Pratham Science Learning Program
Concept Note

Introduction

In India, current teaching practices revolve around rote learning rather than hands-on learning. This problem is further magnified while teaching subjects such as science that require innovation, creativity of thought and experiential learning. Poor infrastructure in government schools further hinders the learning process of students.

Pratham's Science Learning Program attempts to bridge this gap in learning by providing a platform for children to learn by doing experiments on their own, handle various kinds of apparatuses and tools and explore the natural environment. The intervention is designed to stimulate curiosity and help develop a scientific temper not only among children but the community at large. Having started in 2005 in Maharashtra, Pratham's Science Learning Program was scaled up in 2010 at a national level. Currently, over 3 lakh children from std. V to VIII in 95+ blocks across 17 states are reached through science clubs, science fairs and community workshops with a common dictum - 'learn by doing'.

Program Objectives

- Children should develop basic competencies required for science learning such as handling experimental material, making correct observations, identifying patterns, learning reasoning and being able to draw conclusions.
- Children should have the confidence to perform experiments and should hone their demonstration skills.
- Children will prepare experiments and models by themselves and explain different science concepts in their own words.
- The program will serve as a demonstration of the 'Learning by doing' method of science learning in front of teachers, parents and community members.

Activities

Science Program conducts following types of activities in any location by appointing local youth called *'Vigyan Mitra'* (Friends of science). Each *Vigyan Mitra* is responsible for 6 to 8 middle schools or 10 to 15 villages depending upon the project requirement. In an academic year, each *Vigyan Mitra* is expected to spend 20-28 days in each school.

Science Fair

The *Vigyan Mitra* selects 30-40 children from a chosen school and trains them through a two to four day workshop to demonstrate different experiments and models. These children would be referred to as *Bal Vigyan Mitra*. These children will demonstrate and explain experiments and models that they learnt or prepared to other children, teachers, parents and members of their community during

a ‘Science Fair’. Certificates are awarded to each *Bal Vigyan Mitra*. This will provide these children with the opportunity to enhance their demonstration skills. Here, children try to explain the different science concepts in their own words rather than the textbook language. Our experience tells that, children who hesitate to stand up and speak in class, start speaking confidently during a fair.

Science Club

Science fairs are also a taster to convince schools and villages to establish science clubs in their premises. Members of the club assign a suitable name for their science club e.g. name of scientist or spaceship. Each science club will be provided set of science reading cards and quarterly periodical for members of the club. *Vigyan Mitra* conducts activity based workshops in each science club. Different topics for each month are decided on the basis of state curriculum and National curriculum framework 2005 e.g. Nature exploration, microscope, electricity, human body etc. In each session, *Vigyan Mitra* conducts various experiments and activities with the help of science kit provided to him. Powerpoints, animations and videos are used to explain difficult concepts. Pratham has collaborated with VIPNET (Vigyan Prasar network) which is an official network of science clubs run by *Vigyan Prasar*, government of India. Each science club formed in schools by Pratham is entitled to get register with VIPNET also. Considering 7 months (August to March) implementation in science club, each *Vigyan Mitra* generally spends two to three days in each month in the school.

Sky Watching Camps (Camp Galileo)

During November to June, four day-long sky watching workshops are organised in each school or in community. This is called ‘Camp Galileo’. Children are given the opportunity to observe the night sky – stars, planets and the moon - with the help of a telescope. They will also learn basic concepts about the solar system with the help of role-plays and other activities. Specifically designed workbooks are given to children, for them to note down their observations and analyse these observations at the end of the four day camp.

Nurture the Talent

The *Vigyan Mitras* identify children who show interest in science and potential for growth. Identification of these children is based on participation in the science club workshops, eagerness to learn and perform experiments or diligence in completing assignments. The identified children would then be given additional workshops in conjunction with local scientific institution (like government science centers or museums or university) and science experts to nurture their talent and provide them with greater exposure.

Mobile Science Van

In some programs, a ‘Mobile Science Van’ is used by *Vigyan Mitras* to transport science models, telescope, projector, and library books with relative ease. Following the workshops in schools, the Vigyan Mitras use the van to reach communities, where they conduct awareness workshops, film screenings, etc., for the community at large.

Science Exploratory Centres

Science Exploratory Centres have been set up in multiple locations around the country. The Science Exploratory Centres integrate technology with learning, by using tablets and LED TVs with digital content – A dedicated digital content development group has been formed within the content team of Pratham Science Learning Program for this purpose. *Vigyan Mitras* facilitate workshops and sessions with children in the centres.

