SCIENCE EXPERIMENTS AND ACTIVITY BOX

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Shri Prahlad Gajjar joined as an assistant teacher at Shivrajpur Primary School in Dev Bhoomi Dwarka in February 1995. In March 2007 he moved to the Shri Metal Primary School at Bavla taluka, Ahmedabad district. At present he is working in a school near this school, at Rajvala. As a teacher with only PTC, he can teach classes from 1 to 5, but because of his deep interest in science, he is allowed to teach children of Class 6 to 8.

In June 2007, at Metal, he found that students had almost zero curiosity in science. Resources were scarce and children were afraid to use whatever little laboratory material was available. There was fear among the children regarding science. They only had textual or bookish knowledge. He began with the following questions:

- How to get rid of disinterest among children regarding science education?
- What are the possible ways of using science with technology?
- What should be the approach of teaching using insufficient resources or facilities?
- What can be done if the materials for teaching although available are not handy?
- What are the ways of conducting experimental work in science and technology?
- How can materials be child-friendly and handy at the same time?

He started with an activity called "Question box". Any student who had a doubt about something in the textbook or even not relating to it could write it on a note and drop it in the box. In a week's time, the teacher would open the box and select 2 to 3 questions and answer it through videos, photos as well as PPT. This activity was held in the children's assembly on every Saturday. In the beginning very few students would put in their questions, however within 6 months they had learned to ask questions.

During the second session of the academic year 2007–08, he noticed that when children were individually asked to conduct experiments in science, they were either hesitant to do so or had forgotten the process. In order to solve this problem, he made 5 different tables and named them Vikram Sarabhai, Dr Homi Bhabha, S.Ramanujan, Dr A.P.J. Abdul Kalam and Aryabhatt. Whenever the children were required to conduct experiments, they were divided into five groups and given one table each to conduct an experiment.

Students doing experiments

Science Box

This activity encouraged the students to conduct experiments on their own and also introduced them to scientific equipment and their uses. During every experiment, he first demonstrated it to the class and then the group would conduct the experiment. Through this exercise, the student gained sufficient information from the textbook and could relate to the information given in the textbook. Through this exercise including class observation as well as group activity he could conclude that students could overcome their fear regarding science and asked each other questions. They were also eager to conduct new experiments and there was an increase in their curiosity levels.

In the same year, he decided to form the "Science Congregation" to encourage their interest and understanding of science subject. About 3 to 4 gifted students from standard 6 to 8 were made members of this congregation. The task of members of this congregation was to meet every month to exchange views on science. They also made a note of things that were missing from the laboratories and how to replace them. They would also give information regarding special days during school assembly specially if it was related to a scientist. The congregation members also presented their own science models and selected one model for the maths-science exhibition organised at different times by the government. The members also discussed science experiments and create a group model to participate in the district level and state level exhibitions/ competitions. Over time the students' interest in science subject had increased to a great extent. Also, in the year 2009-10, the village people encouraged this interest by contributing around Rs 50000 to establish a laboratory.

Shri Rajvala Primary School was a very small school with only 68 students in 2014. In this school he continued all the activities of the Metal school like the question box, dividing children in 5 groups and creation of Science Congregation. The school's science education was getting better now due to availability of enough equipment. But children were finding it difficult to use the equipment. One child had an idea. He asked if we could group the tools required for each chapter? Other questions followed: "How could it be implemented? How can expenses be met? How and from where to get the materials?"

But work began and first the equipment required for 20 units of the first term was identified and arranged. Shri Gajjar received a donation of Rs. 5000 for this work, which was used to buy big, strong and translucent plastic boxes to replace the shoe boxes that he was using. Once he had to be away for a few days and so made notes for each activity along with the details and kept this card in each of the 47 boxes. Students were able to follow the instructions easily. They got interested and built around 200 toys from waste materials which were also arranged in different boxes. These included magnetic toys, illusion-making toys, puzzles and other toys. The children started learning through online mediums using teacher's laptop or mobile through a variety of applications such as Learnvita, various blogs, AR-VR technology, 3D videos, QR code , animation and YouTube. The school, however, did not have amenities like a computer or a projector and so learning through technology was difficult. Now the kids contributed a small sum of Rs 100 each to create a variety of tools on their own using 3D television, digital archiving, digital microscope, holograms

machine, mini projector, mobile TV Box, etc. Children managed to create a technology driven atmosphere using waste materials obtained from their surrounding environment. However, Shri Gajjar thought of building a workshop for children so that they are free to do their experiments and activities independently. He constructed a workshop in the school and children used it to do all kinds of experiments.

