

**One Day Popularization of Science Event under CTEP Scheme**

**EVENT REPORT**

**VISTAAR 2019**

**Venkateswara Initiatives in Science Training in  
Academics and Research**

**November 1, 2019**

**Organized by**



**Sri Venkateswara College**

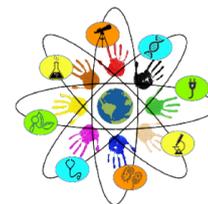
**(DBT STAR STATUS)**

**University of Delhi**

**Dhaura Kuan, New Delhi 21**



**EVENT REPORT**  
**VISTAAR 2019**  
**1<sup>st</sup> NOVEMBER 2019**  
**Sri Venkateswara College**



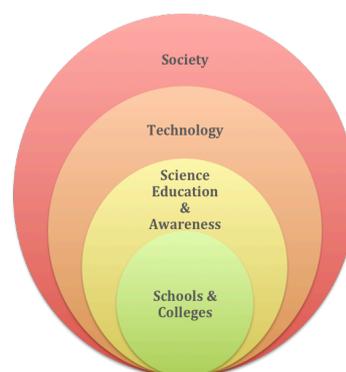
## **VISTAAR – Venkateswara Initiatives in Science Training in Academics and Research: Our Vision**

As Educators, we often notice and realise that at all levels of formal education, many students are not influenced and impressed with **Science**, as much as we would like them to be. Science is often perceived as a complex composition of theories which are not only tedious but burdensome as well. In our classrooms and laboratories, for Science popularisation, it is imperative that we create more meaningful exercises which would excite them not just to enjoy science while learning, but do so without any trepidation. For this, we could simply use observed natural phenomena as a way to explore and understand the universal concepts of science. Also, every day events may be used as a way of bringing **science to life**. Showing students how scientific concepts connect to things that they are passionate about allows them to gain confidence and develop enthusiasm for the subject. It also challenges them to move beyond the traditional expectations of science classwork and to become more open-minded and help them think creatively.

We thus need to make science lessons such that they inspire those students who don't see themselves as classical science students. They should be made to realize that science is broad—not just a singular subject, and that creativity can be a part of science. The exercises and lessons should also challenge the students, particularly those who are inclined to the subject, to expand their vista of knowledge and think more creatively. Many outreach programs are focused on students who have already opted for science as their subject of choice, but it is equally important to inform younger children about the importance of scientific experimentation which consolidates the facts. Our goal has been not only to engage the children in discussion about science, but also to incorporate a social perspective, and integrate learning with everyday events.

The Sri Venkateswara College mission is not only to engage the children and convince them that they themselves could join the world of research and become the scientists of the future but also to generate a broader impact on teachers, parents and students alike to appreciate the beauty of Science & Technology.

Therefore, the focus and vision of VISTAAR was to project science as an interdisciplinary platform that bridges areas as diverse as Anthropology, Archaeology and Mathematics to just name a few. It would show that science concepts underlie the working and understanding of something as small as an atom or quantum particle to something as complex as the survival of a microbe in a large networked and fluctuating ecosystem. Most importantly, **VISTAAR**



**Education, Technology and  
Society knowledge flow**

Most importantly, **VISTAAR**

**was showcased as an all inclusive model** initiative that reaches out to not only schools and college going students but also to parents and hence society.

### **Goals and Objectives of VISTAAR**

VISTAAR was conceived to showcase the future of science as an organic blend of different disciplines that consolidate, support and create a technology platform from where applications extend for benefit and use in society. **The specific objectives are as follows:**

1. To provide school students with hands-on exposure and portray science as a 'fun' activity; one that provides an outlet for their creative and innovative expressions.
2. To reinforce the concepts being taught in schools/colleges and connect these basic concepts to events observed in daily life.
3. To address current global issues relevant to the survival of humankind in future and sensitize them to their roles as future responsible scientists and citizens.

### **How the proposed seminar/symposium is relevant to the thrust areas of Biotechnology and its development**

The primary aim of the event was to bridge a longstanding divide between academics and research/technology. While both forms share organizational approaches in practice, they have remained distinct in career choices. The current education system supports 'rote' learning and restricts freedom at early education stages which leaves less scope for innovation due to lack of creativity.

Thus, our event format was designed to engage the students of secondary, higher secondary and undergraduate levels to develop a vision through experimental learning activities for applying academic concepts to research and technology. Moreover, the involvement of different streams where prime focus was on experiential learning through hands-on approaches in the fields of Biochemistry, Botany, Chemistry, Physics, Electronics, and Zoology allowed the students to develop an awareness of the interdependence among the disciplines. This interdisciplinary event would allow the students to focus on higher-level learning, thinking, critical analysis and decision making, which further would encourage students to set their future goals. Also, seeing immediate application of their learning in day-to-day life motivated the students and facilitated their connection with the environment and the society. The experiments provided them greater control of their reasoning-learning, hands-on, analysis skill set. This teaching approach integrated the academic objectives and methods/experiments/ research from more than one discipline and enabled the students to develop an interdisciplinary aptitude.

### **Scope of the Event**

Science and technology is the engine that drives growth and development of a society. The importance of communicating the merits of science and research, and the development of scientific temper in young minds cannot be understated. As an educational institution, we are committed to encourage students to take up higher education and thus, direct engagement with future science students is an important step in this direction. The major objective of this one-day event was to offer a catalysing experience to infuse curiosity in student's mindset and attract them to careers in

science. Thus, the primary scope of this event was to make the connection between basic science concepts, hands-on experiences and real-world applications. The program has been carefully crafted to make learning an enjoyable process, while highlighting the various opportunities science has to offer.

### VISTAAR EXHIBITION

1. All Inclusive model with wide outreach
2. Multidisciplinary approach involving 6 different science departments to emphasize that science transcends all boundaries
3. Educate students and parents towards career progression in newer and exciting areas of STEM
4. Take-home kits to increase general awareness in science eg. Food adulteration kit, Soil Testing kit, Home remedy kit
5. Simulations on Climate change, Artificial Intelligence & Forensics
6. Interface with people from industries for job prospects

### Innovation in the Approach of VISTAAR

#### DIY - LAB

7. One big practical demonstration class
8. 200 + students from both govt. and public schools at one place
9. Simultaneous work stations (n=40) for all students
10. Experiential learning to reinforce basic science concepts from school curriculum
11. Interdisciplinary experiments simple enough to be performed at home
12. Take back finished result/product along with standardized protocols

#### “Robowars” and “Seeing the Unseen”

13. Cultivate feeling of “Science is Fun”
14. Promote creativity thinking and innovation in science
15. Improve observational skills

The major highlight of VISTAAR was its multipronged approach of targeting students of Class IX and X who face an immediate decision of choosing a science as a subject of choice in high school through a mega practical class that showcased science concepts in an entertaining and simple manner. Two pre-event competitions among the class IX and X students of participating schools were planned to cultivate scientific creativity, observation and self-learning. Additionally, an open exhibition was arranged for students of classes XI and XII, parents and UG students which included stalls in areas of contemporary scientific interest. It also served as a valuable platform for our college students to showcase their scientific innovation and engage in scientific dialogue with their peers. The breakthrough developments in the field were showcased, with special emphasis on career progression in these areas. A brochure for VISTAAR event is attached as **Annexure I**.

