

DEFINE SCIENCE

- **An idea.** It includes ideas, theories, and all systematic explanations and observations about the natural and physical world.
- **An intellectual activity.** It encompasses a systematic and practical study of the natural and physical world. This process involves systematic observation and experimentation.
- **As a body of knowledge.** It is a subject, discipline, or field of study that deals with the process of learning about the natural and physical world.
- **As a personal and social activity.** It is a means to survive in and improve life. It is interwoven with people's lives.

SCIENTIFIC REVOLUTION

- a period of dramatic change in European thought between 1500 and 1700 that replaced ancient Greek views with modern science based on experiments, math, and observation

NICOLAUS COPERNICUS: Heliocentric Model

- Challenged the Geocentric view where Earth was the center
- Proposed that the **Sun is the center of the solar system**
- Published on the *Revolutions of the Heavenly Spheres*
- Triggered the Copernican Revolution
- Changed our place in the cosmos
- An astronomical model that position of the Sun at the center of our solar system, with Earth and other planets orbiting around it.

CLAUDIUS PTOLEMY: Geocentric Model

- He lived in the second century of the Common Era. He was Greek and associated with the city of Alexandria.
- The geocentric model, also known as the **Ptolemaic system**, is the astronomical concept that places **Earth at the center of the universe with the Sun, Moon, planets, and stars revolving around it in circular orbits**

THE IMPACT OF THE SCIENTIFIC REVOLUTION

- Weakened the absolute authority of traditional institutions
- Promoted human reason as the primary source of authority
- Led to the Enlightenment and industrial advancements

- Encouraged the questioning of established social structures
- Developed systematic ways of problem solving

CHARLES DARWIN

- A British naturalist who developed a **theory of evolution based on natural selection.**

Impact of Darwinism on Society

- Shifted the view from divine creation to biological process
- Introduced the idea of constant adaptation and change
- Influenced social sciences and economics
- Challenged traditional religious interpretations of life
- Prompted ethical debates regarding human origins

SIGMUND FREUD: Psychoanalysis

ID = *immediate gratification*

EGO = *manages reality*

SUPEREGO = *moral standards*

- Explored the human subconscious and unconscious mind
- Developed the theory of Id Ego and Superego
- Introduced the talking cure as a psychological method
- Argued that human behavior is driven by hidden desires
- Changed the landscape of psychology and psychiatry
- Human personality is made up of three parts: the **id, ego, and superego**. The id seeks immediate gratification, the ego manages reality, and the superego represents moral standards. Together, these three components interact to shape human thoughts, feelings, and behaviors.
 - ID. If these needs are not satisfied immediately, the result is a state of anxiety or tension. For example, an increase in hunger or thirst should produce an immediate attempt to eat or drink.
 - EGO. It operates across the conscious, preconscious, and unconscious mind and is responsible for dealing with reality.
 - SUPEREGO. **The superego has two parts:**
 1. The **conscience** includes **information about things that parents and society view as bad**. These behaviors are often forbidden and lead to bad consequences, punishments, or feelings of guilt and remorse.
 2. The **ego ideal** includes the **rules and standards for behavior that the ego aspires to**

TIMELINE OF SCIENCE & TECHNOLOGY

- **Ancient Period** focusing on **basic survival and transportation**

- **Middle Ages** focusing on **communication and agriculture**
- **Modern Era** focusing on **industrialization and power**
- **Information Age** focusing on **digital connectivity**
- Evolution of tools from stones to silicon chips

1. Ancient Period Developments

- Sumerian Wheel and Cuneiform writing
- Egyptian papyrus and architectural engineering
- Greek philosophy and early mathematics
- Roman infrastructure and aqueducts
- Chinese gunpowder and compass

2. Middle Ages to the Renaissance

- Development of the mechanical clock
- Invention of the Printing Press by Johannes Gutenberg
- Advancements in seafaring and navigation tools
- Rise of universities and formal education
- Increased interest in alchemy and early chemistry

3. Modern and Information Age

- Industrial Revolution and the steam engine
- Discovery of electricity and the lightbulb
- Development of the computer and the internet
- Rise of Artificial Intelligence and Biotechnology
- Globalized economy driven by rapid technological change

CRADLES OF SCIENCE

- The **Cradles of Early Science** refer to **regions where human societies developed important systems of knowledge**. These societies advanced their understanding

of the world through observation, measurement, experimentation, calculation, problem-solving, technological innovation, documentation, and the transmission of knowledge from one generation to another.

- The growth of early science was motivated by the need to address essential concerns such as food production, water management, health and medicine, timekeeping, understanding space and the environment, construction of structures, trade and commerce, and governance.

- In early civilizations, science was not separate from daily life. People developed knowledge and practical skills because they needed solutions to the challenges they faced in their communities and environments.

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ANCIENT CIVILIZATIONS

- **Cradle of Science** refers to **ancient civilizations or regions where important systems of knowledge, observation, experimentation, technology, mathematics, medicine, engineering, and social organization developed and were passed from one generation to another**. Science did not begin in only one place or with one civilization. Different societies developed knowledge because they needed to solve practical problems.

REGION	CIVILIZATION/TRADITION	Major Scientific & Technological Contribution
Mesoamerica	Maya	Mathematics, zero, astronomy, calendars, architecture
Mesoamerica	Aztec	Agriculture, chinampas, water management, urban planning, botanical knowledge
Asia	Mesopotamia	Writing, mathematics, astronomy, irrigation
Asia	Ancient India	Zero, decimal place value, astronomy, medicine, metallurgy
Asia	Ancient China	Paper, printing, compass, gunpowder, agriculture, engineering
Asia	Islamic Golden Age	Algebra, medicine, astronomy,

		optics, knowledge transmission
Africa	Ancient Egypt	Mathematics, geometry, medicine, astronomy, engineering, writing

THEORIES OF EVOLUTION

Occurrence of Evolution According to Lamarck's Ideas

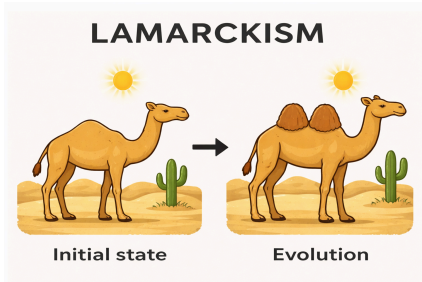
Jean-Baptiste Lamarck

- He developed one of the first theories on how species changed.

He concluded that organisms of higher complexity had evolved from pre-existing less complex organisms.

1. Theory of Need

- states that organisms change in response to their environment. Their ability to survive helped them develop characteristics necessary for them to adapt in a given environment which influences organisms.



2. Theory of Use and Disuse

- states that organs not in use will disappear while organs in use will develop. body structures that are not utilized would decrease in size over generations and eventually disappear, while those body structures that are often used will transform and develop further.



3. Theory of Acquired Traits

- states that an organism can pass on to its offspring physical characteristics that the parent organism acquired through use or disuse during its lifetime.



Occurrence of Evolution According to Darwin's Ideas

Charles Robert Darwin

- An English naturalist, geologist and biologist, best known for his contributions to science of evolution.

Darwinism

- is a theory stating that all species of organisms arise and develop through the natural selection of small, inherited variations that increase the individual's ability to compete, survive and reproduce.

