The Greatest Resource – Education

Ernst Friedrich Schumacher (1911 – 1977) was an influential economist-philosopher and systems thinker. "The Greatest Resource – Education" is extracted from his book "Small Is Beautiful: Economics as if People Mattered". He talks about education as our greatest resource: when it deals with and gives answers to the deeper questions about who we are and what our place is in this universe, then education is our greatest resource.

Schumacher starts out by indicating that people usually look at education as the answer or the key to all kinds of problems or challenges. Men have lived and multiplied wherever they have found their means of living on every part of the earth. They have built great civilizations in the course of time and have disappeared and have become a cause for new civilizations that have arisen as a new form of cultures. The fact is that it is the man who is the primary resource for all the economic development but not the nature on this planet. The key factor of all this development is the sudden outburst of men's daring, initiative, invention and constructive activity in all fields at once. It is strengthened through education which is the most significant of all resources.

No civilization has ever flourished without organized education. We believe that education is the residual legatee of all our problems. Strong and better education would bring solution to all our problems such as nuclear dangers, new abuses of genetic engineering and the new temptations of commercialism. As the modern life is becoming more complex, it is the need for everyone to become more highly educated or we ourselves could vanish from this planet.

It is evident that the global situation at present calls for prodigious educational efforts. Education is a means of prosperity. Hence, we must educate ourselves or we shall be destroyed. Sir Charles Snow talked about two cultures which had greater impact on our lives. According to him, the two cultures are two polar groups… one pole is the literary intellectuals and the other the scientists. He deplores that there is a big gap between these two groups. He wanted this gap should be bridged. It could be to get world-class scientists and professionals to research high-class design and development. Later, many of the other scientists, engineers, politicians, administrators and the entire community should be trained to have a social sense what the scientists are mentioning. Lord Snow tells that the scientists are never exhausted to explain the fruits of their research and innovation is 'neutral'. It depends on how the humanity makes use of it for their enrichment.

E. F. Schumacher points out that modern people face many problems thrust upon them by the advancement of science and technology. So, there must be strong education to cope with these problems. Science and Engineering produce 'know-how', but the author says that 'know-how' is an unfinished sentence because it has got no end. Potential education could help to finish the sentence. The purpose of education should be the transmission of ideas of value and

of what to do with our lives. It could be foolhardy to put great powers into the hands of unreasonable people. The whole mankind would be in mortal danger if we tend to uses science and technological knowhow destructively without wisdom. More education could only fill the ignorant minds with wisdom. We are no doubt the inheritors of 'Dark Ages' and it is only our mental make-up could pave the way for better life on this beautiful earth.

A Dilemma: A Layman Looks at Science

Raymond Blaine Fosdick (1883-1972), lawyer, public servant, and author, was born in Buffalo, New York, the son of a high school principal. He was a lifetime disciple of Woodrow Wilson. Raymond B. Fosdick in the lesson 'A Dilemma**:** A Layman Looks at Science' says that science should be used only for the constructive purpose and not to be aimed at the degeneration of the society. August 6, 1945, a day of unfortunate, on which the atomic bomb was dropped on Hiroshima brought home to all of us about the significance (or) importance of science in human life. Mankind was frightened by science and bewildered by its enormous power. This instance has realised the mankind how unequipped we are in terms of ethics, law, and government, to know how to use it. The author says that science is based on truth and should spring from the noblest attribute of the human spirit.

There are certain inventions that can evoke both positive and negative responses. Invention of radio, automobiles, penicillin, radar and jet propulsions shall be aimed towards the betterment of the society rather than creating ugliness and desolation. The gifts of science, the author vehemently feels, should not blow our civilization into drifting dust. The research and Technology yield right fruits when they are related to human welfare.

Science is the search for truth. But it is the same search for truth that has brought our civilization to the brink of destruction. The writer strongly feels that research shall be subjected to some kind of restraint if it is not linked to human constructive purpose; it is really disheartening to read about that leading scientists associated with atom bomb saying that one should not hold back progress because of fear of misuse of science.