### Outreach of VISTAAR

Sri Venkateswara College well recognizes the role of science as a tool to address local needs and global challenges. Science empowers us to answer questions and address pressing issues that impact societies and civilizations at large. It plays an important role in creating knowledge, disseminating it and ultimately applying it to make our lives better. Be it environment, health or artificial

intelligence, scientific inventions cater to the need of society and reflect upon the changes in our civilization. A critical aspect of science learning is taking science to society, the ultimate beneficiary of all scientific endeavours in a way that is easy to understand and relatable. Not only people at large should know about developments in science rather they should give back their suggestions and opinions for its better applicability. It is very important that society at large and youth in particular are made aware about new trends in science as they are the torchbearers and the future stakeholders.

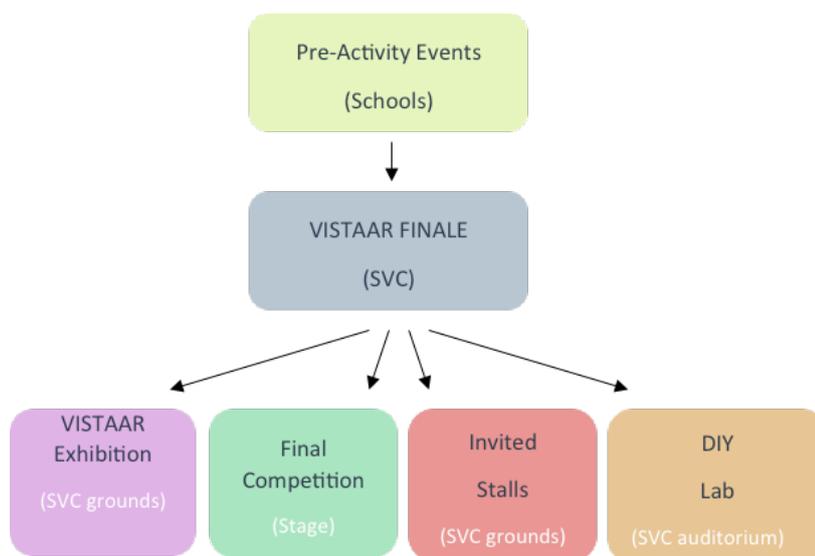
It is the need of the hour to create awareness among school children as their young minds are highly receptive. School children, particularly in the secondary and senior secondary stages are the best targets for sensitization programs as their mind is highly amenable and open. Once scientific consciousness is created in their minds, half the battle is won as they would grow into sensitive adults who would be more responsible and empathetic towards the societal needs.

It is a well-known fact that science is the answer to almost everything in the universe. Curiosity is the key for learning and practicing science. As educators, we know that STEM education (Science, Technology, Engineering, and Mathematics) is the wave of the future. Young children are natural scientists: they ask questions, pick-up sticks and bugs outside, and are curious about the world around them. However, science textbooks have many theories, which are difficult for some students to understand. Judging from the physiological experience, it is uninspiring and unstimulating for a student to study science topics and difficult to know its value without interest.

In lieu of the above mentioned, under the larger umbrella of VISTAAR, we held three different activities targeting audiences that include 9-10 grade students, senior school (XI-XII grade students), undergraduate college students (science/non-science background) and their parents. A program schedule for the event is included as **Annexure II** for review.

The VISTAAR plan consisted of the following events that took place in parallel at different venues in the SVC campus on the event day:

1. DIY- Lab (Do-IT-Yourself Laboratory for IX and X graders)
2. VISTAAR Exhibition (XI-XII graders, UG students and parents)
3. “Robowars” for UG and school students
4. “Seeing the Unseen” competition for school students



**Work Flow of the VISTAAR event**

## The Inaugural ceremony

The day of VISTAAR 2019, a mild chilly morning of November 1<sup>st</sup> started early at 8:00 a.m; with a large number of students from about 22 schools turning up to register for the four events detailed above

Students registering for VISTAAR 2019 on 1<sup>st</sup> of November 2019



- Seeing the Unseen
- Robowars
- DIY- Lab
- VISTAAR Exhibition

The occasion was graced by the presence of two eminent Educationists **Prof L.S. Sashidhara**, IISER, Pune, visiting faculty in Ashoka University and **Dr. Prathibha Jolly**, Former Principal Miranda House, University of Delhi. The event was initiated with the traditional lighting of the lamp by the two distinguished guests, our Principal **Dr P. Hemalatha Reddy** and other faculty members of the Core Working Group of VISTAAR 2019.



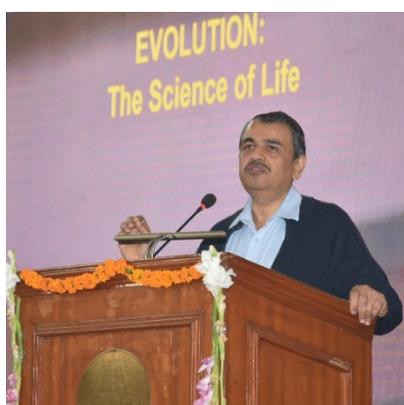
The distinguished guests **Prof L.S. Sashidhara**, **Dr. Pratibha Jolly** and **Dr. P. Hemalata Reddy** lighting the lamp, inaugurating VISTAAR 2019 in front of an audience of staff and students.

The first to address our young guests from the schools was our Principal madam, Dr. P. Hemalatha Reddy. She gave a heart-warming welcome to the students and advised them to focus on knowledge and conceptual learning and not get sucked into the mindless rat-race of marks and materialistic gain. She also welcomed our guests and presented them with a token of appreciation from the college.

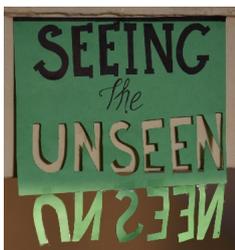


**Dr. P. Hemalata Reddy, Principal Sri Venkateswara College** felicitating **Prof L.S. Sashidhara , IISER Pune/Ashoka University** and **Dr. Pratibha Jolly, Former Principal, Miranda House** and addressing the audience during VISTAAR 2019 inaugural function.

