Chapter 11
Developing an Engaging Online Engineering Ethics Course for Future Engineers

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ABSTRACT

This chapter describes the process of developing both an engaging and motivating online ethics course for future engineers; and includes major concepts in engineering ethics beginning with why engineering students should study ethics at all. Next the various levels of ethics are examined, which include personal, organizational, and global ethics, and how each level then applies to the profession of engineering. Ethical behavior, ethical dilemmas and whistle-blowing are also defined and discussed. Ethical decision-making models, which are used to solve ethical dilemmas, are explained and examples are presented to engage students in the process. The significance of how engineers are held to higher standard and must adhere to both their professional code of ethics along with their organization's code of ethics is also emphasized. Understanding the role of ethical leadership and how it impacts an organization follows. Finally, engaging online methods for teaching ethics to engineering students will be explored throughout.

INTRODUCTION

Ethics, or at least unethical practices, has become a frequent topic in the news in the last 20-30 years. With such organizations and individuals as Nike, Chevron, Enron, WorldCom, Monsanto, Tyco, Arthur Anderson, Martha Stewart and Bernie Madoff committing deceptive acts, the fraudulent behavior within business seems quite common and frequent. Not surprisingly though, the deception has not been exclusive to business as we have seen multiple cases within popular sports in the United States, particularly within the sport of baseball with the use of sports-enhancing drugs.

Given these circumstances, young professionals, in particular, engineering students, may be faced with a barrage of images and ideas about what exactly ethics is and how it should be managed. As they often may look to popular media to aid them in forming their ethical behavior, many forget the influences from their families, former teachers or faith when they were small. This is where their own morals, personal integrity and the area of 'social ethics', how we might live together as a community including in an organization (Hartman & DesJardins, 2011), plays a key role an individual's ethical development. Understanding these areas are central then for engineering students as they begin to understand the fundamental concept of ethics and how it might be applied to both themselves and within the organizations they work.

Understanding the basic concept of ethics plus ethical behavior, ethical decision-making and models builds the basis for an engaging online engineering ethics course for future engineers at either the undergraduate or graduate level. This is exactly what our institution has done over the last ten years as they developed their online sophomore-level engineering and technology ethical decision-making course required of almost every major in the school.

With the ultimate goal of familiarizing engineering students with not only general ethics and the topics surrounding this concept, but also to specifically address how engineers are tasked with the responsibility of the public's health, welfare, and safety at all times (National Society for Professional Engineers, 2014). This chapter offers detailed instruction on exactly how an engineering ethics course might be progressively constructed with both the maximum student engagement and ease of instruction in mind within the online environment.

WHAT IS ETHICS?

Of course, answering the question of 'what is ethics' becomes one of the most important concepts to address first in any ethics course (online or face-to-face) so that students fully embrace the material at hand and build self-efficacy within the topic. This becomes especially critical in an online environment where students seek to understand the importance of the material they study without the guidance of faculty present. Providing clear, easy to understand modules or pages (depending on the learning management system used and faculty preference) of the defined terms and concepts with examples has proven to be helpful to further engage students in the material.

Ethics, of course, has been defined by many, often in the context of social situations or interactions with others, and in relation to business. A common definition includes the distinction between right and wrong actions; and how we behave toward other people as well as how they behave toward us (Ghillyer, 2014). These definitions offer several thoughts toward ethics as a concept with regard to not only how we conduct ourselves within a business environment, but also in our daily lives, toward others as a behavior. But not only do we consider ourselves as isolated entities within these situations; we also often look at what others may be doing in reaction to the same situation, reflect back on how we were raised (influences), seek counsel with a religion or simply look to society for answers on what is the ethical or 'right' answer (Ghillyer, 2014). Relating ethics to students both personally and in their professional lives is helpful in their grasp of the concept.

Engineering ethics, on the other hand, has been specifically defined as the "study of the decisions, policies, and values that are morally desirable in engineering practice and research" (Martin & Schinzinger,

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