



REVELING IN OUR SOUNDSCAPE

The teacher entered a classroom full of chattering students. She clapped a couple of times to get their attention. Once she had their ears, she asked them, *"What is sound?"*

Flummoxed by her sudden question, students mumbled some responses: *"It is noise"*, *"It is energy"*, *"It is just a feeling"*.

Sensing their confusion, the teacher said, *"Let's try and understand it better. Carefully observe and describe all the sounds that we are hearing in this room right now."*

The students listed the sounds of vehicles, students in the next class, drums on the street across, etc. As they continued to list the sounds around them, their observations became sharper. They started describing subtler sounds like that of the footsteps of someone walking in the corridor.

The teacher let them list more sounds, then asked *"What else do you observe about these sounds?"*

"Some are softer, some are louder", a student replied. *"Also, from the way we hear the sound, we can tell if its source is moving or stationary"*, her friend added.

"Wonderful!" the teacher exclaimed. *"Is there anything else common between all these sounds?"* she probed them further.

"I think sound is produced only when two things touch each other, for example, two vessels banging", a student observed. Her friend countered this with a question, *"But what kind of things touch each other in a loudspeaker or a flute? How is sound produced there?"*

"Interesting. Shall we play a game to see if we can figure this out?" The teacher distributed a few plastic straws, and

asked the students to modify it in any way that they could to produce sound. *"Whoever creates the loudest sound wins"*, the teacher announced.

Students started blowing air into their straws and noticing the sounds that were produced. *"Great"*, said the teacher, *"Can any of you produce a louder sound?"* Some of the students tried piercing holes in their straws, others cut their edges. *"It is a little louder than the original straw,"* they shared. Another student said, *"I have noticed that a flute has many holes on its surface. I am going to modify my straw into a flute."* *"That's a great idea. Let's see what happens,"* said the teacher.

The class was startled by a sudden loud sound. As everyone looked around for the source, the student who had managed to produce the sound looked elated. The teacher walked over to this student's desk to look more closely at what she had done to her straw. In the meanwhile, many other students started working faster than before to get the same result from their own straws. In no time, a few more students had figured out the trick and made similar models. The trick was to cut the straw at one end to create a pair of free flaps. The class exploded with loud sounds.

As they were playing around with the different models of straws, a student observed, *"The sound produced by different straws is different. Some produce duller sounds; some produce sharper sounds."*

"That is a wonderful observation. You are saying that apart from its volume, the quality of sound is also changing in different models", the teacher said. She introduced some of the different attributes of sound, like intensity and amplitude.



Students brainstorming on ways to modify their straws to produce sound. On the right are the different designs that students came up with, each producing varying levels of sound. The one that appears second last is the one that produced the loudest sound.

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As students were recovering from their sound party, the teacher posed the next question. *"How is this sound travelling from its source to our ears?"*

After some time of thinking in silence, one of them replied, *"I think sound is made up of small particles. These particles are carried from the source to our ears with the help of air."* Others nodded in agreement.

A little surprised by the reply, the teacher asked *"If sound is made up of particles, where are these particles coming from? When we speak, are we throwing out some particles from our mouth? When we beat a drum, do particles come out from the drum?"*

"I don't think so", said a student.

Sensing their confusion, the teacher asked them to feel the free flaps of the straw as the sound was being produced. *"What do you feel?"* she asked.

"The flaps are vibrating very fast", they said with excitement.

"What about when you speak? If you touch your throat, what do you feel?"

Note: The activity with straws has been adapted from Arvind Gupta's Splendid straws. URL: <http://www.arvindguptatoys.com/arvindgupta/DH-AG-SPLENDID-STRAWS.pdf>.



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"Something is moving."

"Very nice. So that's how all sound is produced and that's also how it travels. Particles in an object vibrate to produce sound. These vibrations are passed on to neighbouring particles, and this continues till they finally reach our ears", the teacher said. Then posed the next question: *"And can you guess what happens in our ears?"*

"Something must be vibrating!", a student replied confidently. *"I have heard of an eardrum that helps in hearing,"* someone else added.

The teacher concluded the class by telling the students about our eardrum – how it has a membrane that vibrates when sound waves reach it; and how these vibrations send signals to our brain, which we interpret as sound. The students seemed amazed by all the new things that they had discovered together about 'sounds' – even ones they routinely heard. They continued to revel in the musical soundscapes of their straw flutes and feel the vibrations of their free flaps long after the class had come to an end.