

**▶ LESSON 1- SCIENCE,
TECHNOLOGY, AND
NATION-BUILDING**

Brief Historical Background of Science and Technology in the Philippines

Pre-Spanish Era

Filipinos were already aware of the medicinal and therapeutic properties of plants and the methods of extracting medicine from herbs. They already had an alphabet, number system, a weighing and measuring system and a calendar. Filipinos were already engaged in farming, shipbuilding, mining and weaving.

The Banaue Rice Terraces are among the sophisticated products of engineering by pre-Spanish era Filipinos.



Spanish Colonial Era

The colonization of the Philippines contributed to growth of science and technology in the archipelago. The Spanish introduced formal education and founded scientific institution. During the early years of Spanish rule in the Philippines. Parish schools were established where religion, reading, writing, arithmetic and music was taught. Sanitation and more advanced methods of agriculture was taught to the natives. Later the Spanish established colleges and universities in the archipelago including the oldest existing university in Asia, the University of Santo Tomas.



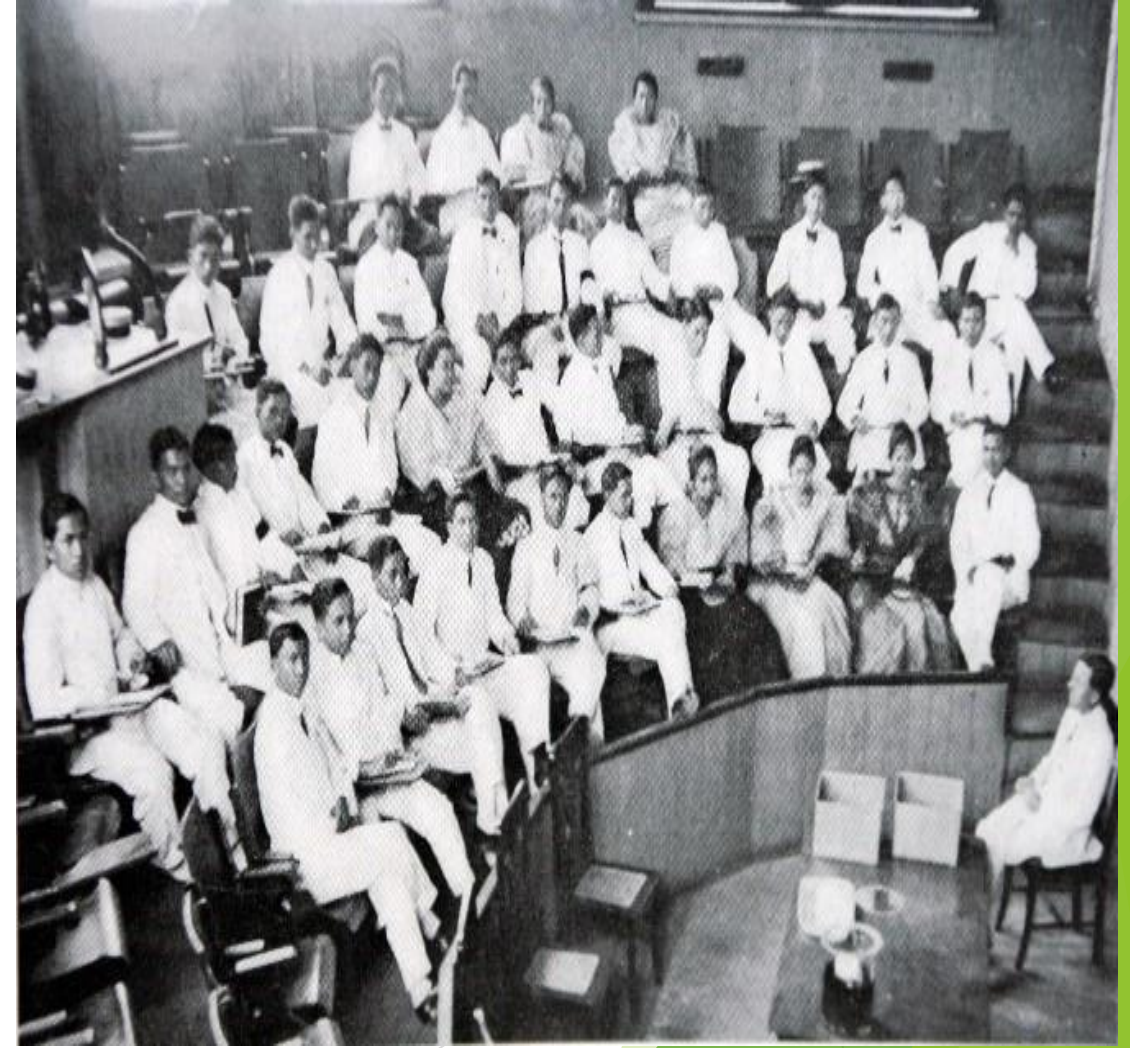
The study of medicine in the Philippines was given priority in the Spanish era,

The Spanish also contributed to the field of engineering in the islands by constructing government buildings, churches, roads, bridges and forts. Biology is given focus.