Fosdick says that some inventions are purely accidental and the scientists never had any evil intentions while discovering them. For instance Albert Einestein never thought of atom bomb while working for his transformation equation in 1905. Yet, from this it has come out one of the principles upon which atom bomb is based. Similarly sulphur drugs and mustard gas which are offshoots of German dye industry was not created to deal with either medicine or weapons of war. Willard Gibbs, was a gentle spirit whose life was spent in his laboratory at Yale University, had never dreamt that his research in the mathematical physics might have even a remote relationship to World War I & II. These discoveries are classic examples where the gifts of science can be used by evil men to do evil even more obviously and dramaticallythan it can be used by men of goodwill to do good.

The author concludes that the towering enemy of mankind is not science but war. Science merely reflect the social forces by which it is surrounded. When there is peace, science is constructive and when there is war, science is perverted to destructive ends. Our problem therefore is not to curb science but to stop war- to substitute law for force and international government for

anarchy in the relations of one nation with another. He feels that our education should be based on tolerance understanding and creative intelligence that should run fast enough to put an end to the evil effects of the science. Formally, Science must help us but the decision lies within ourselves ie., the sole responsibility is of human beings.

Cultural Shock: Adjustment to New Cultural Environments

Culture shock tends to be an occupational disease of people who have been suddenly transplanted abroad. Like most ailments, it has its own symptoms, cause, and cure. Many people have suffered from it. Some never recovered, and left their field. Some live in a constant state of such shock. Many recover beautifully. As it will be clear from the implications of Dr. Oberg's article, the state of culture shock in which an individual lives will have great bearing on his temperament and witness.

Culture shock happens suddenly by the anxiety that results from losing all our familiar signs and symbols of social interaction. These signs are part of our daily life shaking hands, introducing to people, inviting, suggesting and making purchases with words, gestures, facial expressions and so on. The customs and norms to which we acquaint as we grow up are as much part of our culture. It's also like the language we speak and beliefs we accept. This discomfort knocks him down and brings frustration and it can be sure that he is suffering from culture shock. He feels nostalgic which could only bring him back to reality.

According to the author, there are some symptoms of culture shock. They are excessive washing of hands, excessive concern over drinking water, food, dishes and bedding. Individuals greatly affected by culture shock. They cannot live in a foreign country. The author analyses that there are four stages of culture shock. During the first stage (honeymoon stage), he is attracted by the new nationals and their polite association, and he would be pampered and petted. It is a pleasant abroad experience. Slowly, the individual has to cope with the real conditions of life. It is the second stage where he becomes hostile and aggressive towards the host country.

The hostility grows out of the troubles such as maid trouble, school trouble, language trouble, house trouble, transportation trouble and shopping trouble etc… The people of the host country are indifferent and unsympathetic to his worries. Then he blames the host country joining with his cocktail countrymen. This is a peculiar habit of an individual in a negative manner. Later, he succeeds himself to get around and acquaint himself to the new cultural environment. He is convinced that he has to carry his own cross in this stage. His attitude gives him confidence to interact and get around in a new social environment. The individual begins to accept the customs of new culture as just another way of living in the fourth stage. With a complete adjustment he begins to enjoy the new customs.

The nature of culture shock points out to the real experiences of the individual on a foreign land. It arises from not knowing the language, strange customs, the consequent frustrations and anxieties. He cannot live satisfactory life until he gets over culture shock. The author says that the wives are more affected by the culture shock than their husbands.

Once the individual learns to respect the new culture believing that they are one, he feels comfortable. This attitude is ethnocentrism. This common element brings all nations together and avoids the differences. It is a simple matter to acquaint oneself with new culture. The ability to communicate friendly recovers him from culture shock. Understanding new culture is essential but it does not mean that one has to forget his own culture. He must be patient, sympathetic and understanding to get over culture shock.

