

CHAPTER TWO

Professionalism and Codes Ethics

2.2.2 Engineering as a Profession

Using medicine and law as our examples of professions, it is now time to consider whether engineering is a profession. Certainly, engineering requires extensive and sophisticated skills. Otherwise, why spend four years in college just to get a start in engineering? The essence of engineering design is judgment: how to use the available materials, components, and devices to reach a specified objective. Discretion is required in engineering: Engineers are required to keep their employers' or clients' intellectual property and business information confidential. Also, a primary concern of any engineer is the safety of the public that will use the products and devices he designs. There is always a trade-off between safety and other engineering issues in a design, requiring discretion on the part of the engineer to ensure that the design serves its purpose and fills its market niche safely.

The point about mechanization needs to be addressed a little more carefully with respect to engineering. Certainly, once a design has been performed, it can easily be replicated without the intervention of an engineer. However, each new situation that requires a new design or a modification of an existing design requires an engineer. Industry commonly uses many computer-based tools for generating designs, such as computer-aided design (CAD) software. This shouldn't be mistaken for mechanization of engineering. CAD is simply a tool used by engineers, not a replacement for the skills of an actual engineer. A wrench can't fix an automobile without a mechanic. Likewise, a computer with CAD software can't design an antilock braking system for an automobile without an engineer.

Engineering requires extensive formal training. Four years of undergraduate training leading to a bachelor's degree in an engineering program is essential, followed by work under the supervision of an experienced engineer. Many engineering jobs even require advanced degrees beyond the bachelor's degree. The work of engineers serves the public good by providing communication systems, transportation, energy resources, and medical diagnostic and treatment equipment, to name only a few. It is clear that engineering meets all of the definitions of a profession. In addition, it is clear that engineering practice has much in common with medicine and law. Interestingly, although they are professionals, engineers do not yet hold the same status within society that physicians and lawyers do.

Before passing final judgment on the professional status of engineering, the nature of engineering societies requires a little consideration. Each discipline within engineering has a professional society, such as the Institute of Electrical and Electronics Engineers (IEEE) for electrical engineers and the American Society of Mechanical Engineers (ASME) for mechanical engineers. These societies serve to set professional standards and frequently work with schools of engineering to set standards for admission, curricula, and accreditation. However, these societies differ significantly from the AMA and the ABA. Unlike law and medicine, each specialty of engineering has its own society. There is no overall engineering society that most engineers identify with, although the National Society of Professional Engineers (NSPE) tries to function in this way. In addition, relatively few practicing engineers belong to their professional societies. Thus, the engineering societies are weak compared to the AMA and the ABA.

2.2.3 Differences between Engineering and Other Professions

Although we have determined that engineering is a profession, it should be noted that there are significant differences between how engineering is practiced and how law and medicine are practiced. Lawyers are typically self-employed in private practice, essentially an independent business, or in larger group practices with other lawyers. Relatively few are employed by large organizations such as corporations. Until recently, this was also the case for most physicians, although with the accelerating trend toward managed care and HMOs in the past decade, many more physicians work for large corporations rather than in private practice.

In contrast, engineers generally practice their profession very differently from physicians and lawyers. Most engineers are not self-employed, but more often are a small part of larger companies involving many different occupations, including accountants, marketing specialists, and extensive numbers of less skilled manufacturing employees. The exception to this rule is civil engineers, who generally practice as independent consultants either on their own or in engineering firms similar in many ways to law firms. When employed by large corporations, engineers are rarely in significant managerial positions, except with regard to managing other engineers. Although engineers are paid well compared to the rest of society, they are generally less well compensated than physicians and lawyers.

Training for engineers is different than for physicians and lawyers. One can be employed as an engineer after four years of undergraduate education, unlike law and medicine, for which training in the profession doesn't begin until after the undergraduate program has been completed. As mentioned previously, the engineering societies are not as powerful as the AMA and the ABA. Finally, engineering doesn't have the social stature that law and medicine have (a fact that is partly reflected in the lower pay that engineers receive as compared to that of lawyers and doctors). Despite these differences, on balance, engineering is still clearly a profession, albeit one that is not as mature as medicine and law. However, the engineering profession should be striving to emulate some of the aspects of these other professions. the number of different professional engineering societies.

2.3 CODES OF ETHICS

An aspect of professional societies that has not been mentioned yet is the codes of ethics that engineering societies have adopted. These codes express the rights, duties, and obligations of the members of the profession. In this section, we will examine the codes of ethics of professional It should be noted that although most of the discussion thus far has focused on professionalism and professional societies, codes of ethics are not limited to professional organizations.

2.3.1 What Is a Code of Ethics?