



## Simple toys make learning science fun

By [Arvind Gupta](#) | Muktangam Vidnyan Shodhika



*Activity-based learning through play with materials like matchsticks and straws allows children to intuitively grasp the science behind the toy. Photo by Sumeet Moghe*

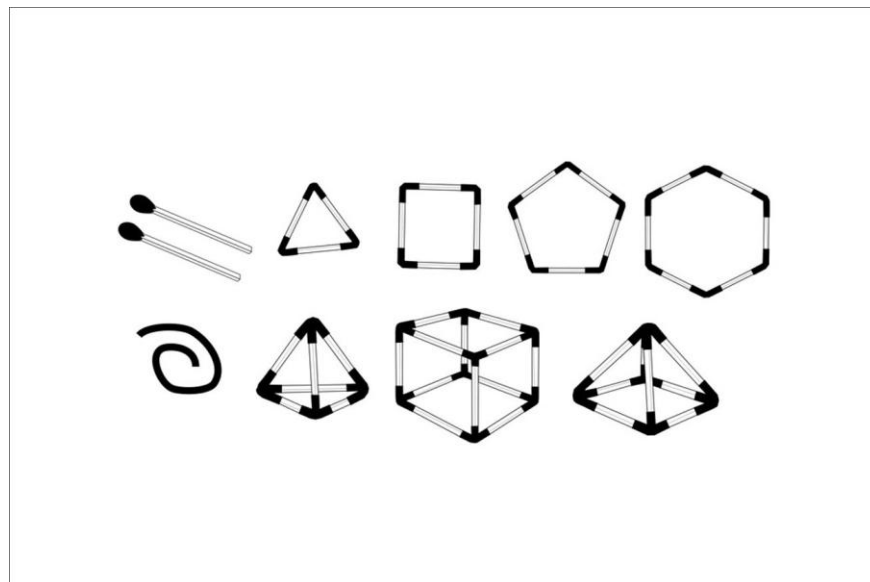
India has sent most of its children to school by opening more schools and increasing enrolment. But the quality of learning leaves much to be desired.

Science in India has traditionally been learnt by rote. Very few schools do experiments. Children parrot key definitions and answers, and reproduce them in exams. In the process, children lose the whole joy of science.

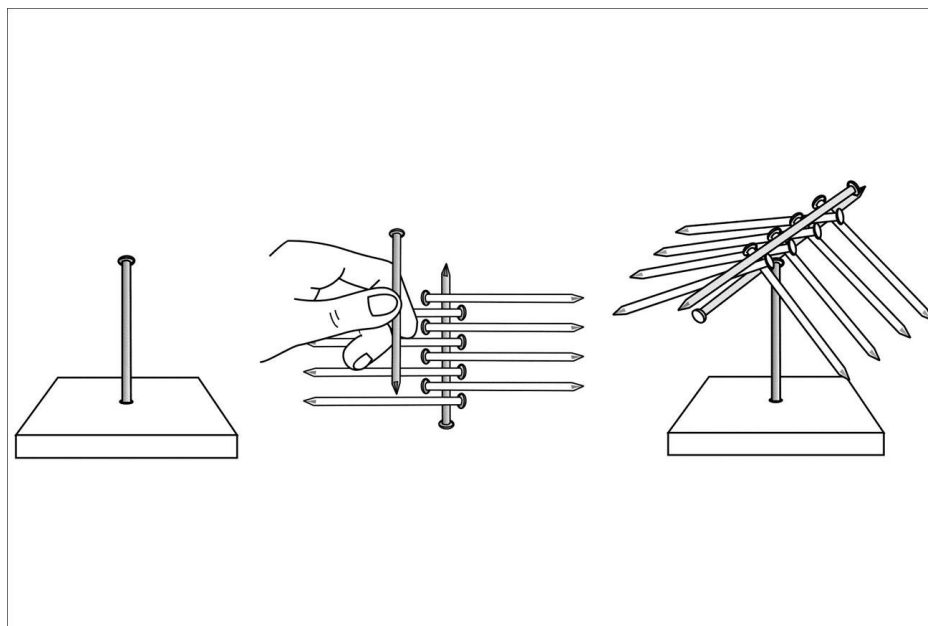
Do you know someone doing an innovative project to spark creativity? Put it on the map!

In 1970, a pioneering experiment – the Hoshangabad Science Teaching Programme (HSTP) – tried to revitalize science learning in village schools. Instead of the standard burettes and pipettes, it improvised apparatus. It used low-cost, readily available and simple stuff to make science fun. Starting with 16 government schools, the HSTP spread to over 1,200 schools.

Expensive glass apparatus is often locked in cupboards. Children have no access to it. Here, familiar, ordinary things were used for activity-based science learning. Children love playing with toys. During play, they intuitively grasp the science behind the toy.



