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# Are we promoting Fundamental Sciences enough?

I am sometimes confused what world we live in. Is it a science world or a technology world? The rapidly changing world of technology makes us believe that science is also rapidly growing. Sadly that is not true. Technology as I understand is the outcome of scientific knowledge with direct application towards making human lifestyle seemingly simpler. So the cell phones, microlight aircrafts, robotics, computers, etc. are all technological outcomes from the basic understanding of Maths, Physics, Biology, and Chemistry - the building blocks of technology. So one can say that technology is application of scientific knowledge in an appropriate manner. Alfred Nobel worked on the possibilities of nuclear energy which would help us meet the increasing future demands. However, the vicious minds of the political class used it to become super powers, converting the scientific understanding to create the atomic bomb technology. On the other hand Madam Marie Curie and her husband Pierre Curie lost their lives in the process of discovering the X-rays. This discovery was subsequently used and is in use even now in the technological advent of X-ray machines. Millions of humans have and continue to benefit from this understanding of Nuclear Science of the Curies.

Both Science and Technology are two sides of the same coin. Science is losing out to technology as it is not attracting the talent needed to pursue the fundamental sciences whereas technology is attracting more young minds as it has the glamour quotient, money possibilities, industry and government support. Thus undertaking research on the fundamental sciences finds few takers. Thus schools, colleges, industry and governments are not giving it a

due importance, little realizing that the basic pipeline of technology is in the area of increasing scientific knowledge in all spheres. Some smart countries continue to invest in fundamental sciences like in the West, China, Japan etc. India is on the cusp. We are there and not there at the same time. We want to but are not sure. There are only a handful of the Indian schools and universities who will lead the scientific breakthroughs. The rest are all followers. Thus until some cool abbreviation did not come their way, we continued to prepare our children to be engineers and join the computer world. Like lemmings we followed. Many schools even today continue to showcase how many children got 99% as though those that barely passed were failures. But wait we have a new cool abbreviation - STEM and schools all round have mushroomed with STEM laboratories. There is indeed a need to focus on STEM which stands for Science, Technology, Engineering & Mathematics. I have added three more letters to the abbreviation A, E & D so now we call it STEAMED i.e. Science, Technology, Engineering, Arts, Mathematics, Environment and Design.

The world needs more students urgently to work on fundamental sciences and create a scientific thinking and curiosity. Applications will automatically follow. But this too will sound hollow (don't mind the rhyming) if the children are not equally exposed to the Humanities and Social sciences. Together they will make a dynamic shift in society for the better. I hope the schools are listening.

**Ranjan Biswas**

*Editor*

*ecotrail@trailblazersindia.com*

River water study of a Trailblazers G4 camp in progress



## On the Brink...

The Forest Owlet (*Athene blewitti*) is a small 23 cm owlet endemic to Central India. This species was once known to be almost extinct until recent sighting in the forest of Central India in Melghat in 1997. Regular sightings of this owlet are documented from Melghat near Nagpur, Tansa near Mumbai, Nashik and Toranmal regions in Maharashtra and some parts of Madhya Pradesh and Gujarat states. It is listed as Schedule I species of the Indian Wildlife Protection Act 1972, the highest protection possible for an owl species in



Image courtesy: Rajneesh Suvarna

India. This is also listed as Critically Endangered in IUCN Red List and also listed under CITES Appendix I.

The owlet prefers deciduous forest habitat especially dominated by teak trees. They are mostly diurnal but active during early morning and late evening hours. Due to its shy nature, these owlets are quite difficult to be sighted and generally they go unrecorded. An estimated global population of this species is 300-400 all around Central India.

The threats to this species include habitat destruction, cutting of teak wood for commercial purpose and forest fires. Conservation efforts include an awareness and education programme among villagers on the significance of saving the forest owlet, avoiding forest fires and saving teak forests.