**Dr. Pratibha Jolly** engaged the audience with her wit and student friendly approach emphasising on the importance of both conceptual understanding as well as a strong experimental approach towards addressing scientific solutions to societal issues. She was extremely optimistic and appreciative about the vision of VISTAAR and hoped that it would be carried on in years to come as an annual event. **Prof L. S. Sashidhara** presented a colourful and delightful presentation on the natural world, evolution and experimental biology. His talk engaged the student in discussion and encouraged them to think with inter disciplinary and multidisciplinary approach, to innovate, learn team work and arrive at solutions to problems existing in the environmental and social sphere.



The distinguished guests **Prof L.S. Sashidhara** and **Dr. Pratibha Jolly** addressing the audience during VISTAAR 2019 inaugural function.



## *SEEING THE “UNSEEN” A MICROSCOPY COMPETITION TO ENHANCE SCIENCE LEARNING IN SCHOOL CHILDREN*

### **Introduction**

Microscopes are a great way of getting students enthusiastic about science as it encourages discovery and it also helps students to create their own experiments and understand the surroundings at a microscopic level. The activity lined up for students was a pre-event activity which included capturing of various biological images through a microscope. The students were given the opportunity to display and explain their images in VISTAAR-2019 event. The students enthusiastically described, interpreted and detailed them during the presentation round to audience and our eminent chief guests.

The objective of this exercise was to help students consider science as a creative and enjoyable subject where they can make new discoveries. This will hopefully give the students a head start to consider science as a subject and ultimately science as a career.

### **Timeline**

In May 2019, after the announcement from DBT a meeting was held with all participating departments to discuss the activities and events to be organised during VISTAAR. The competition ‘Seeing the Unseen’ was conceptualised and the responsibility to conduct this activity was given to Zoology & Botany Departments.

July 2019: Discussion was held about the overall framework of Pre-events and final competition. Volunteers were identified and given the responsibilities.

Aug 2019: Team of teachers approached the schools to introduce and popularise the event and encourage the school to hold the pre-event competition of ‘Seeing the unseen’ at their level.

Sept 2019: In-house preparation of the event.

Oct 2019: Finalisation of the main competition rounds and the guidelines were sent to schools. Answering the queries received from the schools.

Pre event booklet sent to schools with guidelines- **Annexure III**

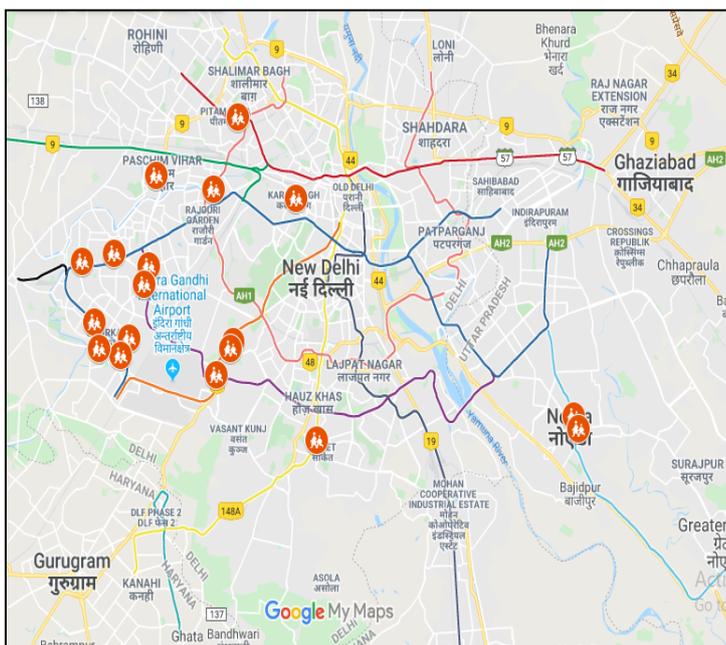
### **Target Audience**

The target audience was school students from class IX and X to strengthen the idea of project based hands-on learning among them.

The following schools participated in the competition.

1.	Mother's International School , Kalu Sarai, New Delhi
2.	Green Fields School, Safdarjung Enclave, New Delhi
3.	Indraprastha International School, Dwarka, New Delhi-110075
4.	Holy Convent School, Uttam Nagar , New Delhi
5.	Holy Convent Sr.Sec School,Vikas Nagar,New Delhi-59
6.	Holy World School, Ishwar Colony, New Delhi
7.	Sadhu Vaswani International School For Girls, Shanti Niketan, New Delhi
8.	Bal Bharati Public School, Noida, UP
9.	DTEA SrSecSchool, Moti Bagh , New Delhi
10.	DLDAV Model School , Pitampura / Delhi
11.	Kothari International School, Noida ,UP
12.	Bal Bharati Public School, Dwarka, New Delhi
13.	Venkateshwar International School, Dwarka, New Delhi
14.	Sri Venkateshwar International School, Dwarka, New Delhi
15.	Vidya Niketan Public School, South Moti Bagh, New Delhi
16.	Frank Anthony Public School, Lajpat Nagar, New Delhi
17.	Mount Carmel School, Anand Niketan, New Delhi
18.	Bloomingdale School, Budaun, UP
19.	Bhatnagar International, Paschim Vihar, New Delhi

The google map given below shows that representation of participating schools covers most areas of Delhi NCR



## **Outcome and Impact:**

There were multiple entries from the 18 participating schools. The college conducted a preliminary screening with an internal judgement team, and the 2 best entrants from each school were printed and displayed on the event day for final judgement. It was both heartening and illuminating to see the quality of slide preparation, photographs and the accompanying text explaining the displays. Students were enthusiastic to explain about their displays to the judges and engaged with them in discussions which were very much appreciated.

### **Display of microphotography submitted for SEEING THE UNSEEN event**



Professor L. S Shashidhar, IISER Pune and Dr. Pratibha Jolly former Principal, Miranda House and Dr.P.Hemalatha Reddy (Principal, SVCCollege, New Delhi) interacting with students and school teachers during the SEEING THE UNSEEN microscopy.