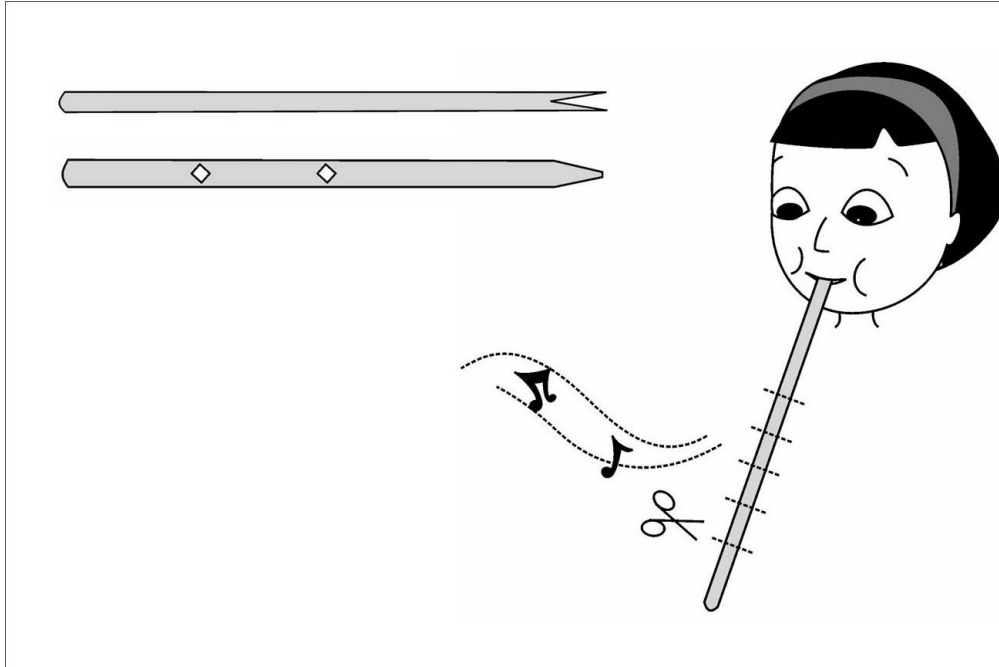
**Matchstick models:** Simple models can be made from matchsticks and a cycle valve tube. This thin black tube is available in all villages. Children can make joints of 2, 3, 4, 5 and 6 with these rubber pieces and construct a whole array of two- and three-dimensional shapes. As they build them, they see the triangle has the strongest shape and understand its use in making roof trusses and bridges. These models help children realize the importance of science – it relates to real life.



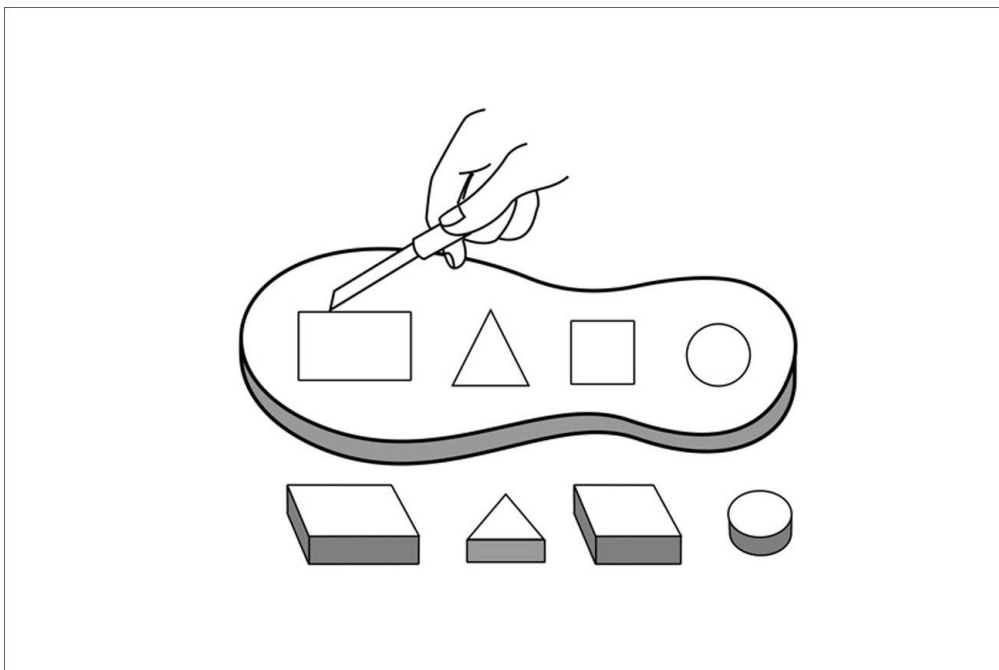
**Nail puzzle:** Nails measuring 10 centimetres – used for making wooden door frames – are readily available in hardware stores, even in remote places. Can you balance 10 nails on the head of a vertical nail? It looks impossible, but it can easily be done. Playing with this toy, children intuitively grasp the fundamentals of balance and centre of gravity.