Robotic pollinator

Image courtesy: Eijiro Miyako

## Robotic Pollinators

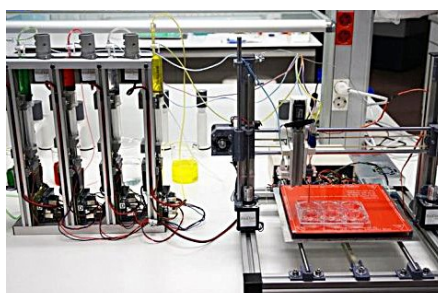
Eijiro Miyako at Japan's National Institute of Advanced Industrial Science and Technology, and his colleagues have used the principle of cross-pollination in bees to make a drone that transports pollen between flowers. The manually controlled drone is 4 centimetres wide and weighs 15 grams. The bottom is covered in horsehair coated in a special sticky gel. When the drone flies onto a flower, pollen grains stick lightly to the gel, then rub off on

the next flower visited.

In experiments, the drone was able to cross-pollinate Japanese lilies (*Lilium japonicum*). Moreover, the soft, flexible animal hairs did not damage the stamens or pistils when the drone landed on the flowers. Miyako says the team is now working on developing autonomous drones that could help farmers to pollinate their crops, especially in the view of declining population of natural pollinators.

## Print your Skin

Scientists from the Universidad Carlos III de Madrid (UC3M), CIEMAT (Center for Energy, Environmental and Technological Research), Hospital General Universitario Gregorio Marañón, in collaboration with the firm BioDan Group, have presented a prototype for a 3D bioprinter that can create totally functional human skin. This skin is adequate for transplanting to patients or for use in research or the testing of cosmetic, chemical, and pharmaceutical products.