ABDUL KALAM

Dr.Avul Pakir Jainulabdeen Abdul Kalam was born on 15th October, 1931 at Dhanushkodi in Rameshwaram district of Tamilnadu. He came from a humble background and started working at an early age to support his family. After completing school, Dr Kalam distributed newspapers to financially contribute to his father Jainulabudeen, who was a boat owner. He did his secondary education at Schwartz high school in Ramanathapuram, He studied physics at the St Joseph's College, Tiruchirappalli, from where he graduated in 1954 and did Aerospace Engineering at the Madras Institute of Technology, Chennai in 1960.

After passing out as a graduate Aeronautical Engineer, Kalam joined Hindustan Aeronautics Limited, Bangalore as a trainee, and later joined as a Technical assistant in the directorate of Technical Development and Production of the Ministry of defense. In1960's Kalam joined the Vikram Sarabhai Space Research center at Thumba in Kerala. He played a major role in developing the first indigenous satellite - launched vehicle.

Dr Kalam joined Defense Research and Development Organization (DRDO) as a scientist and started his career by designing a small helicopter for the Indian Army. He was also part of the INCOSPAR committee working under Dr Vikram Sarabhai, the renowned space scientist. In 1969, he was transferred to the Indian Space Research Organization (ISRO) where he was the project director of India's first indigenous Satellite Launch Vehicle (SLV-III) which successfully deployed Rohini satellite near earth's orbit in July 1980.

In 1982, he rejoined DRDO as director and conceived the integrated Guided Missile Development Programme (IGMDP) for five indigenous missiles : Nag, Prithvi, Akash, Trishul and Agni. He is popularly known as the 'Missile Man of India' for his work on the development of ballistic missile and launch vehicle technology. He played a pivotal role in India's Pokhran-II nuclear tests in 1998. Dr.APJ. Abdul Kalam has established an advance technology research center called 'Research Center Imarat' to undertake development in futuristic missile technology areas. It was perhaps the most satisfying achievement for Kalam during the missile years. Dr.

Kalam has also served as Principal Scientific Advisor to the government of India during 25th November 1999-10 November 2001. Later, he quit the job and took over the job as distinguished professor at Anna University.

On July 25,2002 , Dr .A.P.J Abdul Kalam was sworn in as the 12th president of India by Chief Justice of India Shri B.N.Kirpal in central hall of parliament at an impressive function telecast live across the parliament at an impressive function telecast live across the country. Dr .Kalam took the oath in the name of God as a 21 -gun salute boomed in the background. Dr Kalam was the third President to have been honoured with a Bharat Ratna, before becoming the President, the earlier two were Dr Sarvapali Radhakrishnan (1954) and Dr Zakir Hussain (1963). He was honoured with the Padma Bhushan in 1981 and the Padma Vibhushan in 1990 for his work with ISRO and DRDO and his role as a scientific advisor to the Government.

Dr. Kalam a bachelor is connoisseur of classical carnatic music. He plays rudra veena in his leisure. He wrote poetry in Tamil, his mother -tongue. Seventeen of him poems were translated into English and published in 1994 as a book entitled "My Journey". Among the many books written by Dr Kalam, few of them are: "Wings of Fire": An Autobiography in 1999, "Ignited Minds: Unleashing the Power Within" in 2002. Dr Kalam advocated plans to develop India into a developed nation by 2020 in his book "India 2020: A Vision for the New Millennium" in 1998. He reads the Quran and the Bhagavad Gita with equal devotion. Dr. Kalam is by no means a miracle man .His advice to the youth of the nation is to "dream dream and convert these dreams into thoughts and later into actions". He also advises people to think big. We are a nation of a billion people and we must think like a nation of a billion people. Only then can we become big.

Chandrasekhar Venkata Raman

The Great Indian physicist Chandrasekhar Venkata Raman, popularly known as C.V Raman, was born on 7th November, 1888 at Trichirapalli in Tamil Nadu. His father was a physics teacher and so it was natural that Raman developed love for this subject. He was a brilliant student from the very beginning. As a brilliant and promising lad, he passed his matriculation examination at the young age of 12 from Madras University.