**Professor L. S Shashidhar said that “it was such a great pleasure coming to SVC and seeing the students use the microscopes and to see how interested and engaged they were”.**

**Dr. Pratibha Jolly saw the potential in using microscopes to make learning science more interesting at school level**



**Faculty of SVCollege presenting Foldscopes to inter school SEEING THE UNSEEN microscopy competition winners.**

## **ROBOWARS**

### **Introduction**

As we move towards the 21st century, the impact of robotics in our lives is becoming increasingly apparent. Robotics is a multidisciplinary domain which requires knowledge of **Mechanical Construction** (form or shape), **Electrical technology** (for power and controlling the machinery) and **Programming** (application). To encourage school students towards this multidisciplinary technological advancement of science and to inculcate a realistic approach to understand science, **“Robowars”** was launched as a pre-competition in different schools across Delhi-NCR. The winner(s) of the pre-event from each school participated during the competition at VISTAAR-2019 at SVC and demonstrated their robots. The theme of the competition was based on designing a “Line follower” robot in which robot is supposed to follow a black path on white background with the help of IR sensors.

### **Timeline**

In May 2019, after the announcement from DBT a meeting was held with all participating departments to discuss the activities and events to be organised during VISTAR. The competition ‘Robowars’ was conceptualised and the responsibility to conduct this activity was given to Electronics Department.

July 2019: Discussion was held about the overall framework of Pre-events and final competition. Volunteers were identified and given the responsibilities.

Aug 2019: Team of teachers approached the schools to introduce and popularise the event and encourage the school to hold the pre-event competition of ROBOWARS at their level.

Sept 2019: In-house preparation of the event.

Oct 2019: Finalisation of the main competition rounds and the guidelines were sent to schools. Answering the queries received from the schools.

Pre event booklet sent to schools with guidelines- **Annexure III**

### **Target audience**

The target audience was school students from class IX till XII to strengthen the idea of project based hands-on learning among them. Although the idea was to cover the Delhi-NCR schools at the first place but due to the wide spectrum learning opportunities and multipronged theme of the event, one school from far off place Budaun in UP registered themselves and also managed to participate in the event and appreciated the exposure.

### **Outcome**

It was both heartening and surprising to know that a lot of school have students who are actively engaged in robotics club and activities. Students have started learning robotics at a very tender age of 10-12 years. In all 12 different schools having 17 teams comprising of 2-3 students each registered after the pre-event announcement and a total of 09 teams from those schools took part in the competition. A total of 25 participants (from nine teams) competed in the three rounds. In the final round, three teams which took minimum time to finish the task were declared winners and were given prizes.

### **Impact/Outreach:**

The event proved to create quite a buzz and enthusiasm among the school students. The students got a platform to showcase their talent through a competition and interact with their counterparts from different parts of the city.

View of the participants about the event.....

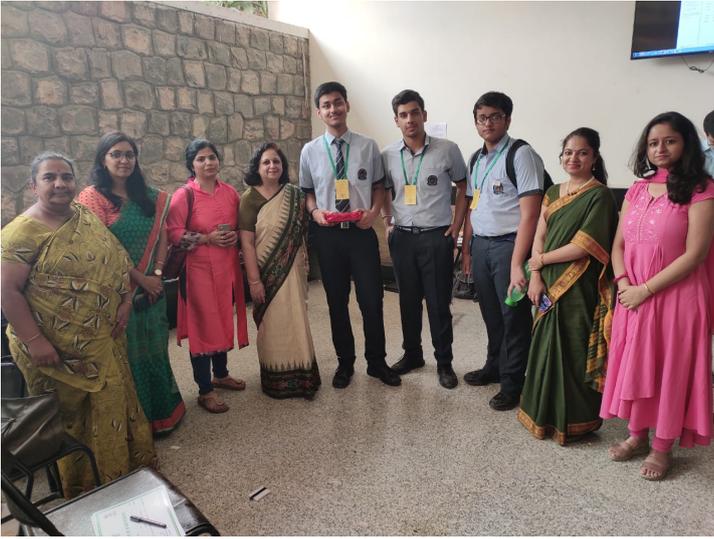
## **ब्लूमिंगडेल के बच्चों ने दिल्ली के स्कूल में किया प्रतिभाग**



प्रमाण पत्र दिखाने ब्लूमिंगडेल स्कूल के छात्र-छात्राएं • जागरण

जास, वदार्गु : नई दिल्ली के श्री प्रस्तुत किए। प्रधानाचार्य ने कहा कि ऐसे  
वैकटेश्वर कॉलेज में डिपार्टमेंट ऑफ कार्यशाला व स्पर्धाओं का उद्देश्य कुछ  
ब्लूमिंगडेल स्कूल के विद्यार्थियों ने नया सीखना, एकता का भाव, बौद्धिक  
की ओर से आयोजित कार्यक्रम में प्रदेश व मानसिक विकास आदि है। अश्वि  
से ब्लूमिंगडेल स्कूल के विद्यार्थियों ने अरोरा, अक्षत रस्तोगी, यासीन अहमद  
प्रतिभाग किया। विज्ञान प्रदर्शनी, रोबो चित्रांश सक्सेना, वंशिका यादव, अमृ  
वार्स आदि के जरिए क्रियात्मक व वंशिका, अभय, रितुज शर्मा, युक्ति  
परिचयनात्मक प्रोजेक्ट देखे। स्वयं से अनेजा, टीला शर्मा आदि ने सहभागित  
करो कार्यक्रम में नवीन क्रियात्मक कार्यों की। अग्रिम जट वानी, मोहीरहीन  
की जानकारी हासिल की। विद्यार्थियों ने मरिचम शेख आदि शिक्षकों का विशेष  
रोबोवॉर्स के तहत एलएफआर रोबो भी योगदान रखा।

*News clip published covering the story of participation of Bloomingdale school from Budaun, UP*



*Left: Winners of the Robowars competition accompanied by their teacher and Faculty members of Department of Electronics, SVCollege.*



*Right: Robot treading through the twist and turns of the track.*

**DIY LAB**  
**DO-IT-YOURSELF LABORATORY**  
**SCIENCE EXPERIMENTS FOR SCHOOL STUDENTS**

**Report**

*“Without laboratories Men of science are like soldiers without arms”*

Louis Paster

One day hands on lab session, “Do-it-Yourself lab”, was organized with a vision to develop experimental learning by applying academic concepts to research and technology. Involvement of different streams like Biochemistry, Botany, Chemistry, Physics, Electronics, allows the students to develop an awareness of the interdependence among the disciplines. The interdisciplinary event allows the students to focus on higher-level learning, thinking, critical analysis, decision making and enables students to set their future goals. Seeing immediate application of their learning in day-to-day life motivates the students and facilitates their connection with the environment and the society. The experiments provide them greater control of their reasoning-learning and hands-on analysis skill. This teaching approach integrates the academic objectives and methods/experiments/research from more than one discipline and enables the students to develop an interdisciplinary aptitude.



