

**Activity 1.6 Discover Engineering**

Introduction

What is engineering? Many people have difficulty answering this question. In fact, engineering is a diverse field – there are many disciplines within engineering that can involve the application of a very different body of knowledge and skills. Nearly everything that is not “natural” (i.e., created by Mother Nature) most likely was designed and created with input from engineers. The shampoo you used this morning to wash your hair, the technology that cleans the water you drink, the buildings in which you live, work, and attend school, and the iPhone you use to communicate all involved the expertise of engineers in the initial design, building and testing, and final production.

All engineers are problems solvers. The differences among engineers in varying disciplines are dependent on the types of problems that they solve. In general there are four major disciplines within the engineering field: chemical, civil, electrical, and mechanical. Many other engineering disciplines are derived as an extension of or specialization within one of these major disciplines. For example, environmental engineering is a subcategory of civil engineering. Other engineering disciplines have resulted from the combination of aspects of two or more of the major disciplines. Mechatronics is a relatively new branch of engineering that incorporates both mechanical and electrical engineering principles.

In this activity you will investigate the four major disciplines of engineering and consider their impact on you and the world.

Equipment

* Engineering notebook
* Pencil
* Computer with internet access

Procedure

1. What is engineering? Based on your current perception, in a few sentences define the term “engineering”.

Engineering is the science of improving life through the invention of new technologies.

Now investigate the engineering profession. Some websites that may behelpful in your research include the following.

* Discover Engineering. [www.discoverengineering.org](http://www.discoverengineering.org)
* Engineering Degrees 101. <http://engineeringdegrees101.com/engineering-info/why-become-an-engineer/>
* Engineer Girl. [www.engineergirl.org](http://www.engineergirl.org)
* National Engineers Week. [www.eweek.org](http://www.eweek.org)
* The Sloan Career Cornerstone Center. [www.careercornerstone.org](http://www.careercornerstone.org)
* Try Engineering. [www.tryengineering.org](http://www.tryengineering.org)

As you perform your research, record information that will help you respond to the following. Once you have gathered sufficient information, write your responses in the spaces provided.

1. Describe the four major disciplines of engineering and identify problems or projects that an engineer in each discipline might encounter.

* Chemical engineering
* A chemical engineer uses chemical processes to find innovative and creative ways of producing goods, or to create new products. Some problems chemical engineers might face include difficulty in humanely testing the safety of some products.
* Civil engineering
* Civil engineers are responsible for the design, construction, and maintaining of structures and transportation. A problem that might be faced by a civil engineer is a dangerous building. Civil engineers must be extremely careful when designing buildings; they must always consider safety.
* Electrical engineering
* An electrical engineer deals with advanced work in electrical power systems, equipment, manufacturing, and more. Electrical engineers might face the problem of safety. Like civil engineers, electrical engineers must do their job perfectly to prevent shocking and other serious injury to their clients.
* Mechanical engineering
* Mechanical engineering is simply the study of mechanics and their unique design process. Mechanical engineers may face problems such as gear jams, loose parts, and miscalibration of machine gears and parts.

1. Choose a discipline of engineering (other than chemical, civil, electrical and mechanical) that is of interest to you. Describe this engineering field and explain how it is an extension of, specialization within, or combination of one or more of the four major engineering disciplines. (**Optional** – create a PowerPoint slide to describe your chosen engineering discipline.)
2. Biomedical engineering is a field that is of interest to me. Those in the field of biomedicine work with medical scientists and researchers to develop the latest medicines and treatments. It is an extension of the chemical field because it deals with the creation of medicines, which essentially are combinations of different chemicals that have a certain effect on the body.

Visit the National Academy of Engineering website on the Greatest Engineering Achievements of the 20th Century at <http://www.greatachievements.org/>. Choose one of the achievements listed and read the information provided about your selected achievement. Then, based on what you learn, respond to the following.

1. Describe your selected achievement in a few sentences.
2. My selected achievement is the internet. The internet is a resource open to anyone with a phone or computer connection. It is used to research, communicate, and purchase a wide variety of items. It began in 1962 as a "packet-switching" technology developed by doctoral student Leonard Kleinrock. It was originally intended to exchange information between students. Today, it is completely depended upon by the human race.
3. Which major discipline of engineering do you think was most involved in the development of this achievement? Justify your answer.
4. Electrical engineering was most involved in this achievement because the internet would be impossible to exist without electricity.

Visit the National Academy of Engineering website on the Grand Engineering Challenges at <http://www.engineeringchallenges.org/>. Review your choice of an engineering discipline in number 3 and consider how an engineer within this discipline could contribute to the solution of one or more of the grand challenges.

1. If you were an engineer within the discipline that you chose in number 3, which engineering grand challenge would you like to work on?

I would choose to work on Grand Challenge Number 3.

1. Describe your selected grand challenge.
2. My grand challenge is to educate the general population on the general mindset of engineering and role of engineering in addressing grand challenges.
3. Why is a solution to this challenge important to the world?

A solution to this challenge is important to the world because the world needs to have a more driven spirit and more urgent sense of motivation. Teaching engineering would discipline people and mold them into becoming better human beings.

1. How could you, as an engineer in your chosen discipline, contribute to a solution to this challenge?
2. I could teach the basics of engineering to elementary and middle school students.

**Conclusion**

1. What is it about “engineering” that is common to all disciplines of engineering? That is, what makes an “engineer” an “engineer” regardless of the work one does?
2. The design process makes an engineer an engineer. No matter what area of engineering you study, you always have to go through the design process in order to succeed.
3. Why do you think engineering has been called the *stealth* profession? (Hint: there are many internet resources that address this question.)
4. Engineering has been called the stealth profession because not many people know or understand the actual work that an engineer does.
5. How is an engineer different from a scientist?
6. While scientists study things and strive to learn more about them, engineers actually apply this knowledge into inventions and modifications.
7. What interpersonal characteristics do you think are important to the success of an engineer of any discipline?
8. To be an engineer, you must be patient, creative, and a bit of a perfectionist.