Voyage of the HMS Beagle 1831-1836

- Went to **Galapagos Island**, and discovered that different finches has different beaks

- published in England on November 24, 1859. Darwin's theory argued that organisms gradually evolve through a process he called "**natural selection**." In natural selection, organisms with genetic variations that suit their environment tend to propagate more descendants than organisms of the same species that lack the variation, thus influencing the overall genetic makeup of the species.

The Four Key Points of Darwin's Theory of Evolution:

1. Individuals of a species are not identical
2. Traits are passed from generation to generation
3. More offspring are born than can survive
4. Only the survivors of the competition for resources will reproduce

NATURAL SELECTION

1. VARIATION

- In all species, individuals differ in their genetic makeup, producing many differences in their physical features.

2. INHERITANCE

- Individuals pass some of their genetic material to their offspring.

3. SELECTION

- Some individuals have inherited character (genes) that allows them to better survive or produce more offspring.

4. TIME

- Over time, selection results in changes in species. These changes may take days, decades, or millions of years to occur. Successful variations accumulate over time.

5. ADAPTATION

- Maybe added where successful organisms are able to reproduce more individuals when they have potential to adjust themselves to a fast changing type of environment.

PHILIPPINE HISTORICAL BACKGROUND

1. Pre-colonial Period
2. Colonial Period
3. Post-colonial Period

Pre-colonial Period

- Scientific and technological development in the Philippines began in the pre-colonial period. Even before the Spaniards came to the Philippine islands:

- Early Filipino settlers were already using certain plants and herbs as medicines.
- The Pre-Colonial Communities are commonly organized by small settlements called barangays, ruled by Datu
- Systems of farming and animal-raising were also implemented.
- Moreover, early Filipinos had also developed different modes of transportation, whether terrestrial or maritime.
- A complicated engineering feat was achieved by the natives of the Cordilleras when they built rice terraces by hand. Through these terraces, the people were able to cultivate crops on the mountainsides in cold temperatures. They incorporated an irrigation system that uses water from the forests and mountain tops to achieve an elaborate farming system. The rice terraces of the Cordilleras, which are still functional, show the innovative and ingenious way of the natives to survive in an otherwise unfriendly environment.

Colonial Period

- Colonial period refers to the long period where foreign powers such as Spain, United Nation and briefly Japan

ruled the archipelago, changed local societies and imposed outside laws, religion and culture.

3 Major Colonization/Occupation

1. Spanish Colonization (1565-1898)

- Establishment of formal education institutions and the launching of scientific organizations.
- Mandate schools to teach different subjects (religion, math, 3Rs).
- Medicine & Biology were taught in educational & training institutions.
- Engineering was introduced to construct buildings, churches, bridges, and roads.
- Natives were trained to use innovative approaches in farming.

2. American Colonization (1898-1946)

- The American colonial period in the Philippines lasted from 1898 to 1946, beginning when Spain ceded the islands to the United States in the Treaty of Paris and ending with full Philippine independence.
- Modernized all aspects of life in the Philippines.

- Established the Bureau of Science — a government agency to nurture the development of S&T.

- Established the National Research Council of the Philippines in 1933.

- Developments in S&T focused on: Agriculture, Medicine & Pharmacy, Food Processing, and Forestry.

3. Japanese Occupation (1941-1945)

- The Japanese occupation in the Philippines lasted from 1942 to 1945 during World War II, bringing severe hardship, a powerful underground resistance, and ultimate liberation by combined Filipino and American forces.
- Priority of opening elementary schools.
- Re-opening of vocational & normal schools in Agriculture, Medicine, Fisheries & Engineering.
- Filipinos were engaged in the sale of food & medicine for aiding the soldiers.
- Government corporations were reorganized to develop the natural resources in the Philippines.

TIMELINE

1898	1899	1901	1902	1916	1935	1946
The U.S. Navy defeats the Spanish fleet in the Battle of Manila Bay during the	The Philippine-American War began as Filipino forces fought against	The United States established a civil government and began expanding its	The Philippine Organic Act established a more organized colonial	The Jones Law promised eventual Philippine independence and created	The Commonwealth of the Philippines was established, with Manuel	Philippine independence: The Philippines became fully independent from the

Spanish-American War.	American rule.	administration and public education system.	government.	a more representative government.	L. Quezon as president.	United States on July 4, 1946.
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PHILIPPINES PRESIDENTS AND THEIR CONTRIBUTION TO S&T

1. Emilio Aguinaldo (1899-1901)

- Universidad Certifico de Filipinas

1. Manuel L. Quezon (Commonwealth President. 1935-1944)

- Founded the **National Research Council of the Philippines (NRCP)**
- Expanded vocational, science, and math education in public schools to support industrial development.
- Created the **National Rice and Corn Corporation (NARIC)** to modernize crop storage and distribution.
- Upgraded the Bureau of Health to fight infectious diseases like tuberculosis using modern medicine.
- Expanded the Bureau of Mines and Bureau of Forestry to scientifically map mineral and forest resources.
- Established the **Institute of National Language (INL)** to conduct linguistic research for a national language.

1. Manuel Roxas

- **Executive Order No.94 - Institute of Science**

2. Ramon Magsaysay Sr. (1953-1957)

- Science and Technology Week: Issued Proclamation No. 7 on March 1, 1954, declaring March 8–14, 1954 as Science and Technology Week to promote science and technology and encourage greater public awareness of scientific work.
- National Science Week: Issued Proclamation No. 79 on October 14, 1954, declaring November 21–27, 1954 as Philippine National Science Week. It emphasized the contribution of science to world progress, education, and economic development.
- Science Advisory Committee: Issued **Executive Order No. 141** on December 8, 1955, creating the **Science Advisory Committee**.

– Coordination of Scientists and Technologists: The committee was tasked with coordinating the work of scientists and technologists so that the Philippines could gain greater benefits from science and technology.

3. Carlos P. Garcia (1957-1961)

- Science Act of 1958: Signed **Republic Act No. 2067, also known as the Science Act of 1958**, which made scientific development a national priority and provided government support for scientific research and inventions.
- **National Science Development Board (NSDB):** Established the NSDB under the Science Act of 1958 to coordinate scientific and technological research, manage research support, develop scientific manpower, provide scholarships, and encourage research and invention.
- Science and Technology Survey: Commissioned Dr. Frank Co Tui to conduct a comprehensive survey of the country's science and technology sector. Its findings and recommendations helped provide a basis for the Science Act of 1958.

4. Diosdado Macapagal (1961-1965)

- Science and Technology Week: Issued Proclamation No. 136 in 1963, declaring December 2–8 as National Science and Technology Week to emphasize the role of science in economic development.

— Continuation of Science and Technology Week: Issued Proclamation No. 412 in 1965, again declaring December 6–12 as Science and Technology Week, continuing the government's effort to promote public awareness of science and technology.

- **Philippine Science High School (PSHS): Signed Republic Act No. 3661** on June 22, 1963, establishing the Philippine Science High School. It provided specialized secondary education with strong emphasis on science and mathematics to develop future science professionals.

