EXPERIMENTS FROM WASTE MATERIALS TO UNDERSTAND SCIENTIFIC CONCEPTS

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Shri Pandurang Hendar Bhoir has been a teacher since 1992. His area of interest is Science. He believes that Science needs to be understood, and that experimentation and observation are two necessary skills to achieve mastery over the subject. However, experiments are sometimes not possible in schools due to the lack of resources. To rectify the situation, Shri Bhoir decided to come up with his own resources and teaching aids. However, money was a concern and he was worried how he could deal with the costs involved in developing these aids. The school had purchased some teaching aids from the market but both the teachers and students were uncomfortable using them as they were scared to cause any damage. In fact, many teachers actually dissuaded their students from even touching them, fearing they would break.

It was in the year 2003, Shri Bhoir decided to use low-cost, or waste material such as balloons, pens refills, bottles, glass stove, straw, coconut husk fibres, steel plates, wooden waste material, bulbs, etc. With trial and error, he learnt to put these materials to constructive use. He has also prepared notes on how to use these materials as teaching aids and shared them with other teachers. Word soon spread and teachers belonging to other schools also followed suite, developing their own teaching resources from waste material. Shri Bhoir also receives invitations from other schools to demonstrate his experiments and teaching aids with a view to making learning fun, interesting and relevant for the students. To further spread the word, he has also launched his YouTube channel with videos showcasing his experiments and tools.

In Thane district, Science teachers regularly meet to discuss and share ideas. Shri Bhoir is an active participant in these meets and his idea are met with great enthusiasm. Teachers also use the opportunity to provide him feedback, which he then uses to further improve his aids.

Demonstration of the experiment in front of visitors

Science videos

Some examples of his teaching aids for Science are given below. Please see the YouTube links for exact details (the language is Marathi).

Bernoulli's Principle

To explain the working of the spray pump, take an empty gel pen refill. Cut it into two and the place it on a waste ice-cream stick with the nozzle of the top half in front of the bottom half which is horizontal. When the bottom part of the top half is dipped into water, and air pressure manipulated by blowing from the horizontal half, a spray results.

Pascal's Law

Working of Air jack. This uses a thick plastic bag. A clean oil pouch with one corner snipped off is used, along with a plastic pipe and thread. The pipe is securely fixed to the opening in the bag. The jack can be demonstrated by blowing air into the bag. By putting a weight on the bag (e.g. brick) the students can see how easily the brick is lifted.

Newton's Law of Gravitation

Michael Faraday's experiment

After 2 years, Shir Bhoir could observer major changes in his students, with a majority of them now interested enough to even conduct these experiments on their own. They are now familiar with the instruments in the science lab and confident about handling them. Further, they also show more interest in the subject approaching him time and again with their queries. Shri Bhoir also conducted regular tests and found a marked improvement in the students' performance.

Shri Bhoir has, through the experiments and inexpensive teaching aids, has initiated the process of activity-based experimental learning, laying in his students the seeds of a scientific temper. He now aims to setup innovative science labs in schools using waste, reusable, and recyclable material.

Motivated by the success achieved by Shri Bhoir, several schools in the district too have followed in his footsteps. He regularly receives

Experiment Demonstration with Kids

Children's laboratory

invitations to showcase his skills in various schools. His school has participated in Maharashtra Shikshnachi Wari. Till date, 62 projects have been completed. He has received a number of awards at the district level and also from the Education Secretary of Maharashtra.

The teachers believe that it is the best approach to involve students in studies. Even they have urged to start such projects in their schools.

Parents have been thanking by various ways to imbibe scientific attitude in their child. Students feel more active while handling this experiments and enjoy such learning.

QUESTIONS FOR TEACHERS

1. What activities can be organized in the school to make the science subject interesting?
2. What should be done to motivate children to experiment with science and technology on their own?
3. How can children be involved in the process of making various educational tools from the materials available in the school at low cost?

QUESTIONS FOR TRAINEES

1. The subject of science and technology is related to another subject, how do you explain it to children?
2. What precautions should be taken to use digital media effectively while teaching a science subject?
3. What co-curricular activities should be undertaken for children to develop functional skills rather than study?