What Is This Module About?

Do you have a television, a radio or a refrigerator? If you do, then you are using technology. In a way, you are already familiar with technology. But technology is not just about having and using appliances at home or in the workplace. Do you know that even small things like the ballpen, paper and eyeglasses are all products of technology?

Technology has changed and influenced our life in many ways. In this module, you will learn more about technology, its benefits as well as its negative effects.

The module has two lessons:

Lesson 1 – *Technology and Its Benefits*

Lesson 2 – *The Negative Effects of Technology and the Challenges That It Faces*

What Will You Learn From This Module?

After studying this module, you should be able to:

- identify various developments related to technology;
- explain the benefits of technology;
- explain the negative effects of technology; and
- state some challenges facing technology.

Let's See What You Already Know

Let us check how much you already know about this topic. Encircle the letter of the best answer.

1. _____ is about discoveries and inventions, the products and methods that man uses to control or make use of his environment.

   a. Technology
   b. Science
   c. Discovery
   d. Innovation

2. Which of the following statements about discovery and invention is true?

   a. Inventions always follow discoveries.
   b. Discoveries always follow inventions.
   c. Invention is creating things that did not exist before, while discovery is finding out about things that already exist.
   d. Discovery and invention are about improving things that are already in existence.

3. On what technology is the electric lamp an innovation?

   a. incandescent bulb
   b. oil lamp
   c. fluorescent lamp
   d. flashlight

4. Which one among the inventions below did *not* revolutionize the world?

   a. computer
   b. horse carriage
   c. automobile
   d. television

5. How did the introduction of the Internet revolutionize the world?

   a. It enabled computers to be linked together.
   b. It enabled a widespread sharing of information.
   c. It enabled people to do many things including shopping using the computer.
   d. all of the above

6. Technology enables workers to _____.

   a. increase their production
   b. reduce the amount of labor
   c. have more leisure time
   d. all of the above

7. In the field of health, technology is able to _____.

    a. cure all illnesses
    b. diagnose all illnesses
    c. provide cures for many illnesses
    d. prevent all illnesses

8. Technology can change our beliefs and value systems by _____.

    a. giving us access to various sources of information
    b. giving us the opportunity to be exposed to other people's culture
    c. giving us the chance to hear others' opinions and beliefs
    d. all of the above

9. Most problems that are related to technology are mainly brought about by _____.

    a. lack of planning and consideration of the possible negative effects
    b. lack of funding to implement the technology
    c. lack of knowledge on the technology
    d. all of the above

10. Technology causes some people to lose their job because _____.

    a. it is able to do the tasks that human workers used to do
    b. it is able to do the tasks faster and more efficiently
    c. it is able to do the task at less cost
    d. all of the above

Well, how was it? Do you think you fared well? Compare your answers with those in the *Answer Key* on page 38.

If all your answers are correct, very good! This shows that you already know much about the topics in this module. You may still study the module to review what you already know. Who knows, you might learn a few more new things as well.

If you got a low score, don't feel bad. This means that this module is for you. It will help you to understand important concepts that you can apply in your daily life. If you study this module carefully, you will learn the answers to all the items in the test and a lot more! Are you ready?

You may go now to the next page to begin Lesson 1.

LESSON 1

Technology and Its Benefits

I'm sure you have read and heard of the term "technology" quite often. You may have heard expressions like "high-tech" or "high technology" to refer to computers or cellular phones or to some new machine. We often associate technology with machines and inventions. Technology is likewise always connected with science.

But what really is technology? In this lesson, you will learn about technology and its benefits.

After studying this lesson, you should be able to:

- differentiate science from technology and invention from discovery;
- define innovation;
- explain how some inventions and discoveries revolutionized the world; and
- explain the various benefits of technology.

Let's Try This

In your opinion, how is technology related to science? Write your answers in the spaces below.

_____

_____

_____

_____

_____

Let's find out if your answers are correct.

Let's Learn

SCIENCE AND TECHNOLOGY, INVENTION AND DISCOVERY

Science is the systematic observation of natural events and conditions in order *to discover facts and create things related to them.* For example, science studies the weather, and is then able to create instruments that can tell where a storm is likely to occur.

Notice the italicized words in the definition of science—*to discover facts and create things related to them*. This discovery of facts and the creation of things is what technology is all about. **Technology** refers to *discoveries* and *inventions,* the things that man uses to control or manage his environment, the products and methods that man uses for building, manufacturing and producing. These products and methods are meant to satisfy our needs and desires. For example, the telephone was invented to enable people to communicate with one another even if they are miles away.

Let's Try This

Which of the following items are discoveries, and which are inventions? Write the items in the appropriate column.

fire	medicinal plants	telephone
electric fan	planet Mars	paper

Discoveries	Inventions

Finished? Compare your answers with those in the *Answer Key* on page 39.

Did you get all the correct answers? If yes, great! If not, don't worry; just read on and you'll soon find them out.

When we talk of technology, we always hear the terms *invention* and *discovery*. What do you think is the difference between the two?

Discovery means finding out or learning about something. For example, thousands of years ago, people could only see and observe the stars above them. But now, through the technology of space travel, the telescope and other space observation instruments, people have discovered that there are actually billions of stars and that some of the "stars" we see are actually planets.

Discovery therefore means finding out about something *that already exists*.

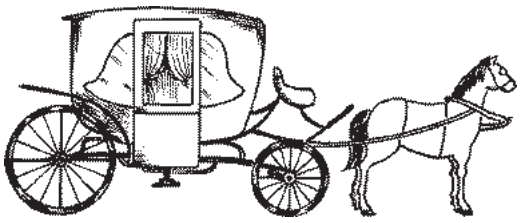
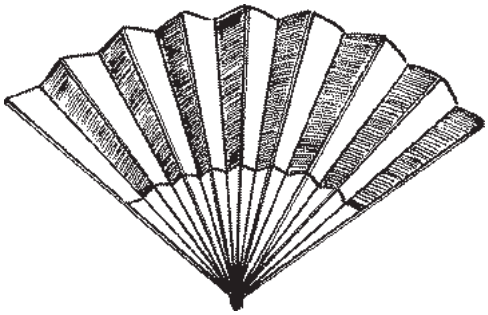
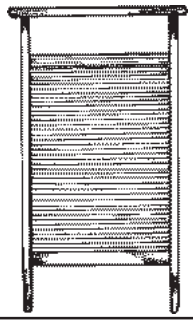
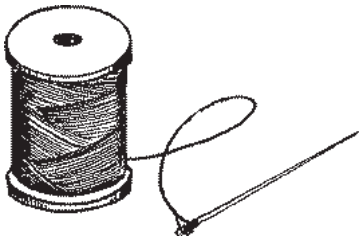
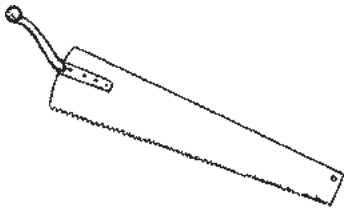
On the other hand, **to invent** means to create something. For example, the appliances that you use at home like the television, refrigerator and radio are all inventions. They did not exist before and were only created by people.

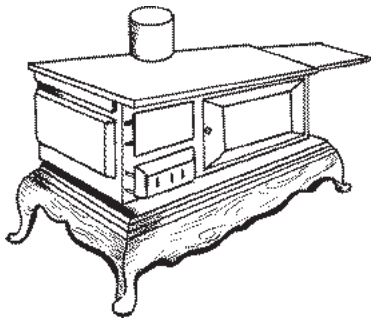
Through the ages, people invented tools, machines, materials and techniques to make work easier. Technology includes the use of both primitive and modern tools and methods of work. **Primitive technology** refers to the old technologies or the things that were created thousands of years ago. **Modern technology** refers to the new technologies. An example of primitive technology is the use of fire. Fire was discovered thousands of years ago. On the other hand, an example of modern technology is the computer.

Let's Try This

The pictures below show technologies from the past—primitive technologies. Through the years, people have made improvements on these technologies. Write the modern-technology version of each primitive technology on the left. The first one is done for you.

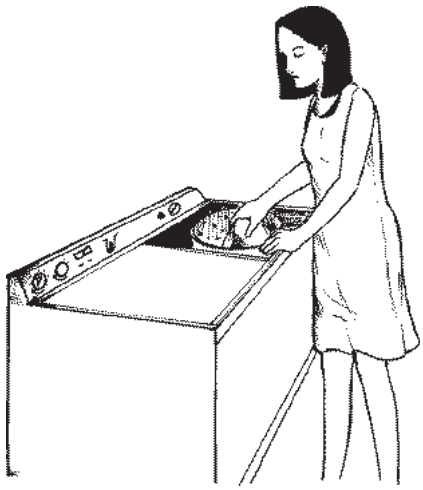
Primitive Technology	Modern Technology
1. Oil lamp 	Electric lamp

Primitive Technology	Modern Technology
2. Horse-drawn carriage 	
3. Folding fan 	
4. Washboard 	
5. Needle and thread 	
6. Handsaw 	

Primitive Technology	Modern Technology
7. Wood-burning stove 	

Compare your answers with those in the *Answer Key* on page 39.