5. Ferdinand Marcos Sr.

1. Recognized science and technology as a key driver of national progress.
2. Directed **DECS (now DepEd)** to expand science education in public high schools.
3. Set up *Philippine Science High School* campuses in **Mindanao and the Visayas**.
4. Designated a 35-hectare property in Bicutan, Taguig as the **Philippine Science Community** — today the home of DOST.
5. Created agencies including **NFA, PAGASA, and NAST (National Academy of Science & Technology)** to serve as the nation's hub of scientific and technological expertise.
6. Tasked the **Philippine Coconut Research Institute (PHILCORIN)** with leading the modernization of the coconut industry
7. Established the Philippine National Oil Company (PNOC)
8. Presidential Decree No. 49 - Strengthened the protection of scientific research, inventions, and intellectual property

6. Corazon C. Aquino (1896-1992)

- In 1986, NAST (National Academy of Science & Technology) was renamed DOST (Department of Science & Technology) — to give the science and technology sector cabinet-level representation and a key role in sustainable economic recovery and growth.

From NAST naging DOST

- Created the **Science & Technology Master Plan** — aimed to update the production sector, improve research activities, and develop infrastructure in the S&T sector.
- Reorganized NAST into DOST with the following attached agencies:
 1. PAGASA — Philippine Atmospheric, Geophysical and Astronomical Services Administration
 2. PHILVOLCS — Philippine Institute of Volcanology and Seismology
 3. PSHS — Philippine Science High School System
 4. STII — Science and Technology Information Institute
 5. SEI — Science Education Institute
 6. TAPI — Technology Application and Promotion Institute
 7. TRC — Technology Resource Center

7. Fidel V. Ramos (1992-1998)

During his term, the Philippines had approximately 3,000 competent scientists & engineers.

- **"Doctors to the Barrio"** Program — made healthcare accessible even in far-flung areas.
- **"National Program for Gifted Filipino Children in Science & Technology"** — created for high school students who wanted to major in Science & Engineering in college.

- Mandated laws & statutes related to the S&T sector:
 - **RA 7687 — S&T Scholarship Act of 1994**
 - **RA 7459 — Inventors & Invention Incentives Act**
 - **RA 8293 — The Intellectual Property Code of the Philippines**
 - **RA 9439 - Magna Carta for S&T Personnel**

8. Joseph Ejercito Estrada

RA 8749 — The Philippine Clean Air Act of 1999

RA 8792 — Electronic Commerce Act of 2000

- Implemented cost-effective irrigation technologies and provided basic health care services for those who could not afford them.

9. Gloria Macapagal Arroyo (2001-2010)

Developed the S&T sector to strengthen the education system and address poverty.

- The term **"Golden Age"** of S&T was associated with her administration
- Coined **"Filipinnovation"** — envisioned the Philippines as an innovation hub in Asia.
- **RA 9367 — Biofuel Act** — promoted the use of indigenous materials as a source of energy.
- Encouraged farmers to use rice varieties that can withstand environmental hazards.
- **RA 10601 — Agriculture & Fisheries Mechanization (AFMech) Law** — modernized agricultural and fishery machinery & equipment.

10. Benigno Aquino III (2010-2016)

Named new National Scientists:

- Gavino C. Trono — Marine Biology
- Angel C. Alcala — Biological Science
- Ramon C. Barba — Horticulture
- Edgardo D. Gomez — Marine Biology
- Established **Project NOAH (Nationwide Operational Assessment of Hazards) in 2012** — an integrated, responsive system to deal with disasters.
- **Monitoring and Operating System for Emergency Services (MOSES)**
- **Diwata-1 (2016)** — displayed the Philippine flag in space

- Initiated the K-12 Curriculum (STEM).
- PHIVOLCS developed the **Valley Fault System Atlas (VFSA)** — detailed large-scale maps to help communities identify if their homes are near the fault line.

11. Rodrigo Duterte (2016-2022)

Prioritized the S&T sector — R&D budget grew nearly 6 times, from ₱5 billion in 2010 to ₱20.8 billion in 2017.

- Formulated programs & policies to aid national development.
- Directed DOST to focus on commercializing R&D results to generate new intellectual properties.
- Launched the Philippine Space Technology Program:
 - **Diwata-2 (2018)**

-RA 11035 - Balik Scientists Program

- Established the Philippine Space Agency (PhilSA)

- Gave importance to agriculture and disaster preparedness.

12. Ferdinand Marcos Jr. (2022-2028)

- Keeping the Philippines competitive in science and technology
- Supported DOST research and development (R&D)
- Promoted STEM scholarships
- Supported the Balik Scientist Program
- Advanced satellite technology
- Improved the use of technology in agriculture and disaster preparedness

PHILIPPINE SCIENTISTS AND THEIR CONTRIBUTION TO S&T

1. Dr. Angel Alcala (1929-2023)

- Artificial Reefs Technology: Pioneered the use of **artificial reefs made from bamboo and concrete blocks** in the late 1970s. This technique provided alternative habitats for fish and restored destroyed marine ecosystems.
- Community-Based Marine Protected Areas (MPAs): Developed and implemented the concept of community-managed marine reserves, notably at Sumilon Island and Apo Island. His work demonstrated the "**spillover effect**," showing that protecting 20–25% of a reef area increases fish yields in surrounding unprotected waters.
- Herpetology Discoveries: Discovered and described over 50 new species of reptiles and amphibians in the Philippines, authoring key books on Philippine biodiversity.

2. Dr. Edgardo Gomez (1938-2019)

- First World Nationwide Coral Reef Assessment: Led the world's first national-scale assessment of coral reefs in the 1970s. His team revealed that over 70% of Philippine reefs were degraded, driving global awareness and conservation policies.
- **Giant Clam (*Tridacna gigas*) Ocean Nursery**: Pioneered the ocean nursery culture and breeding of giant clams to save them from local extinction. Through the Bolinao Marine Laboratory, thousands of laboratory-bred clams were reseeded across coastal waters in the Philippines.
- Institutional Leadership: **Founded the UP Marine Science Institute (UP-MSI) in 1974**, elevating it into an internationally recognized center of excellence for oceanographic and marine research.

3. Fe Del Mundo (1911-2011)

- 1st woman to be named National Scientist of the Philippines (1980).
- She opened the **Children's Memorial Hospital (later renamed Fe del Mundo Medical Center)** which at that time was the Philippines' first pediatric hospital.
- She is most renowned for inventing an incubator made out of bamboo (**Bamboo Incubator**) specifically designed for places without electrical power.
- She conceptualized the banana, rice, apple, and tea (**BRAT**) diet.
- She authored over a hundred articles, reviews, and reports in medical journals on such diseases as dengue, polio and measles.
- She also authored Textbook of Pediatrics, a fundamental medical text used in Philippine medical schools.

4. Diosdado "Dado" Banatao (1946-2025)

- Represents the **first generation of the Internet, technology, and digital innovation in the Philippines**.
- His first major accomplishment was the design and invention of the first single chip 16-bit microprocessor based calculator.
- This would lead him later to develop the first system logic chip set for IBM, the first Windows Graphics accelerator chip for PCs.
- **Known for PC chipsets, PHY chips**

5. Gregorio Y. Zara (1902-1978)

- He is best known for developing the **two-way television telephone (videophone) in the 1950s**.
- Invented the two-way videophone, an early technology that allowed people to communicate with both voice and images.

6. Julian A. Banzon (1908-1988)

- His work on **biofuels and coconut oil** contributed to the development of science, technology, and sustainable energy research in the Philippines.

