



Being a teacher himself, this editor of DARPAN brings out Dr. A P J Abdul Kalam's passion to be remembered "AS A TEACHER".

VED MITRA ARYA

I wish everyone to read the write-up about Dr. Abdul Kalam presented by Srijan Pal Singh in his face book dated 27.7.2018. Srijan is one of the leading activists, well known for working with the former President of India, as his OSD and Adviser for Technology & Policy.

Kalam was on a flight with Srijan, destined to Guahati, that was followed by another ~3 hours car drive to IIM Shillong to give a lecture on - "Creating a Livable Planet Earth". Nobody knew that it was his last journey. For over 5 hours of two legged trip, they talked, discussed and debated. He was in his typical dark 'kalam suit' which he himself complemented as 'nice colour'.

They discussed on how, if the trend of violence, pollution and reckless human action continue, it would force us to leave the earth. The second point of discussion was concerned with the way the Parliament as supreme institute of democracy, should work on developmental politics. Thirdly, he wished to ask the students of IIM to suggest three innovative ways to make the Parliament more productive and vibrant. Then he murmured to himself- "But how can I ask them to give the solution, if I myself do not have any." For the next one hour, they thwarted option after option.

Srijan Pal goes on writing about his experience concerning the depth of Dr Kalam's humility. They were in the second car of a convoy of six. Ahead of their car, was an open Gypsy with three Black-Cats.



Editorial Board

One of the guys was standing atop precariously, holding his gun for hours during this hilly journey. Kalam Sahab expressed his anxiety for the soldier as he thought standing for long would make him very tired. "Is it not like a punishment?" He insisted Srijan to send a wireless message, asking him to sit. But the guy continued to be in standing position, perhaps for better performance of his security duty. When they failed to persuade him, Kalam proposed to meet and thank him on reaching Shillong. Kalam Sahab greeted him with a hand- shake and expressed his concern by saying- "You must have been tired" and wished him to offer some food. The man lost his words only to utter- "Sir, apke liye to chhey ghanthey bhi khadey rahenge".

Srijan Pal recalled Kalam saying- "Children need to take care of parents. It is sad, that sometimes this is not happening. And elders should not leave wealth at their death bed; that leaves a family to finish.". Then Kalam asked Srijan- "Decide what will you like to be remembered for?" But Srijan rebounded the question- "First you tell me, what you like to be remembered for - President, Scientist, Writer, Missileman, India 2020, Target 3 billion.... What?" Leaving all the options aside, APJ Abdul Kalam sprang a surprise - "As a Teacher." Thereafter, the ex-President moved to the IIM auditorium along with Srijan. Two minutes into the speech, Srijan heard a long pause and he fell down. Srijan would never never forget the look in his semi closed eyes as he heeded his head, trying to revive the great man. The man is gone.

I am recalling our first Science Teachers' Congress 2009, when Dr. Kalam was the Chief Guest. As he was being honoured on the stage by my senior colleague, Mr. P C Bose, he interacted and so glad to know that Bose was basically a Physics teacher/Teacher educator. A silent smile of satisfaction appeared on Dr. Kalam's face, perhaps recalling that he wanted to be remembered - "AS A TEACHER".

The author is the Founder Secretary DSSTF



Motivational Role of Teachers

VIRENDRA SRIVASTAVA

This issue of DARPAN is in your hands, which showcases the year long on going events and activities of the Forum.

We all know that, Forum is a platform for the science teachers to share, interact and cross fertilize the ideas with various science organizations, thereby helping and nurturing the young minds to take up exciting science based career options. Our students thus can act as front runners and torch bearers in propagating and popularizing the challenging issues about the protection of environment, water harvesting and energy conservation.

The need of the hour is that the students should be made aware about the harmful effects of excessive use of technology, the impact of dependency on gadgets and the repercussions of minimization of regular physical activity.

We as science teachers only can ignite the budding minds to think and work in positive directions before it is too late. However, we should not preach, rather we need to be brave to ponder differently, have courage to ask questions, to be prepared to face failures and turn these into success, to travel the unexplored path and discover the impossible and to surmount the problems and succeed.

Furthermore, it is desirable that our fellow science teachers have to guide, counsel or motivate upon the fundamental objective of teaching- learning of a science subject, basically aimed as study of pure

science as a discipline. Unfortunately, this aim has been gradually drifted towards more prospective careers in medical, technocrat, engineering or computer based IT professionals. With the result, a major part of the parents and student populations are lured and trapped in the rat race to try their fortune, irrespective of their caliber, suitability or other limitations. In the present scenario, it is suggested that, there are many other science based courses/options which may be pursued after schooling or college education. Using his wisdom, a student/parent has to search out, which of these career options suit him/her most from different points of view. An open-house discussion headed by experts can be arranged to share choices, preferences and expectations.

We all wish that the science teacher fraternity shall strive hard to make this journey a pious and productive venture for the future of our young generation.

The author is President, DSSTF



Anyone who stops learning is old. Anyone who keeps learning stays young.

The greatest thing in life is to keep your mind young.

-Henry Ford

Activities of DSSTF : A Report (2019-20)

PRAGYA KIRAN, GENERAL SECRETARY

1. SCIENCE OPEN MERIT TEST (SOMT) - 2019

SOMT is an academic venture for the benefit of students to inculcate the spirit of healthy competition, to prepare students for Board examination and to familiarize them with multiple choice type test for their future Pursuit. SOMT is held for the students of class X annually. In its 27th year, it was held on 10th February 2019, all over Delhi/NCR. This year about 13000 students, from different Govt. and Public schools of Delhi appeared. With the help of dedicated team of DSSTF, utmost co-operation of the Department and schools, the examination was conducted at 55 test centres with all sanctity. As per practice, the question papers were set and moderated by experienced experts. Evaluation was done by the qualified teachers. The result was prepared with due confidentiality, and posted on DSSTF website.

2. NATIONAL SCIENCE DAY CELEBRATION

To commemorate the discovery of Raman Effect by Nobel Laureate Sir C V Raman and to pay tribute to him, DSSTF celebrates National Science Day every year with utmost enthusiasm. This year it was celebrated on 27th February 2019 at Adarsh Public School, Vikasपुरi. Dr. Gautam Sen, Former Executive Director, ONGC, recipient of National Award in Geo Physics, Sr. Vice President, Reliance (Geo Science) was the Chief Guest. He spoke that Energy and Economics are closely related. Energy consumption on non-renewable resources should come down. We should passionately be concerned about pollution. India has increased use of non-traditional resources of energy. But still there is long way to go. Prof. Dr. Dinesh Kumar, Head, DESM, NCERT presided over the function and inspired the Science teachers, to be more innovative. Smt. Madhu Singh, Deputy Director of Edu. (West B) was Guest of Honour. She motivated Science teachers to work hard for the cause of Science.

3. PARTICIPATION OF THE FORUM AT "INDIAN ASSOCIATION FOR CULTIVATION OF SCIENCE" (IACS), KOLKATA

IACS and CSIR, the famous Institutions, celebrate the Foundation Day and National Science Day, at its prestigious premises, the Mecca for eminent Indian scientists at Jadavpur, Kolkata, Sir C V Raman did his research experiments for 'Raman Effect' here for which he received Nobel Prize. Sh. P C Bose, Chairman, Apex Committee of DSSTF has been attending the celebration as a special invitee whenever he is in Kolkata.

4. ANALYSIS OF CBSE BOARD SCIENCE QUESTION PAPERS (X & XII) - 2019

As a part of our regular annual activities, to critically analyze CBSE's question papers of Physics, Chemistry & Biology for class XII and Science for class X, workshops were organized on the same day of the respective examinations. Subject experts and experienced practicing teachers from different schools were involved in this exercise.

The question papers of all science subjects and of all sets were thoroughly and objectively analyzed, keeping in mind the syllabus and design prescribed by the board for each subject. Comprehensive reports along with suggestive marking schemes were submitted to the Chairman as well as Controller of Examination, CBSE for immediate action at their end. A copy of these reports was also submitted to the Director of Edu., Delhi in person, who appreciated the concern and efforts of the Forum.