What did you notice? While examples of primitive and modern technologies perform the same functions, the latter were developed to make work a lot easier. For example, people used to wash their clothes using the washboard. Clothes were rubbed against the washboard to get rid of dirt. Today, we have washing machines. You just put your clothes in, push some buttons and presto! Your clothes are washed. In fact, many washing machines even have dryers. You need not hang your clothes because you can get them clean and dry using such machines.

Washboard and clothes hanging	Washing machine and drier
	
Primitive technology	Modern technology

Indeed, technology continues to change the world we live in. This is because technology evolves. This means that as time passes, developments and improvements are made on old technologies. From primitive technologies, people create new and better technologies. This is called **innovation.** For example, when the first television was introduced, it did not have any sound. Soon television carried black and white pictures. Then came colored pictures. Through the years, people *innovate* or improve on old technologies to come up with better and more efficient technologies.

Let's Try This

Think about the technologies that you cannot live without. Write down five of them.

1. _____

2. _____

3. _____

4. _____

5. _____

Perhaps you wrote the technologies that are found in your house like the incandescent bulb, television, radio, electric fan and others.

People have continuously thought of how to make their life easier. In doing so, they came up with one technology after another. Many of the modern technologies that we have today would not be here if not for the technologies that people came up with before. These are the technologies that revolutionized or greatly changed the world.

Let's Learn

TECHNOLOGIES THAT REVOLUTIONIZED THE WORLD

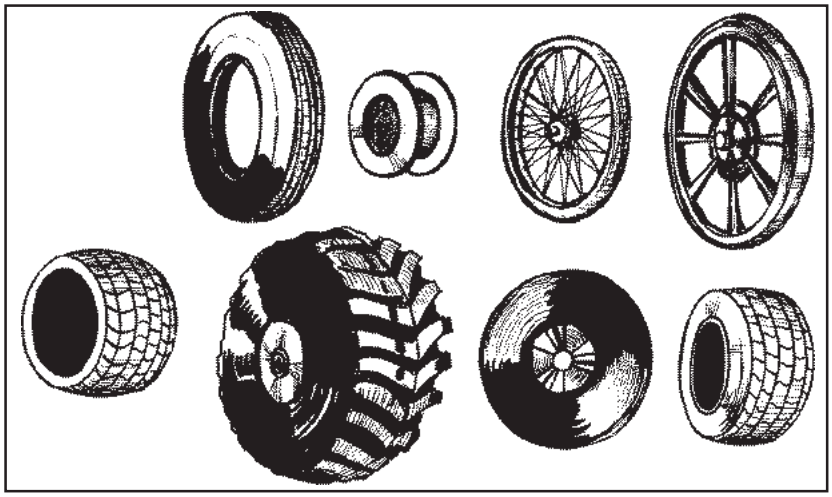
Change has almost always been the effect of technology. But some discoveries and inventions have greater and deeper impact than others. These are the inventions and discoveries that drastically or radically changed people's lifestyles from the time that they were introduced until now. These are also the technologies that paved the way for other inventions and discoveries.

Below are some of these revolutionary technologies. Find out how each technology made life more convenient and work more efficient.

Wheel (3200–3500 B.C.)

We don't know whom to thank for the invention of the wheel, but think of what the world would be like without it. There then would be no bicycles, no roller blades, no cars, no buses. Before, people walked long distances just to get from one place to another. But with the introduction of the wheel, people were able to reach far places in shorter periods of time. It enabled the people back then (and it still does now) to work in and travel to places far from their homes.

Let's Try This



Think of activities that you do which involve the wheel.

Example: travelling by a motorcycle

_____

_____

_____

_____

_____

Do you now realize the many things that we do which involve the wheel? Let's move on to the next revolutionary technology—the printing press.

Let's Think About This

Printing Press (1450s)

What was the thickest book you have ever read or seen?

Can you imagine writing all the contents of that book by hand?

In the early days, that's really how they did it. Yes, they copied the whole book by hand to make another copy of it.

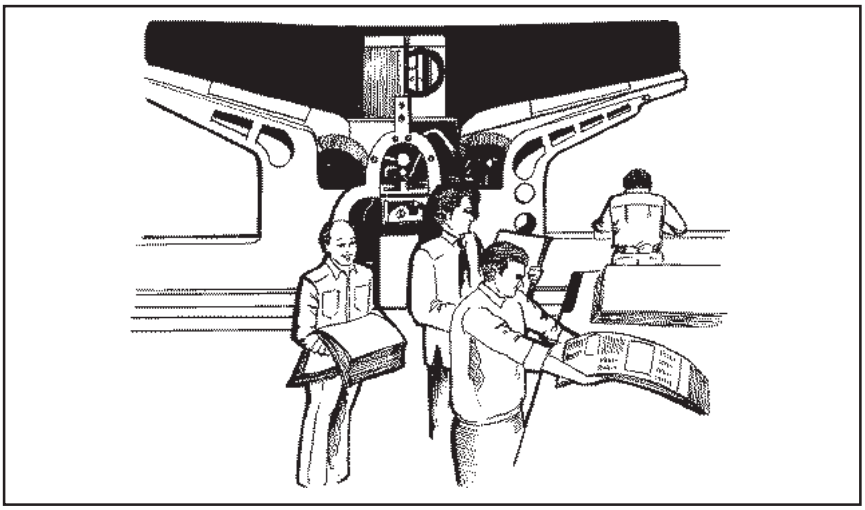
Until the printing press was invented in the 1450s, every book had to be hand-written. Just imagine the amount of work that this invention saved.

A printing press is a machine that hastens the process of printing books. Johannes Gutenberg, a businessman from Germany, is said to have invented the printing press in the early 1450s.

Gutenberg's machine used individual letters, hand-carved out of metal, that could be removed and repositioned for each page in a book. Then, it would sweep ink over the letters and "press" them on to the paper. The technology is much like what happens when you use a stamp pad.

For many centuries, the Catholic Church was producing most of the books that were available at that time, by hand copying each one. But then things began to change. Paper was developed and it proved to be a good alternative to the animal skin — or "vellum" as it was called — that had been available back then. As more and more people were learning to read, the demand for books increased.

The invention of the printing press was an instant hit and soon many people were printing, and the prices of books went down. Many people were able to buy them, and this forever changed the way people learned.



Let's Think About This

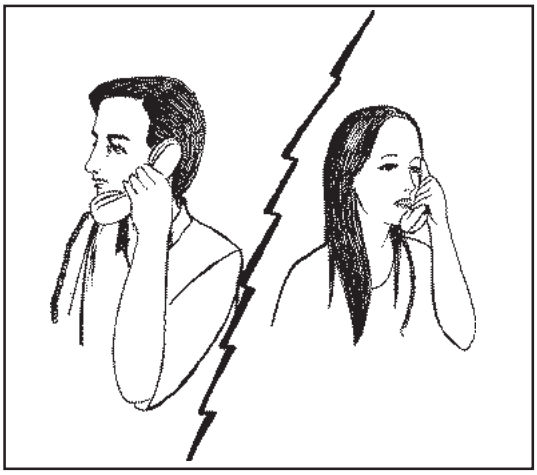
Suppose there was a fire in your area. You have to call the fire department but there is no telephone line in your area and the fire fighters are miles away. What would you do?

It's hard if you do not have an easy means to contact a person who is miles away. You need a telephone. Let's find out how this was invented.

Telephone (1876)

Alexander Graham Bell taught people who were deaf, so he was interested in sound vibrations or how sound bounces and travels. Bell realized that these vibrations can be turned into variations in electrical current that could be transmitted through wires from one place to another. From this, he was able to invent the telephone.

His invention not only made it possible for us to chat with friends miles away, but opened the door for intercoms, walkie-talkies, radio, fax transmission and even the Internet. It has brought people closer together.



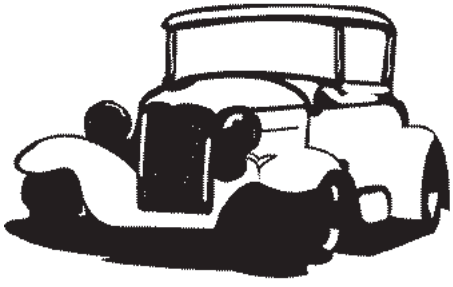
Automobile (1900s)

Nicolas-Joseph Cugnot of France is considered to have been the first to build a true self-propelled vehicle. His vehicle actually moved on its own. In 1769, Cugnot unveiled his model, a steam-powered vehicle which carried four passengers for 20 minutes at a top speed of 3.6 km/hr.