His parents wanted to send him England for higher studies but his poor health did not allow it. He studied at Hindu College, Visakhapatnam and Presidency College, Madras. He obtained his post-graduation degree in physics in 1907 with the top position. During his student period he conducted many researches and published his papers in many reputed magazines. In the same year, Raman got the first position in the Financial Service Examination and was appointed as the Assistant Accountant General in Calcutta. There he came in contact with an eminent scientist named Dr. Amritlal Sarkar who was Secretary of the Indian

Association for the Cultivation of Science. This contact with Dr. Sarkar proved a turning point in the life of this young scientist.

His interest in physics was deep and lasting and so he continued his research work in his spare time in the laboratory of the Association. He published his research results in the leading journals of Calcutta, which were in regard to the subject of propagation of light. These original research papers were of great scientific significance. When these came to the notice of the then Vice -Challenger of Calcutta University, Sir Ashutosh Mukharjee, he appointed him Professor of physics in the University. During his stay at the University he continued his research with much more devotion and won immense honour and recognition as a physicist.

He was elected the Fellow of the Royal Society of London in 1924. He discovered the "Raman Effect" in 1928. For it he was awarded the Nobel Prize for Physics in 1930. He became the first Indian to win this prestigious honour. With this award, his reputation increased by leaps and bounds and many Universities and institutions of repute honoured him with Ph D and D.Sc. degrees. In December, 1927 he was awarded the Nobel Prize for demonstrating that the nature of X-rays undergoes a change when passed through a matter.

This effect came to be known as the "Compton Effect." Encouraged by this discovery, Raman continued his experiments and ultimately proved that light rays can also be scattered. His discovery enabled for the first time, the mapping of possible levels of energy gains of molecules and atoms of a substance and thus discovered their molecules and atomic structure. This discovery of the scattering of light led to the development of a simple alternative to infra-red spectroscopy, namely, Raman Spectroscopy. He also gave us the scientific explanation for the blue colour of the sky and the ocean. He explained that the blue color of the ocean was as a result of the scattering of sunlight by the molecules of the water. He travelled widely abroad delivering lectures about his discoveries and researches. In 1933 he became the Director of the Indian Institute of Sciences, Bangalore. In 1943 he founded the Raman Research Institute at Bangalore. He was knighted in 1927. He was awarded the Bharat Ratna in 1954 and the International Lenin Prize in 1957.

Homi Jehangir Bhabha

Homi Jehangir Bhabha was a multifaceted personality - *scientist, visionary and institution builder*. He was born on October 30, 1909 in an illustrious family with a long

tradition of learning and service to the country. Bhabha was exposed to fine arts, music and painting, which moulded his artistic traits.

Bhabha was intelligent, hard working and sincere student. After finishing schooling, Bhabha's parents sent him to Cambridge University, UK for higher education in mechanical engineering. After completing his degree in 1932, Bhabha continued his research at Cambridge University. His first paper appeared in 1934, based on theoretical explanation of shower production in cosmic rays. His name is associated with Bhabha scattering, which involves relativistic exchange scattering of electrons and Bhabha-Heitler theory, dealing with production of electron and positron showers in cosmic rays. Thus, it was no surprise that at a young age of 31, he was elected as a fellow of the Royal Society, London. Bhabha rubbed shoulders with great physicists like Bohr, Pauli, Dirac, Cockcroft and others, who later became Noble Laureates. This period was crucial for Bhabha for capacity building and leadership qualities.

Bhabha was on vacation during 1939, when the second world war broke out and he could not go back abroad to continue his research. He then joined Indian Institute of Science, Bangalore as a Reader in Department of Physics, headed by Sir C. V. Raman and set up a cosmic ray research unit. Raman had great admiration for Bhabha and at Nagpur Indian Academy meeting in 1941, while introducing Bhabha, he said *"Bhabha is a great lover of music, a gifted artist, a brilliant engineer and an outstanding scientist. He is the modern equivalent of Leonardo da Vinci"*. It was from Bangalore in 1944, Bhabha wrote his historical letter to the Tata trust for support in setting up a centre for research work in nuclear science, which could play a central role in the development of nuclear energy. There was a clear similarity in vision between the great Jamshedji Nusserwanji Tata and Bhabha with respect to the need for education, scientific research and human resource development for economic prosperity. Subsequently, in 1945 Tata Institute of Fundamental Research (TIFR) was formed and large scale research in physics, chemistry, electronics and mathematics commenced.

