

Unravelling STEM

is integrative



INTEGRATES
MATH & SCIENCE WITH TECHNOLOGY & ENGINEERING



CHALLENGES
STUDENTS TO THINK OUT OF THE BOX



EXPERIENTIAL & HANDS-ON APPROACH



INTERDISCIPLINARY APPROACH TO TEACHING & LEARNING

goes beyond activities



STEM BASED CURRICULUM



USE OF DIGITAL TOOLS & TECHNOLOGY



DELIVERS 21ST CENTURY SKILLS



ACTIVITIES INCORPORATING MULTIPLE DISCIPLINES



FOUNDATION FOR A NATION OF INNOVATION

offers manifold benefits



PROVOKES
CRITICAL THINKING, CREATIVITY COLLABORATION



BRIDGES
THE EDUCATION-INDUSTRY REQUIREMENTS GAP



IMPROVES
DESIGN & APPLICATION SKILLS IN MATH & SCIENCE

SENIOR STUDENTS TAKE UP RESEARCH-BASED PROJECTS INVOLVING DATA COLLECTION. THE ASTRONOMY CLUB IS THE GUJARAT NODAL CENTRE OF SPACE.

NAVRACHANA SCHOOL, Vadodara, Gujarat

PRE-ENGINEERING CURRICULUM DISCUSSIONS WITH IISC PROFESSORS AND UNIVERSITY OF RHODE ISLAND CONCEPT OF SONGMATICS. MATH DEBATES INTRODUCED.

VIDYASHILP ACADEMY, Bangalore, Karnataka

EDUCOMP MODULES, 3-D LABS, SMART ASSESSMENT SYSTEM(SAS) OLYMPIADS. FOCUS ON KINESTHETIC LEARNING

LOTUS VALLEY INTERNATIONAL SCHOOL, Gurgaon, Haryana

MRIS ROBOTICS PROGRAM BASED ON STEM

MANAV RACHNA INTERNATIONAL SCHOOL, Gurgaon, Haryana

CONCEPT OF HOMATH (HIGHER ORDER MATH). STUDENT RECEIVED PATENT ON GEARS. ONLY INDIAN SCHOOL TO HAVE CLOUD BASED PROGRAMME.

GEAR INNOVATIVE INTERNATIONAL SCHOOL, Bangalore, Karnataka

ASSOCIATION WITH INTEL, USAGE OF GEOMETER'S SKETCH PAD. NIIT E GURU CONTENT, PEARSON DIGI CLASS.

Sunbeam Group of Educational Institutions, Varanasi, Uttar Pradesh

USING MODEL ELICITING ACTIVITIES (MEA), NASA TRIPS COLLABORATION WITH TERI, NEHRU SCIENCE CENTRE AND THE ASTRONAUTICAL SOCIETY OF INDIA

RYAN INTERNATIONAL SCHOOL, Navi Mumbai, Maharashtra

AIM ON DEVELOPMENT OF IQ, EQ AND PQ. CURRICULUM BASED ON CREYA ALIGNED TO ITEEA

SAMASHTI INTERNATIONAL SCHOOL, Hyderabad, Andhra Pradesh

LARGEST SCIENCE PARK TO LEARN FUNDAMENTAL SCIENCES. EMPHASIS ON NON-CONVENTIONAL ENERGY, WATER HARVESTING AND RECYCLING

SYNA INTERNATIONAL SCHOOL, Katni, Madhya Pradesh

STRESS ON PRACTICAL & PROJECTS WORKS ALONG WITH APTITUDE TESTS. SENIORS RUNNING PRACTICAL SCIENCE CLASSES FOR JUNIORS.

HIMALI BOARDING SCHOOL, Darjeeling, West Bengal

IB, IGCSE, CIE AND CBSE BASED CURRICULA PARTNERED WITH CREYA LEARNING WITH VIRTUAL EDU-TECHNICA, LINGUA-PHONE AND HIGH-TECH LANGUAGE LAB, IAPT ANWESHKA CENTRE, & DST SPONSORED INSPIRE PROGRAMS.

KIIT INTERNATIONAL SCHOOL, Khordha, Orissa

IT FOCUSED TEACHING, ENHANCEMENT OF DIGITAL KNOWLEDGE.