Steam and electricity were used to power early automobiles until the beginning of the 1900s. It was at that point that gasoline was tapped as an alternative power source. The gas-powered vehicles could travel farther and faster than those that used steam and electricity.

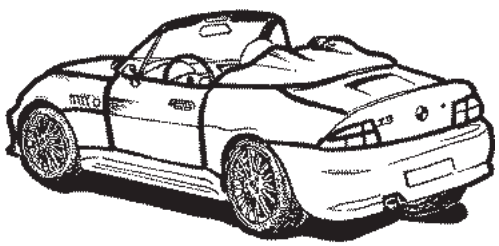
Two of the pioneer manufacturers of these newer and safer gas-powered models were Gottlieb Daimler and Carl Benz of Germany.

It was in 1908 that Henry Ford started his assembly-line style of production. **Assembly-line production** means mass production by getting workers to specialize in parts that are put together to produce an automobile. Because of this method, Ford is credited with completely changing the automobile. Soon, other types of vehicles were innovated from the design of the old model.



Old automobile

New car



Let's Think About This

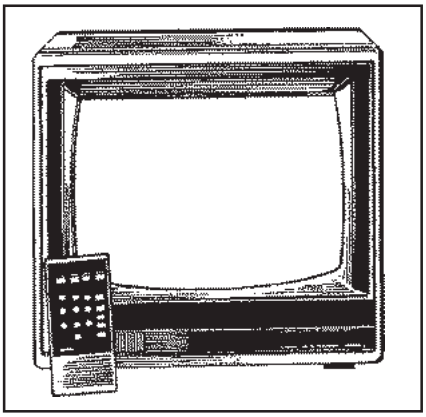
What is your favorite television program? Imagine what it would be like if you can't watch your favorite TV program or any show at all.

Worry not because televisions are now common. Let's find out how this invention came about.

Television (1927)

Television is the most popular way for people to get their news and entertainment today. Can you imagine what the world would be like without television?

Unlike most of the world's major inventions, hardly anyone knows who created the television. His name was Philo Farnsworth. In 1927, Philo, who was only 20 years old, sent the first all-electronic image in his own lab in San Francisco, California. The image was a simple black line that was being rotated to see if the television could record and reproduce its movement.



The first television didn't have any sound. Soon, black and white pictures were introduced, followed by colored pictures. Now, we have television sets complete with remote control devices—you can change the program even without having to leave your seat.

Let's Try This

What do you think can computers do? Write down your ideas below.

_____

_____

_____

_____

Let's find out if your ideas are correct.

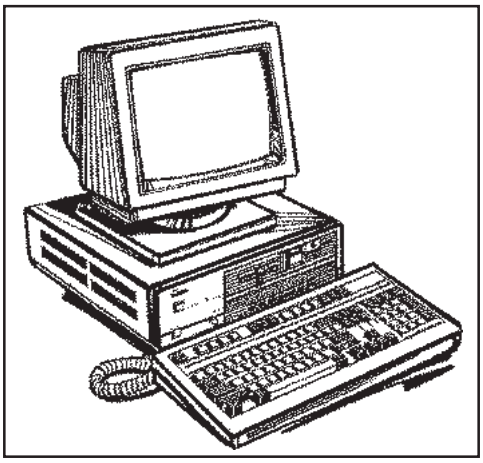
Computers (1945)

Computers today do a lot of things. In homes, tiny computers embedded in electric appliances turn the television on and off and switch channels, or control the temperature of the refrigerator.

Computers in cars and other vehicles regulate the flow of fuel. Computers are also used in hospital machines such as X-rays.

Do you know that computers were primarily created to be used in complex mathematical calculations?

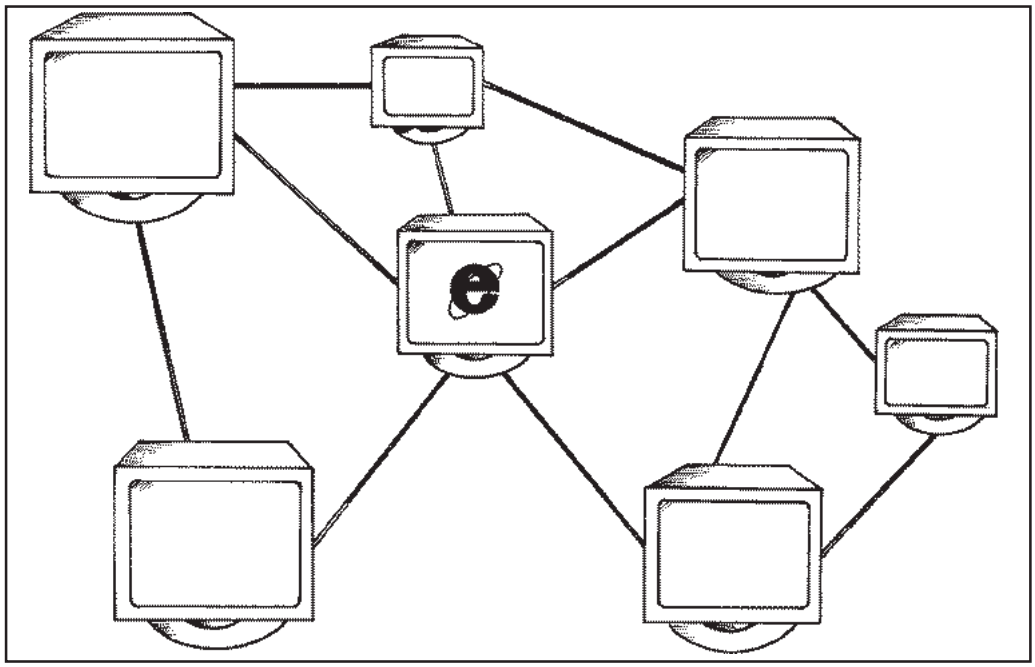
Machines used for doing complex mathematical calculations have roots dating back many thousands of years ago to the Chinese abacus, a set of counting beads in rows in a frame. In 1945, ENIAC — the Electronic Numerical Integrator and Calculator — was born. It was the very first computer. However, unlike most computers today, it took up a very large room and had its own air conditioner. Now, thanks to new developments such as the computer chip, a computer with the same capability can fit into the palm of your hand. Today, computers are a must in most offices. In fact, computers are also used for study and play.



The Internet (1960s)

The **Internet** links computers together throughout the world. Not all computers, however, are automatically connected to the Internet. You will have to apply for an Internet connection, just like what you do with a telephone connection.

If you have an Internet connection, you can access documents and information from the Internet. This collection of information is called the **World Wide Web.** Aside from information, you can also get pictures and even sounds and movies. You can find out about things that are happening in other countries. You can also shop and communicate with others using the Internet. The Internet is now changing the way people shop, entertain, get information and learn.



Computers worldwide are connected to a large network called the Internet.

Let's Review

Write a short paragraph about the importance of inventions like the wheel, printing press, telephone, television, computers and the Internet. How did they change the way people live? What are their effects?

_____

_____

_____

_____

_____

_____

_____

_____

_____.

Compare your answers with those in the *Answer Key* on page 39.

Technology brings us more than just conveniences. We get a lot of other benefits from it. Read on to find out more about its benefits.

Let's Learn

BENEFITS OF TECHNOLOGY

Technology is created to address a certain need. For example, the need to disseminate (give out) information led to the invention of paper, printing press, and partly, television and radio.

As the population continues to grow the need to mass-produce products emerged. Technology has greatly helped in this area.

Let's Try This

Look for people who know how to make vinegar, fruit jellies or other food preserves. Ask them how long it takes them to come up with one finished product.

Chances are it takes them days or weeks, given that food preservation requires time to make. But do you know that through the use of technology, it is possible to do the process faster? Not only that—it is also possible to produce hundreds of these products at a given time.

How?

This will be explained below.