## Life Nearby?

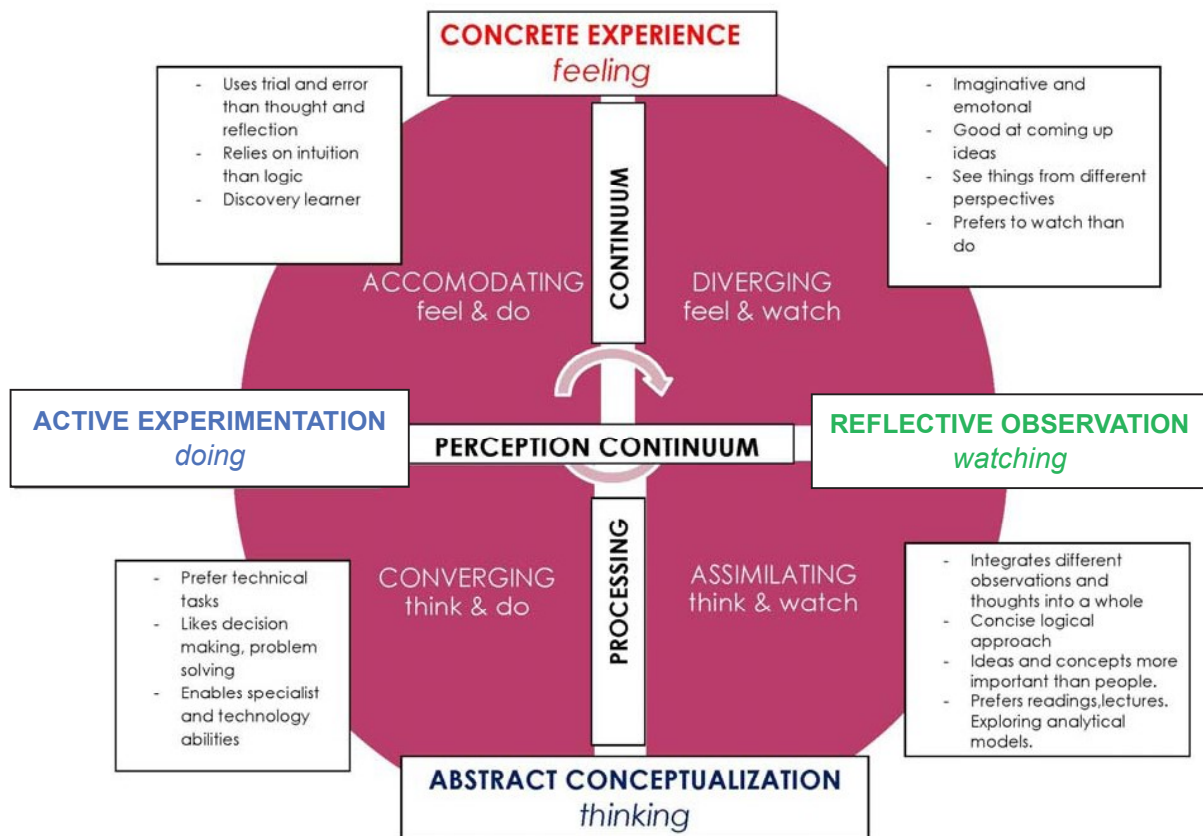


Astronomers have found at least seven Earth-sized planets orbiting the same star 40 light-years away, according to a study published in the journal Nature. The findings were also announced at a news conference at NASA Headquarters in Washington. This discovery outside of our solar system is rare because the planets have the winning combination of being similar in size to Earth and being all temperate, meaning they could have water on their surfaces and potentially support life.



## Kolb's Experiential Learning Theory Model

"Learning is the process whereby knowledge is created through the transformation of experience." (Kolb 1984). Expanding on earlier work by John Dewey and Kurt Levin, David Kolb's experiential learning theory features a four-stage cyclical theory of learning.



### Four Stages of Kolb's Experiential Learning Theory Model

1. **Concrete Experience** - Feeling
2. **Reflective Observation** - Watching
3. **Abstract Conceptualization** - Thinking
4. **Active Experimentation** - Doing

Effective learning is seen when a person progresses through a cycle of four stages: of (1) having a concrete **experience** followed by (2) **observation** of and reflection on that experience which leads to (3) the formation of abstract **concepts** (analysis) and generalizations (conclusions) which are then (4) used to **experiment** or test hypothesis in future situations, resulting in new experience.

### Four Kinds of Learners According to Kolb

1. **Divergers (feel and watch)** - view situations from many perspectives and rely heavily upon brain storming and generation of ideas
2. **Assimilators (think and watch)**- follow logical processes & have the ability to create theoretical models
3. **Convergers (think and do)**- rely heavily on hypothetical-deductive reasoning
4. **Accommodators (feel and do)**- carry out plans and experiments and adapt to immediate circumstances

The east-west axis is called the Processing Continuum (how we approach a task), and the north-south axis is called the Perception Continuum (our emotional response, or how we think or feel about it). Kolb believed that we cannot perform both variables on a single axis at the same time (e.g. think and feel). Our learning style is a product of these two choice decisions.

**Source:** <https://www.simplypsychology.org/learning-kolb.html>, [www.mickhealey.co.uk](http://www.mickhealey.co.uk), <https://pamena.wordpress.com>



# Sahyadris Calling!

Trailblazers organized a memorable camp for students of a reputed school in the pristine surroundings of a lakeside campsite. They enjoyed adventure activities like wall climbing, rappelling, rifle shooting, archery and team games in its serene environs dotted with pink blooms of *Gliricidia*. It was fun galore with games, skit presentations and singing around the bonfire in the evenings. After the campsite stay, it was time to taste the village lifestyle. Students stayed overnight in one of the Sahyadris' villages and experienced

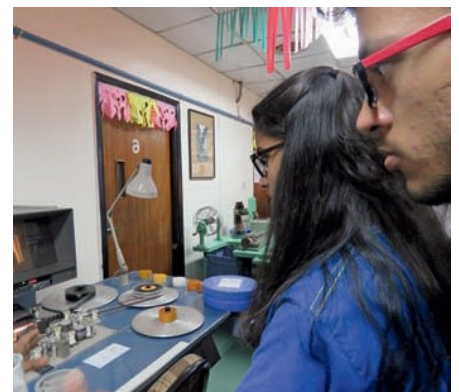
the rural life including interaction with villagers, local food and using of the dry toilets! Fun apart they learned about the shortage of water in this hilly region and how villagers are overcoming this challenge by building a water tank connected to the water cisterns in the nearby forts.