These exercises as feed back have been highly acclaimed by CBSE and the suggestions are incorporated. Further specified information of the subject wise workshops is as follows –

a. PHYSICS**Venue: H M DAV Sr. Sec. School, Daryaganj, Delhi**

Participating experts and practicing PGTs (Physics) Sh. P N Varshney (Former Principal), Sh. Kanhiya Lal (Former Principal), Dr. R A Goel (Former Principal), Sh. J P Agarwal (Former ADE Exam), Sh. R Rangarajan (DTEA, Lodhi Road), Dr. M S Bhandari (Happy School, Daryaganj), Surjan Singh (CRPF, Rohini), Sh. N C Jain (Former PGT), Sh. R K Tiwari Principal, HM DAV S S S, Daryaganj), Dr. Rajeev Tyagi (Principal, Mount Carmel School), Sh. Brijesh Kumar (Takshila Public School), Ms Jyoti Singh (Lady Irwin School), Dr. S K Singhal (Amity International School, Mayur Vihar), Ms A B T Sundari (Andhra Edu. Society S S S, Prasad Nagar), and Sh. Sandeep Upadhyay.

b. CHEMISTRY**Venue: KIIT World School, Pitampura, Delhi**

Participating experts and practicing PGTs (Chemistry) Dr. G S Adhikari (Former ADE), Dr. Sangeeta Bhatia (Principal), Dr. S K Munjal (Former Principal), Sh. D A Misra (Former Principal), Dr. Anil Vashisht (Former DDE Zone), Dr. Azhar Alam (PGT), Ms Shruti Khandelwal (PGT), Ms Garima Bhutani (PGT).

c. BIOLOGY**Venue: H M DAV Sr. Sec. School, Daryaganj, Delhi**

Participating experts and practicing PGTs (Biology) Sh. Damodar Tewari (Former E O), Mr. Johnson David (Former PGT), Sh. R P Singh (Former Vice Principal), Sh. Ashok Seth (Former Vice Principal), Sh. Naresh Kumar Sharma (PGT), Sh. V S Malik (PGT), Sh. Ranvir Singh (PGT), Ms Archana Trivedi (PGT), Ms Iqbal Kaur (PGT), Ms Sadhna R Krishna (PGT), Sh. Sanjeev Kumar (PGT), Ms Madhu Bala (PGT).

d. SCIENCE CLASS X:**Venue: H M DAV Sr. Sec. School, Daryaganj, Delhi**

Participating experts and practicing teachers Sh. Virendra Srivastava (Former E O), Sh. J P Agarwal (Former ADE Exam.), Dr. Indra Prakash (Former Principal), Sh. R K Tiwari (Principal), Sh. Ashok Seth (Former Vice Principal), Sh. R P Singh (Former Vice Principal), Sh. Johnson David (Former PGT), Sh. Laxmi Kant Gupta (PGT Chemistry), Ms Sonia (TGT), Sh. B P

Sharma (TGT), Ms Kalpana (Mentor Teacher), Sh. Aftab Alam (TGT), Sh. Madan Mohan Awasthi (TGT).

5. PRIZE DISTRIBUTION FUNCTION OF SCIENCE OPEN MERIT TEST 2019

Prize distribution function is organized every year to felicitate meritorious students who have come out with flying colour in Science Open Merit Test (SOMT). SOMT 2019 Prize Distribution Function was organized at Vandana International School, Sector – 10, Dwarka, New Delhi on 17th August 2019. Sh. Binay Bhushan IAS, Director of Education, GNCT of Delhi was the Chief Guest. Sh. J C Chaudhary, Chairman & Managing Director, Aakash Educational Services Ltd. was Guest Speaker and delivered Key-Note address. Smt. Bimla Kumari, DDE District (South West B) and Dr. Sushma Kiran Setia, DDE Science were Guests of Honour.

The dignitaries distributed cash prizes, mementos, medals and certificates of Merit to top 100 position holders and Scholarships of Rs. 10,000/- per annum for next two years to each of top seven position holders. The scholarships are sponsored by Hari Krishna Kamla Trivedi Memorial Trust. The Trustees Mr. Rajendra Joshi, Mrs. Kanta Joshi and Mrs. Abha Joshi were invited on the occasion. Sh. Binay Bhushan while complimenting the students for their performance in SOMT, also lauded the Forum, in its endeavor of popularizing Science and encouraging students. Sh. J C Chaudhary, gave illuminating talk on motivation, which was immensely useful to the students. Smt. Pragya Kiran, Gen. Secretary put forth a brief report of the activities of Science Forum and conducted the program with all perfection. Earlier Sh. Virandra Srivastava, President of the Forum welcomed the guests.

Sh. V P Tandon, Chairman, Kamal, Vandana & Trinity Group of Institutions, Dr. Bhupinder Singh, Sh. S K Saraswat, Educational Advisors and Smt. Vandana Tandon coordinated the whole programme which was a grand success. Hari Kishan Yadav, Lalit Gupta, Laxmi Kant, Dr. R A Goel, Johnson David, R K Chitkara, Rajneesh Vashisth, K K Sharma and Tahir Hussain whole heartedly assisted in organising the function.

6. PARTICIPATION OF DSSTF MEMBERS IN K V SCIENCE ACTIVITIES

Members of the Forum were invited by the organizers of Kendriya Vidyalaya Sangathan to participate and evaluate the projects in 27th National Children's Science Congress 2019 of Delhi Region on 23rd and 24th Sept. 2019. Venue of two days program was SPG Kendriya Vidyalaya, Dwarka. In his address Deputy Commissioner, K V Sangathan, Sh. Nagendra Goel expressed his hearty gratitude to the Forum, for its assistance and guidance in Science Congress, which is recognized and acclaimed by people concerned with Science.

The members of Science Forum worked hard for two days, from morning till evening to accomplish the job in a splendid manner. The Convener of program Smt. Rashmi Shukla was highly impressed by expertise and devotion of the members in this endeavor. For DSSTF it was a pleasant experience, as the whole program was meticulously planned and well organized and hospitality offered by the host was par excellence.

The following members represented Science Forum in this activity : Sh. V M Arya, Sh. P N Varshney, Sh. V K Sharma, Sh. J P Agarwal, Dr. R A Goel, Sh. S K Saraswat, Sh. S P Malyevar, Dr. D S Mathur, Dr. J D Upadhyaya, Smt. B Dhanalakshmi, Dr. T N Upadhyaya and Sh. R P Singh.

7. CELEBRATION OF WORLD STUDENT DAY & INTERNATIONAL YEAR OF PERIODIC TABLE IN ASSOCIATION WITH N C JINDAL PUBLIC SCHOOL, PUNJABI BAGH, NEW DELHI

On 15th October 2019, DSSTF celebrated World Student Day & International Year of Periodic Table at N C Jindal Public School, Punjabi Bagh, New Delhi. United Nations has declared 15th October as World Student Day in remembrance of Bharat Ratna Dr. A P J Abdul Kalam- 11th President of India and International Year of Periodic Table to commemorate the 150th anniversary of establishment of Periodic table of chemical elements.

The program was conducted in two sessions – Morning and Plenary Sessions.

Morning Session :- Sh. Virendra Srivastava, President, DSSTF welcomed the guests. Mrs. Pragya Kiran, Gen. Secretary, DSSTF read out brief report of activities of DSSTF. Dr. W Selvamurthy, Former Chief Controller (R&D), DRDO, Chancellor, Amity University was the Chief Guest on this occasion. He gave an illuminating talk about life, achievements and vision of Dr. A P J Abdul Kalam. Dr. Malti Goel (Former Senior Advisor & Scientist 'G', Ministry of Science & Technology, Govt. of India) gave Key Note address. She talked about Helium, second most common element in universe. Discovered by Pierre Janson by observing solar eclipse in India. Gas of sun and stars later discovered on earth and samples from Chandrayan – 1 suggest presence of Helium on moon as well. She discussed uses of Helium in almost all aspects of life. Dr. Sangeeta Bhatia, Sr. Vice President, DSSTF.

