CHAPTER THREE

Understand Ethical Problems

Objectives

After reading this chapter, you will be able to

- Discuss several ethical theories.
- See how these theories can be applied to engineering situations.

INTRODUCTION

In this chapter, we will develop moral theories that can be applied to the ethical problems confronted by engineers. In ethical problem solving, we will need some knowledge of ethical theory to provide a framework for understanding and reaching solutions in ethical problems. In this chapter, we will develop this theoretical framework and apply it to an engineering case. We will begin by looking at the origins of Western ethical thinking.

ETHICAL THEORIES

In order to develop workable ethical problem-solving techniques, we must first look at several theories of ethics in order to have a framework for decision making.

Ethical problem solving is not as cut and dried as problem solving in engineering classes. In most engineering classes, there is generally just one theory to consider when tackling a problem. In studying engineering ethics, there are several theories that will be considered.

The relatively large number of theories doesn’t indicate a weakness in theoretical understanding of ethics or a “fuzziness” of ethical thinking. Rather, it reflects the complexity of ethical problems and the diversity of approaches to ethical problem solving that have been developed over the centuries. Having multiple theories to apply actually enriches the problem-solving process, allowing problems to be looked at from different angles, since each theory stresses different aspects of a problem.

Even though we will use multiple theories to examine ethical problems, each theory applied to a problem will not necessarily lead to a different solution.

Frequently, different theories yield the same solution. Our basic ethical problem-solving technique will utilize different theories and approaches to analyze the problem and then try to determine the best solution.

3.3.1 What Is a Moral Theory?

A moral theory defines terms in uniform ways and links ideas and problems together in consistent. This is exactly how the scientific theories used in other engineering classes function. Scientific theories also organize ideas, define terms, and facilitate problem solving. So, we will use moral theories in exactly the same way that engineering theories are used in other classes.

There are four ethical theories that will be considered here, each differing according to what is held to be the most important moral concept.

Utilitarianism seeks to produce the most utility, defined as a balance between good and bad consequences of an action, taking into account the consequences for everyone affected.

A different approach is provided by **duty ethics**.

Duty ethics contends that there are duties that should be performed (for example, the duty to treat others fairly or the duty not to injure others) regardless of whether these acts lead to the most good.

Rights ethics emphasizes that we all have moral rights, and any action that violates these rights is ethically unacceptable. Like duty ethics, the ultimate overall good of the actions is not taken into account.

Finally**, virtue ethics** regards actions as right that manifest good character traits (virtues) and regards actions as bad that display bad character traits (vices); this ethical theory focuses on the type of person we should strive to be.

3.3.2 Utilitarianism

The first of the moral theories that will be considered is utilitarianism. Utilitarianism holds that those actions are good that serve to maximize human well-being. The emphasis in utilitarianism is not on maximizing the well-being of the individual, but rather on maximizing the well-being of society as a whole, and as such it is somewhat of a collectivist approach. An example of this theory that has been played out in this country many times over the past century is the building of dams. Dams often lead to great benefit to society by providing stable supplies of drinking water, flood control, and recreational opportunities. However, these benefits often come at the expense of people who live in areas that will be flooded by the dam and are required to find new homes, or lose the use of their land. Utilitarianism tries to balance the needs of society with the needs of the individual, with an emphasis on what will provide the most benefit to the most people.

Utilitarianism is fundamental to many types of engineering analysis, including risk–benefit analysis and cost–benefit analysis, which we will discuss later. However, as good as the utilitarian principle sounds, there are some problems with it. First, as seen in the example of the building of a dam, sometimes what is best for everyone may be bad for a particular individual or a group of individuals.

An example of this problem is the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. WIPP is designed to be a permanent repository for nuclear waste generated in the United States. It consists of a system of tunnels bored into underground salt formations. These salt beds are considered by geologists to be extremely stable, especially to incursion of water which could lead to seepage of the nuclear wastes into groundwater. However, there are many who oppose this facility, principally on the grounds that transportation of the wastes across highways has the potential for accidents that might cause health problems for people living near these routes.

An analysis of WIPP using utilitarianism might indicate that the disposal of nuclear wastes is a major problem hindering the implementation of many useful technologies, including medicinal uses of radioisotopes and nuclear generation of electricity. Solution of this waste disposal problem will benefi t society by providing improved health care and more plentiful electricity. The slight potential for adverse health effects for individuals living near the transportation routes is far outweighed by the overall benefits to society. So, WIPP should be allowed to open. As this example demonstrates, the utilitarian approach can seem to ignore the needs of individuals, especially if these needs seem relatively insignificant.

Another objection to utilitarianism is that its implementation depends greatly on knowing what will lead to the most good. Frequently, it is impossible to know exactly what the consequences of an action are. It is often impossible to do a complete set of experiments to determine all of the potential outcomes, especially when humans are involved as subjects of the experiments. So, maximizing the benefi t to society involves guesswork and the risk that the best guess might be wrong. Despite these objections, utilitarianism is a valuable tool for ethical problem solving, providing one way of looking at engineering ethics cases.

It should be noted that there are many flavors of the basic tenets of utilitarianism. Two of these are act utilitarianism and rule utilitarianism.

Act utilitarianism focuses on individual actions rather than on rules. The best known proponent of act utilitarianism was John Stuart Mill (1806–1873), who felt that most of the common rules of morality (e.g., don't steal, be honest, don't harm others) are good guidelines derived from centuries of human experience. However, Mill felt that individual actions should be judged based on whether the most good was produced in a given situation, and rules should be broken if doing so will lead to the most good.

Rule utilitarianism differs from act utilitarianism in holding that moral rules are most important. As mentioned previously, these rules include “do not harm others” and “do not steal.” Rule utilitarian's hold that although adhering to these rules might not always maximize good in a particular situation, overall, adhering to moral rules will ultimately lead to the most good. Although these two different types of utilitarianism can lead to slightly different results when applied in specific situations, in this text, we will consider these ideas together and not worry about the distinctions between the two.

3-3-3 COST–BENEFIT ANALYSIS