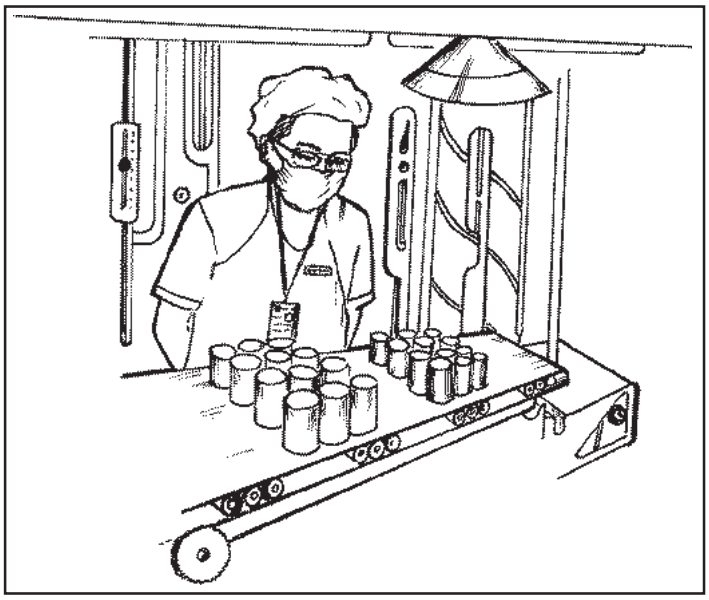
Let's Learn

1. ***Technology has led to increased production and reduced labor.***

   This is the first benefit of technology. Through technology, people have achieved a great increase in the production of goods and services. In the past, for example, farmers and animals were the main source of power in farms. Farmers had to work from dawn to dusk, yet one farmer could produce enough food for only about four people.

   Then came the tractors and other farm machines powered by diesel fuel or electricity. Today machines do most of the work in the farms. As a result of the introduction of these machineries and advanced agricultural technology like the use of fertilizers, one farmer can now produce food for a hundred people or even more.This assures us of a continuous supply of food, particularly rice.

   Other products ranging from cars to canned goods can be made by the hundreds or even thousands in a short period of time because of the machines used in factories. Only a few people are needed to monitor the process and look after the machines.



The introduction of machines has not only increased production but has also reduced the amount of work needed to produce goods and services.

In the 1800s, factory workers needed to work 12 to 16 hours a day, six days a week. Few people were able to take a holiday.

Today, however, new technologies and machines have reduced the amount of work needed to produce goods. For example, the earliest newspapers required the workers to have every letter that would be used to be carved in metal—remember Gutenberg's printing press?—much like how stamp pads are made. These stamps were used for every newspaper that was to be printed. Today, however, producing the text will only require one person to do it on the computer. The computer output is then "photographed" to produce a negative which is used for mass production. There is no need for stamps for every newspaper today! Think about how much time and effort are saved.

As a result, most workers today are required to work only eight hours a day, five days a week.

Let's Try This

Think of three products of technology that are found in your home. Then, write down all the benefits that you get from each technology.

Write your answers in the spaces provided.

1. _____

   _____

2. _____

   _____

3. _____

   _____

There are a variety of technologies in your home. You and your parents got them because they have some use for you and your family.

Look at what I have thought of:

Electric iron

- keeps clothes well pressed at any time

Electric lights/bulbs

- provides lighting especially at night

Refrigerator

- keeps food fresh
- keeps drinks and water cold

Television

- gives information
- entertains

Microwave oven

- cooks/bakes food
- cooks variety of dishes

You may have thought of other technologies and other benefits of these technologies. Just imagine if we had no electric bulbs, refrigerator, TV, radio or flat iron in the house. How would you keep your foods fresh, spend your free time at home comfortably, or prepare your clothes?

It would be a lot difficult, right?

One thing is sure: the technologies that you have identified have improved your standard of living. Don't you agree?

Let's Learn

Let us now study other benefits brought about by technology.

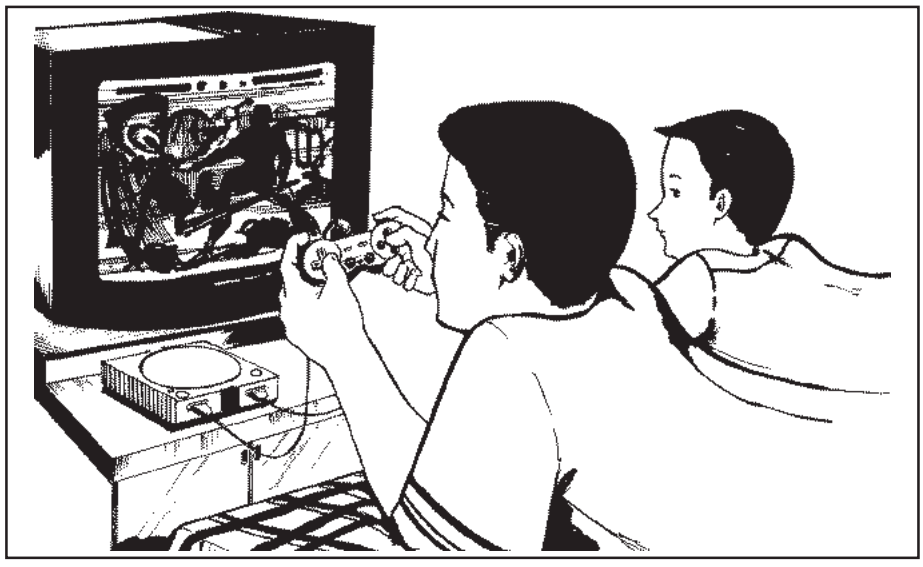
2. ***Technology has brought us higher living standards.***

Higher living standards are a result of the increased production of goods and services. We are now better fed, better clothed and housed, and we enjoy a healthier, more comfortable life than people in the past. Technology has changed the way we live our life.

For example, the development of cars and other vehicles changed where people live, work and even how people spent their leisure time.

You can afford to work in places far from your home because you know that there is a mass transportation system (buses, jeepneys, trains, roads). Instead of just staying at home, you can now go to far places, to tourist spots, to beaches in the provinces, or even to other countries for leisure.

Radio and television have also changed our entertainment habits. We can watch programs, sing with our television (videoke), or play games (Play Station or family computer).



Technology has changed the way people spend their leisure time.

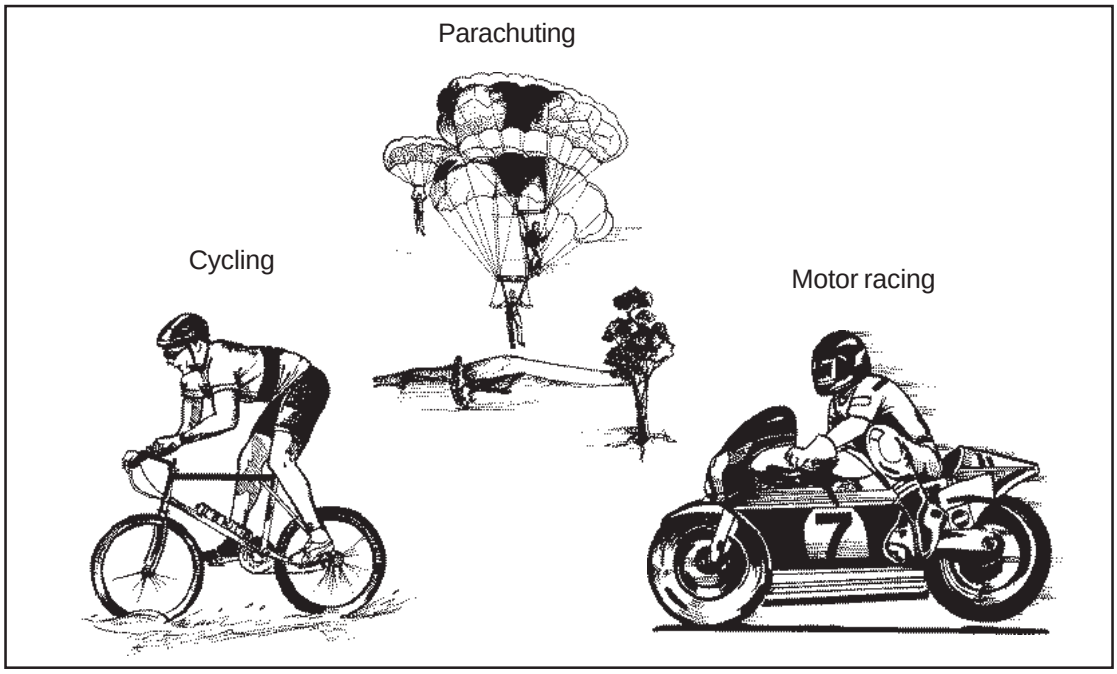
Let's Think About This

What is your favorite sport?

Whatever your favorite sport is, I'm quite sure technology has something to do with how it is today. For example, basketball as we know it today, would not have been as exciting and enjoyable without television to broadcast it, a watch to keep track of the time, the rubber shoes that players wear, or the coliseum where the game is held.

3. ***Technology has made leisure and play better and more enjoyable.***

Under the influence of modern technology, many forms of play have been transformed. An example is the team game that is watched by thousands of spectators and which caters to the large population of big cities. New sports like cycling, motor racing, parachuting and hang gliding have appeared as a by-product of the new inventions that made them possible.



Still more significant is the development of traditional sports. Modern technology has brought a great increase in the skills displayed. Identically and perfectly manufactured balls, more efficient bats, clubs, rackets and vaulting poles have reduced the element of chance and increased the need for skill.