Plenary Session :- Mrs. Zarine Taj, Regional Director of Education, Distt. West (A & B) presided over the function. She also gave away the certificates to the presenter teachers, Smt. A B T Sundari and Smt. Monica Chopra. The program was attended by students, teachers, scientists, Principals and officers of Directorate of Education. Smt. Pragya Kiran, Gen. Secretary, DSSTF managed the stage and coordinated the whole program in amicable manner. Dr. Anil Kumar Mishra, Sr. Scientist, Institute of Nuclear Medicine & Applied Sciences (INMAS) gave a magnificent talk on uses of various isotopes in medicine. Students of N C Jindal Public School presented a short but impressive skit on formation of Periodic table. An article 'Tribute to Dr. A P J Abdul Kalam' written by Sh. P C Bose, Chairman, Apex Committee, DSSTF was distributed among participants.

❖ Smt. A B T Sundari, PGT (Physics), Andhra Edu. Society Sr. Sec. School, Prasad Nagar gave presentation on Space Exploration "A Journey of NASA since its formation till Chandrayan – II".

❖ Mrs. Monica Chopra, PGT (Chemistry), gave presentation on 'Periodic Table', its formulation and uses of various elements in different ways and forms.

❖ Dr. G S Sodhi, Associate Professor, Forensic Science Unit, GTB Khalsa College, Delhi University gave a wonderful talk on uses of various elements in forensic science.

❖ Dr. G S Adhikari, Chairman Co-ordination Committee, gave vote of thanks in the Plenary Session.

8. FORUM'S INVOLVEMENT WITH "INDIAN COUNCIL FOR MANAGEMENT & FUTURE" (ICMF)

ICMF, under the Directorship of Dr. Padma Seth, has been organizing Dr. Satish C Seth Memorial Lecture in memory of its founder. The Forum has been extending its co-operation to ICMF as an academic partner, through Mr. P C Bose as its co-ordinator. This year lecture was held on 14th Sept. '19 at India International Centre, Lodhi Estate. Bharat Ratna Sh. Pranab Mukherjee, Former President of India delivered lecture on 'Future is today'. He also released a book "Restless Futurist". Program was attended by about 50 members of DSSTF.

DSSTF MEMBERS PARTICIPATE IN INSPIRE EXHIBITION

The members of the Forum namely Sh. P. N. Varshney, Dr. T. N. Upadhyaya and Dr. D. S. Mathur were invited as members of jury in State level INSPIRE Science exhibition, at Govt. school of excellence Kalkaji, New Delhi. Scientists from other parts of the country were also invited. INSPIRE is a centrally sponsored scheme under Department of Technology, Govt. of India, to nurture budding scientists in the schools. The programme was organised by Science Branch, Directorate of Education, GNCT Delhi, under the direct control and supervision of Dr. Sushma Kiran Setia, Dy. Director (Science). The event was meticulously planned and very well executed. The authorities expressed sincere thanks to the Forum members for their support and Co-operation in such endeavour of National importance.

Visit to IARI - Pusa

A group of 12 members of the Delhi State Science Teachers' Forum visited Indian Agricultural Research Institute (IARI), Pusa, a premier agriculture institute of India on 28.01.2020. The visit was planned and arranged by Dr. D S Mathur, an eminent Scientist of the institute, who is also the life member of the Forum. The members were warmly received in the premises of M S Swaminathan Library. Dr. S K Jain, Professor, Division of Seed Sciences and Technology, welcomed the members and briefed about the schedule of the day's program.

We began our journey by visiting Dr. B P Pal Art Gallery. Dr. Karuna Dikshit, Chief Technical Officer and Incharge of the gallery explained in details about each and every painting and its theme, that were based mostly on beauty of land scape, mountains, snow peaks, rivers and vegetation. Gallery visit was followed by, "The World of Green Revolution." Dr. D S Mathur explained in detail about the development and progress of Green Revolution in India. This section has amazing collection of varieties of seeds of wheat, maize, millet, rice, pulses and oil seeds such as mustard, soyabean etc. The section also displayed the procedure of transformation of crop varieties, horticulture techniques, crop protection, management of microbial techniques and technical dissemination of human resource development. Thereafter, members of the Forum were served with sumptuous lunch at Ganga International Guest House.

The last leg of visit was to, "Nanaji Deshmukh Plant Phenomics Center". This unique laboratory was inaugurated by Prime Minister Shri Narendra Modi in the year 2017. The lab. is fully automated, equipped with sensors to monitor every phase of growth of plant from germination of seeds to full grown plants. This center is equipped with Hi-tech climate control, weighing and watering stations, automated robotized moving field (potted plants). The group was thrilled to see the automation of such magnitude.

The visit ended on a highly successful and satisfying note. It enriched the knowledge of all to see and learn about the latest techniques and research going on in IARI, Pusa. DSSTF expresses its gratitude to Dr. D S Mathur for arranging such a useful visit and also to Dr. S K Jain for his deep involvement and personal attention, which made this trip a memorable one. Thanks to faculty members namely Dr. D S Gupta, Dr. Dhandaparti Raju and associates for their generosity and hospitality, which was par excellence.

Compiled by Dr. Indra Prakash, Former Principal

World Energy Scenario, India Perspective, Fossil Fuel and Renewables

DR. GAUTAM SEN

Gross Domestic Product [GDP] of the world grew at 3.73% in 2017, driven by growth in China, India from the developing world, and in the USA from among the developed countries. Technological innovations have improved energy intensity which is defined as the inverse of energy required per unit increase in economy, yet global energy demand grew by 2.2% in 2017, and 2.3% in 2018, which is higher than the ten-year average of 1.7% in 2017. Demand for oil grew by 1.7 Million barrels per day, consumption of natural gas, went up by 3.0% liquified natural gas (LNG) demand increased by over 10%, coal consumption rose by 1.0%, Solar capacity increased by nearly 100 Giga Watts (GW), with China contributing over 50 GW. China now imports more LNG than Korea and is next



to Japan amongst the World's highest LNG importers. India has increased its coal consumption, though it is the U S which registered the highest growth in coal production in 2017. Fossil fuel (oil 35%, coal 28% and gas 22% roughly) accounts for around 85% of global energy demand and in spite of the focus on renewables, fossil fuel met 70% of the energy growth with gas emerging as the choicest of fuels.

Renewables were a major contributor to this power generation expansion, accounting for nearly half of electricity demand growth. Solar and wind generation grew at double-digit pace, with solar alone increasing by 31% in 2018. China remains the leader in renewables, both for wind and solar, followed by Europe and the United States. However, coal demand was higher and its use in power generation alone surpassed 10 Gt, accounting for a third of the total

increase. The majority of new coal-fired generation capacity today is in Asia. As a result, global energy-related CO₂ emissions rose by 1.7% to 33 Gigatons (Gt) in 2018. The world is now facing a challenge of high CO₂ concentration, touching an all-time high, of 410 ppm. Accordingly, global temperature can be expected to rise by more than 1.5 degrees centigrade, from a long-term average, in foreseeable future.

Fossil fuels are not equitably distributed across the globe. Middle East, South and Central America, North America (including shale oil), CIS countries and Africa are endowed with major crude oil, while CIS countries and Asia Pacific also have significant gas reserves. Coal reserves are significant in Asia Pacific, North America, CIS countries and Europe. In spite of large oil and gas production, oil majors across the globe have discovered big fields, under different geological settings and/or logically challenged places through better understanding of subsurface geology and use of sophisticated technology in exploration, drilling and in production. As a result, the oil and gas reserves (balance of recoverable reserves), have increased over the decades, in spite of crude oil production of over 90 million barrels per day and gas production of over 3800 billion cubic meters per annum. The concern today, is not peak oil but peak demand. Coal reserves are however declining globally. This trend can also be reversed if underground coal gasification and coal-based methane projects are taken up in a larger scale. It can be concluded that the world will not run out of fossil fuel, however environmental issues will increasingly occupy center-stage.