7. Agapito Flores

- **Fluorescent lamp**

8. Maria Orosa

- **Banana ketchup**

9. Eduardo Quisumbing

- **Philippine Medicinal Plant**

10. Ramon Cabanos Barba

- For his outstanding research on tissue culture in **Philippine mangoes**

11. Josefino Cacas Comiso

- For his works on **observing** the characteristics of **Antarctica by using satellite images**

12. Jose Bejar Cruz Jr.

- Known internationally in the field of electrical engineering; was elected of the famous **Institute of Electrical and Electronic Engineering**

13. Lourdes Jansuy Cruz

- Notable for her research on **sea snail venom**

14. Fabian Millar Dayrit

- For his research on **herbal medicine**

15. Rafel Dineros Guerrero III

- for his research on **tilapia culture**

16. Enrique Mapua Ostrea Jr.

- For inventing the **meconium drugs system**

17. Lilian Formajelo Patena

- For doing research on **plant biotechnology**

18. Mari-Jo Panganiban Ruiz

- For being an **outstanding educator and graph theorist**

19. Gregory Ligot Tangonan

- For his research in the **field of communications technology**

20. Caesar A. Saloma

- An **internationally renowned physicist**

21. William Padolina

- Chemist and **president of National Academy of Science & Technology (NAST)-Philippines**

22. Caesar A. Saloma

- Filipino physicist specializing in **optics and photonics**

23. William G. Padolina

- Specialized in natural products chemistry and biotechnology. Contributed to **research on Philippine medicinal plants and coconut chemistry**

SCIENCE EDUCATION IN THE PHILIPPINES

- Science education in the Philippines **develops scientific literacy, critical thinking, and a workforce equipped for science and technology.**

Scientific Literacy

- which means being able to **understand scientific ideas, evaluate information, and make informed decisions** about health, the environment, and technology.

Critical Thinking

- by observing students to **ask questions, observe, experiment, and solve problems** instead of simply memorizing facts.

Workforce Equipped for S&T

- by **giving students the knowledge and skills needed for careers in fields** like medicine, engineering, information technology, agriculture, and environmental science.

The 3 Core Concept of Science Education

1. Teaching Science

- Explores **pedagogical theories and models to help teachers deliver scientific concepts and processes** effectively.

2. Learning Science

- Help students **understand and love science through engaging methods and modern approaches.**

3. Understanding Science

- Applies science process skills, critical thinking, and scientific literacy to **daily life and the natural world.**

TIMELINE OF SCIENCE EDUCATION IN THE PHILIPPINES

1. Pre-colonial Period (Before 1565)

- Science existed as **indigenous knowledge** systems such as farming, herbal medicine, astronomy, boat-building, and navigation. **Learning happened through community practice, not formal schools.**

2. Spanish Colonial Period (1565-1898)

- **Science was tied to religion and colonial control.** Schools run by religious orders (UST, founded 1611) taught science mainly as part of theology and medicine.
- **Access was limited to the elite (mayayaman).**

1863

- The **Educational Decree of 1863 created a public school system**, opening basic education (including some science) to more Filipinos.

3. American Colonial Period (1898-1946)

- The US **introduced a secular, English-based public school system.** Science became a formal school subject.
- The Thomasites (1901) trained Filipino teachers. Science was also used to support public health, agriculture, and colonial governance.

1905

- The **Bureau of Government Laboratories was established**, linking scientific research to government and society.

1933

- The **National Research Council of the Philippines (NRCP) was created** to organize scientists and promote research for national needs.

4. Post-War and Early Republic (1940s-1950s)

- Following World War II, science was integrated across Grades 1 to 6 in 1957. In 1958, national science initiatives were established to align scientific literacy with economic development.

5. Curriculum Modernization (1960s-1970s)

- The UP Science Teaching Center (now UP NISMED) was established in 1964 to develop localized textbooks and lab equipment. Science and health integrated heavily into elementary and secondary school frameworks.

6. Institutionalization & Media Integration (1980s-1990s)

- The Philippine Science High School (PSHS) system expanded to nurture gifted youth. Science, Technology, and Society (STS) concepts were introduced into secondary curricula (curriculum). Educational TV programs like Sine'skwela (1994) broadened public access to science concepts.

7. K-12 Reform & Spiral Progression

- Republic Act 10533 (2013) introduced the K-12 system, replacing discipline-based teaching with a spiral progression approach where General Science, Biology, Chemistry, and Physics are taught across multiple grade levels.

BASIC TO TERTIARY LEVELS IN SCIENCE

Basic Education

- Basic education is basically the foundation of our learning. It is where students start building their knowledge and skills. It includes Kindergarten, Elementary, Junior High School, and Senior High School.

1. Kindergarten

- Science is introduced in a very simple and practical way. Students learn simple Science, such as their body, senses, plants, animals, weather, and their surroundings. They learn mostly through observation and simple activities.

2. Elementary

- They begin learning more organized and detailed Science concepts. Students learn more about living and non-living things, plants and animals, the human body, matter, energy, force and motion, Earth, space, weather, and the environment.

3. Junior High School

- Science becomes more detailed because students are introduced to different branches of Science. Students study Biology, Chemistry, Physics, and Earth Science. They also learn how to conduct experiments, make observations, and solve scientific problems.

4. Senior High School

- Students study more advanced Science. They go deeper into topics such as Earth and Life Science, Physical Science, Biology, Chemistry, and Physics, depending on their strand and curriculum

Tertiary Education

- Tertiary education refers to any formal education you take after finishing high school. It includes colleges, universities, vocational schools, and technical institutes.

1. College & Universities

- Colleges and universities offer science-related degrees such as Biology, Chemistry, Physics, Environmental Science, Nursing, Engineering, and Medical Technology. Students also conduct research and laboratory work.

SCHOOLS IN THE PHILIPPINES

1. University of Santo Tomas (1611. Oldest Univ in the PH & Asia)

- Founded by Dominican priests, a Catholic religious order
- Started during Spanish colonial rule.

2. Ateneo de Manila University (1859)

- Founded by Jesuits, another Catholic religious order
- Started during Spanish colonial rule, and known as one of the top private schools.

3. University of the Philippines (1908)

- Founded by Philippine legislature, the government body at that time
- Founded during the American colonial period. Started in Manila, and main campus moved to Diliman, QC

4. Philippine Science High School (1964)

- Founded by the Philippine government through RA 3661.
- Set up after the Philippines became independent; it's a special public high school focused on science, math, and technology

5. De La Salle University (1911)

- Founded by the De La Salle brothers, a Catholic religious order focused on education.
- Founded during American colonial rule, and is considered a top private Catholic university.

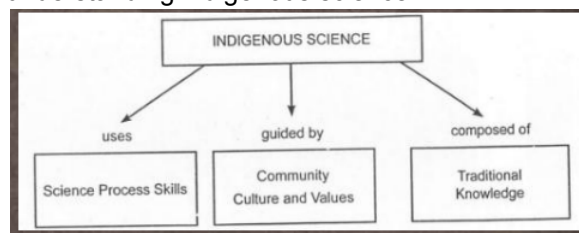
INDIGENOUS SCIENCE

- It is part of the indigenous knowledge system practiced by different groups of people and early civilizations.