Bhabha was instrumental for the formation of Atomic Energy Commission in 1948 and the Department of Atomic Energy in 1954 and he chalked out a focussed research and minerals exploration programmes for nuclear energy. He was such a visionary that he had realized the importance of nuclear power programme way back in 1950s and enunciated a three stage nuclear programme so as to meet the energy security of the nation. It consisted of utilization of natural uranium, plutonium and abundant thorium resources in thermal, fast and advanced nuclear reactors with closed fuel cycle. He also had balanced perspective on the role of other energy resources such as coal, oil and solar. A significant factor that contributed for the growth of nuclear sciences and its applications was Bhabha's rapport with the then Prime Minister Pandit Jawaharlal Nehru, who reposed complete confidence in him. This was possible because Bhabha had the deserving credentials and his passion matched with Nehru's vision of modern India. There was a great synergy in thinking between Nehru and Bhabha with respect to industrialization and scientific research, evolving hand-in-hand.

Bhabha gave utmost importance to the development of quality human resources. The commencement and continuation of BARC Training School for the scientific manpower over the last 50 years is a real tribute to Bhabha's foresight on quality manpower. Bhabha, a person of perfection, purpose and excellence, ensured these qualities in all his endeavours viz., research, management, buildings and environment. His total conviction, never-accepting mediocrity, never compromising on excellence, meeting the challenges head-on with confidence made him a unique personality. Bhabha was a great scientific manager and followed the mantra of right man for the right job.

Bhabha had received many prestigious national and international awards and recognitions. In 1954, he was conferred with Padma Bhushan award for outstanding contributions to nuclear science. In 1955, he was elected as the President of the first International Conference on the *'Peaceful Uses of Atomic Energy'*, organized by the UN at Geneva.

At a young age of 56, Bhabha suddenly passed away in 1966 due to a plane crash in Switzerland. A vibrant and robust organization, that he had left behind with many signal achievements in nuclear science and technology as well as a dedicated and talented pool of human resources, bears testimony to the visionary zeal of Bhabha. His life was an example for all of us, which stood for *'deserve, desire and demonstrate'*.

Message for youth

Bhabha's life is an example of pursuing individual passion with a national perspective and purpose. If he chose, he could have gone abroad after the Second World War and pursued his scientific research and perhaps, could have even won Noble prize in physics. But, he chose to stay back to serve the country. He channelized all his scientific pursuits to develop scientific institutes with an aim to serve the society. He blended his individual vision and passion with that of the Country. Today, we have world class institutes and the Departments like Atomic Energy and Space, thanks to Bhabha's foresight and vision. Thus, his life message to all of us is *'do pursue the passion of your life but with a vector or direction of serving the country and making it proud with your contributions'*.

JAGADISH CHANDRA BOSE

What happens if you take a rich magistrate's son and make him learn in a village school sitting besides the sons of servants and fishermen? He'll hear tales of birds and animals that make him curious about Nature. And that makes him one of India's first scientists - Jagdish Chandra Bose.

Botanist and physicist Jagadish Chandra Bose was born in Munshiganj, India (now in Bangladesh)on November 30, 1858. He was educated first at the village school in Faridpur, where his father was a

magistrate, Bhagwan Chandra Bose. Later he migrated to St. Xavier's College, Calcutta at the age of thirteen. There he met Father Eugene Lafont, who was very interested in promoting modern science in India. He later went to the UK, where he got degrees from the universities of Cambridge and London. He also met Prafulla Chandra Ray, another pioneer of Indian science.

He came back and was made a Professor of Physics at Presidency College on the Viceroy's recommendation. However, the principal and other faculty, who were White, were very racially biased against him and gave only an acting appointment. He was offered one-third the salary of the school's white professors, and in protest at this slight he took no salary at all for several years. They denied him any laboratory facilities, but he carried on his research work, buying equipment with his own salary.