**Prof L.S Sashidhara, Dr. Pratibha Jolly and Dr. P. Hemalata Reddy** releasing the booklet of the DIY-Lab. The booklet was given to all participating schools. A copy of the booklet is **Annexure IV**



About 200 students from the following schools participated in this activity.

- ✚ Mother's International School
- ✚ Green Fields School, Safdarjung Enclave, New Delhi
- ✚ Indraprastha International School, Sector 10, Dwarka, New Delhi
- ✚ Holy Convent School Anand Vihar Uttam Nagar, New Delhi
- ✚ Holy Convent Sr.Sec.Vikas Nagar, New Delhi
- ✚ Holy World School, Arjun Park , Ishwar Colony , New Delhi
- ✚ Sadhu Vaswani International School For Girls, New Delhi
- ✚ Bal Bharati Public School, Noida Sector-21
- ✚ DTEA , Moti Bagh , New Delhi
- ✚ Darbari Lal Dav Model School, Nd Block Pitampura, New Delhi
- ✚ Kothari International School, Noida
- ✚ Bal Bharati Public School Dwarka, New Delhi
- ✚ VIS Sector 10, Dwarka, New Delhi
- ✚ Frank Anthony School, New Delhi
- ✚ Mount Carmel School, New Delhi

### **Commencement of the event:**

- At 9.00 am, DIY-Laboratory was inaugurated by Dr. Pratibha Jolly (Former Principal, Miranda House, University of Delhi) and Prof. L.S. Shashidhara, Indian Institute of Science Education and Research (IISER), Pune in SVC Auditorium.
- The gathering was then addressed by Prof. L. S. Shashidhara at 10.00 am enlightening the students and teachers by his lecture on 'EVOLUTION'.
- At 10.30 am, DIY-LAB experiments were started by the concerned teachers along with the student volunteers from SV College who enthusiastically helped the school students at every step.
- All the experiments were supported by a presentations emphasising on the importance and applicability of the said experiment.
- Detailed step by step procedure was also displayed on a large screen on the stage area. Concerned teachers were guiding the school students at each step so that they could perform the experiment simultaneously.
- Curious and excited school students individually performed each experiment and noted the observations in the workbook provided to them.
- After observations, results were discussed and inferences were deduced.
- This procedure was adopted for all the 5 experiments. SVC student volunteers ensured smooth and efficient transition between the experiments.

At 1.00 pm, DIY-LAB ended with valedictory function and presenting of mementos and certificates to the participants.

## DIY experiments: Learning Outcomes

### Experiment 1: GREEN HOUSE EFFECT

**Aim:** To observe the thermal effect of a greenhouse gas (CO<sub>2</sub>).



Dr Sharda Pasricha explaining the experiment and the experimental set up

#### Observations:

From this experiment students saw that the temperature of the bottle with ENO raised more than bottle with plain water. The difference in temperatures of the two bottles (with and without ENO) after 20 minutes was found to be 5 °C.



Students performing the experiment and noting the change in temperature every few minutes.

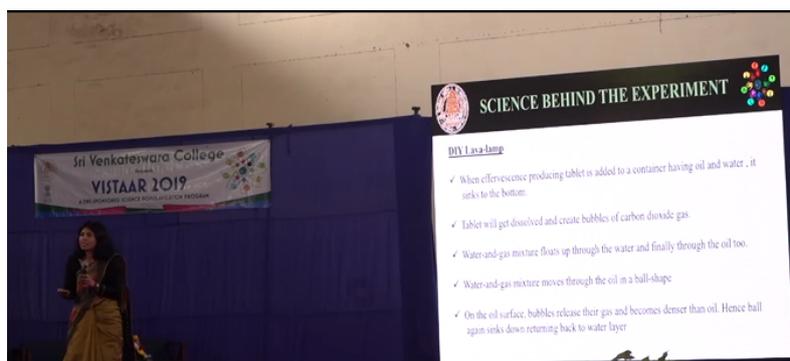
#### Learning Outcomes

This simple demonstration helped the students to understand:

- The meaning of the terms greenhouse gas effect and global warming
- The causes of rise in concentrations of greenhouse gases in the atmosphere
- The connection between rise in greenhouse gas concentration, global warming and climate change
- What makes a Greenhouse gas?
- Thermal effect of the greenhouse gases.

## Experiment 2: MAKE LAVA LAMPS

**Aim:** To make your own lava lamp



Dr. Sarika Yadav explaining the experiment and the concept behind the practical.

### Observations:

The coloured blobs of water-and-gas mixture move up when they are less dense than water and oil and sinks after releasing gas into the air and becoming denser than oil. This creates a LAVA LAMP.



Result of the experiment. And reaction of students seeing the result.

### Learning Outcomes:

This activity is simple and makes chemistry fun. The activity will help students to correlate day to day activities with science. This activity will make them understand the concept of density and surface tension and also the concept of polarity and hydrophobicity.

### Experiment 3: TAKE YOUR DNA HOME

**Aim:** To isolate DNA from your Saliva

Dr. Richa Mishra explaining the details of the experiment.



#### Observations:

In the tube containing saliva, spooling of DNA is observed, while in the tube containing water, no spooling is observed.



Students performing the experiment and observing the DNA spooling.

#### Learning Outcomes:

The isolated DNA needs to be purified before use in a variety of applications in science, medicine and forensics. The ability to extract DNA is of primary importance in studying the genetic causes of disease and for the development of diagnostics and drugs. It is also essential for carrying out forensic analysis, sequencing genomes, detecting bacteria and viruses in the environment.

## Experiment 4: GAME OF LIGHT

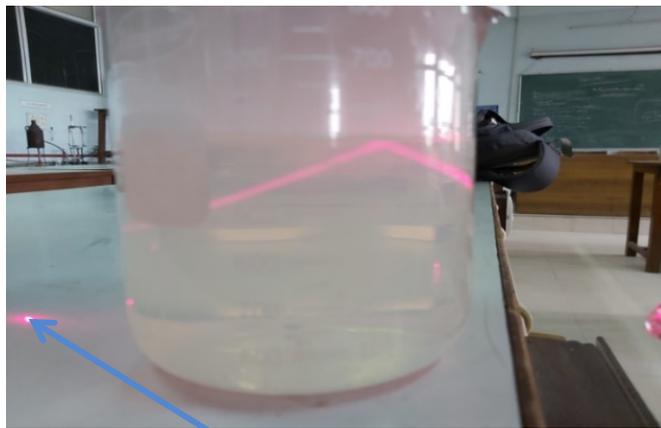
**Aim:** Demonstration of total internal reflection phenomenon



Dr. Piyush Kumar Parasher explaining the details of the experiment.