Crude oil price is not only determined by the rule of demand supply, but has also been influenced by geopolitics since the Arab-Israel conflict. Presently economic sanctions on Iran and Venezuela have propped up the oil price. During the last cycle of low crude price, which lasted from 2014 – 17, oil companies especially the service companies found themselves with existential threat and survived through innovations and all cost cutting measures. Invariably greenfield exploration takes a hit, with fall in crude prices. Finding and development costs vary

from place to place, it is as low as 9 to 10 USD per barrel in Middle East, while companies find it difficult to make profits in shale oil at prices below 40 to 45 USD per barrel. During periods of high-oil pricing shale oil production is pumped up creating a cushion for the extra demand pushing the prices low and vice-versa, however, there is no denying the fact that there is enough oil and gas in this world to meet the demands in foreseeable future.

Various predictions are being made internationally on the global energy basket in the coming decades. British Petroleum produces a statistical digest annually along with future predictions, and as per that natural gas is likely to be the choicest fuel in future. Coal consumption will reduce while demand will plateau. Renewables will step in to fill the gap. Dependence on fossil fuel can be expected to slacken from the current level of 85% to a little over 70% with renewables, Nuclear and Hydro stepping in by 2040. The concurrent reduction of CO₂ emission may however at best drop only marginally.

India is unfortunately endowed only with coal as its major fossil fuel, and currently imports over 80% of total crude oil requirement, over 50% of gas requirement and over 25% of coal requirement. With over 17% of world's population India has 0.3% (595 MT of oil) of world oil reserves. 0.8% (1340 BCM) of gas reserves and 6.8% (60600MT) of coal reserves, as on 2017. India produces 0.7% of world oil and consumes 4.3%, produces 0.9% of world gas and consumes 1.5%, produces 6.2% of world's coal and consumes 9.3%. In 2017 India's primary energy consumption rose by 4.6% taking its share of global primary energy to 5.6% with coal consumption growing by 4.8%, the largest increment in the world. India had its largest ever increase in renewables in power generation (+20%), making the fifth-largest contribution to global growth. India has an aggressive plan for solar power with a view to curb pollution. It is essential for India to move towards cleaner coal technology keeping availability of coal in India in view. Carbon dioxide sequestration, and super critical boiler

technology can help India to meet high energy demands, yet keeping pollution levels in check.

The future prediction for 2040 for India, as per British Petroleum is that India's share of global energy consumption will be 11%, growing by 4.2% per year. India's energy mix will evolve gradually with fossil fuels meeting 82% of demand in 2040, which is above 90%, presently. The share of coal will fall from 57% in 2016 to 50% by 2040, the share of renewables rising from 2% to 13%. Oil imports will rise by 175% and account for 65% of the increase in energy imports, followed by gas (+291%) and coal (+79%), with the underlying assumptions that by 2040 India's energy intensity of GDP will be 37% lower than 2016 while carbon intensity of energy use will be down by 13%.

Concluding it can be stated that India with its burgeoning population has a long way to go before it can be showcased as a semblance of a developed nation and consequently this shall warrant huge energy requirement. Most of the energy requirement will come from import which will have a huge drainage on foreign exchange and current account deficit. Exports will have to match such high level of imports. China has slowed down in its growth but still will need lot of energy to reach a growth of OECD countries. African countries are at rock bottom in terms of development. Total energy requirement to alleviate global poverty is of gigantic proportion. To make matter worse carbon dioxide concentration globally has crossed 410 ppm and this makes the ocean acidic and increases global temperature with green house effects. In spite of skepticism, climate change is an observed reality as the world experiences drastic weather changes and unprecedented catastrophes. As Nations debate and negotiate global emissions are relentlessly rising, demonstrating once again that urgent action is needed on all fronts; developing all clean energy solutions, curbing emission, and spurring investments and innovation, including carbon capture, utilization and storage.

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“You have to dream before your dream can come true.”

A P J Abdul Kalam

Ordinary Men Speak About An Extraordinary Man

Compiled by: P C Bose



Yes, the extraordinary personality is no other than Avul Pakir Jainulabadeen Abdul Kalam (15th Oct, 1931 - 27th July, 2015) and the enthusiastic ordinary men of DSSTF (viz. P N Varshney, P C Bose & R K Chitkara) were privileged to visit 10, Rajaji Marg as per an appointment with the former President of India on a 2009, December morning. It was our dream to get Kalam Sahab as the Chief Guest for a proposed 'Science Teachers Congress' with a befitting theme - 'Science Education Beyond Class Room'.

With pulsating beats in our hearts, we entered in the spacious Lutyen's bungalow, to get confirmation and formally invite the great man. There was a well maintained spacious green lawn, with a double storey English countryside manor house at the background. There was no extravaganza of flower show but our attention was drawn to a solitary gigantic tall tree, similar to an English oak, standing gracefully on the green patch. We were ushered to the lobby to undergo a rigorous preliminary interface by a senior ex-army officer, to know all about our purpose of coming and about DSSTF. He was highly impressed to know that it was all about science, schools, teachers and students. And when we were granted the audience, we saw Kalam Sahab from near and were overwhelmed. The graceful giant tree of which I mentioned, stands no comparison to his greatness as his human touch of great soul, is measured not by the size but could be felt by his presence.

On the scheduled day of the Congress, the supreme guest arrived punctually at the Air Force Bal Bharati School, Lodhi Estate and wasting no time, he preferred to move towards the students to interact with them. They talked freely as photos were taken. It was a life time experience for them.

The great Kalam Sahab, son of a little educated boat owner and Imam of local mosque at Rameswaram, had unparallel career as a Defense scientist, culminating in the highest civilian award - the 'Bharat Ratna', a real ratna of Bharat, which he received from one of his predecessors, Sh. KR Narayanan. Incidentally, it was not known then that in future many jewels of India would receive various distinguished awards from his hands, during his golden tenure of President ship.

As the Chief of Indian Defense Research & Development Program, Kalam demonstrated great potential of dynamism and innovation. Kalam's biography is the story of his own rise from obscurity and his personal and professional struggles as well as success story of missiles of India, for which he was rightly called 'the Missile Man of India'. On the other side, Kalam maintained the ascetic rigor of personal life, working 18 hours a day and notably practicing the 'veena' side by side. Although, away from politics, when he was named as a presidential nominee in 2002, to utter surprise, the left politicians opined that - "We need a politician to be the President and not a scientist. However, Kalam proved to be a very successful President.

Referring to his childhood, he was a short boy with rather undistinguished look, born to a ideal humble parents - Jainulabadeen and Ashiamma, who possessed great innate wisdom and true generous spirits. They used to avoid all essential comforts and luxuries. Their ancestral home at Rameswaram, was hardly 10 minutes walk from the famous Shiva temple. In their Muslim locality, there were Hindu families who used to live together amicably. And when



Jainulabadeen used to come out of his mosque after the prayer, people of different religions offered bowls of water to him who would dip his finger in and say a prayer. This water could cure invalidity of any.

The high priest of Rameswaram temple, Pakshi Lakshmana Shastry, was very close friend of Jainulabadeen. In the evening, they used to discuss spiritual matters to convey complex spiritual concept in very simple Tamil.

While studying in local Elementary School, Kalam had three close friends, all from orthodox Hindu Brahmin families, of which Ramanadha was the son of the said priest Shastryji. They never felt any difference among themselves. During any Hindu religious ceremony, Jainulabadeen used to arrange the boats. Once a new teacher joined the school, who did not like Kalam, a Muslim boy sitting in the front bench next to Ramanadha Shastry. who wore a sacred thread. He directed Kalam to sit on the back bench. The two friends became very sad and felt like weeping. They went home and reported the matter to their respective parents. Lakshmana Shastry summoned the teacher to scold him, saying that he should not spread the poison of social inequality and communal intolerance. Thus, ultimately the teacher reformed himself.

Throughout his studentship in life, whether in elementary, high or college and highest educational institutes, Kalam got extremely good and motivating teachers for whom he developed a great attachment and respect. In fact they helped him in moulding his career. That will be a long story if one writes about each one of his teachers. And in return, he developed a deep love and sense of duty towards the student community as a whole.