He remained at Presidency for his entire career, where he assembled the first modern scientific research facilities in Indian academia. He conducted landmark research of the response of plant and animal life to stimuli including electricity, light, sound, and touch, and showed how water and sap in plants and trees is elevated from roots due to capillary action. He invented the crescograph, an early oscillating recorder using clockwork gears to measure the growth and movements of plants in increments as small as 1/100,000 of an inch. His 1902 paper "Responses in the Living and Non-living" showed that plant and animal tissues share a similar electric-impulse response to all forms of stimulation, a finding which challenged conventional science of the time, and also showed that even inanimate objects — certain rocks and metals — have similar responses. In a 1907 paper Bose established the electro transmission of excitation in plant and animal tissues, and showed that plants respond to sound, by growing more quickly in an environment of gentle speech or soft music, and growing more poorly when subjected to harsh speech or loud music.

Prior to his plant and animal experiments, Bose spent several years experimenting with electromagnetic waves, and conducted successful wireless signaling experiments in Calcutta in 1895. The invention of radio is usually credited to G. Marconi, but a comparison of their records suggests that at certain points of Bose's radio research, he was about a year ahead of the Italian scientist. In Marconi's first wireless trans-oceanic transmission in 1901 a mercury auto coherer was a key component of the receiving device, and while Marconi made no acknowledgment of Bose at the time, subsequent research has shown that Marconi's auto coherer was a near-exact replica of a mechanism invented by Bose, who explained it in detail in a demonstration at the Royal Society of London two years earlier.

Bose was the first Indian scientist to be widely respected as an equal in the halls of western science. When he demonstrated his mechanisms for generating and detecting radio waves in a January 1897 lecture before the Royal Institution in London, it was the first such lecture given by an Indian. He was elevated to

knighthood in 1917, and in 1920 he became the first Indian elected to membership in the prestigious Royal Society. Bose, who came from a fairly affluent family, had no particular interest in the profit potential of his work, and refused to file patent claims. A patent was filed by friends in Bose's name for his 1901 invention of a solid-state diode detector to detect electromagnetic waves.

He founded the Bose Research Institute in Calcutta in 1917, which continues to conduct scientific research. He was a contemporary and friend of the poet Rabindranath Tagore. In 1937, Dr. Jagdish Chandra Bose breathed his last. In the pages of history are recorded the glorious achievements of many great men whom the world recognises, loves and respects. Such men prove to be a true asset not only to their own countries but also to the world. Their lives become a message and a source of inspiration for generations to come.

Dr. Jagdish Chandra Bose was one such personality who became immortal in the field of science. He was not only a scientist par excellence, but also a warm human being and a modest personality. Dr. Jagdish Chandra Bose was worthy and illustrious son of our motherland whom the nation feels proud of. He brought various laurels to our country. Immense hard working capacity, patience and simplicity were hallmarks of his personality. Dr. Jagdish Chandra Bose was a creative and imaginative scientist, a connoisseur of literature and a great lover of nature.

Srinivasa Ramanujan

Introduction:

Srinivasa Ramanujan, a poor uneducated Indian, was one of the greatest and most unusual mathematical geniuses who ever lived, was born on 22nd December in 1887 in Erode in Tamilnadu. He grew up in Kumbakonam where his father K. Sirnivasa Iyengar worked as an accountant in a sari shop. His mother Kamalat Ammal was a house wife and also sang songs at local temple.

Childhood:

Srinivasa Ramanujan started his schooling in 1892. He did not like school though he completed high school and tried twice to obtain a college education. But he failed both times because he

was so obsessed by mathematics that he simply could not spend anytime on other subjects. He started excelling in mathematics. He came to think of his results or the source of his incredible outpouring of mathematics.

Early Life:

In 1909, when Ramanujan was 22 years old, he married 9 year old Janaki and took a clerical position in Madras Port Trust Office to support her and his mother who lived with them. While working as clerk, Ramanujan continued to pour out math results on wrapping paper in the office. He was tied up with mathematics in such a way that he forgot event to eat. His wife and his mother used to feed him at meal times so that he would continue writing while he ate.