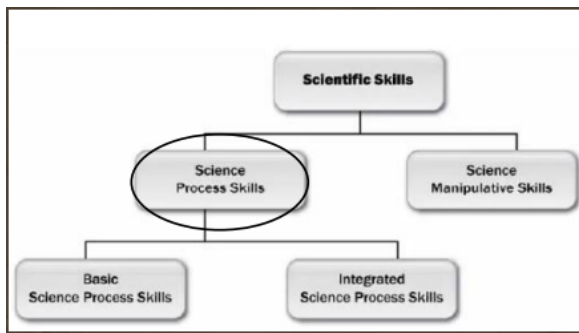
- Sibisi (2004) pointed out that indigenous science provides the basics of astronomy, pharmacology, food technology, or metallurgy, which were derived from traditional knowledge and practices.

- Ogawa (1995) proposes that every culture has its own science and refers to the science of a given culture as its "indigenous science"

- Pawilen (2006) developed a simple framework for understanding indigenous science.



- **Scientific skills** are associated with the process of conducting investigation in science in order to acquire scientific knowledge. One of the categories of scientific skills is Science Process Skills



Science Process Skills

- They are defined as a set of broadly transferrable abilities, appropriate to many science disciplines and reflective of the behavior of a scientist.
- They are used to gather information about the world.
- These skills help a person to conduct investigations objectively.

2 Categories under Science Process Skills

1. Basic Science Process Skills

- Useful science and also non-science situations.
- 1. **Observing** - using your senses to gather information about an object or event. It is description of what was actually perceived. This information is considered qualitative data.
- 2. **Measuring** - using standard measures or estimations to describe specific dimensions of an object or event. This information is considered quantitative data.
- 3. **Inferring** - formulating assumptions or possible explanations based upon observations. (NOTE: Focuses on the past, thinking about what happened in the past.)
- 4. **Classifying** - grouping or ordering objects or events into categories based upon characteristics or defined criteria.
- 5. **Predicting** - guessing the most likely outcome of a future event based upon a pattern of evidence. (NOTE: Focuses on the future, thinking about what will happen.)
- 6. **Communicating** - using words, symbols, or graphics to describe an object, action or event

2. Integrated Science Process Skills

- Working behaviors of a scientist which are more complex than the basic skills
- These skills are advanced, complex abilities used to design and conduct formal scientific experiments.
- 1. **Using Space-Time Relationship** - describing changes in parameter with time. Examples of parameters are location, direction, shape, size, volume, weight and mass.
- 2. **Interpreting Data** - Giving rational explanations about an object, event or pattern derived from collected data.
- 3. **Defining Operationally** - Defining concepts by describing what must be done and what should be observed.

- 4. **Controlling Variables** - Naming the fixed variables, manipulated variables, and responding variables in an investigation. The manipulated variable is changed to observe its relationship with the responding variable. At the same time, the fixed variables are kept constant.
- 5. **Making Hypothesis** - Making a general statement about the relationship between a manipulated variable and a responding variable to explain an observation or event. The statement can be tested to determine its validity.
- 6. **Experimenting** - Planning and conducting activities to test a hypothesis. These activities include collecting, analyzing and interpreting data and making conclusions.

The Indigenous People Rights Act of 1997 (RA 8371)

- Protects indigenous sciences, technologies, and knowledge systems.
- It gives indigenous cultural communities and indigenous peoples the right to own, control, develop, and protect their science and technology.
- The law covers indigenous knowledge systems and practices (IKSPs), such as herbal medicines, agricultural technologies, resource management, and weather forecasting.

Indigenous Knowledge, Skills, & Practices System

1. Indigenous Knowledge

- Indigenous knowledge is local knowledge that developed over centuries through experimentation of our ancestors and passed orally from generation to generation.
- It is embedded in the daily life experience of young children as they grow up.
- They live and grow in a society where the members of the community prominently practice indigenous knowledge.

2. Indigenous Skills

- Indigenous skills are traditional knowledge and abilities developed by Indigenous communities and passed down through generations. They help people meet their needs while preserving culture and nature.
- a. **Traditional Weaving** - creating baskets, clothing, mats and other items from materials such as bamboo, rattan, or abaca, using locally available fibers and patterns passed down through generations.
- b. **Indigenous Farming** - growing crops using traditional knowledge, such as seed saving, crop rotation, and natural irrigation.
- c. **Herbal Medicine** - identifying and using local plants for traditional healing and wellness.
- d. **Fishing & Hunting Techniques** - using traditional tools and knowledge of animal behavior.
- e. **Pottery & Wood Carving** - making useful or decorative objects by hand.
- f. **Traditional House Building** - constructing homes suited to the local climate using native materials.

g. **Storytelling & Oral Tradition** - preserving history, values, beliefs, and community knowledge through spoken stories.

3. **Indigenous Practice Systems**

- Indigenous practices are traditional ways of living and doing things that Indigenous People have learned from their ancestors and passed on to the next generation.

- These practices are connected to their culture, livelihood, beliefs, community, and environment.

According to Department of Agriculture – Philippine Rural Development Project

a. **Muyung (Ifugao)** - a private or communal woodlot and forest management system in the Cordilleras that preserves watershed health for adjacent rice terraces.

b. **Bayanihan/Ugbu** - Mutual aid systems used during heavy agricultural work, terrace repair, and community building.

c. **Ata & Matigsalog Practices** - Sustainable foraging, natural pest management using specific plant extracts (sagbot), and traditional seed storage.

INDIGENOUS SCIENCE & CULTURE

- Indigenous knowledge can become embedded in community life and identity.

- Culture provides ways for communities to express, practice, and transmit knowledge.

It can be expressed through: arts, stories, crafts, and languages.

1. **Yakan Community**

- Tennun - handwoven cloth that symbolizes the characteristics of the indigenous textile tradition in Basilan, Philippines.

- Weaving connects craft, identity, environment, and heritage

- Knowledge of weaving is passed down between generations

INDIGENOUS SCIENCE & TRADITIONAL VALUES

Indigenous science is composed of traditional knowledge practiced and valued by people and communities such as ethno-biology, ethno-medicine and folk astronomy.

1. **Ethno-biology.** Studies the relationship between people and their biological environment.
2. **Ethno-medicine.** Focuses on traditional healing practices.
3. **Folk Astronomy.** Uses systematic sky observation to guide daily survival, farming, and navigation.

TECHNOLOGY

- **Technology** is not just tools, gadgets, or machines, it is the skill, knowledge, and activity of shaping and transforming the world to meet human needs.

- It comes from the Greek word **techne**, meaning “art, craft or skill” so it is a way of bringing something into being that did not exist before.

- It includes how we think, plan, and apply knowledge to create, improve and use things in our daily lives.

What does “revealing” mean in the context of technology?

- “Revealing” means uncovering, bringing, forth, or making visible what was hidden unknown or waiting to be seen.

- In this view technology does not just change things it discloses truth potential and reality that was already there but not yet seen.

- It is like opening a door. Technology lets us see, understand and work with parts of the world that would otherwise remain hidden from us.

