

Learning from the Extremes Summer School 2023

Teaching with Astronomy



Teaching with astronomy

- One of the most targeted disciplines for the production of fake news and pseudoscience is astronomy. In this sense, our project proposes the use of digital tools and ludic materials for the inclusive teaching of astronomy, in addition to the use of astronomy itself for teaching other subjects. The project dedicated to teachers, that is, students are teachers.
- Goals
- Motivation and Creativity
- interdisciplinarity
- multidisciplinary
- Inclusion

Feel

Propose to student-teachers that they identify the problems in their local communities. We cite some examples:

- students' lack of interest in activities in their subjects
- sensationalist disclosures about science (myths and truths, fake news)
- on the other hand, interest in pseudosciences (e.g. astrology)
- disconnection of the discipline taught with everyday life
- BNCC: Base Nacional Comum Curricular in Brazil provides teaching of astronomy from the 1st year of elementary school to the last year of high school and teachers do not have training in astronomy. There is a lot of material on the internet, but which one to trust? how to use astronomy to motivate interest in other disciplines?
- inclusion of blind or low vision students, deaf students and students with ASD (autistic spectrum disorder)

Imagine



Astronomy fascinates, astronomy enchants

We can teach several disciplines using astronomy as a motivation tool for the student, connecting it with the students' daily lives and showing its highly influential factor in the development of science.

We present an example of a set of adaptable activities for several school years and inclusive

Create

Use existing and ready-to-use tools available online, like Stellarium to develop dynamics, such as:

How was the sky on the day of your birth?

How many stars are there in the solar system?

Do you know any constellations? Which? Are the constellations the same for all peoples?

Are the stars in the same constellation at the same distance from Earth?

Where are nebulae, clusters and galaxies?

What are the distances from the stars to us?

also incentivizing the students to perform dynamics at home by asking questions to family members, observing the sky and, if possible, using the stellarium

Create

Inclusion

To include students who are blind or have low vision, everyone makes an embossed drawing of the constellations, using glue, which is thicker the brighter the stars. The lines made with string.

Students with ASD are effective in active search, they are self-taught. If the professor proposes to everyone "let's learn together?", "let's research together?" it will also be in a comfortable zone for students with ASD.

Create

The student-teachers seek to adapt the activities according to the subject and school year and try to work in an integrated way.

Arts: Drawing and 3D representation of volumes + distances from the sun and planets. Initial version and Final version after the activities of other disciplines

Mathematics: Distance scale and volume scale: initial series ready tables; EF 2 creation of tables; In search of the scale factor

Physics: Search for the tilt of the axis of rotation relative to the orbit plane.

History: How man began to realize that the world is not geocentric.

Geography: Understanding celestial coordinates x geographic coordinates.

Create

Based on the tables obtained, make scaled volume representations using newspaper, used paper, used aluminum foil or other material. To represent the axes barbecue sticks and matchsticks.

At the end of the performance pass the Earth from hand to hand and motivate students to reflect on our planet, our home and what we should take care of.

Make the representation of the distance using string or paper, remembering that the scale factor is different

Reference

Manual de Astronomia Canalle & Matsura

Create

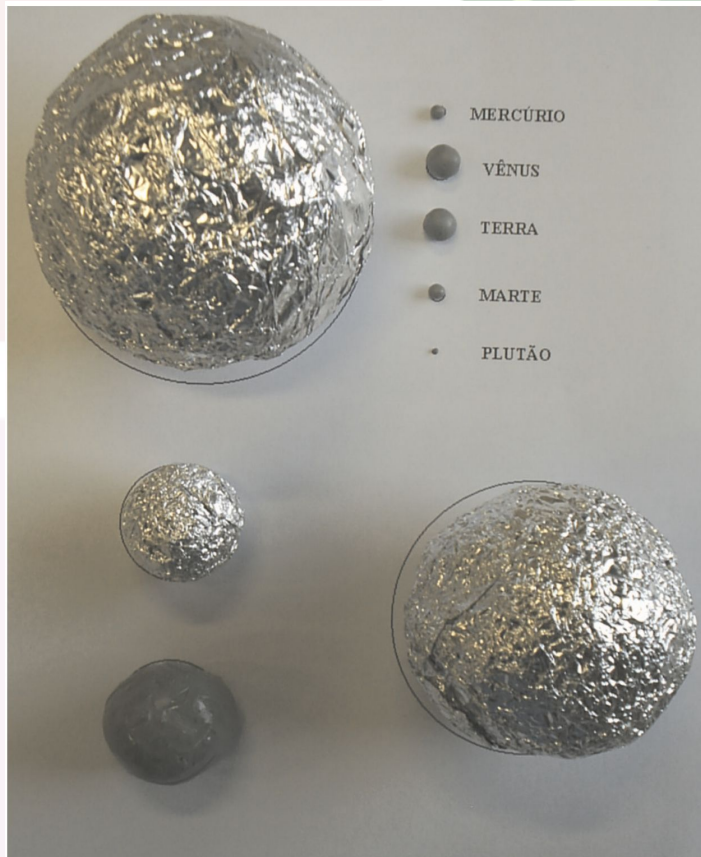
TABELA COM AS DISTÂNCIAS MÉDIAS DOS PLANETAS AO SOL

PLANETA	DISTÂNCIA MÉDIA AO SOL (KM)	DISTÂNCIA AO SOL NA ESCALA ADOTADA (CM)	DISTÂNCIA AO PLANETA ANTERIOR (CM)
Mercúrio	57.910.000	5,8	5,8
Vênus	108.200.000	10,8	5,0
Terra	149.600.000	15,0	4,2
Marte	227.940.000	22,8	7,8
Júpiter	778.330.000	77,8	56
Saturno	1.429.400.000	142,9	65,1
Urano	2.870.990.000	287,1	144,2
Netuno	4.504.300.000	450,4	163,3
Plutão	5.913.520.000	591,4	141,0
<i>Estrela Alfa Centauro</i>	$4,1 \times 10^{13}$ km	4.067.800 (= 40,7 km)	4.067.208,6

TABELA COM OS DIÂMETROS EQUATORIAIS DO SOL E DOS PLANETAS

ASTRO	RAIO EQUATORIAL (KM)	$\frac{R_{ASTRO}}{R_{TERRA}}$	RAIO NA ESCALA (MM)	DIÂMETRO ¹⁰ NA ESCALA (MM)	DIÂMETRO EQUATORIAL (KM)
Sol	695.000	109,0	400,0	800	1.390.000
Mercúrio	2.439,7	0,4	1,4	2,8	4.879,4
Vênus	6.051,8	0,9	3,5	7,0	12.103,6
Terra	6.378,14	1,0	3,7	7,3	12.756,28
Marte	3.397,2	0,5	2,0	3,9	6.794,4
Júpiter	71.492	11,2	41,1	82,3	142.984
Saturno	60.268	9,4	34,7	69,4	120.536
Urano	25.559	4,0	14,7	29,4	51.118
Netuno	24.746	3,9	14,2	28,9	49.492
Plutão	1.160	0,2	0,7	1,3	2.320

Create



Share

- Social media
- Dynamic learning platforms
 - LfE Portal
 - Open Teach
- Availability of slides and materials produced elsewhere, such as DesignCT



Thank you!!!!

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