### Observations:

By increasing the incident angle, the refracted angle is also increased further. There is an angle after that the refracted ray is not transmitted in to the second medium but moves from the surface and back to the first media (water) given that it is now reflected. As a result, total internal reflection occurs as shown in picture below. Bending of light from the water surface and laser spot is observed from the other side of the table as shown in figure below.



Laser spot after reflection from surface

### Learning Outcomes:

As the ray of light moves from water (incident ray) to air (refracted ray) it is possible to see in the image that the ray of light is bent at an angle. The angle of incidence is smaller (due to higher density of water) while the angle of refraction tends to be larger.

Change in the light path verifies the phenomenon of total internal reflection of light.

## Experiment 5: MAKE YOUR OWN pH PAPER

**Aim:** To determine acidity or basicity of given solutions by using **Red Cabbage** as pH indicator.



Dr. Pragya Gehlot explaining the details of the experiment.

### Observations:

**Red at low pH (less than 7):** Anthocyanin (Red cabbage indicator) has less conjugation at low pH; green light is absorbed and red light transmitted.

**Blue at higher pH (7-8):** Anthocyanin has more conjugation at high pH; Orange light is absorbed and blue light transmitted.

Solutions	Colour change	pH	Description
Lemon juice	Bright Red	2	Acidic
Vinegar	Light Red	3	Acidic
Water	Purple	7	Neutral
Baking soda	Greenish	8	Alkaline
Tooth paste	Blue	9	Alkaline
Bleach	Yellow	13	Alkaline



Students preparing a pH indicator range and checking the pH of common household ingredients



### Learning Outcomes

#### Usage of indicator strips

Different solutions can be taken and using pH strips the colour change in different acidic or basic solutions can be seen. The colour of the strip is an indicator of the pH.

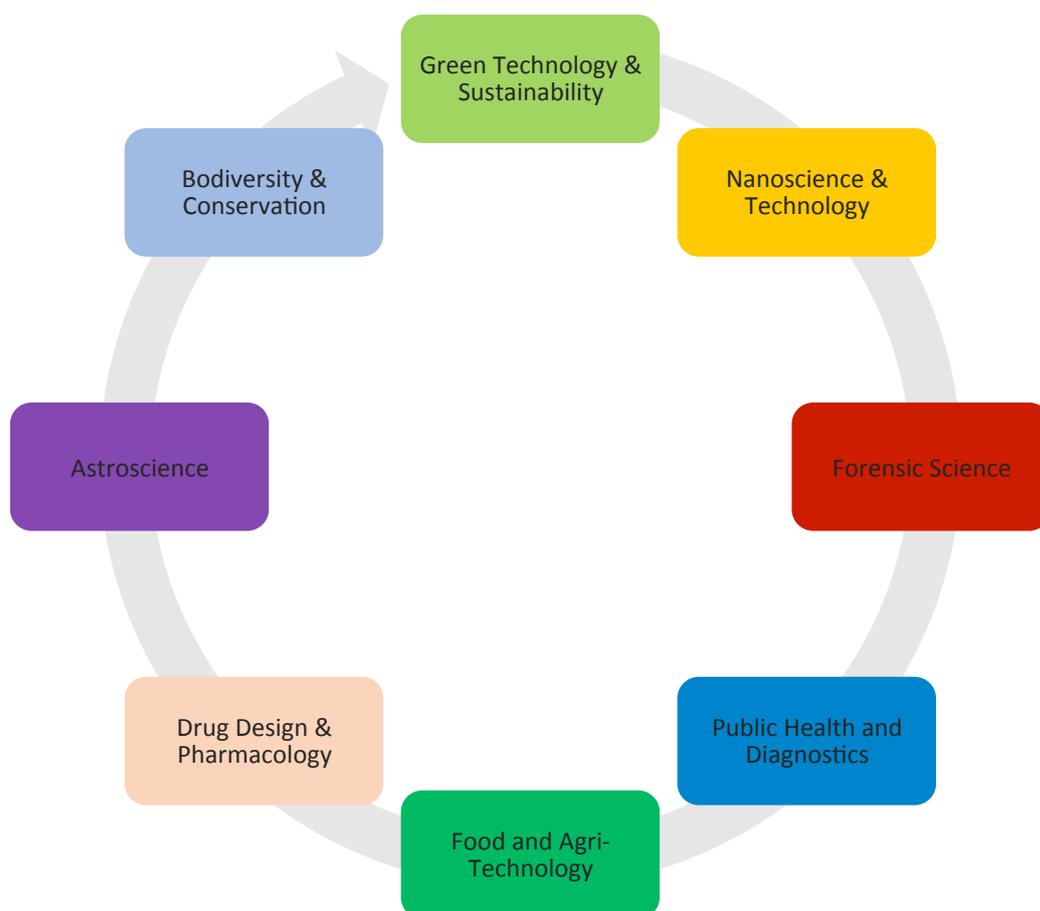
Acidity or basicity of different solutions can be determined by using Red Cabbage, Beets, Blackberries extract etc. as indicator. Other household chemicals that students use daily (shampoo, glass cleaner, dish soap, hand soap, salt, ammonia, soda, milk, orange juice, coffee, lemonade, etc.) can be tested by adding a small amount of each household chemical to your cabbage juice. Determination of pH of cosmetic and food products can help assess their suitability for human use.

## **Overall Impact and outreach**

- 200 + students from both Government and Public schools participated in the demonstrations and hands-on experiments.
- Simultaneous work stations for all students encouraged collaborative learning
- Hands-on experimental learning helped reinforce basic science concepts from school curriculum.
- Experiments provided deep insight into basic concepts like Greenhouse gases and Greenhouse gas effect, DNA and its isolation, pH and making pH paper at home, solubility and relative density and total internal refraction
- Interdisciplinary experiments, simple enough to be performed at home, were demonstrated and students carried the finished product home.
- Students can share and discuss the science behind these experiments with their peers at home /school. The message of understanding science through reasoning, analysis and hands-on skills can thus be shared with a large population of students.

## VISTAAR STALLS

The aim of VISTAAR was to engage students in some exercises that would excite them to enjoy Science. VISTAAR also envisioned projecting Science as an interdisciplinary platform to bridge diverse fields of scientific studies. Thus, an exhibition was organized by participating Science departments where school students of Class IX – XII and undergraduate students were invited. The stalls gave insights to the visiting students into various upcoming fields in Science and Technology. Each stall had a primary theme and /or area. Within the stall a variety of activities were conducted ranging from static posters representative of the theme with associated demonstrations and hands-on activities incorporating cross-curricular challenges and games. There were eight stalls in the exhibition namely:





The exhibition was inaugurated by :

**Prof L S Shashidhara** (IISER, Pune), **Dr Pratibha Jolly** (Former Principal, Miranda House, University of Delhi) and **Dr P Hemalatha Reddy** (Principal, Sri Venkateswara College, University of Delhi).