Kalam wondered, why some people tend to see science as something which takes a man away from the God. It is rather, the science that has always been a path of spiritual enrichment and self realization.

I wish to end by narrating about the first choice of Abdul Kalam to fly which was perhaps injected into his mind while seeing the birds flying at the sea shore of Rameswaram.

He wanted to join Air Force as a Pilot. When he appeared in an interview of the IAF Selection Board, he could only finish 9th and was deeply disappointed to find that only 8 candidates were to be selected. He dragged himself out of the Selection Board and stood at the edge of a cliff. With a heavy mind, he trekked down to Rishikesh, bathed in the Ganga and then walked to Sivananda Ashram up the hill. He met Swamiji who looked like Budhha. Kalam was struck by his irresistible, almost child-like smile and gracious manner. His Muslim name aroused no reaction in him. Kalam told him about his unsuccessful attempt to join IAF and his long-cherished desire to fly. Sivanandji smiled, washing away all of his anxiety almost instantly.

What is notable that Dr. Abdul Kalam never knew at that juncture, that one day, as the President of India, he would be the Supreme Commander of whole Army, Navy & Air Force.

*The author is Chairman, APEX Committee, DSSTF
Retd. Dy Director of Education, Delhi Admn.*



SMART FARMING WITH DRONES

DR. K K NATHAN

New Technology is revolutionizing the Indian Agriculture which is a boon to our farmers. Drones are one such Artificial gadget which is an asset to smart farming and farmer friendly. Artificial Intelligence models that predicts best time to sow the crops, use of Drones to map crop-health as well as to rent tractors through Apps. like city cabs. Major issues like pesticides treatments and Weed detection as well as its population can be detected through Drones.



Dry zones of Andhra Pradesh and Karnataka, where poor and marginal farmers look to the sky for the rains to irrigate their cotton and groundnut crops. They have meager land holdings of 2-3 acres only. Every season, particularly delay in monsoons or break in monsoons, they are always in predicament when to sow their crops. Recently Microsoft used about 40 to 50 years of weather data, soil data (both physical and chemical) and built reasonably a good model. From this model Microsoft started sending advisories to farmers in the form of SMS so as when to sow their crops. This was found to be encouraging in both the states in Machine Learning, A I (Artificial Intelligence) and use of Drones enabling farming communities to facilitate their day to day operations without much loss in their outputs.

For example, some of the conservative farmers in both the states started sowing when they received the first pre-monsoon rain in May, although the advice from A I was not to sow now but in summer monsoon in June. There was a big dry spell and the crops damaged due to drought. Those who sowed in June as per advisory were benefitted. It was seen that the number of start ups have come on the variety of the models that explore the A I and other Machine Technologies like Drones. Drones were very much used to do

Multispectral Aerial Imaging of crops to study its health. Also Drones very much played a stellar role to know the NPK ratio (Nitrogen, Phosphorous, Potassium) for a good healthy crop.

However, there is a wide scope for Smart Farming with Drones and other machines to solve the agricultural problems and farmers issues. More focus on the dry land agriculture with each district will be provided timely rainfall forecast, forewarning of crop pests and epidemics in different seasons. Smart farming will help us in

various dates of sowing crops, identify the drought tolerant breeds. Drones no doubt help us precision agriculture which is a part of Smart Farming. It guides in Precision Analytics Agriculture. Before planting of crops, Drones can assess the water availability in the field. It determines the need of drainage management and soil health. During growing season, it assess the crop stress in the middle season of growth cycle, identify the weed growth and its density or population. Drone helps in assessing the Nitrogen fertilization of crops, crop health, optimize water consumption during drought stress at different stages of crop. It also predicts the optimal harvest timings and estimate crop yield. Apart from the above activities, Drones monitor forage conditions in the farm areas and the best grazing moves, number of

The Science of today is the technology of tomorrow.
- Edward Teller

animals for grazing a particular farm area etc. Drones are useful guide for the infra structures assessment of Groves, Orchards and Forests.

It is very much encouraging to note that UBER type Apps. for tractors cater the needy farmers in their daily operations since only 10% of our farmers can afford tractors. This was found to reach out middle class and poor farmers with 2-3 acres land holdings. Keeping farmers welfare and their major problems in view some of the Schools and Technical Universities in India, particularly Punjab state developed Drone Powered Technology to manage Weeds and Pesticides and Insecticide Management with cost effective solutions. Pre-programmed Drones can target specific farm areas and crops to deliver pesticides which avoids wastages and overdoses. Drones programmed with computer Algorithms and Infra Red Sensors can precisely detect the exact location of Weeds and population density. Accordingly transmit the information to the farmers. It was found that field trials resulted with 15% to 20% improvement in the produce quality.



Drone consists of a wireless Sensor device which can be used for mapping as well as survey of yields, biomass etc. It also estimates soil nutrient status of crops. Each Drone can fly for atleast 30 minutes with full power. The minimum cost is about Rs. 10000 to Rs. 15000 which were developed by the students. However large scale commercial models are yet to emerge in the market and its success depends on the awareness and participation by the users, particularly the farming community for a better Smart Farming.

The author is Principal Scientist (Retd.), IARI, New Delhi



Techniques in Teaching Science

OMESH BANSAL

As a Principal of a school, with Physics as subject, one is tempted to share his experiences with teachers and students to improve the system.

A meaningful and joyous school experience constantly derives the children towards merit and excellence, that will keep them motivated and kindle the life-long desire to aspire aim and achieve. While teaching science at secondary and senior stages, a climate conducive to nobility and innovation has to be promoted. In the present scenario, effective use of technological tools such as green/white board, judicious use of U-Tube, online teaching, smart classes, Power Point Presentation being made in order to motivate and inspire the students in day to day teaching - learning sessions in schools.

We teachers very much acknowledge that a large number of students lack in conceptual understanding and experimental skills and therefore we, the practicing faculty have to put maximum thrust upon the teaching of fundamentals and basic concepts. Specially, in the teaching of Physics, emphasis has to be given on solving more and more numerical problems.

Furthermore, activity based transaction of concepts has to be endeavoured on a regular basis. A few examples for organization of contents in Physics can be taken up as follows (in the question form only):

* How does electromagnetic field is formed around a current carrying conductor ?

* How salty water exerts more up-thrust than the simple tap water ?

* How an electromagnet can be made with the help of iron nail, connecting wire and cells ?

Similarly, Chemistry and Biology teachers can elaborate their points of emphasis concerning their subjects.

During such interactive sessions, an access to a science lab plays a vital role in the involvement and evolution of young minds. The nature walk, visit to

science park and places of scientific interest also develop curiosity among the students. For a city like Delhi there are numerous such places, which ought to be visited.

We as science teachers have to encourage the senior students for self study in a scheduled manner. They must

develop a constant writing habit for jotting down the units, formulae, definitions, diagrams etc. The sharply drawn diagrams are a must in teaching of sciences. In Physics, the circuit/ray diagrams have to be practiced very often. Thus the drawing skills provide an impetus and encouragement in the writing of sharp and brief answers in examinations.

Therefore, as a science teacher, we have to work upon fostering curiosity, imagination, zest and grit among the students to evolve them as future science patriots.

The Author is Former Principal, Singhania School



Strategies in Teaching Science

MONIKA SINDHWANI

"I hear and I forget. I see and I remember. I do and I understand".

----- Confucius

Alternate approaches are becoming an integral part of science education, as students can intellectually and physically involve and evolve through activities, while they try to imbibe a new concept.

We the science teachers have been promoting innovative ways of thinking and motivating the children during the teaching - learning sessions. Many of us engage them in group discussions to experience science in various interesting and joyful fun loving activities. A few among them are as follows :

* **HANDS - ON - LEARNING** is the most convenient method, as it involves the active participation of learners to experience the difficult scientific concepts, rather than sitting in the audience (class) as mute spectators. Some handy, low cost teaching aids can be developed to enable the students to understand the concept in a lucid manner.

* **MULTIMEDIA APPROACH** is a blend of text, audio, animation, video, still images and GIFs(Graphics Interchange Format), used in teaching the contents, which require visualization, specially in 3Ds. The GIFs give an insight into the lesson in a very short interval of time. The children really love such academic visuals as these provide them a rich learning experience.