MAHATMA GANDHI INTERNATIONAL SCHOOL, Ahmedabad, Gujarat

CURRICULUM EMBRACES EVERY ASPECT OF A SCHOOL'S EDUCATIONAL PROGRAM. SMART CLASSROOMS AND EXPERT LECTURES THROUGH SKYPE.

PODAR INTERNATIONAL SCHOOL, Nerul-CIE, Navi Mumbai, Maharashtra

THE CURRICULUM ALIGNED TO ITEEA. SEPARATE CREYA LEARNING STUDIO WITH CONFIGURABLE WORKSPACES TO HELP CHILDREN DEVELOP THEIR THINKING AND CREATIVITY

GITANJALI SENIOR SCHOOL, Hyderabad, Andhra Pradesh

TEACHERS FOR EXCHANGE PROGRAM.

CATHEDRAL AND JOHN CONNON SCHOOL, Mumbai, Maharashtra



STEM EDUCATION GOES BEYOND THE TEACHING OF SUBJECTS LIKE MATH & SCIENCE IN ISOLATION

Terrie Rust, Director of Academics, Creya Learning

Learning Math & Science Innovatively

Innovation leads to wealth generation, as many developed nations around the world have demonstrated amply. In our own country, our then-President stated in 2009 that the second decade of the 21st Century would be our “Decade of Innovation” with an aim to “... develop an innovation eco-system in the country to stimulate innovations and to produce solutions for the societal needs in terms of healthcare, energy, urban infrastructure, water and transportation.”

Lofty goals indeed, but does the situation on the ground match the hype? Are our young school-going children being trained in the skills necessary to think critically, analyse solutions and to create? Are they being prepared for 21st century careers?

For a change, the answer is yes! A new movement is slowly but surely gaining ground in India, bringing with it novel methods of teaching and learning; and laying the ground work for our next generation of thinkers, innovators and leaders.

A New Paradigm for STEM Education

STEM (Science, Technology, Engineering and Mathematics) education is a trans-disciplinary effort that aims to teach students using concepts and practices from the four core S, T, E and M disciplines.

Dr. Mark Sanders of Virginia Tech University, a pioneer in integrative STEM education says it is an umbrella term for “...technological / engineering design-based learning approaches that intentionally integrate the concepts and practices of science and mathematics education with the concepts practices of

technology and engineering education”.

Terrie Rust, DTE, Director of Academics at Creya Learning, a pioneering provider of STEM Education programs to K-12 schools in India, explains that STEM education goes beyond the teaching of subjects like Math and Science in isolation. A distinguished technology educator, author and expert on STEM Education, Ms Rust states that, “STEM programs are designed to harness resources from across subjects and facilitate learning of the core topic at hand.

For example, a program that teaches Newton's three laws will consist of elements like studying the life and times of Newton (history), building simple applications that demonstrate and apply the laws (engineering), mock interviews with Newton (language arts) that are videotaped and blogged about (digital arts).”

A classroom that achieves all this in a single session will be abuzz with student groups walking around performing research, working cooperatively in teams, constructing objects,



STEM Education in action: A Creya Learning Studio at Anand Niketan

Voices of transformation

If such a classroom sounds too good to be true, rub your eyes. The change has started sweeping across some of our schools, revolutionising K-12 education in many classrooms, and waking parents, teachers and educators up to the potential of STEM education.

Maya Sukumaran is the Principal of Gitanjali Senior School, Hyderabad, a school with a traditionally strong focus on academics. Gitanjali has embarked on a transformation of their teaching methodologies in recent years. One of their prime initiatives has been to integrate Creya's STEM Education program into their school day. Ms. Sukumaran opines that, “STEM education is an evolution beyond discrete, subject-specific, activity-based, approaches to teaching. As a trans-disciplinary approach that facilitates learning via multiple methods, STEM challenges students and inspires them to think out of the box.”



Maya Sukumaran, Principal, Gitanjali Senior School



Kamal Mangal, Trustee, Anand Niketan

Kamal Mangal, Managing Trustee of the progressive Anand Niketan group of schools in Gujarat, feels that STEM learning aids the holistic development of the child and helps them acquire real-life skills. He believes that “students will develop skills...that remain with them for a life time” with STEM learning.

Anand Niketan has always encouraged children to learn out of the box via practical experimentation and science labs and other STEM pilots, but Mr Kamal Mangal saw that Creya's program for 21st century skills and STEM Learning was all about challenging students to think differently and to apply technology in their learning. Anand Niketan has integrated 30 hours of STEM learning by introducing Creya Learning program into their regular school schedule.