Overview of the Vistaar stalls with student footfall



## **Overall Impact and outreach**

- The exhibition successfully inculcated organizational skills and team spirit amongst the students from various departments involved in organizing the exhibition.
- It also gave them a platform to critically think and analyze about projection of the given streams.
- Their artistic skills were also well displayed by the posters and models put together by SVC students.
- The target audience benefitted by visiting various stalls and understanding various career paths that they could tread.
- The stalls also engaged the visiting students with games, quizzes and highlighted the “wonder” and “fun” part of Science to these students.
- Students from both Government and Public schools visited the stalls and participated with enthusiasm in the games and activities organized in the stalls.

An overview of all eight stalls is provided through A5 notecards presented in **Annexure V**.

Details of displays in each stall is outlined below

## ASTROSCIENCE

The stall showcased five major discoveries in the field of Astronomy and Astrophysics of 21st century. Each discovery was discussed as a separate poster (A0 size) with good graphical and pictorial expatiations. One of the posters was completely dedicated to the Nobel prize winners of 2019 in Physics for their contributions to our understanding of the evolution of the universe and Earth's place in the cosmos and discovery of an exoplanet.

Along with this several hand-made posters were displayed to discuss physics behind mission Chandrayaan II launched by ISRO in 2019. The working of orbital was also explained with the aid of a video with the aim to address audience from all science branches. Small models of Vikram, rover and the landing site of Chandrayaan II on moon, made by students were also displayed.

Career prospects in the field of Astronomy and Astrophysics at national and international level were discussed.

There were two games: a quiz and a game based on viscosity of water which was highly appreciated by the audience.



*Prof L S Shashidhara interacting with students at the stall    Dr Pratibha Jolly playing Astroquiz at the stall*

## DRUG AND PHARMACOLOGY



In Drugs and Pharmacology Stall, six important, recognized systems of medicine that is Ayurveda, Siddha Unani, Yoga Naturopathy and Homeopathy were projected via posters and models. Dried

medicinal plants were procured from various institutes and were displayed in the stall. Important medicinal plants used in all traditional system were raised and mass multiplied by student volunteers. These plants include *Withania somnifera* (Ashwagandha), *Cissus quadrangularis* (Hadjod), *Aloe vera* (Ghritkumari), *Eclipta alba* (Bhringraj), *Bacopa monerii* (Brahmi), *Trachyspermum ammi* (Ajwain). Different career prospects in field of Drug and Pharmacology were displayed. The subsequent degree/diploma courses to be pursued for acquiring the jobs mentioned were discussed and explained by student volunteers to the audiences. A survey on “Know your Prakriti” was conducted. Visitors were asked to fill a questionnaire based on the Ayurveda concepts of Tridosha and Prakriti. A digital Blood pressure monitor machine was used to check Blood pressure of visitors. Various Diagnostic tools were displayed such as B.P. Monitor machine (Old and Modern), Thermometer (Old and Modern), Glucometer with their lancet, strips etc., Stethoscope, Microscope. Accidentally discovered drugs were explained with their timeline and events of discovery along with the uses of natural products as medicinal values. Ligand based drug design (LBDD) as well as structure-based drug design (SBDD) were also the part of interaction. A video on journey from usage of naturally occurring substances to the modern day engineered drugs. It had a detailed animation showing how modern drugs are made including engineering, testing, trials and approval. A game: Pill-pong. A game based on the questions from drug discovering, scientists, natural therapy, diseases and basic drug knowledge.



*Prof L S Shashidhara with students at the stall*



*“Pill Pong” and “Know your Prakriti”*

## **FOOD AND AGRICULTURE TECHNOLOGY**

Starting from origin of agriculture to the establishment of genetically modified plants, the students got an understanding of the journey of Agriculture with the help of models and posters. They were also introduced to various new techniques of sciences that have been inculcated to improve agriculture and the students also gave suggestions to improve the existing practices. They were informed about how they can minimize their exposure to the adulterants.

There were interactive games like slogan writing competition and Spice identification (the students were blind folded and then they had to identify the spice by either touch or smell) and models (Tissue culture, Poly-houses, Bio-fertilizers.), capturing the attention of the budding scientists. They were also demonstrated with the techniques to test the presence of various adulterants in food. It

was done by a kit called “The Magic Box” which was a gift from the Food Safety and Standards Authority of India.

They asked questions about how agriculture is an inseparable component of life and can provide employment. Agriculture being a large and labor intensive sector, the idea that it can generate large amount of employment was well accepted by the students They were intrigued by the advancements science has made to the sector and how far we have come from the traditional methods in a span of only about 60-65 years of time. A student even asked, “Why can’t we use the spent water of Azolla to use as a fertilizer ?” These questions open doors to new spaces of research and ensure us that science will continue to progress. Their inputs have suggested that the students have budding minds in the field of research and innovation for future and proved that the initiative has met its concept and was a fruitful event.



*Teachers and Students at the stall*



*Demonstration of the “Magic Box”*

## **FORENSIC SCIENCE**



A crime scene was set up for which an area outside the stall was cordoned off and the scene was explained by the students to the audience. The students demonstrated how various evidences had been picked up from the crime scene for analysis inside the stall. The students also discussed how

evidence gathering, preservation and transportation to a laboratory is instrumental to success of application of Forensics for crime solving and what are the various methods employed for these steps of evidence collection and preservation.

The stall had a hands-on demonstration of analysis of various evidences picked up from the crime scene. These included forged currency analysis using UV lamp where visitors could see how to differentiate between actual and forged notes. Fingerprint analysis was performed using a powder prepared by the students themselves under the guidance of experts from SGTB Khalsa College. Phenolphthalein test was demonstrated which is commonly used for solving bribery cases. Posters were used to explain DNA fingerprint analysis which is often a conclusive test in forensics if biological evidences have been picked. Based on these tests, the crime scene mystery was solved. The stall also had a section displaying the various tools used for forensic sciences which included tools for evidence collection as well as laboratory tools for sample analysis.

To help students understand the fields in Forensics as a career path, a poster was displayed inside the stall which highlighted various specialized fields of Forensic Sciences. Posters on major Indian and Foreign Universities offering courses in Forensic Sciences were also displayed. A timeline development on how the field of Forensics has progressed over the last so many years was also displayed. Students also displayed handmade posters on various key crime cases solved using forensics from across the globe.



