Relationships Among Technologies

ITEA 3

Outcomes

In this presentation, you will learn:

- Technology transfer occurs when a user applies an existing innovation developed for one purpose in a different function. (ITEA 3-G)
- Technological innovation often results when ideas, knowledge, or skills are shared within a technology, among technologies, or across other fields. (ITEA 3-H)
- Technological progress promotes the advancement of science and mathematics. (ITEA 3-J)

Technology Transfer

Technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function. Windmills and solar systems are examples of technology transfer.

The sharing of the development and production of an invention (a new product or system) or innovation (an improvement of an existing product or system) expands the knowledge base of technology.

This new knowledge base will have a direct effect on the ability of people to develop and produce more technologies, which is referred to as technology transfer or spin-offs.

Technology transfer, or spin-offs, is an exciting concept. You will have various opportunities in this course to investigate how technology transfer happens within a technology, among technologies, and across other fields of study.

Technology Transfer: Examples

- Smoke detectors, CT scanners, global positioning systems, the cordless drill. These products and thousands more are results of NASA technology transfer. The National Technology Transfer Center (NTTC) provides a crucial link in this process by connecting NASA with companies that can commercialize federally funded technologies.
- There are thousands of products which have mad the transition from space-related products to common use. These are a few examples.
- Our nation’s investment in NASA technologies ha paid for itself many times over both monetarily and in our improved way of life.

Spin-offs

Spin-offs are products which have undergone a technology transfer process from research to public use. These uses may be direct or indirect. Spin-offs are recognized as important products and a concerted effort is being put forth on behalf of NASA and other agencies and corporations to introduce spin-offs into both private industry and commercial use.

Marshall Space Flight Center used technology from astronaut space suits to improve the safety of firefighter attire. This new attire is lightweight, fire-resistant, and heat-protective.

Sometimes spin-offs are things that we could not live without, such as satellites for communications, broadcasting, and weather forecasting. Often they are simple things, like saran wrap or aluminum foil. Sometimes they help us have fun by improving upon designs for sports equipment. Spin-offs are everywhere and they are everything.

Spin-offs are all around us. Most spin-offs usually go unrecognized and unappreciated. They are a part of every facet of our culture and pop up most in the areas of:

- Household Safety
- Health and Medicine
- Communications
- Computer Technology
- Environmental Management

The following is a very brief sampling of a few of the spin-offs that make our lives healthier, more fun, and safer.

- Nutritional Products from Space Research
- Ski Boots
- Cardiac Monitor
- Night Vision Camera
- Scratch-Resistant Lenses for Glasses

Technology Transfer Between Societies

The transfer of technology from one society to another can cause cultural, social, economic, and political changes affecting both societies to varying degrees.

Sharing methods to increase food production and preservation can alter a country's living habits in significant ways. For example, the idea for developing flash freezing, a method to freeze foods that preserves the flavor, appearance, and nutritional valve, was based on how the people of Labrador preserved their food.

The resulting invention, frozen food that is ready to heat and eat, has considerably changed the living habits and culture of many societies.

Interdependence: Math, Science, and Technology

Transfer of another type is found in the interdependence between math, science, and technology

- Scientific and mathematical knowledge and principles influence the design, production, and operation of technological systems. Science concepts, such as Ohm's Law, aerodynamic principles, and the periodic table of elements, are used in the development of new materials and designs.
- Mathematical concepts, such as the use of measurement, symbols, estimation, accuracy, and the idea of scaling and proportion are key to developing a product or system and being able to communicate design dimensions and proper function.

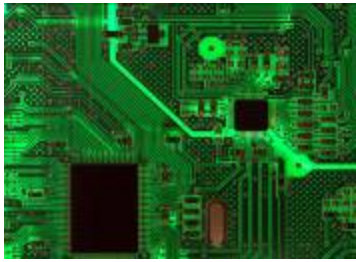
Interdependence: Math, Science, and Technology

- Technological progress promotes the advancement of science and mathematics. Likewise, progress in science and mathematics leads to advancement in technology.
- Because technology cannot really be appreciated in isolation, you need to understand that these interrelationships exist and to gain an appreciation for how the relationships shape technology.
- Science and technology are like conjoined twins. While they have separate identities, they must remain inextricably connected in order to survive.
- Science provides the knowledge about the natural world that underlies most technological products today. In return, technology provides science with the tools needed to explore the world.
- The two fields have many similarities, such as the development of codified sets of rules and reliance upon testing theories in science and of design in technology.
- The fundamental difference between them is that science seeks to understand a universe that already exists, while technology is creating a universe that has existed only in the minds of inventors.