American period

Science during the American period was inclined towards agriculture, food processing, forestry, medicine and pharmacy. Not much focus was given on the development of industrial technology due to free trade policy with the United States which nurtured an economy geared towards agriculture and trade. In 1958, during the regime of President Carlos P. Garcia, the Philippine Congress passed the Science Act of 1958 which established the National Science Development Board.

American period



Post Commonwealth Era

The National Science Development Board was replaced by the National Science and Technology Authority under Executive Order No. 784. A Scientific Career in the civil service was introduced in 1983.

In 1986, during Corazon Aquino's presidency, the National Science and Technology Authority was replaced by the Department of Science and Technology, giving science and technology a representation in the cabinet. Under the Medium Term Philippine Development Plan for the years 1987-1992, science and technology's role in economic recovery and sustained economic growth was highlighted.

During Corazon Aquino's State of the Nation Address in 1990, she said that science and technology development shall be one of the top three priorities of the government towards an economic recovery.

Government Policies on Science and Technology

1. Paradigm shift: Towards an evergreen revolution
2. Investment in agriculture, agricultural sciences, and research and technology development
3. Pro-poor science development and technology transfer: science with a human face

4. Science-led agricultural diversification

5. Building bridges for science: strategic partnerships and regulatory framework

6. Globalization and liberalization: the role of science

7. Linking science, nutrition, and development

Science has many roles including:

1. to generate knowledge and make it accessible to all
2. identify issues - such as the causes and consequences of hunger, food insecurity and poverty
3. find facts to help resolve conflicts, and
4. provide technical, physical and social solutions to problems and new options for human well-being.

It is now time to realize the other roles that science must play to aid the world and to transform the Green Revolution into an Ever-green Revolution.

Evergreen revolution refers to productivity improvement in perpetuity without ecological and social harm. The evergreen revolution involves the integration of ecological principles in technology development and dissemination.



There are other outstanding Filipino scientists who are recognized here and abroad for their contributions in science:

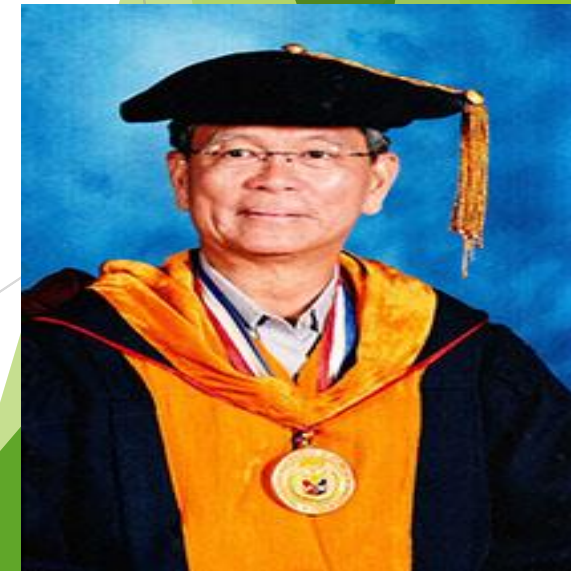
▶ **Caesar A. Saloma** – an internationally renowned physicist



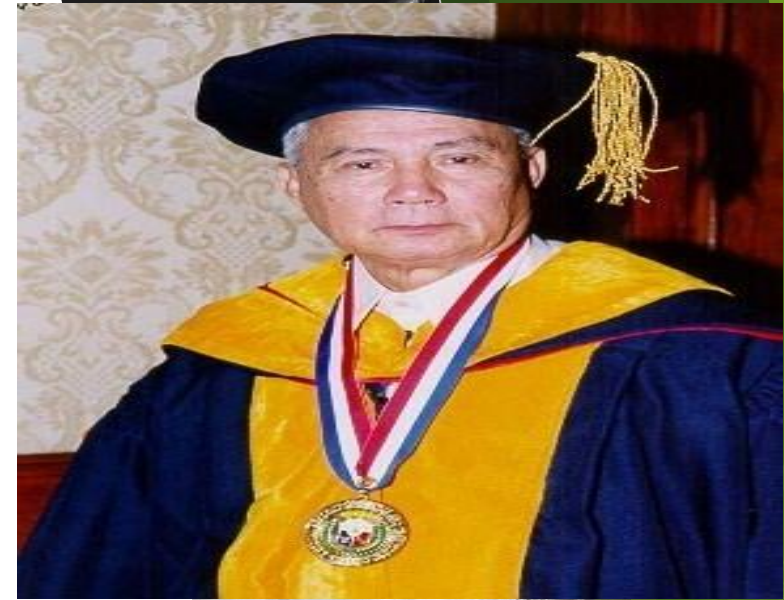
▶ **Edgardo Gomez** – famous scientist in marine science