They also trekked to these twin forts and clicked some beautiful picture dabbling in excitement. The mountains were coloured in Trailblazers colours of green and yellow – the cool green of trees in the valleys with simmering yellow of





dry grasses on the slopes. Trailblazers experts shared the history of the forts and importance of these forts as strategic points on the ancient trade routes. After the beautiful village stay, it was time to move back to city life. Students visited a premier national institute on films and television production. They explored various studios, audio labs and locations used for film making... And another wonderful camp just like a fairy tale got over. Students had a time of their life.





## Trailblazers Economics Module



The policies formulated by governments have a far reaching impact on micro and macroeconomics of a nation. Economics as a subject is not only interesting but one which touches our lives the most. Trailblazers conducted a camp on Economics with a group of students from a reputed school. The objective was to visit various institutes of commercial and economic importance and meet industry experts. Students got exposure to various businesses and industries and they collected information from the experts. Trailblazers experts also organized a session on debate and discussion on the recent government policies of demonetization and black money. Students participated enthusiastically and presented their views innovatively. Apart from the intellectual quotient and focus on Economics, the programme also had a fun element! They enjoyed the visits to heritage monuments, marine drive and fashion street where they practiced their art of bargaining and shopped souvenirs for their friends and family. They also pampered their taste buds and relished local delicacies like pav bhaji and vada pav. The press visit elucidated preflight and postflight stages of printing. During the press visit, the new issue of ECOTRAIL was also launched at the esteemed hands of the teachers and students.



# Wetlands Day



On the occasion of the World Wetlands Day, Trailblazers organized birding trails. The highlights of the trails were watching migratory birds and understanding the mystery of migration. Every year during the winter season, Mumbai's coastline attracts many migratory shorebirds, who migrate all the way from Arctic Circle, Russia, China to various wetlands of Mumbai region.

weather condition and poor availability of food are some of the reasons why birds migrate from summer grounds to wintering grounds. Once they arrive in Mumbai, they spread across all corners of Mumbai & suburban regions in search of small invertebrates which form their major food source. Wetlands which are located on North Eastern part of Mumbai across the coast of Arabian Sea are considered to be a bird watchers' paradise.



Trailblazers conducted an informative bird watching trail at these wetlands for students of a reputed school. Students enjoyed bird watching and identifying

Overall more than 50 bird species were observed in two days, mostly migratory species and few resident species. The highlight was identifying and observing species like Osprey, Painted Stork, Greater Flamingo and Eurasian Spoonbill. Apart from the birds, a lone Golden Jackal was also sighted during the trail. They were awstruck at the

in search of food and shelter.

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# Corporate Team building Trek

Nature is the best teacher and nobody knows this better than the corporate world. Employee engagement programs in the outdoors with challenging activities like trekking, rappelling, rock climbing and rafting bring about leadership qualities that promote team building.

With these objectives in mind, Trailblazers conducted an energizing trek to Karnala fort for the employees of HPCL. In the early hours of dawn, the group of enthusiastic trekkers set off for the fort trail. A sumptuous breakfast enroute along with a quick tea and vada-pav break on the highway set the trend for an enjoyable trek. The lovely green zone of Karnala bird sanctuary welcomed trekkers with chirping birds and a glorious sunrise adorning the

about the programme, the history of the fort, safety measures and the trek challenge.

Armed with this information, they marched to conquer the fort. The team was fully charged up and every step forward was enjoyed amidst the emerald green surroundings. There



wherein bonding and team work was experienced live in action. This fostered team spirit and cooperation. Trekkers were in full form and busy attempting the trek challenge. Almost after 2 hours they reached the top, prayed at the fort goddess temple and clicked several pictures. All the energy spent on the trek

views from the summit. They felt thrill of achievement on reaching the peak and enjoyed the view. They were witness to the rich history of our ancestors.



Trailblazers guided the trekkers in exploring the fort, the water reservoir, the structure and its architectural importance. After enjoying the breathtaking scenery and absorbing the beauty and serenity, they commenced on their downward trek.

The descent was even more wonderful. The trekkers were beaming with the sense of accomplishment. Overcoming ones limits gives a sense of achievement and builds

They felt relaxed and rejuvenated as it broke the monotony of their routine corporate lives. The learning outcomes were many.