Educators like Ms. Maya Sukumaran and Mr. Kamal Mangal have taken proactive steps to transform the way their children are learning and to prepare them better for life in the 21st Century. This will in turn address the needs of the country and society in the future.

In order for India to be competitive globally, it is not enough for our young people to learn Math and Science. They must integrate Technology and Engineering practices as well, in an inter-disciplinary manner. Along the way, students learn to work cohesively in groups, to articulate, analyse and think.

using digital tools and having lots of fun while learning. Teachers will move around, making resources available and aiding students where necessary; in essence, facilitating multi-pronged learning.

Did anyone say “21st Century classroom?”

Why STEM?

What is the crying need to integrate this new form of learning into Indian classrooms? How does it meet the needs of today's children, helping them to succeed in their lives and careers?

For one, the way learning is achieved in most of our schools is just not effective or interesting. “[Most Indian] class rooms and schools are still very didactic”, says Dr. Mahesh Prasad, Former

What's PISA?
Programme for International Student Assessment is an OECD benchmark for 15 year old students' competency

evaluating INTERPRETATION INTEGRATION APPLICATION of MATH SCIENCE READING



India's international standing in student learning assessments

Head of the Heritage School in Gurgaon, Haryana. “But we have reached a point wherein the complexity of the current reality cannot be negotiated using the old approach to learning.” The sheer range and depth of what needs to be learnt has increased immensely, triggering a need for newer, more evolved learning methods.

“Education is no longer a linear effort where you learn facts from text books and ace exams”, explains Hari Verma, ex-VP at Knowledge Universe and now the Founder/CEO of Creya.

“Information and facts are everywhere now – at the tap of your fingertips as you pull up google.com on your Smartphone, which every second pre-teen knows nowadays. It's how you analyse that information and utilise it that matters for personal and career success.”

Second, STEM learning will solve some of the problems plaguing Indian K-12 education and fulfil the unmet requirements of Indian industry. Indian students have fared miserably in international assessments of reading, math and science such as PISA (see accompanying

graphic for PISA 2009 results).

While this arguably need not be a report on the state of all our schools (the study was conducted only in Tamil Nadu and Himachal Pradesh), other studies have delivered similar news. A year-long Quality Education study conducted by Wipro and Education Initiatives in 2011 reveals that even in our “top schools” in the metros, students are habituated to rote learning. They performed below or at par with international averages in scholastic assessments – not heartening news when we are hankering to be a knowledge economy.

Perhaps more alarming, researchers found that there is no major emphasis in school curricula in building qualities such as teamwork, self-confidence or communication, qualities Indian industry actively seeks in its employees.

However, hope is on the horizon, and STEM constitutes a big part of this good news. Ms Rust cites statistics of STEM adoption in many countries overseas and the benefits they have reaped by going the STEM way as an indicator for the successes India could achieve by going the STEM way.

Ms. Rust adds, “In the US, Germany and other countries, entire schools are run on the STEM model, producing new generations of scientists, thinkers and leaders.”

This thought has found an echo among Indian educators. Dr. Mahesh Prasad says, “STEM can help schools to create space for collaborative learning through dialogue and enquiry.”

Studies have found profound positive impacts in the psychological, social and developmental metrics of children who study in STEM programs. These are auspicious harbingers of what Indian schools can achieve by adopting and including STEM Learning Programs into their regular school schedule and curriculum.

It is important also to note that STEM fulfils the guidelines laid down by our National Curricular Framework.

The 2005 edition of the **National Curricular framework** states the following paramount concerns while educating our children:

- Connecting knowledge to life outside the school.
- Ensuring that learning is shifted away from rote methods.
- enriching the curriculum to provide for overall development of children rather than remain textbook centric.
- Making examinations more flexible and integrated into classroom life.
- Nurturing an over-riding identity informed by caring concerns within the democratic polity of the country.

Understanding STEM

The path ahead is not smooth however. Barriers to adoption exist, especially in a country as diverse as ours, with uneven distribution of resources.

Educators and school management bodies must be willing to make time in the school day for STEM learning in what is an already crammed time table. Parents must be convinced that spending money, time and resources on a new methodology is for the benefit of their children.