*Teachers and Students at the stall with the guests*



Crime scene being explained by students



## GREEN TECHNOLOGY AND SUSTAINABILITY



The Green Technology & Sustainability Stall focused on emphasizing on the need for Environmental technology, Green technology or Clean technology as an application of Environmental Science, Green Chemistry. It aimed at explaining the need for Environmental Monitoring i.e., using Electronic devices to monitor, model and conserve the natural environment and resources, to curb the negative impacts of human involvement.

The subjects of Green Chemistry, Sustainability and Managing Electronic Waste were presented on Posters. Models of a Green Environment, and a Green House which was Electronically controlled were presented. The objective of the Stall was to draw the Audience attention towards the various aspects of Sustainability in the wake of severe damage that is being done by Humans depleting the Natural Resources for their selfish motives.

School Kids and College Kids were to be educated on this subject.

There was a e-waste management set up also where CHINTAN, which is an NGO promoting the collection and due disposal of Electronic Waste gathered most of the audience attention.



## MATERIAL AND NANOSCIENCE

Stall Consists of following activities:

A Quiz competition was organized during the exhibition based on questionnaire of material and nanoscience and around 50 students from various schools participated for that same.

There were two models in exhibition - A working model on pancreatic cancer cells treatment using nanoparticles (NPs); targeted therapeutic approaches and a model on Biofuels from Lignin by process named LignoBoost which causes precipitation of Lignin by its acidification.

Posters on following different areas are exhibited in Nano Stall:

An Introduction to Nanotechnology, Nanomaterials and Energy Storage, Nanomaterials and Energy Harvesting, Biomaterials in Drug Delivery, Biomaterials in Tissue Engineering, Biomaterials and Biosensors, An Investigation of the Thermoluminescence Properties of Dysprosium Doped  $\text{Li}_3\text{Po}_4$ . Besides this, a hands-on session on metal nanoparticles formation was also conducted.



*Pictures: From upper left: (i) The team of teachers and students from the material and nano science stall with the principal ma'am and guest. (ii) A visually challenged student playing quiz. (iii) Student explaining the Thermoluminescence Properties of Dysprosium Doped  $\text{Li}_3\text{Po}_4$*

*From bottom left: (i) Students and faculty with pancreatic cancer cells treatment model, (ii) Students explaining the lignin formation to the faculties from other departments*

## PUBLIC HEALTH & MOLECULAR DIAGNOSTICS

The Public Health stall included posters on various themes like colour blindness, SAR value of mobile phones, TDS value of water, Stethoscope, blood grouping etc. The students also broached topics such as Molecular Diagnostics, Agglutination assays and Cancer Immuno-therapeutics by designing attractive posters encompassing the principle of the diagnostic procedures which have revolutionized health care over the past decade as well as the potential future therapeutic applications of Cancer Immunotherapy. Along with this, as optimum nutrition is the underlying requisite for good health, students also created awareness on the impact of various synthetic diets on health of youth. The stall had posters explaining the proportions of various nutrients required to keep the body healthy which attracted a number of students. All students engaged in the VISTAAR activities were thorough with their theoretical explanation and demonstration of relevant topics that kept the audience involved.

Along with this theoretical knowledge, some interesting activities were also performed to make the school students understand the topics easily and apply that in their daily life. Lateral Flow Pregnancy kits and antigens and antibodies were mounted as brief demonstrations to provide a small -scale practical experience corroborating the explained processes mentioned in the posters. Use of mobile phones, the importance of hygiene and sanitation, checking the quality of potable water were also explained for general awareness. Since the overuse of mobile phones by current generation is the prime menace of this era, Students were disseminated the knowledge of SAR (Specific Absorption Rate) value of mobile phones. Colour Blindness was tested in school students using Ishihara Plate, which would help those students who are interested in opting for Armed forces as a career after class XII. ABO blood grouping was performed (with the consent only). As most of the school students were not aware of their blood groups before that, it was an interesting exercise for them. After knowing about their blood groups, the chemistry behind the ABO blood grouping was explained to them with the help of chart, videos etc. As a part of nutritional assessment, using anthropometric measurements parameters like - Body Mass Index, Basal Metabolic Rate and % of Body Fat were calculated for all students visiting the stall and the printed report was given to them on the spot. This allowed students to assess their health by non-invasive methods which they found very interesting. A quiz was also conducted to know the awareness of students about rampant diseases in Delhi-NCR such as Dengue, Chikungunya, Typhoid etc.



## **BIODIVERSITY & CONSERVATION**

The stall displayed about a new and emerging field of science “Bioacoustics” highlighting how it can be a tool for conservation of biodiversity. A large number of students visited the stall (visiting school students VIII-XII, college students and faculty member from Sri Venkateswara College). The students were introduced about various aspects of Biodiversity with special reference to India, like India’s diversity, its biogeographic zones and the various hotspots of our country. The stall also introduced the concept of carrying capacity and the threats, which our biodiversity currently face. There were interactive games – “sound is coming” which was based on identification of animal sounds, “connect the food chain and food web” based on some unique ecosystems and models of ecological succession which captured the attention of the visiting students. There was also a demonstration of butterfly and the importance of its host plant for its survival.

They were also introduced to various new branch of science “Bioacoustics” that can have a significant role in conservation of biodiversity in future. The students learned and enjoyed the demonstration with great enthusiasm. It might be fruitful in motivating students to pursue field biology as a future career choice.

Total Visitors: 200 students (School and College combined)



*Students and teachers with visitors at the stall*



*The conservation and Biodiversity team*

## VISTAAR 2019: IMPACT AND OUTCOMES.



VISTAAR 2019 was an interdisciplinary event having multifaceted outcomes. We anticipate that participation in such an event will have far reaching and a sustainable impact on student learning. The deep learning process facilitated through such a multipronged event like VISTAAR is bound to have a lasting impact on students from middle, senior and undergraduate levels. Such a vision is critical for creating novel citizens for a better tomorrow.

In future, Sri Venkateswara College aspires to continue its efforts in the direction of scientific awareness and education at not only regional but at national level. We aim to make VISTAAR an annual event that can benefit our youth of today and help make better citizens of tomorrow. *Albert Einstein has rightly said “Logic will get you from A to Z, Imagination will get you everywhere”.* Integrating a vastly inclusive model like VISTAAR with other novel initiatives of SVC such as “MindSpar”, an out-of-the box innovation competition will enable us to amalgamate scientific observation and thinking, with innovation and discovery.

Feedback from schools is presented as **Anneure VI**