Education & Research:

Fortunately, both the chairman and manager of Madras Port Trust Office were engineers who recognized his extraordinary mathematical talent. They urged him to send his results to English mathematics. He wrote to HF Baker & E.W. Hobson of Cambridge University. Both returned his letters without comment.

Then on 16th June 1913, he wrote to G.H Hardy. He invited Ramanujan to come to England to study with him Ramanujan accepted his invitation and arrived at Trinity college in April 1914. Hardy characterizes Ramanujan as a very great mathematician full of paradoxes, who defies all judgment. Ramanujan worked very hard in collaboration with G.H Hardy. He used to work 24 to 36 hrs at a stretch and collapse and sleep for 12 hrs or more at a time. As he was a vegetarian it was difficult for him for food in England. It resulted that he was affected by mysterious illness that might be vitamin B2 deficiency caused by his poor diet. He returned to India in 1919. He died a year later at the age of 32.

Conclusion:

Ramanujan left behind 3 notebooks, which he wrote before coming to England and which are filled with as many as 4000 results. GH Hardy showed a colleague of his Ramanujan's strange letter which was crammed with as many as 60 mathematical theorems and formulas stated

without any proofs. He made a significant contribution to mathematical analysis, number theory and continued fractions.

Prafulla Chandra Ray

Prafulla Chandra Ray was an eminent Indian scientist who is hailed as the "Father of Indian Pharmaceuticals". His work on the nitrites and hyponitrites of metals, especially mercury, earned him fame worldwide. He was a recipient of the 'Companion of the Order of the Indian Empire', an honour that was conferred upon him in the year 1911.

Prafulla Chandra Ray was born on 2 August 1861 in Raruli-Katipara, a village in the District of Khulna (in present day Bangladesh). His early education started in his village school. He often played truant and spent his time resting comfortably on the branch of a tree, hidden under its leaves. After attending the village school, he went to Kolkata, where he studied at Hare School and Metropolitan College. The lectures of Alexander Pedler in the Presidency College, which he used to attend, attracted him to chemistry, although his first love of subject was literature. He continued to take interest in literature and taught himself Latin and French at home. After obtaining a F.A. diploma from the University of Calcutta, he proceeded to the University of Edinburgh on a Gilchrist scholarship where he obtained both his B.Sc. and D.Sc. degrees.

In 1888, Prafulla Chandra made his journey home to India. Initially he spent a year working with his famous friend Jagadish Chandra Bose in his laboratory. In 1889, Prafulla Chandra was appointed an Assistant Professor of nitrite and its derivatives brought him recognition from all over the world. Equally important was his role as a teacher - he inspired a generation of young chemists in India thereby building up an Indian School of Chemistry. Famous Indian scientists like Meghnad Saha and Shanti Swarup Bhatnagar were among his students.

Prafulla Chandra believed that the progress of India could be achieved only by industrialization. He set up the first chemical factory in India, with very minimal resources, working from his home. In 1901, this pioneering effort resulted in the formation of the Bengal Chemical and Pharmaceutical Works Ltd.

He retired from the Presidency College in 1916, and was appointed as Professor of Chemistry at the University Science College. In 1921 when Prafulla Chandra reached 60 years, he donated, in advance, all his salary for the rest of his service in the University to the development of the Department of Chemistry and to the creation of two research fellowships. The value of this endowment was about two lakh rupees. He eventually retired at the age of 75. He lived an astute life and spent most of his life serving the poor and contributing toward scientific advancements. He remained associated with the 'Sadharan Brahmo Samaj' for most of his life and was even nominated the President of the division. A revered figure, many institutions have named after this scientist such as the 'Acharya Prafulla Chandra College', 'Prafulla Chandra College' in Calcutta, and the 'Bagerhat P.C College' of Bangladesh. In Prafulla Chandra, the qualities of both a scientist and an industrial entrepreneur were combined.