PHILOSOPHICAL ASPECT OF TECHNOLOGY

- More than tools or machines

- Focuses on the meaning and essence of technology

- Affects human life and understanding

Technology as More Than a Tool

Common View

- Technology = tool

- Used to achieve a goal

- Philosophical View

- Goes beyond its use

- Examines its deeper meaning

Heidegger: Technology as a Way of Revealing

- Reveals possibilities

- Shapes how things are understood

Aletheia / Unconcealment

- Means unconcealment

- From hidden → revealed

- Connected to truth

How Technology Reveals Things

- Reveal possibilities

- Make things understandable

- Bring hidden things into view

- Make things usable

How Technology Shapes Human Perception

Technology can influence how we see:

- Nature → Resource

- Objects → Useful things

- People → Human resources

TECHNOLOGY TIMELINE

- **3.3 million years ago — The first stone:** Early humans used stone tools as knives, hammers, and anvils, found in Lake Turkana, Kenya.

- **1 million years ago:** The first control over fire was achieved.

- **20,000–15,000 years ago – Neolithic Revolution:**

Humans shifted from hunting and gathering to farming, formed larger communities, made pottery and woven clothing, and likely invented the wheel.

- **6000 BCE – Irrigation:** Early irrigation systems were developed in Mesopotamia and Egypt, showing advanced social organization.

- **4000 BCE – Sailing:** The first sailing ships were used on the Nile River, with oars for navigation.
 - **1200 BCE – Iron:** Iron became widely used, replacing bronze and making metal tools more available.
 - **850 CE – Gunpowder:** Chinese alchemists invented gunpowder, which was first used to power rockets attached to arrows.
 - **950 CE – Windmill:** The first windmills appeared in Persia and were used to operate mills.
- Middle Ages (450 to 1400 AD)
- **1044 – Compass:** Chinese soldiers used a magnetized iron compass to navigate.
 - **1250–1300 – Mechanical Clock:** Mechanical clocks appeared in Europe to mark time.
 - **1455 – Printing: Ni Gutenberg** printed the Bible using movable type, spreading information faster.
- The Industrial Revolution (1750–1900)
- **1765 – Steam Engine:** James Watt improved the steam engine, making it more efficient and important to the

Industrial Revolution.

- **1804 – Railways: Richard Trevithick** built the first steam-powered railway locomotive.
- **1807 – Steamboat: Robert Fulton** introduced steam-powered transportation on water.
- **1826/27 – Photography: Nicéphore Niépce** created the first known permanent photograph.
- **1844 – Telegraph: Samuel Morse** sent the first long-distance telegraph message.
- **1876 – Telephone: Alexander Graham Bell** made the first successful telephone call.
- **1876 – Internal-Combustion Engine: Nikolaus Otto** developed an engine powered by fuel burning inside it.
- **1879 – Electric Light: Thomas Edison** developed a practical, long-lasting electric light bulb.
- **1885 – Automobile: Karl Benz** built the first modern gasoline-powered automobile.

The 20th and 21st Centuries (1900-2022)

- **1901 – Radio: Guglielmo Marconi** successfully sent a radio signal across the

PREHISTORIC TO ANCIENT TECHNOLOGY TIMELINE

What were some of the earliest technologies created by humans?

Stone tools – Used for cutting, hunting, and preparing food.

Wood and bone tools – Helped humans make weapons, shelters, and other useful objects.

Fire – One of the most important discoveries because it helped humans cook food, stay warm, and protect themselves.

Cooking

Warmth and light

Protection

Atlantic, showing that wireless communication could work over long distances.

- **1903 – Airplane: Orville and Wilbur Wright** achieved the first successful powered airplane flights, beginning modern aviation.
- **1927 – Television: Philo Farnsworth** demonstrated the first electronic television transmission, leading to modern television technology.
- **1937 – Computer: John Atanasoff** designed an early electronic digital computer that used binary numbers for processing information.
- **1947 – Transistor: Bell Labs** introduced the transistor, allowing electronic devices to become smaller and use less power.
- **1957 – Spaceflight: The Soviet Union launched Sputnik 1**, the first artificial satellite to orbit Earth.
- **1974 – Personal Computer: The Altair** helped bring computers into homes and started the personal computer era.
- **1974 – Internet: TCP/IP** was developed as a system for transmitting data, becoming a foundation of the modern Internet.
- **1973 – Mobile Cellphone: Martin Cooper** invented the first handheld cellphone in 1973 by developing a portable device that used radio signals to make wireless calls without being connected to a landline.
- **2007 – iPhone:** Apple released the iPhone, popularizing touchscreen smartphones and mobile computing.
- **2012 – CRISPR:** Scientists developed CRISPR-Cas9, a technology that allows specific changes to DNA.
- **2017 – Artificial Intelligence: AlphaGo** showed the growing abilities of AI by defeating skilled human Go players.
- **2022 – ChatGPT: OpenAI** released ChatGPT, allowing users to communicate with AI through natural language.

SURVIVAL

Better hunting – Stronger tools helped humans hunt animals more effectively.

Farming – Tools made planting and gathering crops easier.

Building – Better tools allowed people to build stronger shelters and communities.

Growing crops – Humans learned to produce their own food instead of only hunting and gathering.

Domestication – They learned to raise animals for food and other needs.

Permanent communities – A stable food supply allowed people to settle in one place and form villages.

EGYPT - 3100 BCE-30 BCE
MESOPOTAMIA - 3500-539 BCE
CHINA - 1600 BCE-220 CE

MEDIEVAL PERIOD TO INDUSTRIAL REVOLUTION TECHNOLOGY TIME

- **Vertical windmills** - to provide power and help machines move, making work easier.
- **Spectacles** - were developed to help people see better, especially when reading and studying.
- **Mechanical clocks** - used to measure time through mechanical parts.
- **Improved water mills** - used water power to move a big wheel and help machines, such as turning wheat into flour.

Gothic architecture - improved engineering and construction through the use of pointed arches and large windows.

- **Three-field crop rotation** helped farmers produce more crops and food.
- The **Printing Press, improved by Johannes Gutenberg** (c.a 1395–1468) made creating books and documents easier and faster. It allowed people to make many copies instead of writing everything manually. How did inventions such as the printing press change society?

Industrial Revolution — around 1760–1840

The Industrial Revolution was a time when people started using machines and new technologies to make work and production faster.

Improvements in iron production — 1700s

Iron production improved during the 18th century, making it easier to create stronger tools and machine parts.

Example: Iron could be used to make stronger parts for machines used in factories.

Steam engine – James Watt — 1760s–1770s

James Watt greatly improved the steam engine during the 1760s and 1770s. It could then be used to power machines.

Textile machines — 1700s–1800s

Textile machines improved the production of clothes and fabrics.

Example: Instead of making fabric by hand, machines could produce much more fabric in less time.

Machine tools – Henry Maudslay and Joseph Whitworth — 1800s

Henry Maudslay developed an important screw-cutting lathe around 1800, while Joseph Whitworth later developed precision machine tools, including a planing machine in 1842.

Steam engines — 1700s–1800s

Steam engines helped power machines and factories.

INDIA - 1500 BCE-500 CE
MAYA - 2000 BCE-1500 CE

Example: Steam power could keep factory machines running for production.

George Stephenson – Steam locomotive — 1814

Stephenson developed an early steam locomotive in 1814, helping improve transportation on land.

Example: Trains could carry people and goods over long distances.

Robert Fulton – Steamboat — 1807

Fulton's steamboat began operating commercially in 1807, helping improve transportation through water.

Example: Boats could travel using steam power instead of depending mainly on wind.

Karl Benz – Automobile — 1885–1886

Benz developed an early gasoline-powered automobile in 1885, and it was patented in 1886.