* **GRAPHIC ORGANISATION** contain a central point from which different branches or sub-branches are formed and thus the teaching exercise becomes more easier and cognizable.

* **POWER POINT PRESENTATION** may include animation, text and lots of GIFs. Students get fully engrossed during these presentations as these appear to be more interesting and gripping.

* **INTERACTIVE WHITE BOARDS** are yet more effective tools in the transaction of a concept while teaching in class rooms rather than the traditional chalk and black board delivery.

* **PEER GROUP LEARNING** is beneficial in enhancing the excitement among the learners to interact with each other and share individual experiences. The students get engaged in the content discussions about the scientific topics, generate

curiosity and ask questions among themselves to explore new dimensions pertaining to the thought of discussion. Such kind of open platforms help in reducing students' distractions, raising their concentration, developing them as better team players and also fostering love for scientific knowledge.

* **FLIP LEARNING** is to replace an empty mind with an open mind. A group of students is assigned the task to explore and search the information about a topic and ask them to present their team work through PPT, highlighting the core vital points. Thus a question answer session is initiated and the teacher acts as a facilitator in order to build up the acquired knowledge of students.

* **MOOCs** (Massive Open Online Courses) are the free online courses available for any one to enroll. It provides an affordable and flexible strategies to learn new skills and deliver quality experience at scale. MOOC supplements the learning concepts and imagination of students.

* **COLLABORATIVE LEARNING** benefits the students with their joint efforts. In order to develop a fearless class room, the children need to be involved in all type of project work, interactive sessions and in out of the box activities, which make them an ambitious learner and a fun enthused creative innovator.

Above all, we as science teachers have to become more imaginative and adapt alternate strategies for teaching science at upper primary and secondary stages. All of us have to focus on helping students to learn through guided exercises along with repeated feedback loops. Thus with soft skills, such as communication, critical thinking and creativity becoming more vital, now is the time to invest in skilling, up-skilling and reskilling for the future - both from the individuals' point of view and the society as a whole.

Hence through effective science teaching only, the desired objectives can be achieved.

The author is P.G.T. Physics

An Educationist Speaks

The Excerpts from the speech of Sh. J. C. Chaudhary, MD Akash Educational Services Ltd.



SH. J. C. Chaudhary was the special guest on the occasion of award giving ceremony of SOMT 2019 on 17th August 2019 at Vandana International School, Sector - 10, Dwarka, New Delhi. The gathering was a congregation of

awardee meritorious students, parents, science teachers, head of schools, teacher educators, scientists, officers of the Directorate of Education, members of the Forum and apart from these, Sh. Binay Bhushan, Director of Education, GNCT of Delhi was the Chief Guest.

Sh. Chaudhary in his Key Note address shared his life time experiences as well as the successful journey in becoming the CEO of the established, reputed and renowned coaching institute of the country for the medical and engineering aspirants. He spoke with simple and humble anecdotes/phrases and put his valuable thoughts/sermons on "dos and don'ts" in becoming successful in life.

As a wholesome approach, he touched upon the FAMILY VALUES, DEVELOPING SELF CONFIDENCE and TIME MANAGEMENT.

While emphasizing upon the family values, he subtly advised the young learners to respect their parents and honour their feelings, leaving "the taken for granted attitude" aside. He further added that, respecting parents has a cyclic effect on the new generations ahead as they follow their parents

likewise. Students should realize that how much their parents sacrificed for them and therefore it is the moral responsibility of the children to reciprocate by showing sincere efforts in their work and to get the desired results as per their expectations.

In his deliberations on self-confidence, he opined that, it can be developed when the students learn the concepts in depth and then only one can remember and retrieve the learnt concepts during examinations. He also gave a tip for memorizing and shared that while studying, one has to imagine and map the things in their minds, just like the memory stored in computers and other such gadgets.

With regard to his advisory on time - management, he wished that each one of you has to work extensively without getting distracted by friends and other net- working gadgets. You have to realize that all your friends are co-competitors and hence need not get influenced by the modes of their preparation, schedule etc. One should respect and value the time. Once the time is gone, it will never come back.

At the concluding end of his address, as a science teacher as well as a sincere well wisher of the FORUM, he announced that all the 100 students, who excelled in SOMT-2019 shall be given free coaching in his institute to pursue their choice of streams. Sh. Chaudhary was magnanimous enough to donate a sum of Rs. Ten lac to the Forum for strengthening and enriching its activities towards the propagation and popularization of science in the schools of Delhi/NCR.

The KEY NOTE address of Sh. Chaudhary was highly praised and widely acclaimed by the students and science fraternity.

Reporteer Smt. B Dhanalakshmi, Former Principal

The essence of Science is independent thinking and hard work, not equipment.

- C. V. Raman

All India Science Teachers' Association & Its' Relation with the Forum

Started in the year 1956, All India Science Teachers' Association (AISTA) is one of the oldest recognized body concerning Science education at school level. With branches in different parts of India, namely Bengal, Bihar and Maharastra, it has already organized 50 Annual Conferences in different parts of India. Dedicated for improvement in teaching of science, the State branches arrange various activities such as science based workshops, seminars, training programmes and competitions in quiz, debate, drawing and drama for the school children.

Since the aims and objectives of AISTA are similar to our Forum (DSSTF), we had no hesitation in taking interest for each other, specially whenever AISTA organizes the conference in Delhi. When the 47th conference was held on Dec. 27th & 28th, 2016 at Gandhi Peace Foundation, some twenty members of the Forum actively participated and extended cooperation. Sh. P. N. Varshney was co-opted as one of the Vice Presidents of AISTA and Chairman of the Organising Committee. He was honoured for his contribution in the field of school science education. Dr. A. K. Vashistha gave a Power Point presentation on Science, Technology and Environment. Sh. P. C. Bose was given the responsibility to introduce Sh. Biman Bose, his childhood companion, who was one of the Guest Speakers in the event. Dr. Sangeeta Bhatia gave the vote of thanks. Sh Y P Purang chaired plenary session. Sh. Virendra Srivastava also spoke on this occasion. Sh. J P Agarwal, Sh. R M Mohla, Sh R K Tiwari, Sh. Johnson David, Sh. A K Seth, Dr. K K Nathan, Sh, K M Rohilla, Dr. R A Goel and Sh. S K Goel were among the invitees from DSSTF.

Presently, AISTA has its Head Office in Patna with Rajmani Prasad Sinha (Ex. V. C., Darbhanga University) as the President and Rabindra Prasad Sinha, Principal as General Secretary. Dr. Subir Kumar Sarkar and Sh. Banabihari Patra looked after all the activities of AISTA in Bengal.

The latest, 49th Annual Conference of AISTA was held at Banaras Hindu University on Dec. 27th & 28th, 2018. AISTA specially invited DSSTF members in this grand congregation. Dr. Praveen Kumar and Smt. Manju Praveen were deputed to attend the Conference on 'Global Warming'. The welcome

address was given by Dr. G. C. Bhattacharya, Chairman, while Dr. K. K. Dey from Bengal, delivered the Key Note address. 150th Birth Anniversary of Sir S. N. Bose was marked and ceremonized by the illustrious lecture of Dr. P. K. Misra, Dean, B. H. U.

It is noteworthy, that Dr. Praveen Kumar of DSSTF was amongst the honoured dignitaries on the stage and was specially felicitated by the organizers.

It is hoped that AISTA and DSSTF will be working hand in hand for the promotion of their common goals and objectives.

P. C. Bose compiled the inputs given by Dr. Subir Kumar Sarkar (AISTA) & Dr. Praveen Kumar (DSSTF)

OBITUARY

With heavy hearts, we the members of DSSTF record our condolence for the sad demise of the souls, we lost in recent past.



Sh. H.N. Bhargava
Served FORUM as President
Age : 93 yrs.



Sh. J.N. Kaushik
Served FORUM as Press Secretary
Age : 71 yrs.



Sh. C.B. Bhardwaj
Served FORUM as Vice President
Age : 85 yrs.



