

UNIT-5: Education system in India

Education in ancient India:

During the ancient period, the state government and the people did not interfere in designing curriculum, payments of fees, regulation of teaching hours. There was a strong bonding between teacher and student. Every student was allotted with one teacher and more emphasis was given to the student-teacher relationship, each student used to meet teachers personally to learn and gain instructions from them. During ancient times, royal families, as well as kings of states, used to donate their wealth to improve the education system and quality. The syllabus was designed in accordance with the demands of that era. At that time students used to leave their houses and went to live with their gurus until their education was completed.

During the early Vedic period, women's education was also given more emphasis. The education focuses on the physical and mental development of students. The course duration was about 10–12 years, as there were no books so students used to memorize all things, memory played a crucial role during learning. The education was imparted in forests away from cities and peoples to give students a pleasant and silent environment of study.

Education in Medieval India:

The rulers helped in the spread and development of education. They helped in the establishment of different educational institutes and funded it, big landlords also gave them some wealth in the development of institutes. There was no control of rulers over the educational institutes and also to their management. The student-teacher relation was also good like the Buddhist and Brahmanic period, although students did not live with their teachers at that time. Teachers took interest in learning, at that time teachers were used to teaching students individually.

Education in Modern India:

The student-teacher relations remained the same as it was in ancient and medieval, but students did not live in the teacher's house. As technology is increasing day by day, the education sector is also following the trend of technology by teaching the students through online lectures and Massive Open Online Course (MOOC). In Aviation and the medical sector, more emphasis is on practical knowledge as compared to other sectors. Women's education is giving more importance, and the Government has launched many programs to encourage women's education. In the modern era electronics gadgets like projectors, Light Emitting Diode (LED), and computers are used to teach the students. The Government has established many programs and there are many organizations that promote education in India.

Science and scientists in ancient India:

During this period **Science and Mathematics** were highly developed and Ancient Indians had contributed immensely.

1. Aryabhatta

- He was a **fifth century** mathematician, astronomer, astrologer and physicist.
- At the age of 23, he wrote **Aryabhattiya** which is a summary of mathematics of his time.
- First time he had calculated the value of **pi** at 3.1416.

- **He showed that zero was not a numeral only but also a symbol and a concept.** Infact the discovery of zero enabled Aryabhatta to find out the exact distance between the earth and the moon. And zero discoveries opened a new dimension of negative numerals.
 - Also, Aryabhatta contributed greatly to the field of science particularly Astronomy and so known as **Father of Astronomy**. As we all know that in ancient India, the science of astronomy was well advanced. It was called **khagolshastra**. Khagol was the famous astronomical observatory at Nalanda, where Aryabhatta studied.
 - He also disregarded the popular view that our planet earth is 'Achala' i.e. immovable; **Aryabhatta stated its theory that** 'earth is round and rotates on its axis'.
 - **He also explained that** the appearance of the sun moving from east to west is false by giving examples. Like when a person travels in a boat, the trees on the shore appear to move in the opposite direction.
 - Scientific explanation of solar and lunar eclipse was also explained by him.
- So, now we come to know that why the first satellite that was sent into the orbit by India has been named after Aryabhatta.***

2. Mahaviracharya

- **Isn't it amazing that** there is an elaborate description of mathematics in Jain literature (500 B.C – 100 B.C).
 - **Jain gurus knew how to solve quadratic equations.** In a very interesting manner they have also described fractions, algebraic equations, series, set theory, logarithms and exponents.
 - Mahaviracharya was 8th century Indian mathematician (Jain) from Gulbarga who asserted that the square root of a negative number did not exist.
 - In **850 A.D**, Jain Guru **Mahaviracharya** wrote **Ganit Sara Sangraha** which is the first textbook on arithmetic in present day form. It was translated into Telugu by Pavaluri Sanganna as Saara Sangraha Ganitam.
 - He had also described the method of solving **Least Common Multiple (LCM)** of given numbers.
- John Napier introduced the method of solving LCM to the world but Indians already knows about it.***
- He also gave a sum of series whose terms are squares of an arithmetic progression and empirical rules for area and perimeter of an ellipse and was patronised by the great king **Amoghavarsha Nrupatunga** of Rashtrakuta dynasty.
 - Amazing is he had that time only established some terms for concepts like equilateral, isosceles triangle, rhombus, circles and semicircle.
 - **He had also established equations** for the sides and diagonals of cyclic quadrilaterals. It is: let a, b, c and d are the sides and x, y are the diagonals of cyclic quadrilateral then equation will be as follows;
 - **He had made great contributions in the fields of** hydrology, geology, maths and ecology.
 - **First scientist to claim that** termites and plants could be the indicators of the presence of underground water. Infact he had given important information about termites (insects that destroy woods or dimak) is that they go very deep to the surface of water level to bring water to keep their houses wet.
 - In his **Brhat Samhita** he had given **earthquake cloud theory** which has attracted the world of science.
 - **Astrology** or Jyotish a science of light was presented scientifically in a systematic form by Aryabhatta and Varahmihira.
 - Vrahmihira was one of the nine gems, who were scholars in the court of Vikramaditya.
 - Even the predictions of Varahmihira's were so accurate that king Vikramaditya gave him the title '**Varaha**'.