New ideas in dieting, health maintenance, and techniques in solving the problems of competition have led to the repeated breaking of records.

In the field of music, many kinds or genres of music are now available partly because of the variety of instruments available. Now, we have pop, rock, metal, rhythm and blues, rap and others. Just like sports, music can now be shared with many people through various means, either through cassettes and CDs, through concerts and television, through the Internet and other forms of media.

Let's Think About This

If there were no medicines before, how were people's illnesses treated?

Well, since there were no cures for many illnesses then, many people died. There weren't many methods to prolong the life of people. But thanks to technology . . .

4. ***Technology has improved the life expectancy of people.***

Life expectancy refers to the number of years a person can expect to live. Discoveries and inventions that treat diseases have helped many people to prolong and improve the quality of their life. In the 1900s, many people did not live past the age 50. Today, many people live for more than 75 years.

Let's Try This

Anwer the following questions. Write your answers in the spaces provided.

1. What is the latest news about technology that you have heard or read about?

_____

_____

_____

_____

Where do you get information today? _____

_____

Chances are you get the information from television, radio, newspaper or the Internet.

2. From which of these sources do you usually get information? Why?

_____

_____

_____

5. ***Technology has sped up the exchange of information.***

Through mass media, which includes television, radio, film and the Internet, information can be disseminated or shared with thousands and even millions of people at the same time.

People can talk to other people in an instant through the telephone or cellular phone, even if they are far from each other. Even the written form of communication, which in the early days meant writing a letter, has changed. Now people can write to each other using the computer (through the Internet), through the fax machine, or even through the phone (text messaging). The latest form of electronic communication is the *e-mail*, which is like sending letters through the computer and the Internet.

People today are better connected because of the advances in transportation and communication. People can easily and quickly see each other if they want to because there are faster means of transportation now—whether by land, air or sea. Technology has indeed brought people together.

Let's Think About This

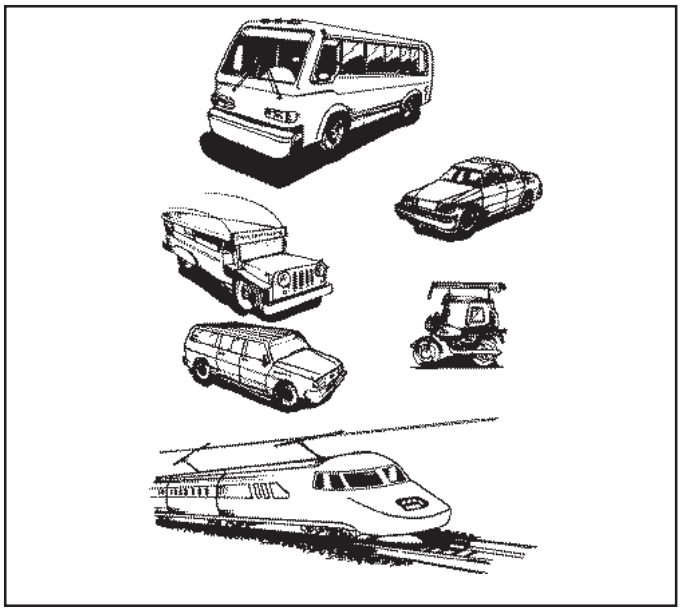
Imagine yourself wearing the same clothes, eating the same food, riding the same jeepney, watching the same television program, and listening to the same music every day.

Wouldn't life be boring? Well, I bet you'll say "Absolutely!"

6. ***Technology has provided us options and access to variety.***

Technology has provided us with more choices on what food to eat, what clothes to wear, what programs to watch, etc. The presence of many options then leads to value and behavioral changes.

For example, before, the only modes of transportation in Metro Manila were the jeepneys, the buses, the taxi cabs and the train (LRT). Then came the Tamaraw FX taxis, which are like larger taxi cabs. You pay a lower fare and get the same comfort when riding the FX.



The choices that are available to you can cause you to change your behaviors and values. Many people, especially office workers, prefer to ride an FX taxi because it has fewer passengers (a maximum of ten passengers) compared to a bus. It is also more convenient (no standing), and the fare is not far from what the air-conditioned buses charge (a difference of about ₱5.00 at most).

As a result, the FX taxis grew in number and is now "officially" part of the public transportation system in Metro Manila.

Let's Review

Enumerate the benefits of technology that we have discussed so far.

Write your answers in the spaces provided.

_____

_____

_____

_____

_____

_____

_____

_____

Finished? Compare your answers with those in the *Answer Key* on page 39.

Were you able to identify all the benefits of technology that we have discussed? If not, review the previous sections before you proceed.

Now you already know what technology is and what benefits you can derive from it. In the next lesson, we will look at the other side of the coin, that is, the harmful effects of technology. We will likewise discuss the challenges that technologies face.

Let's Remember

Before you proceed to Lesson 2, do not forget the important points of this first lesson.

- *Science* is the systematic observation of natural events and conditions in order to discover facts and create things related to them.
- *Technology* is about inventions and discoveries, the products and methods that man uses for building, manufacturing and producing.
- *Discovery* means finding out or learning about something that already exists.
- *Invention* means creating new things.
- Some of the inventions and discoveries that revolutionized the world are the wheel, printing press, telephone, automobile, television, computers and the Internet. They are considered to have revolutionized (greatly changed) the world because they paved the way for other major inventions. They drastically changed the way people lived during the time that they were invented or discovered.
- Some of the benefits of technology are:
  - increased production and reduced labor;
  - higher living standards;
  - better leisure and play;
  - improvement in the life expectancy of people;
  - increased and faster exchange of information; and
  - more variety and choices in lifestyle.

The Negative Effects of Technology and the Challenges That It Faces

According to Emmanuel Mesthene, "Technology is neither good nor bad, it is neutral." While technology brings us conveniences and luxuries, as what we have discussed in Lesson 1, it can also cause problems. It is all a matter of how technology is used. Some people now think that we are allowing technology to become our master rather than our slave. This implies that if we are to take advantage of technology, then we have to think about how to utilize it well.

In this lesson, we will discuss the undesirable effects of technology and the challenges that it faces.

After studying this lesson, you should be able to:

- discuss the harmful effects of technology; and
- explain some challenges technology is facing.

Let's Try This

If you were to invent something, what would it be? Draw your invention in the space provided below. Write an appropriate label or title below it.

Explain what your invention can do.

_____

_____

_____

_____

I'm sure you have thought of something really great, something that you think will make your life easier. Perhaps, you have thought of a flying car, so that you will be able to travel far and quickly, without getting caught in traffic.

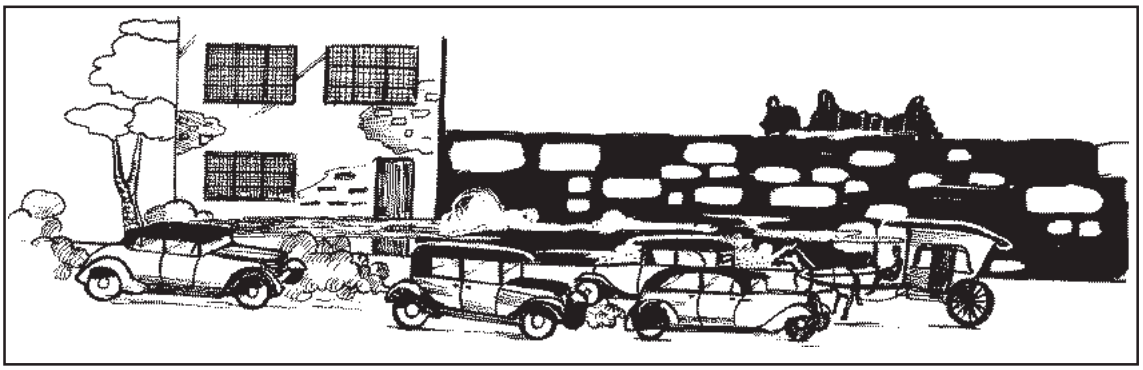
While your ideas and "inventions" may be great, you most likely missed something. Have you thought of the possible negative effects of your invention? You may have thought of its benefits, but how about its undesirable effects?