**Straw sprinkler:** Poke a stiff broomstick in the middle of the straw. Make two equidistant half-cuts in the straw. Bend the arms in a triangle and tape them together. Place the sprinkler in a glass of water, spin the broomstick and water will sprinkle all over! Children will spontaneously grasp the invisible force of spin. On a hot summer day, it's a sheer delight for children to water plants with this sprinkler.

**How many things can fit in a matchbox?** Try to pack in small things – only one specimen of each – into an empty matchbox. Children start looking at the world critically, searching for small things: a mustard seed, a rice grain, a sliver of thread or a piece of leaf. In one such competition, 30 years ago, a child was able to pack in over 250 specimens! Children today would certainly surpass this record.

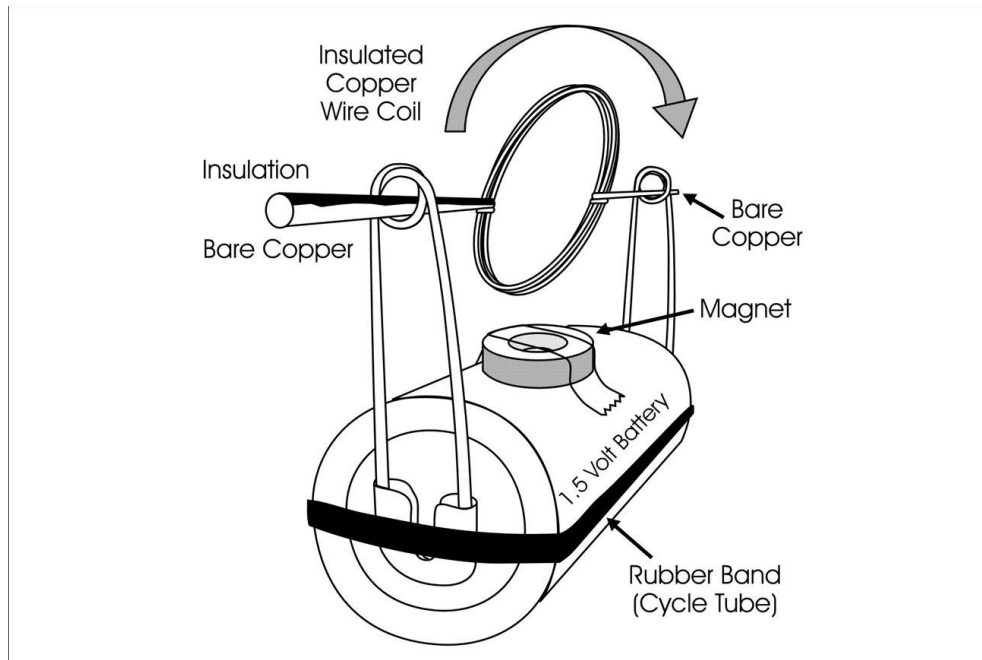


**Magical flute:** Flatten one end of a plastic straw by pressing it, then cut two slants to make a pointed spear. Place this reed in your mouth and blow out. The reed will vibrate and make a musical note. Make a few holes in the straw and play it like a flute! Children can learn many principles of sound through this activity. Keep cutting the straw to hear low- to high-pitch notes.



**Slipper insets:** Poor people wear rubber flip-flops. The base of a broken slipper makes an interesting Montessori teaching aid. Cut a triangle, square and a circle in the rubber base. It

makes a good inset puzzle for little children – especially the visually impaired. With no rough edges, it is safe for children.



**Simple motor:** The electric motor powers many devices at home – fan, cooler, fridge, pump and washing machine. Few children, however, ever make a motor. Apart from a 1.5-volt torch battery, you need a ferrite magnet, two big safety pins, two rubber bands cut from a bike tube and 1 meter of insulated copper wire used for motor rewinding. The coil is wound using the battery as a former. One end of the coil is completely scraped of the insulation exposing the shiny copper below. The other end is scraped only on three sides – the little remaining insulation on this end acts as an on and off switch. This improvised switch is the heart of the motor. It acts as the ‘brush’ or the ‘commutator’ of a DC motor. One girl was utterly fascinated by this magical motor. She would get up in the middle of the night, run it for a few minutes and then go back to sleep.

## Online resources

For the past 10 years, a focused team of competent and compassionate people have attempted to make science fun and accessible for children – especially the poor. These low-cost science experiments use plastic bottles, tetrapaks, newspapers, broomsticks, postcards and other throwaway stuff. The group has 4,300 short videos dubbed in 20 different languages [on its website](#).

Apart from helping schools in far-flung villages of India, these resources help children and teachers in countries of Africa, Asia and Latin America to make science fun. Breezy Ocana Flaquer, from the Dominican Republic, has dubbed nearly 300 videos of toys from trash in

Spanish. They have been viewed by millions of children across Latin America. We are trying to find partners to dub the videos in Nepali and Bangla, as they would help children learn science better in these developing countries.

*(Illustrations by Vidula Mhaiskar)*



### **Arvind Gupta**

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