

TU 130: Integrated Science and Technology

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- Try to imagine a world without science and technology.
- Would you want to live in the world without science and technology?
- For most of us the answer would certainly be **no**, for science and technology affect every aspect of our lives.

- Animals rely on adaptations for their survival, humans rely on science and technology for our survival.
- The link between human beings and technology is inseparable, because technology is an important extension of the human minds that allows us to do things and live like no other organism on the Earth.

- Equally important to humans is our search for knowledge and understanding of the world in which we live. This forms the base of what we call "science".
- Science: systemized knowledge derived from observation, study and experimentation carried on in order to determine the nature or principles of what is being studied.

- Technology: the science or study of the practical or industrial arts, applied science etc.
- Human possesses the ability to extend their own capabilities by using tools.

- The appearance of a new type of primate occurred on the African continent approximately 4 million years ago.
- Primate: any of an order (Primates) of mammals characterized especially by flexible hands and feet, each with five digits, including humans, great apes, monkeys and lemurs.

- This new species belonged to a family of what anthropologists called the hominid.
- Hominid: any of a family (Hominidae) of two-legged primates including all forms of humans, extinct and living.

- Although this creature would hardly have looked like a modern-day human being, it possessed two very unique adaptations. The first was the ability to walk upright on two legs. The second was the ability to make stone tools.

- These ancestors of modern humans are called Homo Habilis (“clever human”) by anthropologists and are the first known hominid to create customized tools.
- Modern humans are called Homo Sapiens (“Intelligent human”).

- The oldest tools discovered so far are approximately 2 million years old. These consist of crude stone implements called choppers.

“Stone Age Technology”

- The stone age is divided into 2 periods; the first is called the Paleolithic (“old stone”) period, the second is called Neolithic (“new stone”).

- During the Paleolithic period, hominids used crude stones mainly for chopping and for breaking open animal bones to expose the nutritious marrow.
- During the Neolithic period, our ancestors began to manipulate stones to form customized sharp cutting tools for use in farming the land.

“Agricultural Revolution”

- The appearance of modern humans approximately 100,000 years ago led to major advancements in technology.
- Modern humans began to craft very specialized tools in the form of spears and knives.

- About 35,000 years ago, people began creating pieces of art and primitive musical instruments.
- After fire and the wheel, one of the greatest advancements in human technology was human domestication of plants and animals. This is called the Agricultural Revolution, which began ~10,000 years ago in southwest Asia.

- During the Agricultural Revolution, humans created many customized tools made from stone, wood and animal bones for the purpose of growing and harvesting food crops.

“Bronze Age and Iron Age”

- The use of naturally occurring metal ore deposits such as copper and tin to create new, stronger tools.
- This began more than 5,000 years ago and marked the beginning of the Bronze age.

- Bronze is an alloy, or mixture, of copper and tin.
- Eventually humans found that iron was better than bronze for making tools.
- Iron was much stronger than bronze and quickly improved human tool-making abilities.

- This led to what is called the Iron Age.

“Industrial Revolution”

- Human being began to build cities, conquer the oceans and construct complicated machinery.
- The culmination of human ingenuity began a new era called the Industrial Revolution, which started in the late 1800's.

“Technology Timeline”

- Paleolithic Period:
 - First use of stone tools by *Homo Habilis* (~2.5 million years ago)
 - Emergence of modern humans (*Homo Sapiens* ~100,000 years ago).

- Neolithic Period:
 - Use of stone, wood and animal bone tools.
 - Emergence of art and musical instruments (~ 35,000 years ago).
 - Beginning of Agricultural Revolution (~10,000 years ago).

- First known use of wooden plow in south-west Asia (~7,000 years ago).
- First known use of the wheel (~5,500 years ago).

- Bronze Age:
 - Emergence of copper and bronze in tool making (~5,000 years ago).
 - Beginning of textile production in Mesopotamia (~5,000 years ago).

- Iron Age:
 - Smelting of iron in Africa (~3,000 years ago).
 - Use of iron in Europe and China (~2,000 years ago).
 - Construction of the Roman aqueducts (~300 B.C.)

- Industrial Age:
 - Invention of steam engine (1720 A.D.)
 - Invention of the steamboat (1807 A.D.)
 - First airplane flight (1903 A.D.)
 - First moon landing (1969 A.D.)

- Information Age:

“The Birth of Science”

- It is difficult to determine when humans actually began to practice science, it can be assumed from our ancient beginnings that we have always wondered at how our world works.

- The birth of formal science most likely had its roots in the study of celestial objects.
- Careful observation and measurement of astronomical phenomena lead to the birth of astronomy and to the birth of modern science.

- Many of the world's most well known scientists were and are astronomers.
- Aristotle, Newton, Kepler, Galileo, Copernicus, Einstein, Hubble, Hawking and Sagan are all famous astronomers who helped to revolutionize science.

- Today science continues to improve our world and increase our understanding of how it works. To do this, scientists use a formal method of inquiry to attempt to unlock the secrets of nature; this is called the scientific method.