Example: People could travel using an engine-powered vehicle instead of a horse-drawn carriage.

Gottlieb Daimler – Automobile — 1885–1886

Daimler developed a high-speed gasoline engine in 1885 and used it in an early motor vehicle around 1886.

Example: His engine showed how gasoline could be used to power vehicles.

Henry Ford – Model T — 1908

Ford introduced the Model T in 1908, and mass production helped make automobiles more affordable.

Example: Instead of making cars one at a time, factories could produce many cars using an organized system.

How Did Machines Change People's Work?

People started using machines instead of doing everything manually. Factories became important places where machines and workers worked together.

19th century

Some people moved from mainly working in agriculture to working in industrial manufacturing and other technology-related jobs.

Example: Instead of working mainly as a farmer, someone could work in a factory producing clothes, tools, or other products.

20TH CENTURY TO DIGITAL AGE

Computer History

1. 1642: **Blaise Pascal — Pascaline**

- Blaise Pascal invented the Pascaline, a mechanical calculator designed to help his father with tax calculations.

It used wheels and gears to perform addition and subtraction automatically. This invention helped reduce the time and effort needed for mathematical calculations.

2. 1673: **Gottfried Wilhelm Leibniz — Step Reckoner**

• Gottfried Wilhelm Leibniz developed the Step Reckoner, an improved mechanical calculator. It was designed to perform addition, subtraction, WITH multiplication, and division using gears and a special stepped-drum mechanism. Although it had mechanical problems, it helped advance the development of calculating machines.

3. 1822: **Charles Babbage — Difference Engine**

• Charles Babbage designed the Difference Engine to automatically calculate mathematical tables. It used mechanical gears to solve mathematical problems and was intended to reduce errors caused by manual calculations. Although it was not fully completed during his lifetime, it influenced the development of automated computing.

4. 1837: **Charles Babbage — Analytical Engine**

• Charles Babbage designed the Analytical Engine, a mechanical computer intended to perform different types of calculations. It included components for processing, storing numbers, and receiving instructions through punched cards. Although it was never fully built during his lifetime, its design introduced important concepts used in modern computers.

5. 1843: **Ada Lovelace — First Computer Algorithm**

• Ada Lovelace wrote a set of instructions for calculating Bernoulli numbers using Charles Babbage's Analytical Engine. Her work demonstrated how a machine could follow instructions to solve mathematical problems. Because of this contribution, she is often recognized as the first computer programmer.

6. 1939: **John Atanasoff and Clifford Berry — Atanasoff-Berry Computer (ABC)**

• John Atanasoff and Clifford Berry developed the ABC to solve systems of linear equations. It used electronic components, binary numbers, and capacitors to process and store numerical information. Although it was not a general-purpose computer, it contributed important ideas to the development of electronic computing.

7. 1943: **Thomas Flowers — Colossus**

• Thomas Flowers led the development of Colossus, an electronic computer used during World War II to help decode encrypted German communications. It used vacuum tubes and paper tape to process information electronically at high speed. Its development demonstrated how electronic machines could help solve complex

information-processing problems.

8. 1946: **J. Presper Eckert and John Mauchly — ENIAC**

• J. Presper Eckert and John Mauchly developed ENIAC, one of the first large-scale electronic general-purpose computers. It used approximately 18,000 vacuum tubes and was originally designed to calculate artillery firing tables for the United States military. ENIAC could perform calculations much faster than manual methods, but it occupied a large room and required considerable effort to program.

9. 1947: **John Bardeen, Walter Brattain, and William Shockley — Transistor**

• John Bardeen, Walter Brattain, and William Shockley contributed to the invention and development of the transistor at Bell Laboratories. A transistor controls electrical signals and can function as an electronic switch. It helped make computers smaller, more reliable, and more energy-efficient than machines that relied on vacuum tubes.

10. 1971: **Federico Faggin, Ted Hoff, Stanley Mazor, and Masatoshi Shima — Intel 4004 Microprocessor**

• Federico Faggin, Ted Hoff, Stanley Mazor, and Masatoshi Shima contributed to the development of the Intel 4004, one of the first commercially available microprocessors. It combined important processing functions into a single electronic chip and was initially designed for a calculator. This invention helped pave the way for smaller, more affordable computers and modern electronic devices.

Precursors and Mechanical Era (3000 BC – 1930s)

* c. 3000 BC: The Abacus emerges in Mesopotamia/China as the earliest manual calculation rack.

* 1642: **Blaise Pascal invents the Pascaline**, an early mechanical adding machine.

* 1822–1830s: **Charles Babbage conceptualizes the Difference Engine and Analytical Engine**, earning him the title of the father of computing. Ada Lovelace writes the first algorithm intended for the Analytical Engine.

* 1890: **Herman Hollerith develops the Punched Card Tabulator** for the U.S. Census, automating data processing.

NTH GENERATION	DEFINITION	CHARACTERISTICS	KEY ACHIEVEMENTS
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1ST GENERATION (1940-1956): Vacuum Tubes	Vacuum tubes for circuitry and magnetic drums for memory.	Massive, room-sized, generated extreme heat, consumed heavy electricity, and used machine language.	- Atanasoff-Berry Computer (ABC, 1939): Early electronic digital principles. - Colossus (1943): British code-breaking electronic computer. - ENIAC (1946): First general-purpose electronic digital computer. - UNIVAC I (1951): First commercially available business computer.
2ND GENERATION (1956-1963): Transistors	Transistors replace vacuum tubes.	Smaller, faster, cheaper, more energy-efficient, and reliable; introduction of assembly and early high-level programming languages (FORTRAN, COBOL).	- IBM 1620, ERMA for banking automation, and early magnetic core memory deployment.
3RD GENERATION (1964–1971): Integrated Circuits (ICs)	Integrated circuits miniaturizing multiple transistors onto silicon semiconductor chips.	Increased efficiency, interaction via keyboards and monitors instead of punch cards, and multi-program operating systems.	- DEC PDP-8 minicomputer and the birth of ARPANET (precursor to the internet).
4TH GENERATION (1971–Present): Microprocessors	Microprocessors (CPUs on a single chip).	Desktop revolution, personal computing, graphical user interfaces (GUIs), mouse navigation, and global networking.	- Intel 4004 (1971): First commercial microprocessor. - Xerox Alto (1973): Pioneered modern GUI, mouse, and ethernet. - IBM PC (1981) and Apple Macintosh (1984): Popularized personal computers in homes and offices.

5TH GENERATION (1950–Future): Artificial Intelligence (AI) and Beyond Started in 1950 but became popular in the early 2020s	Artificial intelligence, parallel processing, ultra-large-scale integration, and quantum computing concepts.	Natural language processing, machine learning models, autonomous problem-solving, and neural-synthetic interfaces.	- Modern Era: Shift toward mobile laptops, smartphones, cloud computing, and ubiquitous digital integration
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THE ESSENCE OF TECHNOLOGY

1.. What does "essence of technology" mean?

- The essence of technology is not the machines or tools themselves, but the fundamental nature, meaning, and human relationship behind technology and how it shapes our thinking, values, and way of engaging with the world.
- It refers to the deeper purpose, mindset, and influence that technology carries, beyond just the physical devices we use.