The centres are built close to the existing project areas which have been set up with the support of grants from various donors who believe in the vision of Pratham's Science Learning Program.

Typically, a centre is set up with science models, equipment and a library. Some centres also use Mobile Science Vans to reach villages and schools to conduct workshops as part of our intervention.

A Science Exploratory Centre is structured such that there is a large, centrally located centre – which serves as a hub – and two or three smaller centres within a 20-50 km radius of this large centre that serve as outreach centres. These outreach centres, together with the larger hub centre, are considered as one single centre.

Administration of these centres is taken care of by *Vigyan Mitras*. Depending on whether the centre is large or small, 3-5 *Vigyan Mitras* handle one centre. In addition to working in the centre, each *VM* carries out workshops in 5-6 schools and villages.

Multiple activities take place both inside and outside Science Exploratory Centres, with the centres serving as a resource hub. A brief description of these activities is given below:

Location	**Activity**	**Target group**	**Outcomes**
INSIDE THE CENTRE	Workshops with children (on weekends, weekdays after school)	Children from the local communities (and/or) from schools in which our programs are running.	To create a stimulating, engaging learning environment for children to learn and explore science. Thereby, children develop a scientific bent of mind. The centre also serves as a space for other learning activities like studying, leisure reading, etc.
	Workshops with community members	Youth and adults from the community who are curious about the centre or are keen to volunteer/teach.	To build scientific awareness among youth, to invest them in the education of children in their communities.
	Exposure visits	Visitors from other NGOs, Govt officials, DIET students, school teachers.	These visits are conducted to understand the 'learning by doing' approach; to understand the program model and activities.

OUTSIDE THE CENTRE	Workshops in schools	Students of classes 6-8. Workshops and Science fairs in schools are conducted as a part of the Pratham Science Learning Program.	To create a stimulating, engaging learning environment for children to learn and explore science. Thereby, children develop a scientific bent of mind.
	Community engagement activities – Awareness workshops, film screenings, sky watching	Village community members of all age groups.	To build awareness in the community of concepts like 'Food adulteration', 'Hygiene and sanitation' and activities like sky watching.
	Training sessions	DIET students, school teachers, etc.	To share the 'learning by doing' approach with other teachers and stakeholders.

General approach for conducting any science workshop/camps

- Children will be formed into sub-groups consisting of 5 to 7 children. Care will be taken to bridge 'gender gap' by forming mixed group of boys and girls.
- Material will be provided to each group and children will be asked to do the experiment or make the model on that topic. Children will be encouraged to work in groups, perform experiments, observe and explore it. There will be a discussion with them at the end of session on each experiment.
- During workshop days, as homework, children will be asked to read associated textbook chapter or reading material for each science topic.
- Also children will write or draw pictures of each experiment and model in their own words in their notebook.
- During entire workshop period, role of vigyan mitra will be as 'facilitator' and to guide students to explore on their own.
- Assignments or project work will be given on each science topic and children will be encouraged to work on it individually or in groups.
- Digital content will be used to give additional information on workshop topics e.g. video of actual Maglev train of Japan after magnetic levitation experiments. Also Children will play interactive simulations to explore given science concepts which are otherwise difficult to visualize. In near future, we may plan to give tablets in groups for this purpose.

Measuring impact

Impact of the Science fair is something to be experienced but very difficult to be measured. Children explain the experiments in their own words and parents and their teachers are surprised to see the increased confidence level. Impact of the Science fair has been measured by checking the retention of the children 3 to 4 months after the fair and the results have been satisfactory.

Impact of the Science club activity or workshops is measured by conducting formative assessment with the testing tool made by ASER center. The intervention begins with 6th std. children and then goes on for the next 3 years that means till these children pass 8th std. A summative test will then be done to measure the impact at the end of the intervention period.

Project management

There is central project management team who is involved into overall program implementation, content and its training. This team is comprised of training and content experts and they visit each location on regular basis. This team is also responsible for content generation – print as well digital - of the subject.

Annexure 1 - Photographs

Science Fair - Hand Made Stethoscope

Science Club - Leaf Zoo

Science Fair – Straw flutes

Science Club - Day and Night model

Exploring Human body

Camp Galileo – Sky watching

Mobile Science Van

Science Centre of 1200 sq. ft.

Mini Science Centre