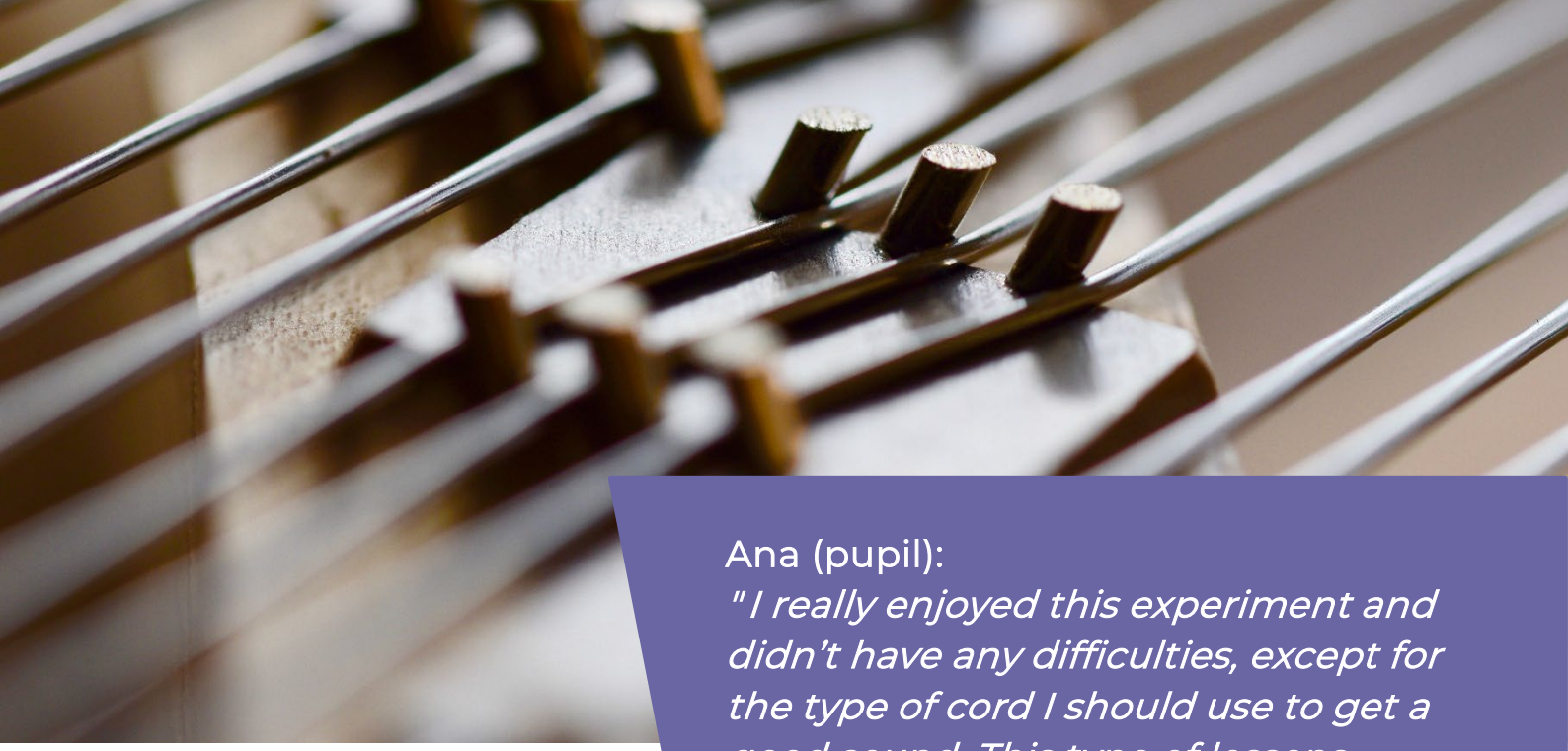


Ana (pupil):
"I really enjoyed this experiment and didn't have any difficulties, except for the type of cord I should use to get a good sound. This type of lessons makes me understand maths better."

MAKE IT SOUND

[Music] [Mathematics] [Physics] [History] [Crafts]

Objective

A workshop on how to make your own music instrument. The workshop teaches pupils about how sound is made, how it may be transformed into music and how our attraction to music has made it one of our oldest forms of expression.