2. According to Heidegger, why is the essence of technology not itself something technological?

- Technology' is one of those words that's so commonplace yet it's hard to define.
 - Computers and smart devices are technologies, but so are books and notepads.
 - Indeed, the definition of technology may span from simple tools and utensils (hammers and spoons) to powerful machines and media (car factories and artificial intelligence).
- In his essay "The Question Concerning Technology," Heidegger asks, what is the "essence" of technology? Directing that question to modern technology, especially powerful machines, he gives the following answer: "enframing." Let's unpack the meaning of that word.
- Heidegger names this technological worldview "enframing." As a worldview, enframing is not a subjective mindset, but the way our world usually "looks" today.

- Tools from stone and flints marked the era of the Stone Age, during the advent of our own Homo sapiens.
- People discovered minerals and began forging metalwork.
- Fur clothing and animal skin are primarily used for comfort against harsh winds. They began to cover themselves up out of necessity.
- People of the time had also painstakingly wrought and hewed said figures in honor of some deity, the initial roster primitive Gods includes objects they encounter through their day-to-day lives
- Driven their primal need to survive, humans were quick to find ways to drive off megafaunas threatening a perspective hunting spot
- The Holocene extinction is an ongoing extinction of several species, both flora and fauna due to human activity

HUMAN CONDITION BEFORE COMMON ERA (BCE)

- Homo erectus (upright man) have been using fire to cook, all of these without realizing the laws of friction and heat.
- They began to farm, and produce things that prospect of profit
- When they could not sell products, they used their skills and got compensated for it, bringing forth a specialized group of artisans
- Physical strength was valued at most, although there appeared to be as many intellectually gifted figures just the same.
- Advancement in medicine, technology, health and education assured humanity's best yet, and showed no sign of stopping

NOTABLE COMPARISON

1. Mortality Rate

- Due to technology, fewer women and children die during birth, assuring a robust population and strong workforce. Medical care for premature infants allows them to survive and develop normally, while proper maternal care ensures that mothers can fully recover and remain empowered.

2. Literacy Rate

- Access to education provided to more individuals generally creates a more informed public that could determine a more just society.

3. Gross Domestic Product (GDP)

- Determine the value of the country's foods and services produced within the territory given a certain time period.

BACKTRACING THE HUMAN CONDITION

Human condition improved, only if improving we means the level of:

- Comfort
- Various scientific breakthroughs
- Improvised lifestyles of those who had luxuries to do so

DIFFERENT MACHINERIES AID IN PROLONGING LIVES

- Assisting those with disabilities
- Honing efficiency in industrial workplace
- Exploring the universe

SOME PLACES IN THE WORLD ARE STILL BATTLING FOR THEIR DAILY SURVIVAL

- Diseases
- Tribe wars
- Lack of habitable territories
- Competitions on resources

THE BATTLING BETWEEN SCIENCE AND RELIGION

Considering other concepts

- Aristotle's conception of human flourishing
 - His subscription on evaluative concepts called "virtues" good life

THE GOOD LIFE

- The **Good Life** introduces the concept from Aristotle's *Nicomachean Ethics* and examines the issues in contemporary science and technology using the same philosophical lens

ARISTOTLE

- Who lived from 384 to 322 BC
- the most important ancient Greek philosopher and scientist
- known for his natural philosophy, logical and political theory
- was a student of Plato, was then a student of Socrates. Together they were considered the "Big three of Greek Philosophy."
- One of the greatest thinkers in the history of western science and philosophy, making contributions to logic, metaphysics, mathematics, physics, biology, ethics, politics, agriculture, medicine, dance and theatre.
- First to classify areas of human knowledge into distinct disciplines such as mathematics, biology and ethics.
- One of the strongest advocates of liberal arts education.

- Founder of the Lyceum, the first scientific institute based in Athens Greece.

NICOMACHEAN ETHICS

- The Nicomachean Ethics was abbreviated as Nicomachean Ethics (NE) or sometimes Ethica Nicomachea (EN) based on the Latin version of the name, is a **treatise on the nature of the moral life and human happiness based on the unique essence of human nature.**

"All human activities aim at some good. Every art and human inquiry, and similarly every action and pursuit, is thought to aim at some good; and for this reason the good has been rightly declared as that at which all things aim." - NE 2.2

Human Flourishing

- *Flourishing*
- To grow or develop successfully

- It is the **highest good of human attempt achieve his/her goal**

Human of today are expected to become a "man of the world"

Supposed to situate himself in global neighborhood, working side by side among institutions and the government to be able to reach a common goal

Competition as a means of survival has become passe (out-of-date)

Coordination is the new trend

EASTERN VS WESTERN CONCEPTS REGARDING SOCIETY AND HUMAN FLOURISHING

1. Western Concept

More **focused on the individual**

Human flourishing as an end

Aristotelian view

Aims for Eudomonia as the ultimate good

2. Eastern Concept

Focus is community-centric

Individual should sacrifice himself for the sake of the society

Chinese Confucian system

Japanese Bushido

Encourage studies of literature, science, and art for greater cause

SCIENCE, TECHNOLOGY, AND HUMAN FLOURISHING

- Every discovery, innovation, and success contributes to our pool of human knowledge
- Human's perpetual need to locate himself in the world by finding proofs to trace evolution
- Elicits our idea of self-importance
- Japanese Bushido Technology is a human activity we excel in as a result of achieving science. (Heiddeger)
- Good is inherently related to the truth

EUDAIMONIA

- Eudaimonia refers to *human flourishing*, meaning living well, doing well, and achieving well-being and fulfillment. It means *good and meaningful life* by developing virtues and fulfilling one's potential

- A Greek concept associated with Aristotle. "*Eu*" means good or well. "*Daimon*" means spirit, divine power, or guiding spirit. "*Ia*" means state or condition of being

Aristotle's View on How Should a Person Live a Good Life

1. The Good Life is an Active Life

- The Good Life is not just about having good things
- It is about actively living and making good choices
- A good life is shown through our actions and how we live
- It involves using our abilities and choices well

2. Human Life Should be Guiding by Reason

- Humans have the ability to think and reason. We should think before making choices.
- Actions should not be based only on desires or impulses.

- Reason helps us make better decisions and live well.

3. The Good Life is More Than Material Possessions

- The Good Life is not just about wealth or material things
- What matters is how a person lives and acts
- Having many things do not always mean living well
- The Good Life focuses on the quality of life and actions

Happiness According to Aristotle

1. *Everything has a purpose (Telos)*
2. *Happiness comes from virtue*
3. *Happiness is not instant, it is a lifestyle*

Happiness as the Ultimate Goal

It is final meaning hindi na instrumento lamang

It is self-sufficient meaning sapat na sarili

It is achieved through living well

ARETE = Excellence

- Arete is an ancient Greek word that means excellence, virtue, or the fulfillment of our potential

For example: A student practices arete by managing their time well, engaging deeply with the material, and giving their best effort on a report—regardless of just chasing grades.

Two Types of Arete

1. Moral (Ethike arete)

- It is the excellence of **character and behavior**. It is the ability to process your emotions, desires and actions so that you respond to a situation appropriately. We acquired this by habitual practice, training and teachings

2. Intellectual (Neotike arete)

- It is the excellence of the **mind and rational thought**. It is your ability to think deeply, logical reasoning, and your understanding on how the world works. We acquired this by studying, experience, and time.