Technology Advances Mathematics

- Mathematics and technology have a similar but more distant relationship. Mathematics offers a language with which to express relationships in science and technology and provides analytical tools for scientists and engineers.
- Technological innovations, such as the computer, can stimulate progress in mathematics, while mathematical inventions, such as numerical analysis theories, can lead to improved technologies.
- Another example is the development of binary language, a digital language made up solely of ones and zeros, and the foundational language of computers.

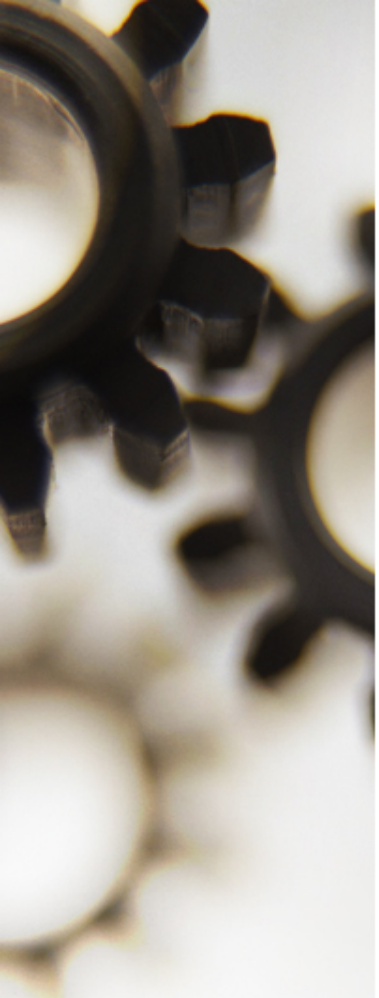
Technological Progress Promotes Progress in Math



- The use of integrated circuits, a collection of millions of miniature transistors, helped spawn a new generation of machines, from laptop computers and compact disc players to digital television.
- The mathematical and scientific ideas applied in the development of these digital devices promoted further developments that resulted in new tools, such as computer modeling. These tools, in turn, are used to explore new scientific and mathematical ideas, thereby spawning additional discoveries.

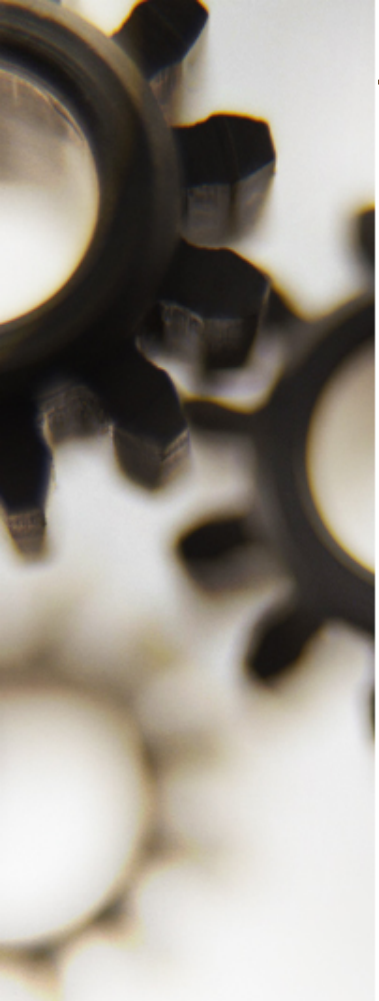
Technology's Unique Content

Technology has its own unique content base with specific concepts and principles that set it apart from these other fields. Technologies are intimately related, such as, the manufacturing used to produce generators and motors that are then used in energy and power technology.



Technology Transfer Summary

- Technology transfer or spin-offs is the transfer of ideas, information, methods, procedures, techniques, tools, or technology from the developers to potential users
- Many technology transfers or spin-offs come from developments in technology from NASA
- Spin-offs are all around us. Most spin-offs usually go unrecognized and unappreciated
- The influence of the space program has by now become so persuasive and is so quickly assimilated into our living patterns that we tend to take much of it for granted



Technology, Math, Science Relationships: Summary

- Mathematics is the study of quantity, structure, space and change. It developed, through the use of abstraction and logical reasoning, from counting, calculation, measurement, and the study of the shapes and motions of physical objects
- Science is the study of the natural world.
- Technology is the study of the human-made world.
- Technological progress promotes the advancement of science and mathematics. Likewise, progress in science and mathematics leads to advancement in technology.
- Science provides the knowledge about the natural world that underlies most technological products today. In return, technology provides science with the tools needed to explore the world.
- Scientific and mathematical knowledge and principles influence the design, production, and operation of technological systems.