Let's Learn

NEGATIVE EFFECTS OF TECHNOLOGY

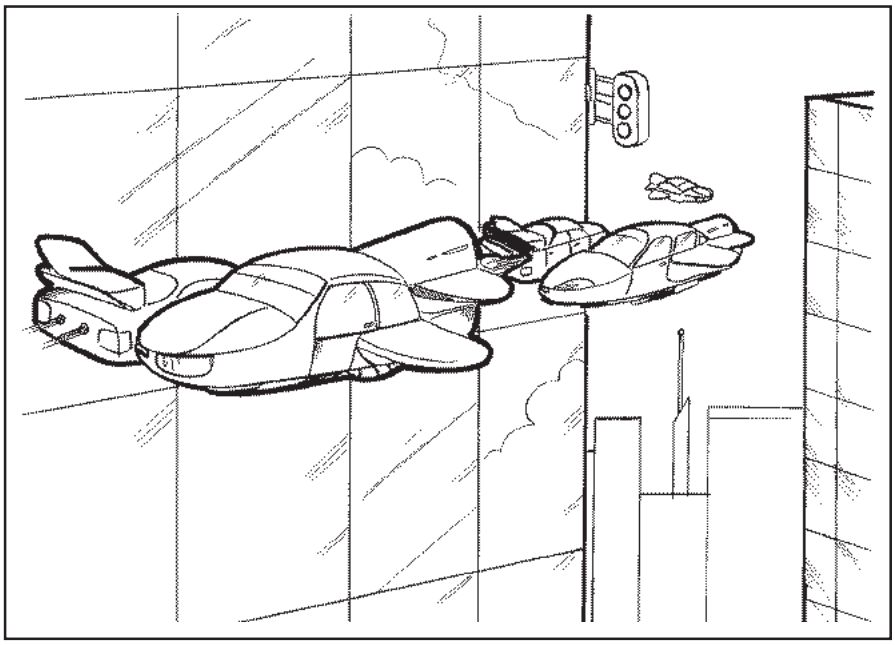
Most problems related to technology arose mainly because those who created the technology did not consider their possible harmful effects. For example, many people welcomed the invention of the car in the early 1900s. They believed that cars would be quieter and less smelly than the horses that were commonly used in those days.

But as more and more cars came into use, the traffic noise proved more annoying than the clatter of horse hoofs. Car exhaust also proved worse than the smell of horse manure. The fumes polluted the air with carbon monoxide and other impurities that threatened human health. Also, cars today cause so much traffic congestion in the city that it may sometimes be actually faster to travel on horseback.



Most people did not realize the negative effects of technologies because these effects will only be obvious once they occur on a large scale.

Let's go back to the flying car example.Yes, the flying car can get you off the traffic, but not for long. Sooner or later, more and more people will have their own flying cars. By then, you'll experience air traffic, and maybe air accidents as well.



Let's Try This

Think of three activities or practices made possible through certain technologies (like playing video games, riding the bus, cooking) that you see or experience every day. Write them down and their possible negative effects. Think of the effects that could happen on a large-scale basis. Use your imagination!

Write your answers in the table provided on the next page. An example is given below.

Activity	Possible Negative Effects
Eating in fastfood restaurants	♦ Creates more trash – styropore and other materials used as containers will add to our garbage problem. ♦ Less choices – most fastfood restaurants only have burgers, hotdogs, spaghetti and chicken. ♦ Less nutritious food – because of the fewer varieties and sometimes lower quality of food, we may not get the nutrition that we need.

Activities	Possible Negative Effects
1.	
2.	
3.	

Do you now realize that while technology may have advantages, it also has disadvantages which affect people directly or indirectly?

Let's Learn

THE HARMFUL EFFECTS OF TECHNOLOGY

Some of the harmful effects of technology are:

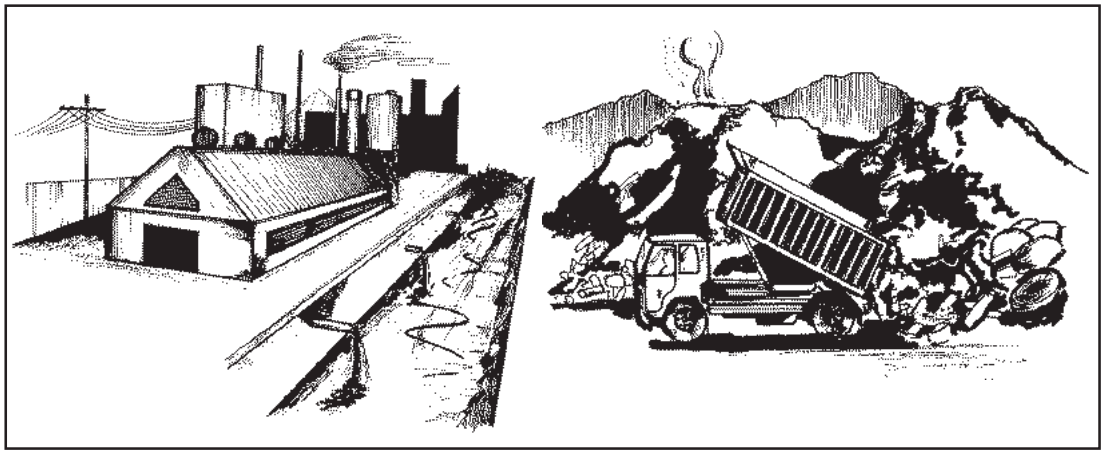
- environmental pollution;
- depletion of natural resources;
- unemployment;
- creation of dissatisfying jobs; and
- change in people's behavioral patterns and values.

We shall discuss all these one by one.

Environmental Pollution

Environmental pollution is one of the most harmful effects of technology. Most if not all countries now face problems of air, water, soil and noise pollution.

Motor vehicles have grown in number and still continue to increase. They are likely to worsen the air and noise pollution that they have already created. Aside from vehicles, factories that manufacture products also pollute the environment mainly due to the waste that they produce. Open dump sites, logging operations and many other activities aided by technology destroy the natural environment.

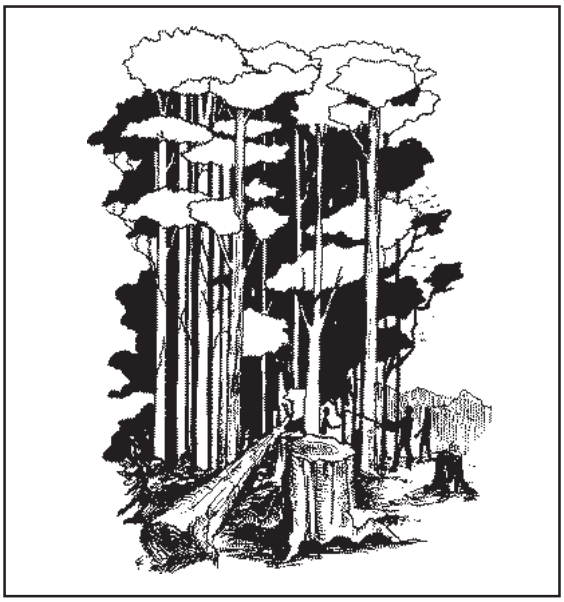


Depletion of Natural Resources

The rapid advance of technology may also cause the depletion of our natural resources. Because of the need to produce many products in large quantitites, our natural resources are used up very fast.

The use of electric powered machinery, for example, has greatly increased factory production. However, it has also reduced the supply of oil and other fuels needed to produce electricity. Once they are used up, these fuels cannot be replaced for a very, very long time. As power production increases, the supply of fuel decreases.

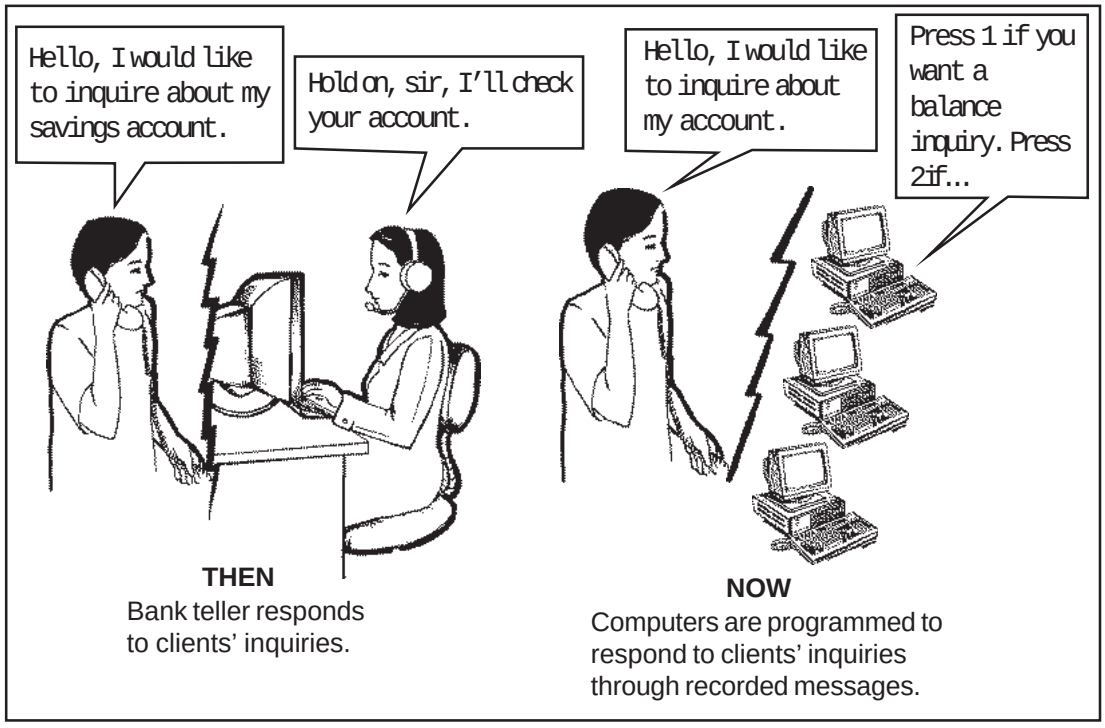
The use of paper requires trees to be cut for use as raw materials. Technology enables us to print books, newspapers, magazines and many other paper products. But unless we recycle paper (or make used paper into new raw materials) on a large-scale basis, trees will continue to be used as raw materials. If we do not immediately replace trees that are cut, soon they might all be gone.