The challenging trek was not only a journey into self discovery and awareness but also an opportunity to interact with colleagues. The improved awareness about self and team lead to better interpersonal skills and harmony. A better team

retains work force which is what any corporate house aims at. One of the participants remarked, "You all have made us believe that Yes...I can do this. Really a memorable experience...All of you were very very helpful and I thank you Trailblazers for arranging such a wonderful trek for us."





# Teacher Training Workshop - Multiply The Message



'Multiply The Message' has now reached over 5,000 teachers. Now in its 8th year this successful programme has explored new techniques, methodologies and covered a wide variety of topics in environmental sciences. Both in-service teachers and B.Ed. student teachers have used the tools we shared either on site or through the useful tools we gave them back to carry. Dow Chemical International and Trailblazers Foundation have made an impact on thousands of children and public at large by making them understand the science of the subject and seeking to find solutions. This year Dow Chemical International

with Trailblazers Foundation conducted the workshop for 500 student teachers of Mumbai and 100 in-service teachers of rural Maharashtra in Khed and Chiplun talukas. In a first, we got the Mumbai student teachers to undertake a survey of the residents of villages in Apta and Tara. Then they reflected on the survey and undertook the learnings as to how the environmental concerns can be addressed. This year we expanded the geographical reach of the project and conducted the workshops near Lote village in Khed Taluka where the Dow Agroscience is situated. The Maharashtra Government Education Department supported the move wholeheartedly



Top to Bottom Photos: 1. On the Dias from left: Mr. Ranjan Biswas, Trustee, Trailblazers Foundation; Mr. Chandrakant Dhuri, Manager - Manufacturing, Dow Agrosciencences; Mr Subhash Mukadam, Plant Manager, Dow Agrosciencences; Mr. Shreedhar Shigvan, Block Education Officer, Chiplun Taluka and Ms. Kiran Islania, Trustee, Trailblazers Foundation inaugurating Environment Education Workshop at Lote, Chiplun. 2. Traditional Inauguration by Mr. Mukadam 3. Welcoming the guests on the dias with a bouquet of flowers. 4-6. Mr. Shigvan, Mr. Mukadam and Mr. Dhuri addressing the participants respectively. 7-12. Teachers engrossed in workshop activities conducted by Trailblazers Foundation.







Mr. Lohar, addressing the participants

3. participants.

as well. They also participated in event for the teachers along with the senior executives of the Dow Chemical International's plant at Lote. The issues of air and water pollution, soil erosion, climate change, etc. were covered through unique experiments

cleared the basics. What was wonderful was also the participation of the science teachers congress. Over 100 in-service teachers participated in all the games, demonstrations, audio visual sessions to deeply understand how can we use these simple but effective techniques to convey the concerns and understand the science behind it.

The teachers committed to multiply the message amongst their students and in the last one month alone we have received over 37 communications of what they are doing to spread the message. Almost all the teachers have given the feedback that the classrooms they teach in are more vibrant and the students are reciprocating positively by their personal actions and accounts. The Government Education

also learned about biodiversity and were astounded to know of the number of species of birds, insects, reptiles and plants that were found in such a small campus. They were surprised to see a live ecosystem complete with detritus materials, insects, annelids, coelenterates, fungi, mushrooms, amphibians and reptiles under a dead tree trunk. It was an eye opener for all. They saw a similar one under a potted plant as we just lifted the pot. Life is all around us and all are affected if the environment is affected. All organisms have a role as important

the Message' is directed at two such teachers at one spectrum and the universe at the other. If the teacher is



aware the world shall learn. Trailblazers Foundation thanks Mr Chandrakant Dhuri, Manager - Manufacturing, Dow Agrosiences; Mr Subhash Mukadam, Plant Manager, Dow Agrosiences; Mr. Deepak Mhatre, Manager Quality Assurance, Dow; Mr. Jayanta Sheth, Senior Executive, Dow Agrosiences, Dow Chemical International and its



as humans. It is just that we forget and our laidback reactions impair their growth and this in the long run will be an intractable situation for us humans. We need to be aware and act. 'Multiply

Mr. Shreedhar Shigvan, Block Education Ratnagiri District.