The solution to this is to spread awareness about what STEM really is, and to begin early. Creya has found that when parents and schools are made aware of the immense possibilities that STEM education offers their children, they are eager to get started. Schools are able to accommodate STEM hours in the timetable when they realise that syllabi will be covered in these classes, just via a newer and more interesting method.

Ms. Maya Sukumaran sums it up when she says, “Most schools talk about STEM education but none of them know what exactly it was. Many think teaching Math and Science is STEM.



“WE HAVE REACHED A POINT WHEREIN THE COMPLEXITY OF THE CURRENT REALITY CAN NOT BE NEGOTIATED USING THE OLD APPROACH TO LEARNING”

Dr. Mahesh Prasad, Former School Head, The Heritage School, Gurgaon

True STEM



True STEM Education Offers Manifold Benefits to Implementers

Schools should be made aware of what exactly STEM is, and how important it is for the future of their children. It is also very important that STEM education begins at a young age.”

Most importantly, teachers must be made aware of what STEM is – of the integrative nature of the methodology – and must be trained to teach the new way. Ms. Rust who has coached scores of teachers usually encounters initial resistance as to why they must spend the extra time to get trained in STEM. Not surprising, considering teaching is a not-so rewarding, high stress profession in India.

Once teachers and schools are convinced of the value of STEM learning, real transformations occur, as experienced by many teachers. “A sense of discovery and surprise lies within us. We only need to keep our minds open to learning. I experienced this myself during my training program at Creya”, says Mr. Gopalakrishnan, a teacher at Kamala Niketan Montessori School, a leading school in Trichy, Tamil Nadu.

STEM Experiences

The movement has started. Many traditional and progressive schools have started implementing STEM programs and are seeing the creativity, analytical and problem-solving skills of their students burst forth.

Ms. Maya Sukumaran has seen this transformation first-hand among her students who attend STEM learning sessions every week at the Creya Learning Studio, as part of their regular school day. “The child will always remember what they've made and experienced. The principles of a pulley system taught dryly on the board will never be remembered versus a pulley system they made themselves” concludes Ms Maya Sukumaran.

Mr Kamal Mangal adds that the Creya Studio remains open during the weekends at Anand Niketan for students who want to pursue projects on their own time beyond the mandated hours, and enthusiastic students make full use of this opportunity, thus reinforcing the power of what STEM learning can achieve in terms of engaging learning.

As schools explore the diversity and possibilities of STEM education, it is also important to understand what STEM is not. It is not a fad that will go the way of many education paradigms, for one. It is also not just the teaching of Science and Math in silos.

Computer classes, math labs or science labs and activities by themselves might not qualify as STEM, neither would the Abacus classes or the popular robotics classes. What might qualify any of the above programs as STEM is only when they have an integrative curriculum, real world connections and promote project based learning.

STEM checklist for Schools

5 Steps towards STEM Education for your students

What steps to take towards STEM

AWARENESS

Study about STEM and build consensus internally

ASSESSMENT

Speak to/Visit schools with STEM implementation

MAKE OR BUY?

Evaluate internal 'MAKE' Versus 'BUY' decision for STEM

PROVISION

Make provisions for - Budget/Curriculum/Schedule

IMPLEMENT & MONITOR

Implement and Monitor the STEM program for results

Key questions to seek answers for

What is true STEM?

Why should our school implement STEM?

How do I make parents, teachers and management aware of the benefits of STEM?

Understand how STEM can provide Leadership to my school.

What are the learning outcomes there?

What are the best known methods they can share?

Do we have the time/resources and experience to design STEM curricula in-house?

Who are the vendors that can help deliver quality STEM education?

Can we schedule STEM into our school day?

Do we have the right resources to make it a success?

How do we track our STEM implementation?

What are the rubrics for success?

How do we assess students and report results?

for more resources on STEM-based education, visit :: www.creyalearning.com/STEM

“There are thousands of ways of combining concepts and resources across subjects to create STEM programs. But the key is to combine two or more STEM areas within one activity”, Ms. Rust reiterates.

Over in Gurgaon, Mr Mahesh Prasad felt that it was essential to provide their students a learning space within the school set-up to have some hands-on experience — a space wherein they could integrate and apply the knowledge across disciplines in a simulated environment close to the real context. While it was not difficult to design some projects or themes to achieve this objective, they found that it required a lot of effort to plan and research. A key component of real STEM education is training children in 21st Century skills – skills essential for workers in this technology driven era. Employees are expected to be self-driven and independent. They must exhibit a lifelong desire to learn. They must be literate in digital tools, and be capable of working with remote teams towards a common goal. Such workers will be ready to tackle complex issues that impact multiple sectors of industry such as global warming.