The children started participating in Science exhibitions and other competitions. In the long term, the school's grading and student numbers also increased. The parent community also built up a special connection with the school. Many students have entered higher studies in science-related fields. Some examples are:

SR NO	YEAR/ STANDARD	STUDENT'S NAME	NAME OF COURSE
1	2011/Std 8	Umangbhai Prajapati	Software Engineering degree
2	2011/Std 8	Sanjaybhai Patel	Electrical engineering degree
3	2018/Std 9	Hardikbhai Prajapati	Civil Engineering degree
4	2018/Std 9	Haribhai Patel	Software Engineering degree
5	2018/Std 9	Jayadeva Prajapati	Mechanical Engineering

Boxes for scientific experiments

Awards & Recognition

NAME OF THE AWARD	INSTITUTE GIVING THE AWARD	YEAR OF AWARD	FIELD
Best Teacher Award (Taluka level)	District Panchayat, Ahmedabad	2015	Ahmedabad district
Special Work Citation for Science	District Panchayat, Ahmedabad	2016	Ahmedabad district
Best 100 Innovations	I. I. M, Ahmedabad	2014	State level
Citation to honour publication as a case study in Saarth (I.I.M)	District Pancayat, Ahmedabad, Teacher's Group, Bavla	2018	Ahmedabad district
Sandipani Vidyaguru Award	Sandipani Ashram, Porbandar , Award given by Ramesh bhai Oza	2018	State level
Samarth Online Training Case Study Citation	IIM Ahmedabad	2018	State level
National Education Innovation Conference, Solapur	Sir Foundation Maharashtra, IIM, Ahmedabad	2018	National
Sarth Online Training Case Study Citation	IIM, Ahmedabad	2019	State level
ICCIG International Conference	IIM, Ahmedabad	2019	State level
Innovation Festival	Nehru Science Center (Mumbai)	2019	National
MakerFestival Platinum Awards with cash prize of Rs 18,000	MakerFestival, Vadodara	2019	State level
Zero Investment in Education Award	Arvindo Society, IIT Delhi	2020	National

Shri Gajjar has been helping other teachers through WhatsApp and face-to-face training. Nearly 200 schools have adopted his work.

Details of participation at Education Innovation Fair organised by IIMA and GCERT at the district and state-level:

SR NO	YEAR OF INNOVATION FAIR	NAME OF INNOVATION
1	2015–16	Conduct experiment in groups (Shri Metal Primary School)
2	2016–17	Spread awareness regarding science education among teachers (Shri Rajvala Primary School)
3	2017–18	My box is my science (Shri Rajvala Primary School)
4	2018–19	Digital educational tools

Given below is a list of all the innovative work done at the district and state level in Math-Science exhibitions:

SR NO	YEAR	STAND-ARD	NAME OF THE WORK / MODEL	THE REASON AND EXPLANATION BEHIND IT	DISTRICT/STATE LEVEL
1	2006	7	Detective equipment (students)	To prevent theft of school computers, they made a model at the cost of Rs 50 where a phone call is done as soon as the door is opened.	State level
2	2006	7	Honeycomb Mathemagic (teacher and students)	The model explaining the math involved in a beehive	District level
3	2010	7	Machine for fertilizers (students)	A machine which ensures each plant gets enough fertilizer and fertilizer does not get wasted not occur to the machine	District level
4	2018	8	Drug spraying pumps (students)	A spraying pump that sprays pesticides from the rear side so that it does not get sprayed on the face of the person using the machine.	National level
5	2018	7	Multiple farm tractor (teacher +student)	Mini tractor from the bike's engine	State level Inspirational Award
6	2018	7	Machine to get rid of birds from fields	A tool made to ward off herons and other birds at school	District Level
7	2018	7	Modern brooms	Creating a bigger broom for school cleaning	District Level
8	2018	7	Modern Pesticide Pump	Machine to spray pesticides	State level Inspirational Award
9	2018	6	Digital tools	Tools for providing digital education to children made at very low cost	District level

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QUESTIONS FOR TEACHERS

1. What activities should be done to make the science subject interesting?
2. What care must be taken while experimenting in a science subject?
3. What should be done to overcome the fear of science subject?

QUESTIONS FOR TRAINEES

1. How can a science subject be made interesting through digital medium?
2. What do you do to explain to children that science is involved in everyday activities?
3. What precautions should be taken while designing a science workshop?