

The improvement of science learning through astronomy

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Abstract

With the experience of almost three years teaching Astronomy in the public schools of Manaus, Brazil, the volunteers of the social project called Projeto Cosmos analyzed the enthusiasm and commitment of the students on astronomy and astronautics lectures and workshops promoted by the project.

The volunteers began to develop activities and didactics that explored more natural sciences and mathematics in the context of astronomy. The first planned activity was to teach ratio and proportion by playing with the size scales of the planets of the Solar System and the distances among them. The second activity was as exploration of chemical elements through the origin of the universe, the birth of stars and planets. And the final one was through rocket building workshops, exploring concepts of kinematic physics, dynamics, and hydrodynamics.

Keywords: Astronomy; education; natural sciences; mathematics.

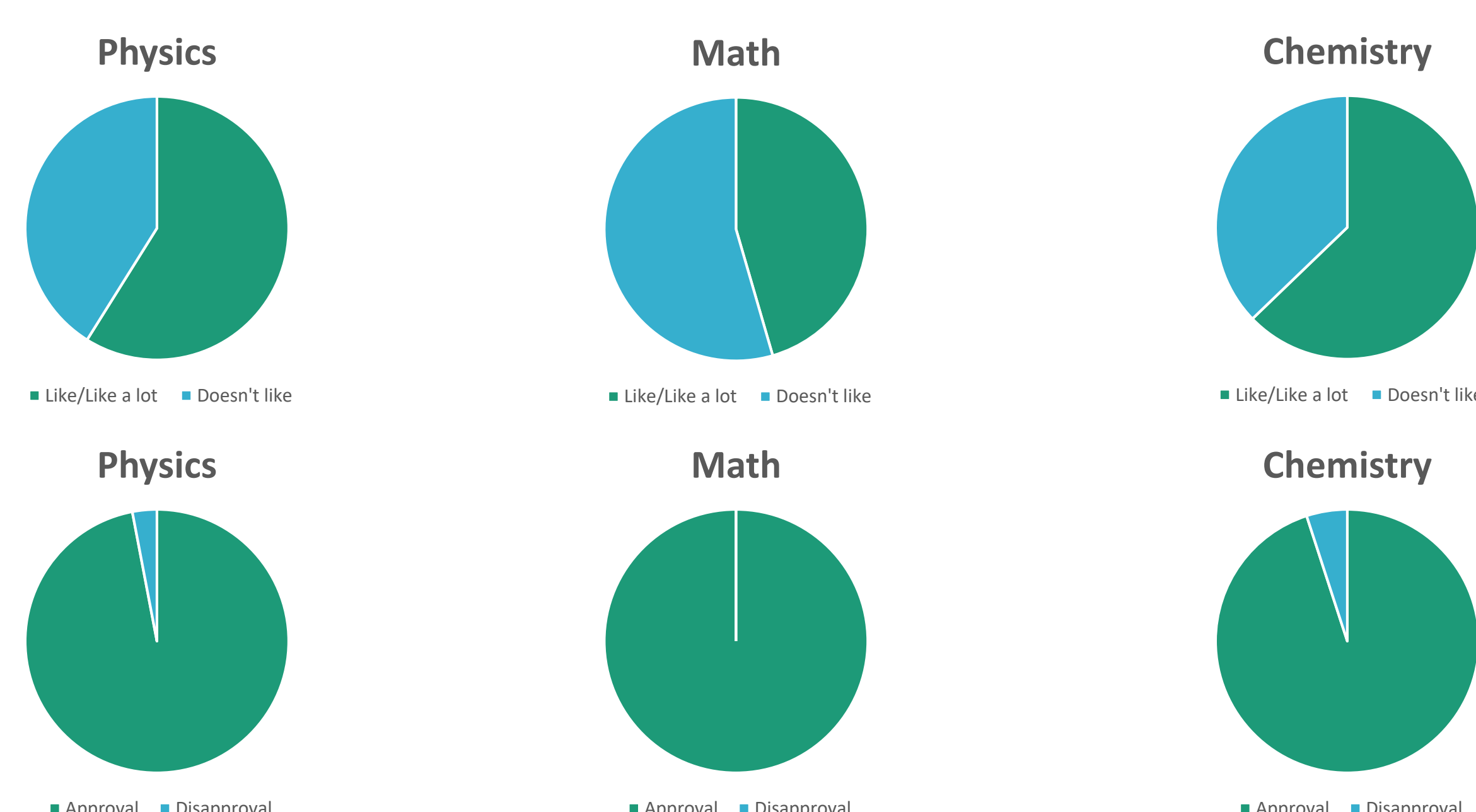
Methodology

Projeto Cosmos' classes were set up to use various didactic strategies: subject explanation, audiovisual resources, experiments, workshops and challenge questions. Specifically, to further explore the multidisciplinary of astronomy, we have developed three lectures, each with the aim of reinforcing concepts of a specific subject: mathematics, chemistry and physics.

1. Astronomy and mathematics: By comparing them with distances and sizes closer to our daily lives by working with scales, we can have a real sense of how big these numbers are and how we improve our view of the outer space. In this class, two workshops were worked: one reproducing the size of the planets of the solar system in scale and another the distances between the planets. In the first we played the design of the circumferences on a paper, and the students rolled up balls of aluminum foil and newspaper to reproduce the planets in a three-dimensional plane. The second workshop measured distance in inches from one planet to another, and they were positioning each planet's name on a long paper tape.

2. Astronomy and chemistry: "The Chemical Elements and the Stars" explores the birth and evolution of stars and how to identify its chemical elements by analyzing its light spectrum. In this way, we can reinforce the concept of atoms, thermonuclear fusion, light as electromagnetic wave and spectroscopy. In this lesson we used videos, images, animations to show how the chemical elements are made inside a star and how we can detect these elements by the light that come to us. In addition, we introduced an experiment to show how different chemical elements produced flames of different colors. And finally, a challenge for students to analyze a spectrum of a fictitious star and infer the chemical elements present in it.
3. Astronomy and physics: "Rocket Physics" covers several concepts of astronautics, such as the engineering behind the rocket structure, as well as concepts such as aerodynamics, Newtonian dynamics, kinematics, and energy concepts. In addition, we commented a bit on the current outlook and future goals of the aerospace industry. We included videos about gravity, how to put a satellite in orbit and the launch of Space X Falcon Heavy (many students does not have ever heard about Space X). As a practical activity, we did a plastic bottle rocket construction workshop and the launch was done with water and compressed air.

Results



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