Smt. Romila Chawla
Served FORUM as Cultural Secretary
Age : 72 yrs.

DSSTF And ICMF As Mutual Collaborators

DR. PADMA SETH

'Future Studies' initiated by Dr. Satish C. Seth, Founder of Indian Council of Management & Future (ICMF), came into prominence, when three decades back 'Futurology' was introduced as a Science based elective activity under SUPW by Central Board of Secondary Education. When Dr. Satish C. Seth Memorial Lecture Series was started a decade back, I was introduced to DSSTF by Sh. P. C. Bose, who is Chairman, Apex Committee of the Forum and works as Coordinator of ICMF. Thereafter ICMF and DSSTF continued to be mutual collaborators.

Considering that more and more students are opting out of Science stream and taking to Commerce and Accountancy at +2 stage is a threatening trend in education system. This alerts the educational authorities and the teachers as a community that has to think aloud. The time and the cost involved in pursuing Science in schools and colleges, either to pursue engineering, medicine or research later, have left a large volume of unemployed youth in the country. The education being imparted in these fields emphasize on theory is resulting in adding to the volume of unskilled labour. More than the illiterate or neo literate workers, the educated theoreticians have brought gloom in the employment scenario.

It is high time for Science teachers and enthusiasts to think of the possibilities of starting applied Science subjects in schools. This will surely enthuse the students to experiment and which shall attract them to opt for Science subjects. The example set up by Finland in starting projects with multi disciplinary learning is encouraging more and more students for experiential learning.

We as a populous country with a constitutional responsibility to educate the millions with compulsory schooling/learning, has to devise new ways to impart education. The DSSTF can take the lead in preparing a model of Applied Science in any one of the Science subjects / areas to experiment the level of interest shown by students. Unless the organization like DSSTF takes initiative, mere pleading to educational authorities, parents and students to invite them to the present day science scenario in school program may not fetch the desired results.

Science and Technology are taking strides. The speed with which even the ignorant and the illiterate are taking to new technologies, like mobile phones, wireless communication, long distance learning module, digital transference are a reality. Why not teach Science around the manufacturing of small objects, which shall enhance the understanding of children in Physics, Chemistry, Biology, Environment, Electrical system and Electronics, and this will help in pursuing UN sustainable goals.

Students can be attracted towards the Science stream with a new approach. Hands on practical application shall unravel its utility to the developmental arena and growth.

The author is Director, ICMF



A Note of Appreciation From Indian Association of Physics Teachers

DR. M. S . BHANDARI

Delhi State Science Teachers' Forum (DSSTF) has been doing commendable job in the Field of Science education. Science education being the common goal, IAPT and the DSSTF striving to achieve through various activities conducted and hosted conferences from time to time.

Some of the prominent fields of common ventures are : Question paper analysis and preparation of marking schemes for AISSCE in Physics conducted by CBSE, participation and assistance in conducting Science Open Merit Test (S O M T). I congratulate DSSTF on the completion of 40th year of successful

journey and on behalf of IAPT wish all the best for the mission the DSSTF has adopted for the benefit of school children and the society.

We always look forward to the Forums' participation in our functions organized from time to time. In the current year, the faculty members of Physics from DSSTF participated in our Prof. Ved Ratna Memorial Lecture held at Ramjas Public School and other function at N. C. Jindal Public School, Punjabi Bagh in the months of April and August respectively.

The author is General Secretary, IAPT

S.O.M.T. 2019 Scholarship Holders

S.No.	Roll No.	Name of Student	Name of School	Position
1	8994	Manpreet Singh	K R Mangalam World School, Vikaspuri, Delhi	I
2	9009	Pravar Kataria	K R Mangalam World School, Vikaspuri, Delhi	II
3	4901	Aditya Gupta	St. Angel's School, Sector 15, Rohini, Delhi	III
4	5830	Ritvik Baweja	Bal Bharti Public School, Parwana Road, Pitampura, Delhi	IV
5	14050	Aditya Singh Patel	Rajkiya Pratibha Vikas Vidyalaya, Lajpat Nagar, New Delhi	V
6	15261	Kartik Aggarwal	Ramjas School, Anand Parbat, New Delhi	VI
7	15068	Saanvi Jain	St. Thomas School, Mandir Marg, New Delhi	VII



Judges from DSSTF at work in Centre Level Science Exhibition of the Directorate of Education 2019-20

The Forum's Participation In World Environment Day

DR. A. K. VASHISHTA

The Climatic Change Research Institute (CCRI) in collaboration with Royal Society of Chemistry and Oil and Natural Gas Corporation organised a two day Conference on 'Chemistry and Environment' on June, 6th & 7th, 2019 at India International Centre, Lodhi Estate. The Delhi State Science Teachers' Forum (DSSTF) was specially invited to participate.



Dr. Malti Goel President, CCRI, delivered the welcome address. The special guest of honour was Prof. G.D. Sharma, Ex – Secretary, UGC, who stressed upon the implementation of all the innovative ideas as a part of culture to make environmental problems and their solutions as a big challenge. Dr. V. K. Garg, Ex – CMD, Power Finance Corporation, the Chief Guest, raised the burning issues of Environment and ways to cope up with the problems. Mrs. Maya Gupta of Universal Public School showcased a Power Point presentation of Environmental problems and how to sensitize the masses to create awareness. Sh. P. N. Varshney, Executive Chairman, DSSTF was one of the Guests of Honour, who led his team comprising of members of the Forum, Dr. Anil Vashishta, Sh. D. A. Mishra, Mrs. Pragya Kiran, Ms. Shruti Khandelwal, Mrs Kiran Manglik, Sh. Johnson David and Ms. Malhari. Mrs. Vimla Oak, acting as Resource Person from Royal Society of Chemistry, provided a set of three books as resource material on Active learning of Chemistry, for

the benefit of all the participant teachers from various schools. On this occasion, a bulletin on 'Climate S.A.R.' was also released.

Since the UN General Assembly has proclaimed 2019 as the International 150th year of Mendeleev's Periodic Table, Dr. A. K. Vashishta, Vice President, DSSTF, delivered a lecture on History of development of Periodic Table since the era of Mendeleev, Henry Mosley and Neil Bohr. He also narrated a few interesting events associated with different scientists.

At the conclusion Dr. Malti Goel praised about the dedication of DSSTF, specially Mr. P. N. Varshney in making this event a grand success. Ms. Vimla Oak of Royal Society of Chemistry recognized the delegates of DSSTF as the most intelligent group in this Awareness and Capacity Building Workshop. Dr. A. K. Vashishta, on behalf of the Forum gave the vote of thanks.

Lastly, all the participants were awarded testimonials and mementos as a token of recognition.

The author is Dy. Director of Education (retd.) & Vice President, DSSTF



National Camp on Annular Solar Eclipse

SUSHIL KUMAR

Popularizing and improving Science in general and Astronomy among the people has been the primary objective of Vigyan Prasara (An autonomous body under the Department of Science & Technology, Govt. of India). A rare celestial event of Annular Solar Eclipse approached in the month of December 2019 that was visible from some of the Southern States of India. The best location to observe that eclipse was Coimbatore, Tamilnadu as from other parts of the country only partial solar eclipse was seen.