Departments have extended their full support and have asked for a repeat which will enable thousands of other science teachers to learn and implement the activities. What makes the learning fun and unique is the simplicity of using locally available material. It is a classic study of how much learning can happen in the outdoors only if we plan well and survey the site in advance to know what all elements can be used. The teachers

## पर्यावरण जागृतीसाठी योगदान द्यावे

शिगवण : परशुराम येथे डाऊ अॅग्रोटर्फे पर्यावरण शिक्षण कार्यशाळा

चिपळूण, ता. २४ : पर्यावरणाचा न्यास हो जगाला भेटसावणारी यमरम्या आहे. स्पर्धेच्या युगात पर्यावरणाचा न्यास होत आहे. पर्यावरण शिक्षण माध्यमातून विद्यार्थ्यांच्या बालवयात पर्यावरण जागृतीसाठी शिक्षकांनी योगदान द्यावे, असे आवाहन गटशिक्षणाधिकारी श्रीधर शिगवण यांनी परशुराम येथे केले.

लॉटे औद्योगिक वसाहतीमधील डाऊ अॅग्रोटर्फेच्या पुढाकारातून पर्यावरण शिक्षण कार्यशाळेचे आयोजन परशुराम येथे निसर्गाच्या साक्षिण्यात केले होते. मुंबईतील ट्रेलब्लेजर संस्थेच्या पदाधिकाऱ्यांनी



परशुराम (ता. चिपळूण) : डाऊ अॅग्रोटर्फे पर्यावरण शिक्षण कार्यशाळेचे उद्घाटन करताना चंद्रकांत धुरी. शेजारी सुभाष मुकादम, श्रीधर शिगवण, रंजन विश्वास, किरण ईस्तानिया.

पर्यावरण शिक्षणाची महिती दिली. चिपळूण व खेड तालुक्यातील १०० विज्ञान शिक्षकांना कार्यशाळेसाठी घ्याय निमंत्रित केले होते. या वेळी

डाऊ अॅग्रोटर्फे सुभाष मुकादम, चंद्रकांत धुरी, जयंत गेट, दीपक म्हाने, गटशिक्षणाधिकारी श्रीधर शिगवण, ट्रेलब्लेजर फाउंडेशन, मुंबईचे रंजन विश्वास, किरण इस्तानिया उपस्थित डाऊ अॅग्रोटर्फे वतीने चंद्रकांत धुरी यांनी मार्गदर्शन केले.

पर्यावरण संतुलनासाठी प्रत्यक्ष कृती महत्त्वाची आहे. पर्यावरण जागृतीसाठी विद्यार्थ्यांवाही सहभाग हवा. त्यासाठी विज्ञान शिक्षकांना पर्यावरणाची अदयावत महिती देण्यात आली. ट्रेलब्लेजरचे संस्थापकीय अध्यक्ष रंजन विश्वास यांनी पर्यावरणाचे धडे दिले.

Above: Multiply the Message - Teacher Training Workshop on Environment Education in Lote was covered by Sakal Newspaper, Ratnagiri, on 25 Jan 2017.



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- 3 Mar - World Wildlife Day
- 8 Mar - International Women's Day
- 14 Mar - World Pi Day
- 21 Mar - International Day of Forests and the Tree
- 22 Mar - World Water Day
- 22 Apr - International Mother Earth Day
- 23 Apr - World Book & Copyright Day
- 23 Apr - English Language Day
- 23 Apr - World Day for Safety & Health at Work
- 30 Apr - International Jazz Day



Earth day is celebrated annually on

widely credited with having launched the modern environmental movement. It spearheads campaigns on climate change and clean energy worldwide. Some of its campaigns include Trees for the Earth, Green Schools, Campaign for Communities or C4C. You can celebrate Earth day by doing green acts, planting a tree, marching for science and spreading awareness on climate change, reducing your carbon footprint, using less plastic or going outdoors!



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