Unemployment

Mechanization, or the use of machines instead of manual labor, has displaced many workers or removed them from their work. Machines now perform many tasks that were formerly done by people.

Have you experienced making a phone call in an office where a voice answers you and then tells you to press certain numbers? The voice may say, "press 1 if you want to talk to someone or 2 if you want other services." These telephones are actually programmed machines that can do the tasks that human telephone operators used to do.



Most of the mass-labor workforce has been or will be badly affected by technologies. Factory workers who do assembly-line production are now being replaced by machines that can do the job faster and more efficiently. People are no longer needed to fold, pack, wrap or do other mechanical things because machines can do them.

The Creation of Dissatisfying Jobs

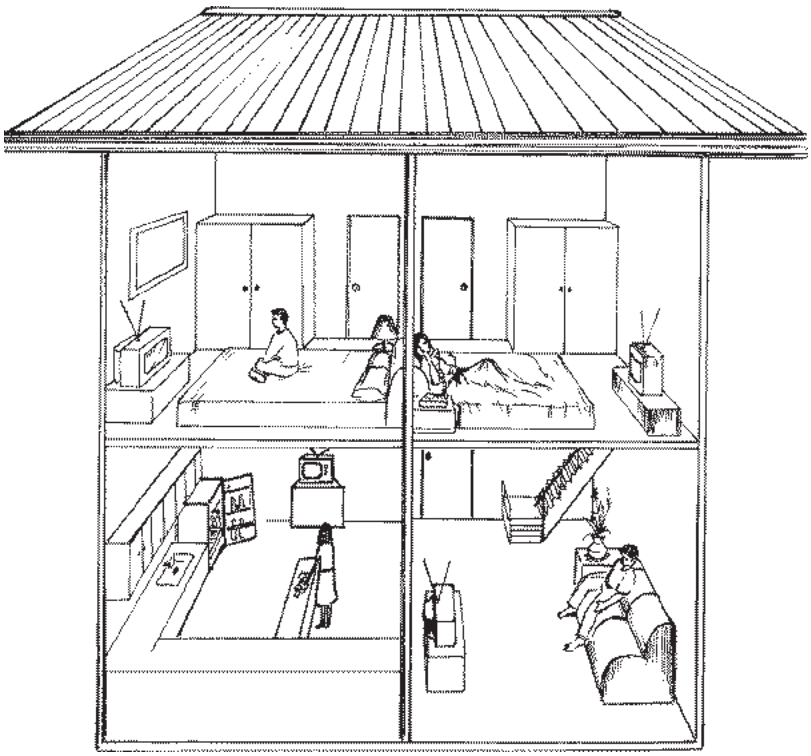
Some tasks required by industrial technology fail to give workers a feeling of accomplishment. Most factory workers now do only certain tasks in creating a product rather than creating a whole product. For example, when canned goods are manufactured, factory workers most of the time just oversee the whole process, since the machines do everything including filling the cans, sealing them, and packaging or putting the labels on them. This often results to less job satisfaction for the factory workers. Also, performing the same task again and again can be monotonous and boring.

Change in People's Behavioral Patterns and Values

In Lesson 1, we discussed that technology provides us with variety and that this variety leads to value and behavioral changes. While variety may be good, the resulting behavioral and value change may not always be positive.

With the coming of technology-aided communication, people are able to talk with less face-to-face interaction. Even the way families interact changes.

For example, if the family has a television set, the time that should be ideally spent for family conversation and interaction may instead be used to simply watch television. If the family has several television sets, say one TV for each of the children, the likelihood that the family will spend more time together decreases even further.



Television, radio, newspapers, the Internet and film can also transmit values and norms and influence or shape attitudes. For example, when you see a television advertisement about a certain product, you may be convinced to buy this product even if you do not really need it. Or when you see a certain action done on TV by an actor, you may try to imitate it even though it may not be a very wholesome or postive action. Your attitude and behavior can therefore be negatively changed or influenced by technology.

Let's Think About This

What do you think will the future technologies be? In what way will these technologies affect us?

The technologies today and the technologies of the future will continue to benefit or cause harm to you one way or another. That being the case, technology faces several challenges.

Let's Learn

THE CHALLENGES TO TECHNOLOGY

Given the extent of technology's influence in our lives, it faces several challenges today. One of its biggest challenges is how to fight the bad effects of existing technologies. Another is how to prevent similar effects in the development of new technologies. Still another challenge is how to spread technology's benefits to as many people as possible.

Fighting the Negative Effects

Technology's bad effects are hard to remedy mainly because there are different technologies to deal with. For example, we have problems about the negative effects of some television programs on children, and the waste created by technologies. This variety of problems will need a variety of solutions. But people have to realize first that there is need to take action. Car makers for example can help solve the problem of air pollution by installing a catalytic converter (a kind of filter) to purify the emissions from car exhausts. Producers of technology must develop means of fighting the bad effects of their products.

Let's Think About This

In your own way, how can you fight the negative effects of technology? Write your ideas below.

_____

_____

_____

_____

You can do simple things that can help lessen the problems brought about by technology. For example, if you practice recycling (reusing materials again and again), you can help solve the garbage problem that is partly caused by products of technology.

Preventing Undesirable Effects

Some experts believe that most harmful effects of technology can be prevented. Any proposed technology should be tested and studied before it is put into use. Such evaluation is called **technology assessment.**

The purpose of an assessment is to discover in advance all the possible good and bad effects that a new technology may have on society and the environment. An assessment might show that the benefits of a new technology are greater than any undesirable effect. Or it may show that the undesirable effects would be so harmful that they would outweigh any benefits.

Let's Think About This

How can you prevent technology's undesirable effects on you?

You might think that technology assessment is best left to the inventors who create technologies. Besides, it is impossible to have yourself protected from all the negative effects of technology. Some of these effects will reach us whether we like it or not.

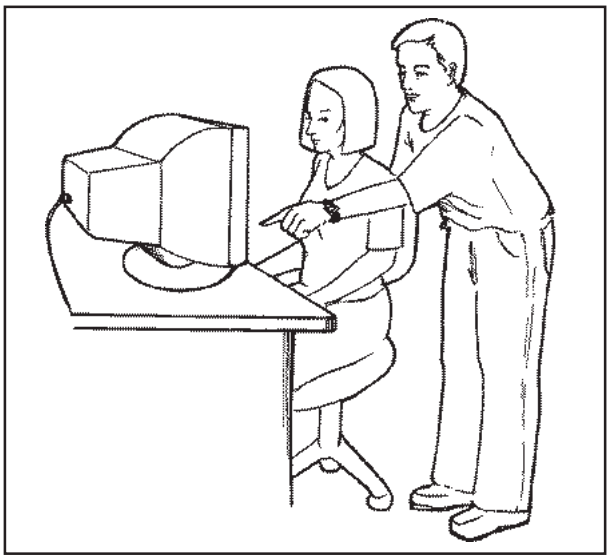
But the truth is you can do your own technology assessment from time to time. Assess a particular technology before you buy or acquire it. Ask yourself, "Do I really need this?" If you come to think of it, you may not really need some of the technologies that you are using.

For example, why buy an air conditioner when all you need is an electric fan? Aside from being just a waste of money, you may just be contributing to the depletion of some natural resources. (Since an air conditioner consumes a bigger amount of electricity than an electric fan, it consumes more oil—indirectly—as oil is needed to produce electricity.)

Spreading the Benefits of Technology

The benefits of technology are limited largely to the industrial nations like the United States, Japan and Germany. But even in these countries, the benefits of technology are not evenly distributed. This means that the benefits may be felt in some areas or by certain groups of people, but not in other areas or by other groups of people. Meanwhile, many families in the industrial countries lack even the basic necessities in life.