- In the history of science he was the first to claim that some “**force**” might be keeping bodies stuck to the round earth. And now it is known as gravity.
- **He also proposed that** the Moon and planets are lustrous not because of their own light but due to sunlight.
- **His mathematical work** included the discovery of trigonometric formulas. **Moreover, he was the first mathematician** to discover a version of what is now known as the **Pascal’s triangle**. He used it to calculate binomial coefficients.
- He is known as **Father of ancient Indian Science of Medicine**. In the court of Kanishka he was the Raj Vaidya (royal doctor).
- His remarkable book on medicine is **Charak Samhita** in which he had given various description of diseases and gives methods of identifying their causes as well as method of their treatment.
- **He was the first person who talked about** the digestion, metabolism and immunity.
- He also knew the fundamentals of genetics.

5. Maharishi Patanjali:

- He is known as **Father of Yoga** who had compiled **195 Yoga Sutras**.
- He was the first who had systematically present Yoga the great science.
- In Patanjali’s Yoga Sutras, **Aum** is spoken as a symbol of God. He refers to Aum as a cosmic sound.
- He also wrote a work on medicine and worked on Panini’s grammar known as **Mahabhasaya**.
- Do you know that Patanjali is an avatar of Adi Shesha- the Infinite Cosmic Serpent upon whom Lord Vishnu rests?***
- It is believed that he is an essayist who had written upon the ancient Indian medicine system i.e. Ayurveda.
- **Even the classical dancers in India** summons him and pays him their regards.
- It is believed that the **Jeeva Samadhi** of Patanjali is situated at **Tirupattur Brahmapureswara Temple**.

Yoga

It is an allied science of Ayurveda which was developed in Ancient India for healing without medicine the physical and mental level. It has also its roots in the Vedas like other sciences. It also defines **Chitta** i.e. dissolving thoughts, emotions and desires of a person’s consciousness and achieving a state of equilibrium. Yoga is physical as well as mental. Physical yoga is known as **Hathyoga** and mental yoga is known as **Rajayoga**.

Science and scientists in Modern India:

In the nineteenth century, Sir C V Raman brought about an extraordinary change in Indian scientific thinking. Dr Homi J Bhabha, known as the father of Indian Nuclear Physics, framed the future of Indian science. Dr J C Bose became a pioneer in the field of plant physiology, Dr Vikram Sarabhai developed the concept of atomic energy and industrialization, and Dr APJ Abdul Kalam contributed to the field of defence technology.

1. Sir.C. V. Raman:

CV Raman was not only a great scientist but also believed in social development. In 1930, he won the Nobel Prize for Physics becoming the first Asian to do so. He is associated with the concept of Raman's Effect, which says that when a light passes through a transparent substance, it scatters.

2. Dr. J. Chandra Bose:

Dr Jagadish Chandra Bose is famous for the invention of the Crescograph that can record even the millionth part of a millimetre of plant growth and orbital movement. Dr Bose proved, by

virtue of the Crescograph, that plants have a circulatory system. The Crescograph has also proved the fact that the upward movement of sap in plants is the doing of living cells.

3. Dr. H. J. Bhabha:

Dr Homi Jehangir Bhabha joined the Indian Institute of Sciences at Bangalore as a Reader at the request of Dr C V Raman. Soon, he became a Professor of Physics. It was here that he got the idea of building a research institute for some of the new areas of Physics. India's first atomic research centre, now known as the Bhabha Atomic Research Centre (BARC) was established at Trombay, where Bhabha became the first chairman in 1948. India's first atomic reactor, 'Apsara' was also established under his authority

4. Dr. V. A. Sarabhai:

Dr Vikram Ambalal Sarabhai was the key person behind the launch of India's first satellite 'Aryabhata'. His studies of cosmic rays have made it evident that cosmic rays are a flow of energy particles with its source in outer space. On their way to earth, they are influenced by solar energy, and the earth's atmosphere and magnetism.

5. Dr. A. P. J. Abdul Kalam:

Dr A P J Abdul Kalam, the eleventh President of India, was born on October 15, 1931. He was awarded the Bharat Ratna in 1997 for his contributions in the field of science and engineering. He developed the Satellite Launch Vehicle (SLV 3) at the Vikram Sarabhai Space Centre, which put the satellite Rohini into orbit.