This thin line of distinction between true STEM programs and other stand-alone activity based programs in science or robotics makes it important for schools to identify the correct partners who can help kick-start their STEM education initiatives. Key criteria in potential partners would be to look for an interdisciplinary curriculum designed ground-up for STEM education and the availability of experts with experience to train on delivery.

In the opinion of Dr. Mahesh Prasad it is important for schools to look into the credentials of the company schools are seeking to partner with for STEM, their implementation plan and backup support. It is also vital to take feedback from their clients, and from schools which have already implemented STEM programs. He adds, “I have had ample interaction with the program from Creya Learning and concluded that their

content, methodology, training and philosophy are very good after extensive evaluation of this, and other programs.”

The Way Forward

STEM education is a deeply studied, well-designed education methodology that is coming of age in India. STEM is the future, and is here to stay. It can bridge the demand-supply gap between what our educational institutions churn out and what industry expects. It can also be the real bridge between the guidelines laid down by the NCF, and the pioneering innovations in education made by our private schools.

Going forward, as the movement gains strength, efforts should be made to integrate this inter-disciplinary approach to education into our national education boards. Schools must take concrete steps to implement STEM education for their students.

The mantra for Indian schools is, “Take the time to study STEM and integrate what is best for your student.” The caveat however, is to tread carefully while doing so, taking the help of experts who have knowledge and experience in true STEM that can help their children.

With this movement, India can look to the rise of a whole new generation of engineers, scientists, entrepreneurs and innovators who will lead the country to its rightful place on the global podium in the 21st Century.

Studies have found profound positive impacts in the psychological, social and developmental metrics of children who study in STEM programs.

