follow-up. Since my course is discussion-based, I have a follow-up, arranging students into interdisciplinary groups and asking them to compare their codes for commonalities, such as avoiding conflicts of interest and maintaining confidentiality. This affords a nice opportunity to discuss general expectations for professional behavior in codes from a variety of fields, and students are genuinely surprised at the similarities, ethically speaking, between such disparate fields as nursing and engineering. In any given term, about 25% of my class, primarily juniors and seniors, has never seen their professional code, so students feel that this exercise is an important one.

Another approach to codes is to focus on the institutional student code of conduct. Given the prevalence of cheating, using such technologies as cell phones or cut-and-paste plagiarism from the Internet, this examination should prove eye-opening for students, especially those just embarking on their academic careers. Another advantage is that this assignment impresses upon students the reality that ethics is not “out there,” not just something one does on the job, but is a part of daily life.

**Interview with a professional.** This assignment is useful for acquainting students, especially freshmen and sophomores, with ethics in action. Ask students to locate a professional in their chosen field, preferably off-campus, and conduct a short interview, focusing on questions such as the following:

- Does the company have an ethics statement/code/conduct guidelines?
- Does the company maintain ethical behavior as described in this code?
- Is the employee familiar with this code? With his/her professional code?
- What ethical situations has the employee faced? How severe are they? How does the employee resolve them?
- Does the company have a formal outlet (hotline, ethics office) to investigate employee concerns?

Although students routinely report that the people they interviewed are not aware of either a business or professional code of ethics, this is still a useful exercise in helping students understand the place of ethics on the job.

**Ethics across the curriculum assignments.** For 6 years, Oregon Institute of Technology offered a formal seminar in integrating ethics into technical classes, open to all faculty; some 70 have participated and
generated some very interesting written assignments and discussion exercises for their classes, including the following:

- Number-crunch Ford Pinto gas tank redesign statistics (statistical methods)
- Examine the Hyatt Regency walkways collapse (structural engineering)
- Explore why a corporation persistently includes a dead employee’s resume in grant applications (technical writing)
- View Stalking the Wily Hacker and discuss issues of database privacy (software engineering technology)
- Discuss graphical data manipulation (math)
- Discuss whistleblowing (mechanical engineering technology)

Faculty have also experimented with a number of methodologies, including using cases and videos; having students, in groups, read professional literature about ethics in their field and report back to class; taking a “regular” problem and adding an ethics dimension; and taking advantage of serendipitous occasions for ethics discussions, such as plagiarism cases, newspaper articles, and local issues.10

Conclusions

Offering ethics as a side dish in technical courses can enhance the entree: students can begin to understand the rationale behind design decisions and can project into the future, to see the potential consequences of those designs. While ethics as an entree is also effective, the issue of knowledge transfer always arises: do students take the information gleaned in a non-major course and apply it to technical classes?

An integrated approach assures faculty that ethics content is not lost in a general education jungle, that students clearly see the relationship between ethics and engineering. As Martin and Schinzinger explain, “Technology has a pervasive and profound effect on the contemporary world, and engineers play a central role in all aspects of technological development. In order to hold paramount the safety, health, and welfare of the public, engineers must be morally committed and equipped to grapple with the ethical dilemmas they confront.”11 Ethics on the side can help ensure that our students develop methods for practicing the technical and ethical problem-solving skills required to operate professionally in a world constantly remade by new technologies.

References