▶ **William Padolina** – chemistry and president of National Academy of Science and Technology (NAST) – Philippines



Angel Alcalá – marine science



LESSON 2 -SCIENCE EDUCATION IN THE PHILIPPINES

Concepts of Science Education

School Science Education Science is useful because of its links to technology and industry, which, from a national perspective, are areas of high priority for development. Science provides ways of making sense of the world systematically. It develops students' scientific inquiry skills, values and attitudes, such as objectivity, curiosity, and honesty and habits of mind including critical thinking. All these are useful to the individual student for his own personal development, future career, and life in general. These skills, values, attitudes, and dispositions are likewise useful to the community that an individual student belongs to, and are further useful to the country that he lives in.

Challenges in Science Education:

Some Filipino students have gained recognition for their high level of accomplishments in the International Science and Engineering Fair, Robotics Competition, and Physics Olympiad, to name a few. There are also reports of students in far-flung rural schools scoring much higher than the international mean in the case of the Third/Trends in International Mathematics and Science Study (TIMSS) or have gone beyond the 75% mastery level in the case of the National Achievement Test (NAT).

Challenges in Science Education:



Science
in
the
City

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**PROVIDING
STUDENTS WITH A
WORLD CLASS
SCIENCE
EDUCATION
PROVIDES THEM AN
UNDERSTANDING
OF HOW THE
WORLD WORKS
AND THE TOOLS TO
CHANGE IT.**

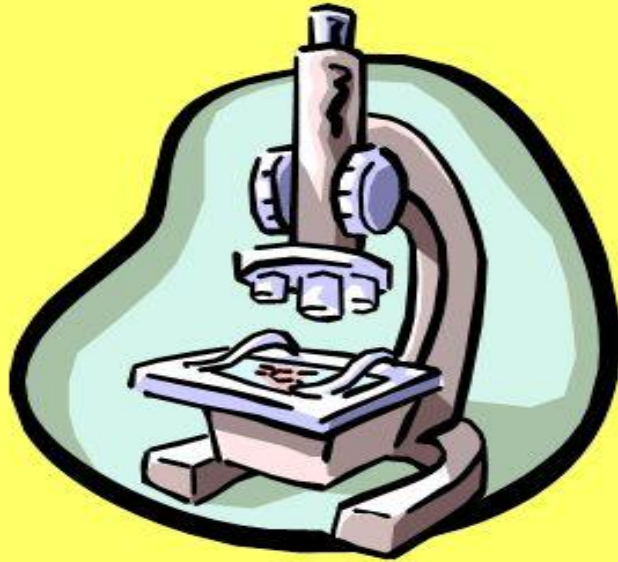
-Science In The City Research Team

SCIENCE EDUCATION IN BASIC AND TERTIARY EDUCATION

Science is a way of thinking about and investigating the world in which we live. This component addresses those skills scientists use to discover and explain physical phenomena. These skills include asking questions about the world, designing and conducting investigations, employing different strategies to obtain information, and communicating results. Activities such as scientific investigations, experiments, project work, field work, group discussion, and debates allow students to be actively engaged in the following processes. In the early grades, students should be exposed to science as a “hands-on, minds on” process and encouraged to explore and raise questions about the world around them.

As they go up the grades, they should develop skills to design and conduct investigations addressing self-, as well as teacher-generated questions, and involving identifying and controlling variables. Through the grades, students should develop abilities to systematically collect and organize data and communicate investigations, culminating in abilities to formulate explanations or models based on results of investigations. Among the inquiry skills that should be developed through the years of schooling is analyzing and evaluating information, procedures, and claims. A person should not accept every piece of information offered to him as true without some analysis. When confronted with a certain claim, one should counter with, What is your basis for saying so? How do you know? Why do you say so? One should always ask for supporting evidence, or search for further clarifying information. Moreover, one must develop the skill to recognize faulty arguments or reasoning that lumps facts and opinions together.

SCIENCE PROCESS SKILLS



Science is more than a collection of facts.

Learning the process skills is preparation for becoming a scientist.

Process skills are the tools scientists use to “know” about the world.

Observing

Classifying

Measuring

Communicating

Inferring

Predicting

SCIENCE SCHOOLS IN THE PHILIPPINES AND PHILIPPINE SCIENCE HIGH SCHOOLS SYSTEMS (PSHSS)

The PSHS System offers an education that is humanistic in spirit, global in perspective, and patriotic in orientation. It is based on a curriculum that emphasizes science and mathematics and the development of well-rounded individuals.