In the Philippines, for example, some people use computers while others have not heard or seen one yet. You can help in this area by teaching what you know about technologies to others. For example, if you know how to operate a computer, you can teach others the basic skills in the use of computers. Or, if the roles are reversed and you are the one who don't know much about computers, you can take the effort to learn from someone who is knowledgeable.



Let's Review

What are the three main challenges facing technology today? Write your answers in the spaces provided below. Explain each.

1. _____

   _____

   _____

2. _____

   _____

   _____

3. _____

_____

_____

Check your answers with those found in the *Answer Key* on page 40.

Let's Try This

To enrich your knowledge on technology, ask your friends and family members about their views on technology. Ask them if they think technology is:

a. good

b. bad

c. overrated (not as good as people believe it to be)

Just listen to their views even if they are not the same as your own opinions about technology. This activity will give you ideas on the various views or perspectives in which you can look at technology. Hopefully, the activity will help you understand technology better and be able to make better use of it as well.

You may share what you have gathered with your Instructional Manager or Facilitator.

Let's Sum Up

- Technology has harmful effects like:
  - environmental pollution;
  - depletion of natural resources;
  - unemployment;
  - creation of dissatisfying jobs; and
  - undesirable changes in people's behavioral patterns and values.
- Given that it has both positive and negative effects, several challenges face technology. Among these challenges are:
  - fighting the present negative effects of technology;
  - preventing the undesirable effects of technology; and
  - spreading the benefits of technology.

What Have You Learned?

Now that you have finished the module, let us test how much you have learned.

A. Identify what word is being described in the following sentences. Write your answers in the blank provided before each number.

_____ 1. A part of science that refers to the things that man uses for building, manufacturing and producing.

_____ 2. It means finding out or learning about something that already exists.

_____ 3. It refers to the creation of new things.

B. Answer the following questions.

1. Which of the following technologies caused radical changes? Encircle your answers.

   printing press needle and thread

   flat iron telephone computers

2. How did these technologies cause radical changes? Write your answers below.

   _____

   _____

   _____

   _____

   _____

   _____

3. Identify and explain two benefits of technology. Write your answers below.

   _____

   _____

   _____

   _____

Compare your answers with those found in the *Answer Key* on pages 40–41.

If you got:

9	–	10	Very good! You have learned a lot in this module. Now you understand technology. You may now proceed to the next module.
7	–	8	Good! Just review the items which you were not able to answer correctly.
5	–	6	Study again the parts of the module which you did not understand.
0	–	4	You have to study the whole module again.

Answer Key

A. Let's See What You Already Know *(pages 2–3)*

1. The correct answer is **(a)**. Technology is the application of science (b), discovery has to do with finding out about new things (c), and innovation is about making improvements on previous inventions (d).

2. The correct answer is **(c)**. Invention and discovery do not necessarily follow each other [(a) and (b)]. Letter (d) refers to innovation.

3. The correct answer is **(b)**. The fluorescent and incandescent bulbs both use electricity, so they are basically the same as the electric lamp.

4. The correct answer is **(b)**. The invention of the wheel prior to the horse carriage was the one (not the horse carriage) that revolutionized the world. With the invention of the wheel, many forms of transportation became possible, including the automobile (c) which enabled people to travel long distances. The computer and the television [(a) and (d)] likewise revolutionized the world upon their introduction because they made many things possible, especially communicating to many number of people.

5. The correct answer is **(d)**. All of the items mentioned are now functions of the Internet which can basically be summarized as interconnecting people around the world.

6. The correct answer is **(d)**. Technology, especially machines used in most factories, enables workers to do a lot of things that they would not be able to do if they used manual labor alone.

7. The correct answer is **(c)**. While advances in technology are able to cure many illnesses, there still remains a need to discover or invent cures for other illnesses.

8. The correct answer is **(d)**. Technology interconnects people and together with this comes the sharing of information and culture.

9. The correct answer is **(a)**. The lack of planning and consideration of the possible negative effects of technology remains as the primary reason for our problems related to it. While lack of funding (b) or knowledge (c) about the technology may also be possible reasons, they are not as significant as the lack of planning and consideration.

10. The correct answer is **(d)**. Technology, especially machinery, is likely to replace humans in mass labor jobs for these reasons.

B. Lesson 1

Let's Try This (page 5)

Discoveries	Inventions
fire	electric fan
medicinal plants	telephone
planet Mars	paper

Let's Try This (pages 6–8)

2. Car or automobile
3. Electric fan or air conditioner
4. Washing machine
5. Sewing machine
6. Power saw
7. Microwave oven

Let's Review (page 15)

Some sample answers are:

- They changed the way people lived during the time that they were created or discovered.
- They paved the way for new inventions.

Your answers may be slightly different. But if they carry the same thought as the ones given, you are still correct. You may show them to your Instructional Manager for additional feedback.

Let's Review (page 23)

The benefits of technology are:

- increased production and reduced labor
- higher living standards
- better leisure and play
- improvement in the life expectancy of people
- faster exchange of information
- more variety and choices

C. Lesson 2

Let's Review (pages 34–35)

The main challenges facing technology today are:

- *Fighting the negative effects of technology*. Producers and users of technology need to find means to fight, if not lessen the negative effects of technology.
- *Preventing the undesirable effects of technology*. Technology needs to be assessed to discover in advance its possible harmful effects.
- *Spreading the benefits of technology*. As much as possible, everyone should be given access to various technologies to ensure that many people benefit from them.

D. What Have You Learned? *(page 36)*

A. 1. technology

2. discovery

3. invention

B. 1. Give yourself one point for each correct answer.

printing press
telephone
computers

2. You may have a different way of stating the following answers, but if the thought is the same, give yourself 2 points.

- They paved the way for new inventions.
- They changed the lifestyle or the way people lived during the time that they were invented or discovered.

3. Choose any two of the following answers and if your explanation is similar to them or carries the same thought, then give yourself 2 points.

- *Technology has led to increased production and reduced labor*.
  Mainly through the help of machinery, people are able to produce more because the machines do part of the job. Machines can in fact do the job faster and more efficiently. This also means that people have less work to do.

- *Technology has brought us higher living standards*.
  As a result of technology, we are now better fed, better clothed and housed, and we enjoy a healthier, more comfortable life.

- *Technology has made leisure time better*.
  New sports, new kinds of music and new forms of entertainment are now possible because of advances in the materials used. Modern technology has also brought a great increase in the skill displayed through the instruments and devices that it provides.

- *Technology has improved the life expectancy of people*.
  Through technological advances in the field of health and medicine, many illnesses can now be cured and prevented.

- *Technology has sped up the exchange of information.*
  Through technology, information can be disseminated to thousands and even millions of people at the same time.

- *Technology gives us more choices*.
  Technology provides the means for us to have access to several choices and more opportunities. These choices and opportunities often lead to behavioral and value changes.

Glossary

Abacus A square or rectangular frame holding an arrangement of small balls on metal rods or wires, which is used for counting, adding and subtracting

Disseminate To spread or give out (news, information, ideas, etc.) to a lot of people

Drastic Very noticeable, significant, and usually causing worry because of its amount or degree

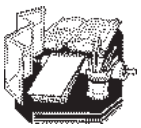
Electronic mail or E-mail A system for transmitting messages and data from one computer to another, using a telephone connection and a modem

Evolve To develop something gradually, often into something more complex or advanced; to undergo such development

Mechanization To change a process so that it is performed by machinery rather than with the use of human or animal labor

Monotonous Uninteresting or boring as a result of being repetitive and unvaried

Revolutionize To change; to turn around



References

Cogin, Philip. *Technology and Man*. New York: A. Wheaton & Company Limited, 1980.

Dunn, P.D. *Appropriate Technology, Technology with a Human Face*. New York: Macmillan Press, 1978.

<http://polaris.umuc.edu/~rclark2/social.htm>.

<http://www.bbc.co.uk/education/archieve/wheel/dot.htm>.

<http://www.ceiss.org/randa/making/content/chap2pa.htm>.

<http://www.emagazine.com/may-june_1996/0596conversations.html>.

<http://www.fcae.nova.edu/wwwboard/fcae/techtrain/messages/424.html>.

<http://www.findarticles.com/cf_0/mofwe/n3_v2/20855344/print.jhtml>.

<http://www.findarticles.com/cf_0/m0999/7220_319/57943208/print.jhtml>.

<http://www.forbes.com/asap/120296/html/jeremy_rifkin.htm>.

<http://www.pbs.org/wgbh/amex/telephone/sfeature/index.html>.

Mesthene, Emmanuel. *Technological Change: Its Impact on Man and Society*. London: New American Library, 1970.

Toffler, Alvin. *Future Shock*. New York: Random House Publishing, 1970.