Pianola: sound, music and mechanics

1. General features

1.1. Presentation

What do we need pianolas for in the XXIst century, when computers enable us to see sound? It's true that programs of wave representation let us relate visual records of sound to their intensity or energy, recognise patterns of sounds, measure periods and frequencies, relate visual records to pitch, etc. There is also musical software that helps us interpret or compose and see the score simultaneously.

However, as our computer activity is restricted to tapping keys or moving the mouse, the gap between action and visual or musical effect is too great for younger children. In addition, the source of the music is electronic and the process of sound production is difficult to understand.

With the activities of this theme we wish to overcome these difficulties and offer children the opportunity to relate their actions in space and time with graphical representations of sound on a Cartesian plane, something that can be seen as a musical graph with some analogy with scores. With the pianola, children can easily "programme" and play melodies. They can also modify or compose melodies and record their compositions on paper. Moreover, they can observe and investigate how the sound is produced.

1.2. Fields to explore

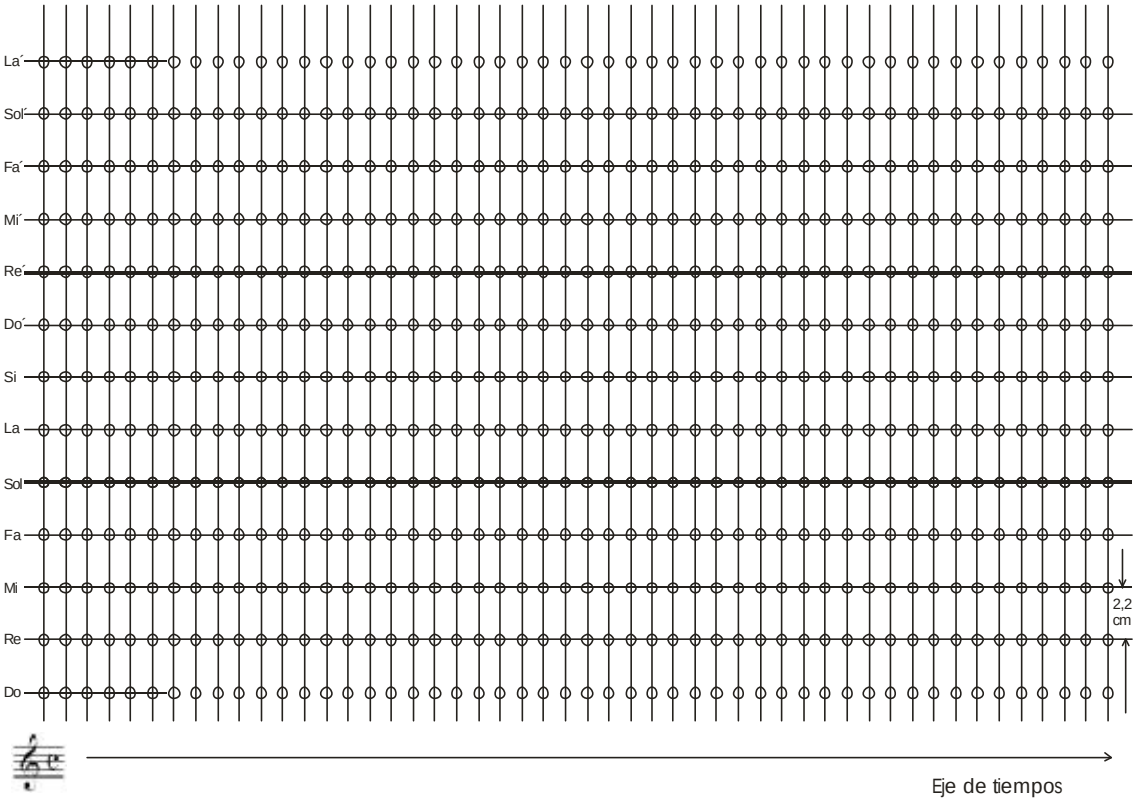
- ✍ Exploring what the pianola is like and how it works
- ✍ Variables that affect the production of sound
- ✍ Introduction to musical programming: experiences of musical composition and recording on the Cartesian plane.
- ✍ Graphical representations of sound

1.3. Materials

Sheets of paper for recording notes

These are A3-sized pieces of paper with holes arranged in lines and columns. The most complex sheet has 13 lines and 30 columns. Each line represents a note; and each column, a time period.

(Fig.)