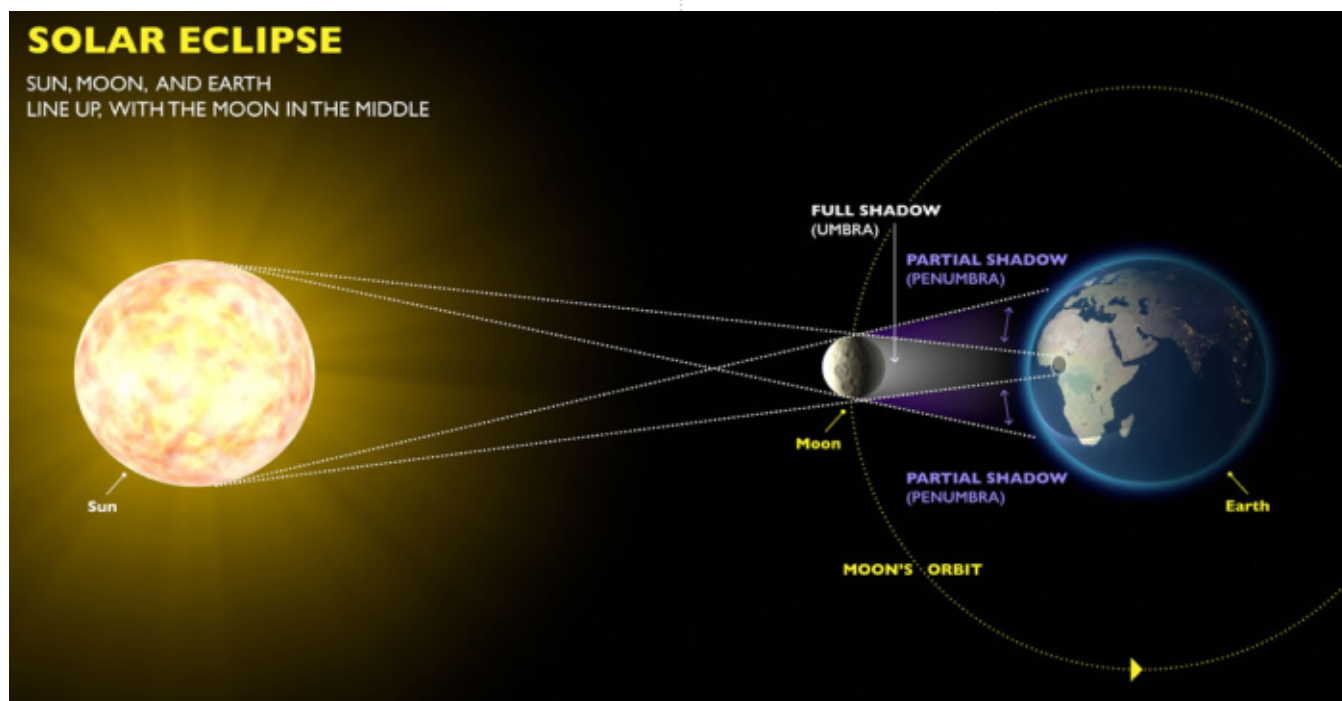
In order to witness the rare celestial event, a two day program was organized on 25th & 26th December 2019 at Coimbatore wherein selected VIPNET CLUB members and subject experts were invited and it was hosted by Janson Institute of Technology, Coimbatore. The writer of this report also had the privilege of attending this important event. After registration and inaugural session, many scientists presented following meaningful programs and outreach activities in that camp as mentioned below :-

- 1) Session of "Basic Eclipse" by Mr. Sarang Vandana, Executive Committee Member of Jyotirvidya Parisanstha, Pune.

- 2) The brief history of Eclipse by Mr. Bhargav Joshi, Member Jyotirvidya Parisanstha, Pune.
- 3) Various parameters i.e. Temperature, humidity and ambient light effected by eclipse.
- 4) Session on 'Experiments during solar eclipse by Mr. Suhas Gurjar, Chairman of Academic Council, Jyotirvidya Parisanstha.
- 5) Session on 'Eclipse Safety' and overview of activities during eclipse by Mr. Atharva Pathak, Executive member, Jyotirvidya Parisanstha.
- 6) Eclipse viewing and Experiments by Vigyan Prasara and Jyotirvidya Parisanstha (Group Activity).
- 7) Overview of the activities done during eclipse by Dr. Arvind C Ranade, Scientist – F and Mr. Anirudh Deshpande of Jyotirvidya Parisanstha.

Thus National Camp on Annular Solar Eclipse emphasized on various observations and scientific experiments which imbibe scientific temperament in common human beings. It linked to utilize the opportunity to remove the superstitions associated with the eclipses and other celestial events.

The author is DSSTF Zonal Representative of Zone 24



Educational Tour to Khajuraho and Chitrakoot

DR. ANIL VASHISTHA

Delhi State Science Teachers' Forum organised its 6th educational tour to Khajuraho and Chitrakoot w.e.f. January 2 to January 6, 2020 comprising of 38 members. The group reached Khajuraho on 3rd January morning by train and after a brief rest in hotel headed to visit the temples. Khajuraho is in Panna district of Madhya Pradesh and well connected by train, road transport and International Airport. The architecture of temples is Indo-Aryan style. The temples were made by Chandela dynasty and are



made of sand stone (Balua Pathar) and Nagar style was adopted to build them. The temples have foundation on rocks to get stable structure and are divided in chaturbhuj (4 columns). The temples comprise of Toran Dwar, Ardha Mandap, Mahamandap, Antral and Sanctum Sanctorum. As on date out of 85 temples only 23 temples exist in good shape. In the evening it was a magnificent light and sound show depicting on historical background of Khajuraho temples in forceful voice of Amitabh Bachhan. All these temples are preserved and protected as National Heritage by U.N.O. There are few places where one tells instinctively as said, "Truth is beauty and beauty is truth".

On 4th January we began our journey to Chitrakoot and in between enjoyed "Panna wild life sanctuary, water fall and Pandav Caves". It was picturesque and full of bryophyte plants and ferns. On our way we also witnessed Panna Diamond area where diamonds are separated from coal. We also witnessed trees like MAHUA (*Madhuca longifolia*), source of vegetables, sugar, wine, oil and timber and TENDU which is the source of Bidee and Chaat Patta.

Chitrakoot is 160km away from Khajuraho and is situated in Satna district of M.P. A sizable area also falls in Banda district of U.P. It is well connected by train, road and now by Air service. It is most pious pilgrimage centre in lush green range of Vindhya mountain, where Lord Ram spent 11 years of exile. There are holy places like Panch-mukhee Hanuman Dhara, Ram Ghat, Sati Anusuiya temple, Tulsi Ghat and many ancient temples. Gupt Godavari is a natural cave which has origin of Godavari and comprises of hot and cold water current which is flowing continuously on both sides of Mandakini river. There is a pleasant sound of ringing bells, enchanting of mantras and bhajans. Tulsi Ghat has its own attraction where it is believed that, Tulsi Das applied chandan on forehead of Lord Ram. We also enjoyed AARTEE of Ram Ghat in the evening, which was a delightful sight. In Vindhya, lot of medicinal herbs are spread and utilized. Kamadgiri is a famous hill, around which devotees do 5km parikrama to fulfill their wishes.

After spending two days at Chitrakoot, visiting holy places, scaling difficult terrain and braving some adventures feat, we returned to Delhi on 6th January by train. All the members of DSSTF fully enjoyed the highly successful and satisfying tour. All praised Dr. R. A. Goel for his untiring & sincere efforts and meticulous planning to organise such a memorable sojourn beautifully. He was well assisted by Sh. Ajay Kumar and Sh. Tahir Hussain throughout the trip.

The author is Vice President of DSSTF



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- To propagate, popularize & promote science education.
- To work for the betterment of science education.
- To promote innovation in pedagogical concepts in science.
- To disseminate the scientific information among the learners.
- To promote research in science education.
- To help in solving the academic problems of science teachers.
- To help and support the children in academics belonging to the weaker sections of the society.

ACTIVITIES

- To organize study circle meetings, seminars, workshops, conferences for improvement of science curriculum and its transaction during teaching- learning process.
- To organize popular lectures on scientific topics for the benefit of science teachers and students.
- To organize free science teaching camps for the children belonging to socially and economically weaker sections of the society.
- To assist the Directorate of Education, Govt. of NCT of Delhi in training programmes for science teachers and laboratory assistants.
- To have effective liaison with various Govt. Agencies viz. Directorate of Education, SCERT, NCERT, CBSE and Science Branch.
- To review NCERT Textbooks in sciences and critically examine the class 10th & 12th CBSE question papers in sciences.
- To supplement the classroom teaching in science subjects against the vacant posts in Govt. of NCT of Delhi.
- To develop question banks and related material (sample papers) for the benefit of science teachers and students.
- To publish Newsletter-DSSTF Darpan.

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