Activities

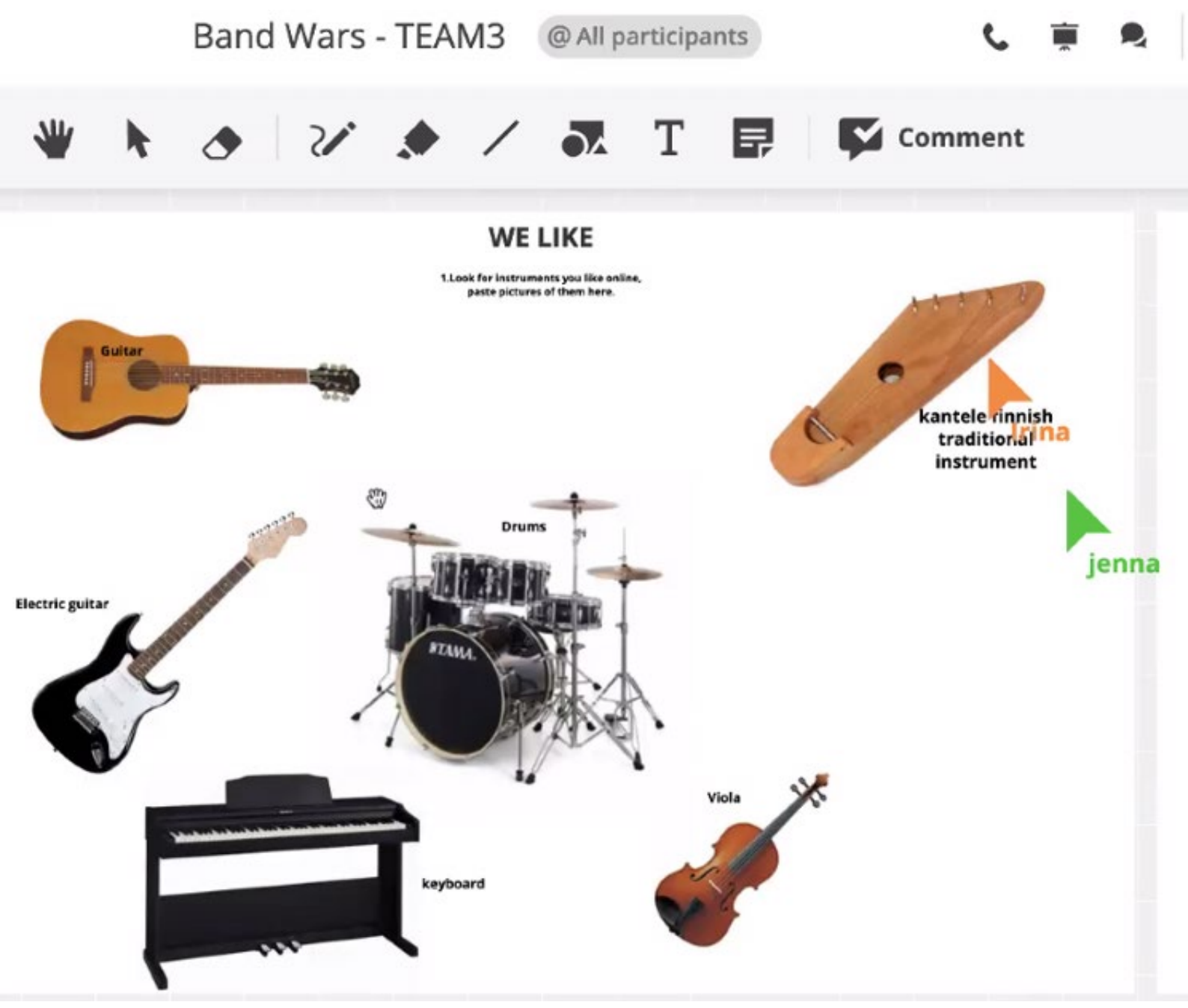
- 5 min - Short intro into the theme, explanation of sound, vibration, different music instruments and sound outcomes.
- 20 min - Workshop: Build your own monochord music instrument.
- 10 min - Discussion: Instrument showoff / discussion / funtime
- 15 min - Break Out in groups using Padlet, Conceptboard or Jamboard: Look for traditional instruments. What are they made of? / which is your favourite / how does it sound? Why is music important?

- 20 min - Small Presentation of findings. 2-3 min presentation per group.

Materials needed?

- 1 piece of straight wood, preferably hardwood of 70-100 cm length, about 10 cm broad and 2-5 cm thick/ worse case a wooden broomstick
- 1 guitar string preferably or a nylon wire 1-2 mm
- 2 nails
- Hammer
- 1 empty metal can
- 1 piece of round metal, 0.5-1cm thick (for instance a screwdriver, also a thick knife might do)
- A pencil

Image below: Impression using Jamboard



Make it Sound in practice in Romania

We integrated the ”Make It Sound” international Smart Hands workshop in the maths lesson Ratios, proportions and mean (arithmetic and harmonic mean) for the 9th graders from Colegiul National Emil Racovita in Cluj, Romania.

The lesson started with a structured discussion around the following questions:

1. Do you know any string instruments? Do you know anything about the arithmetic or geometric mean of 2 positive numbers? Or the harmonic mean of 2 positive numbers? What about the octave, quint or quart?
2. Is there any connection between the 3 means of 2 positive numbers (or just one of them maybe) and the octave, quint and quart? If so, which is the connection?

Then, the students were asked to make monochords (like described above) with different string lengths: 90cm string length, 45cm string length, 60cm string length, 67.5cm string length and to compare the sounds produced by the 4 monochords.

In groups of 4 (each student in the group had a different string length for their monochord) the students worked together to investigate the connection between the sound and the length of the string and to identify different properties of musical

proportion. During the group work activity, the students solved the tasks related to the musical proportion, the relationship among the musical proportion and the proportion made with 2 positive numbers, the arithmetic mean and their harmonic mean, harmony of sounds, the frequency of the sounds produced by the 4 monochords (they used FizzIQ app to measure the frequencies) and the relationship between the musical notes and the string frequency.

The lesson ended with the students' reflection on their work. What do pupils actually say about this lesson?

Amelia:
"Throughout the lesson I learnt about the way in which the length of a cord could influence the frequency of the sounds it emits. I also received information about a thing I had known nothing up to that moment: the musical proportion; I find it very interesting that maths plays an important role even in music. I was amazed by the way in which we can find the length of the cord that emits an octave, a fifth or a quartet of a sound by using a basic calculation.
I also enjoyed working in a team, which allowed us each to focus on an exercise and take the necessary time to think about it."

Ana:
"Using our four-string monochords, our team found out that when the strings vibrate together, they produce 4 sounds, the shorter strings having the highest pitch(an octave) and the longer string having the lowest pitch.
I really enjoyed this interesting experiment and didn't have any difficulties, except for the type of cord I should use to get a good sound. This type of lessons makes me understand Maths better."