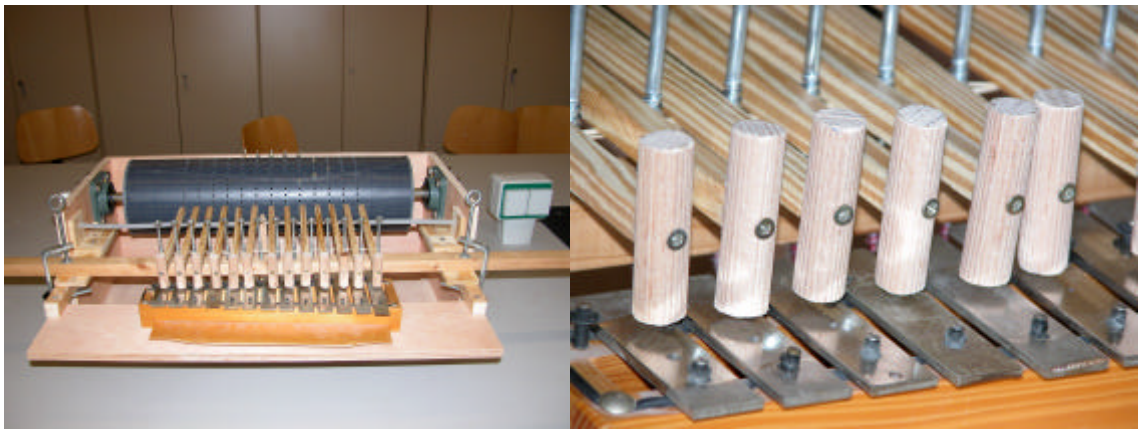


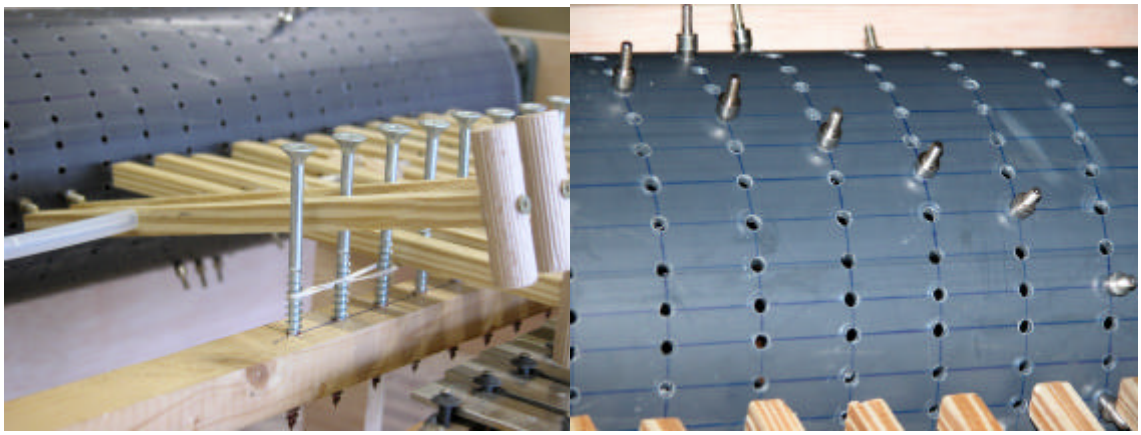
Pianola

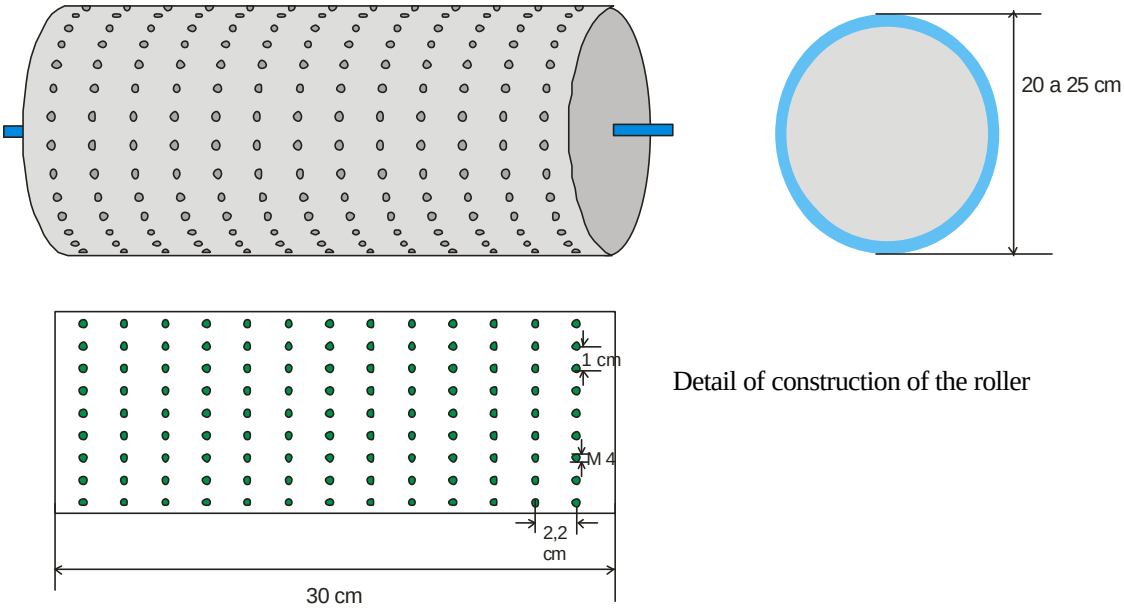
The pianola consists of the roller, the xylophone, hammers and the brake system.