**BOOK
YOUR COPY
NOW**



Engineering watch

India's most prestigious magazine dedicated to Engineering Community

PRESENTS



NATIONAL SKILLS DIRECTORY

A Must Have for every Engineering Student

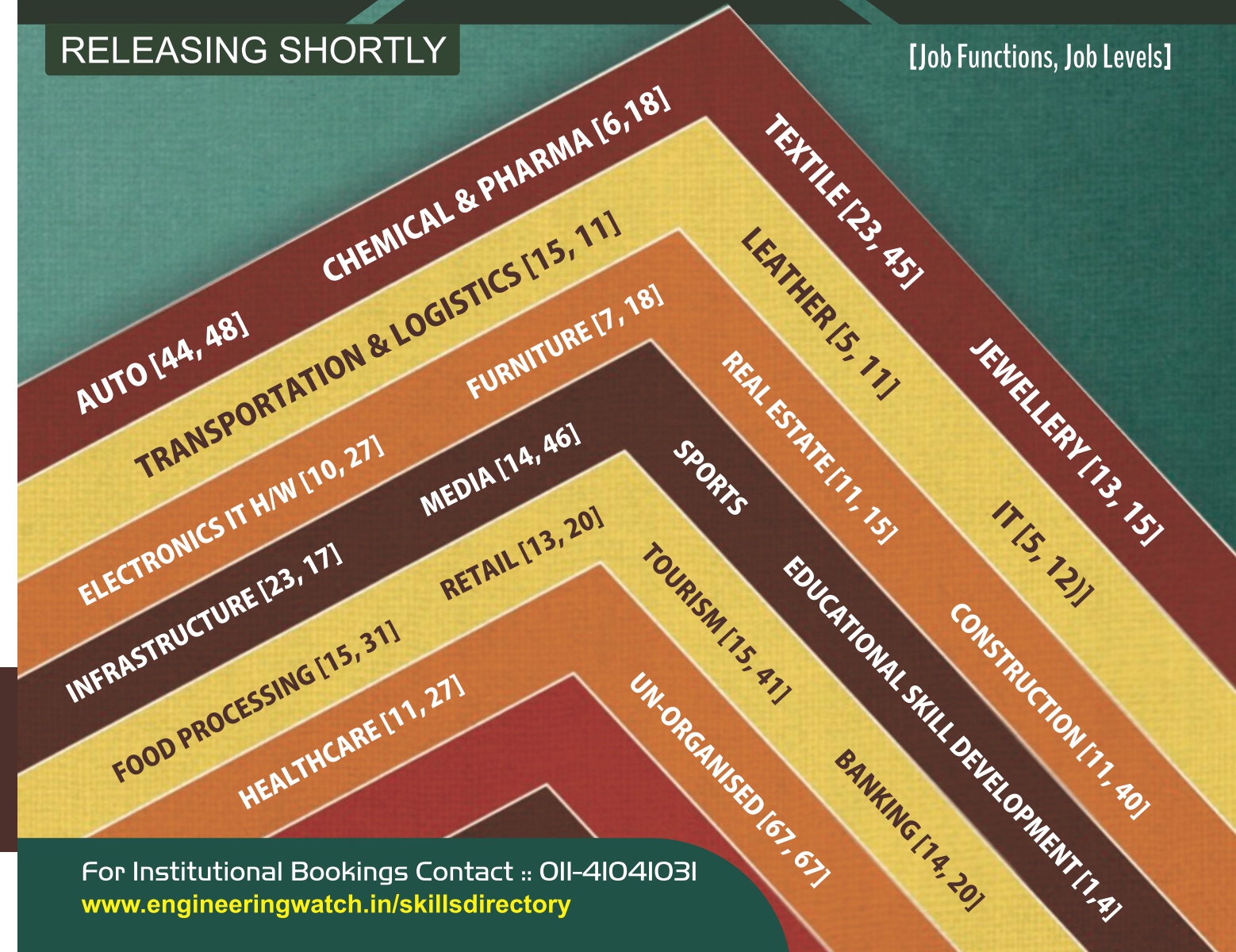
SKILLS REQUIRED

SECTORS

SKILLS GAPS

RELEASING SHORTLY

[Job Functions, Job Levels]



For Institutional Bookings Contact :: 011-41041031
www.engineeringwatch.in/skillsdirectory

Efforts to reclaim the lost interest & status of science amongst students at large especially at degree level



Dr. D R Singh
ICAR Port Blair

On a high time when ISCA made its centenary celebrations at Kolkata during Jan 2013, I take the privilege to convey that our Port Blair chapter which was recently initiated during Dec 2012 and our team of dedicated scientists was bound to gather the interest of science among the students and college graduates in coming years through structured programmes in Andaman and Nicobar Islands. We have our networking and collaborating institutes/ organizations from ANI including Andaman and Nicobar administration and certainly our chapter has a great potential to enhance the lost interest and status of science among students and other graduates of ANI.

Ways to incorporate the love for science amongst the vast community of engineering graduates

The opportunity available for engineering and B. Tech students should be made transparent through interactive programmes at the end of their graduation. A canvas program targeting passing out students from engineering profession and the opportunities available can be really helpful to incorporate the love for science among the other professional students. Our Port Blair chapter will also take necessary steps in coming time to organize such events.

Possibility of the continuation of Engineering & Technological interventions & inventions in the absence of a scientific fervor

Scientific literacy among graduates has entered a period of decline in knowledge. Contrary to our perception, the interest of non-scientific graduates for the sciences has not grown in parallel with the advances that science has brought to society. Without a scientific feeling or warmth no technological interventions will flourish and expand. Teachers have a daunting task ahead of them to provide students with such experiences in a meaningful way.

Bridging the discipline of Science from its corresponding applied disciplines of Engineering & Technology

Yes or so it seems! There is certainly a gap for a student right from the young age they have the option to choose either biology or Mathematics for higher education. The only hope we see is Education. Science education should be part of the school curriculum from the very early ages. Science is fun, and as such teachers should transform the fun in interactive way and we scientists should also have an important role in reducing the gap between science and technology. Probably the scientists should show their good side to the society and share the excitement of science with non-scientific and common lay man which will greatly help in bridging the gap between science and engineering technology.

India's emergence on the global forefront in the Scientific & Technological domain

Seeds of innovation abound in the technological domain of study. Several competitive organizations like DST, DBT, MOES, CSIR, ICAR, IIS, IIT etc are leading the country with innovative scientific approaches. However not all technologies developed by the scientific organizations are adopted by public. Technology dispersal and adoption would be an important area to be planned meticulously to bring India in global forefront. Exposure of Indian scientists/ students to global platform on innovative technologies should be another area to be addressed through way of learning experiences and study visits. Collaborative partnership particularly in scientific platform with developed countries could be an alternative approach.