The PSHS System prepares its students for careers in Science and Technology and contributes to nation building by helping the country attain a critical mass of professionals and leaders in Science and Technology.



The Special Science Elementary Schools (SSES) Project of the Department of Education (DepEd)

The Department of Education through the Bureau of Elementary Education is implementing the Special Science Education (SSES) Project in pursuance to DepEd Order No. 73, s. 2008, DepEd Order No. 51, s.2010 and the latest is DepEd Letter Unnumbered from the Director III, OIC, Office of the Director IV dated August 2, 2011.

The SSES Project envisions developing Filipino children who are equipped with scientific and technological knowledge, skills and attitudes; creative and have positive values; and lifelong learning skills to become productive partners in the development of the community and society

Its mission is to provide a learning environment to science inclined children through a special curriculum which recognizes multiple intelligences and is geared towards the development of God-loving, nationalistic, creative, ecologically aware, scientifically and technologically oriented and skilled individuals who are empowered through lifelong learning skills.

The program has three components – **The School, the Learner and the Curriculum**

The learners in the SSES must exhibit the following characteristics:

1. On **Physical/Psychomotor**– must generally be healthy, alert and active and has heightened sensory awareness.

2. On **Intellectual/Academic Aspect** – acquires knowledge fast and accurately, has quick mastery and recall of factual information, superior reasoning ability, inquisitive and curious about a lot of things, observant and quick to note details, reads books within and above his/her age, has a ready grasp of underlying principles and can make valid generalizations, has a wide and well developed vocabulary, has a large storehouse of information about a variety of topics, can concentrate for long periods of time, can analyze ideas in different ways and other varied solutions to problems.

3. On **Social/Emotional/Motivational Aspect** – must be adaptable and flexible, independent, enjoys doing challenging and different tasks, prefers to work independently and requires little directions from teachers, is self-motivated in accomplishing his/her work another.

4. On Leadership/Creativeness – the SSES pupil participates actively in school/community activities, is self-confident with children of his/her own age as well as adults, initiates worthwhile activities, creates new ideas and products, gives original ideas or solutions to questions, has varied interests and abilities, etc.

The SSES utilizes Science curriculum that will provide for the development of lifelong learning skills and foster the holistic development of the child.

The Manila Science High School (MaSci) was established in 1963. It was the first science high school in the country. It was patterned after the Bronx Science High School of New York. 1963 was when the first batch that entered the pilot science high school graduated. It started in 1959 with 36 students

In 1964, the **Philippine Science High School (PSHS)** was established. It was under the Department of Science and Technology (DOST). The premier science high school in the country, it is considered among the top science high schools in ASEAN. Aside from its main campus in Diliman, Quezon City, it has 12 other regional campuses in the Philippines.

LESSON 3-INDIGENOUS SCIENCE AND TECHNOLOGY IN THE PHILIPPINES

INDIGENOUS SCIENCE AND TECHNOLOGIES

Indigenous Knowledge Systems and Practices (IKSPs) are local knowledge developed over centuries of experimentation by our ancestors and are passed orally from generation to generation. It was proven to be a perfect scaffold to sustainable development connecting the past, the present and the future..

According to Baguilat (2009), IKSPs cover a broader scope that included all traditional skills, laws, philosophy, rituals, livelihood, sciences and technologies of the community. IKSPs were incorporated in several public secondary subject. (Kinomis, X. 2016)



WHAT IS INDIGENOUS SCIENCE?

Like Western science (WS), Indigenous science (IS) relies upon direct observation for forecasting and generating predictions; it's power lies in its ability to make connections and perceive patterns across vast cycles of space and time. Indigenous scientists are trained in various specializations such as herbalism, weather observations, mental health, and time keeping, and there are tests to ensure IS validity.

One marked difference between the two sciences: Data from IS is not used to control the forces of nature, but instead is used to find methods and resources for accommodating it. Other critical distinctions apply to IS, including:

- Indigenous scientists are an integral part of the research process and there is a defined process for ensuring this integrity.
- IS tries to understand and complete our relationships with all living things. All of nature is considered to be intelligent and alive, thus an active research partner.
- The purpose of IS is to maintain balance.
- IS collapses time and space; our fields of inquiry and participation extend into and overlap with past and present.

- IS is holistic, drawing on all senses, including the spiritual and psychic.
- The end-point of an IS process is an exact balance where creativity occurs.
- We always remain embodied in the natural world. In other words, when we reach the moment/place of balance, we do not believe that we have “transcended.” Instead, we say that we are normal.
- Humor balances gravity and is a critical ingredient of all truth seeking, even in the most powerful rituals.