The roller is a cylinder with 13x30 holes. In these holes children can fit a banana pin, as you can see in the figure.

The hammers strike the xylophone. To ensure that they only hit the metallic pieces of the xylophone once and do not stick to them, there are rubbers that function as brakes.







Detail of construction of the roller

2. Activities

2.1. Meeting the pianola.

(4-5 years old)

Purpose:

To introduce the pianola to children and familiarize them with its use.

Key contents:

The pianola can interpret well-known songs

The songs are written on a piece of paper

Different notes have different pitch

Between two notes there is always a time period

Notes and time periods form a melody

Suggested procedures and methodological considerations

The teacher must choose some popular songs that children have sung in the classroom. He/she can suggest that the children interpret these songs with the pianola.

The teacher must show the piece of paper with the pattern of the song and explain how the song is written on it.

The teacher should assemble the pattern sheet and the banana pins in the pianola and play the song. It's very important that the teacher shows and explains his/her actions to the children and invites them to collaborate in the assembly and in getting the pianola to play the song.

2.2. Investigating the pianola

(4-5 years old)

Purpose:

To get children to explore the pianola so as to understand how it makes music.

To encourage children to relate the pitch of notes and time periods to the position of the banana pins.

Key contents:

The different parts of the pianola and how they work.

Suggested procedures and methodological considerations

In this activity the teacher leads the exploration of the pianola. The main actors are the children, but the teacher monitors their progress. He/she asks, suggests, introduces explanations and summarizes.

The teacher asks the children how the pianola manages to make music. He/she suggests observations, and asks for explanations and demonstrations.

Do you know how the pianola works?

Where does the banana pin push?

Where does the hammer strike?

What is the rubber for?

What happens if you put this pin into another hole?

2.3. Investigating sound production

(5-6 years old)

Purpose:

To encourage children to explore how the pianola produces sound.

Key contents:

Sound is produced by vibrations in objects

In the roller, the holes of each circle are the same note

In the roller, the holes of each line sound at the same time

The pitch of a sound produced by an object depends on the object's length

Suggested procedures and methodological considerations

The teacher asks the children if somebody knows how the pianola produces sound. He/she can suggest observations and experiments.

How do you think the pianola knows what song to play?

Does this banana pin produce a sound equal to/ higher than/ lower than this other one?

Where do you think the sound comes out?

What do you notice in the xylophone piece when it makes a noise?

The teacher must ask for explanations and demonstrations of the children's answers. Attention should be directed to the hammer mechanism and the vibration of the metallic pieces of the xylophone.

He/she should suggest that children find examples of similar situations.

The main actors are the children, but the teacher monitors their progress. He/she asks, suggests, introduces explanations and summarizes.

2.4. Composing and recording with the pianola

(5-6 years old)

Purpose:

To provide a method of music composition and recording for children to experiment with.

To provide the children with experience in graphic representations of songs.

Key contents:

Different notes have different pitch

Between two notes there is always a time period

A melody is formed by notes and time periods

In the roller, the holes of each circle are the same note.

In the roller, the holes of each line sound at the same time.

Suggested procedures and methodological considerations

The teacher asks the children if somebody knows how musicians compose songs, in order to make clear that the notes produced have to be written down or recorded.

The teacher must show and explain to the children how a song is composed and recorded. The children must have an active role by choosing holes, putting in banana pins and marking holes on the sheet of paper.

The teacher must encourage the children to create their own compositions, alone or in small groups (2 or 3 children). The children work autonomously with the pianola: they select the holes for the pins and play the song. If they like the song, they mark the holes and change the used sheet of paper for a new one.