Prof. B. B. P. Gupta
FNASc Convener, ISCA Shillong Chapter
Department of Zoology
North-Eastern Hill University
Shillong

ISCA Shillong Chapter strongly feels that all possible steps should be taken by concerned agencies to encourage science students of schools and colleges to opt for higher education in science. In collaboration with the National Academy of Sciences (NASI, Allahabad), ISCA Shillong Chapter has been conducting science awareness programmes in remote areas of Meghalaya. We invite eminent scientists to deliver lectures for science students. We have recently collaborated with the Indian National Science Academy, New Delhi and Indian Academy of Science, Bangalore for organizing lecture series for college students. We will be organizing a lecture series by eminent INSA Fellows in

I feel that provisions should be made to allow fresh B.E./B.Tech. students to opt for M. Sc. in the concerned subject followed by Ph. D. programme offered by Indian Universities. If B.E./B.Tech. students are allowed to opt for M. Sc., it will encourage technology students to opt for post-graduation in science, and thereby we can pave their ways for higher education in science.

Engineering and Technological interventions and/or inventions cannot continue in India without a strong scientific fervor. We have to try very hard to bridge the gap between science and technology. For this, we need a very strong national desire involving the central and state governments, MHRD, UGC, IITs, NITs and Indian Universities.

Our policy makers must take necessary steps to create an atmosphere where science and technology can be taught side by side by science and technology institutions. A unique joint effort has been made by the Indian Academy of Science (IAS), Bangalore; Indian National Science Academy (INSA), New Delhi and National Academy of Sciences (NASI), Allahabad to offer summer research fellowships (SRF) under which a student is offered a fellowship for two months and TA to undertake a research project under the supervision of renowned scientists.

India is emerging as a very strong nation on the global forefront of scientific and technological domain. But much more needs to be done. The number of science and technology institutions of global standards need to be increased with quality control measures. Immediate steps must be taken for seamless movement of science graduates to technology and technology graduates to science. It is also very important to generate excellent employment opportunities for science and technology graduates. Classical approach to science and technology education will not keep pace with the global competitions. We must take urgent steps to create national institutions to impart graduate and post-graduate education in courses combining both science and technology.



Prof. V. K. Parashar
Head, Dept. of Geology, Govt. MVM, Bhopal
Convener, ISCA, Bhopal Chapter

ISCA Bhopal Chapter office is situated at Govt. Motilal Vigyan Mahavidyalaya, Bhopal and certainly because of its strategic location the students of B.Sc. and M.Sc. enthusiastically take part in the scientific activities organized by Bhopal Chapter or some other agencies. In addition to this, ISCA Bhopal Chapter organizes several programmes on various occasions in collaboration with Regional Science Centre, Bhopal, M.P. Council of Science and Technology, Bhopal and other science based agencies. Students from various schools/ Colleges actively participate in these programmes.

It is quite true that the young engineers act as catalysts in the science regeneration process in today's society. We are trying to involve them by formulating a local science club at every engineering institute, so that they can participate in each and every activity organized by Bhopal Chapter and thus can motivate science in different sectors of the society.

Technological invention and innovative ideas presented by engineering students and have always been appreciated by one and all. Recently, M.P. Council of Science and Technology, Bhopal launched a programme to promote the pioneering ideas of science/ engineering student which is beneficial to the society. But it is not mandatory that graduates from only science/engineering background can do innovation/ invention. There are hundreds of examples where non science background masterminds from various disciplines invented/ innovated something new for the society.

Yes indeed it is observed that the discipline of science has been distanced from applied discipline of science and technology. In my opinion, it is very clear that basic science status has to be maintained firmly since it is the foundation and without basic sciences no other applied science survives. In my view the science and engineering graduate students should come forward on a same platform to discuss and share their views by organizing seminar/ conference/ symposium and brain storming session on the focal theme of any science topic for the betterment of society.

Indian students are highly talented in the world, we have enough energy to do miracles but unfortunately our policies sometimes restrain the innovative ideas. Central and State government should adopt a policy to organize a working model competition on any scientific innovation every year so that the endowed students showcase their talent. After the selection of a particular model/ innovative idea, it should be patented and they should be provided with suitable reward and good packages so that others are also motivated. Moreover this will protect our talent and stop the migration of our youth to other countries.