

Brain Box: Astronomy for everybody.

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Abstract

"Brain Box" Project is a customizable set of classes and activities about astronomy, made to children between 3 and 12 years old in any school from the city of Zaragoza. Each educative center can choose any part of it or talk to the team who developed it to adapt the activity to its particular educational purposes. The entire cycle has been developed by six schoolgirls between 13 and 18 years old from Colegio Obra Diocesana Santo Domingo de Silos (Zaragoza, Aragón, Spain).

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Main text

Our project started with two of us. Both had interest on astronomy so we decided to talk about this subject. At this point, we realized that we were too few to develop our project, so we ask for help to our schoolmates, and soon we were the six of us: five schoolgirls from second course and one from the fourth one of the Spanish Compulsory Secondary Education with one project in common: The development of an astronomy activities and meetings customizable set, thought for children between ages from 6 to 11 years old, and entirely conceived, designed and executed for us. Then, we offered it to all the primary school which requested it on the metropolitan area of the Zaragoza city on Aragón, Spain.

We needed something to present our set to the schools. Fortunately, Aragon's Education Department has a program called "Ciencia Viva" which connect school's initiatives such scientific poster expositions and related initiatives. We proposed them something new: an interactive and customizable exposition. Our set was composed on several items, chosen and developed by one of us each one. But schools could choose which item or items they needed us to explain for them, as well as the courses they wanted to implement the program on. Activities an meetings were designed with several difficulty levels, ready to be adapted to any course or centre. We had a previous meeting with the headmaster of each school to talk about the specifical needs of them. Our program was chosen for four courses on two schools. We also had the oppourtunty to prepare a public demonstration of our program. It took place on our

centre's open doors day, (july the fourth, 2016), and it consisted on our portable planetary, the activity about gravity, -starships at the black hole-, and other activities listed at the end of this section.

The subjects we decided to offer, -as they appeared on the leaflet we develop to the centres-, were:

Items intended for 1st, 2nd y 3th Primary:

- **Constelations:** Concept. Mitology. Astrology and Astronomy. Evolution of the concept within the years. Physic and digital demonstrations of the stars relative movements. Constelations workshop with sticks and color pens.
- **Space travels:** Actual starships and planned ones from the future. NASA and ESA published projects. Demonstration of the action-reaction concept, (Can water move a starship?).
- **Galaxys:** Our galactic neighbourhood. Planetarium creation workshop with diary paper.

Items intended for 4th, 5th y 6th Primary:

- **Constelations:** Concept. Mitology. Astrology and Astronomy. Evolution of the concept within the years. Regions on the sky.
- **Stars evolution:** Birth, growth, color changes and death. Diamond spheres and black holes.
- **Comets and meteorites:** Remainigs of our solar system birth. Crossed orbits and shooting stars.
- **Space travels:** Spaceships and speed limits. Cosmic distances.
- **Galaxys:** Concept, dynamics and evolution. Galaxy colisions and cosmic group migrations.

Our headmaster transferred us a requirement from our centre's first ages section to make some additional sessions in english for their pupils, and so we prepared it, -some planetarium sessions about our hemisphere visible constellations at the moment, assisted with power point presentations about mitology-, but finally this cycle couldn't be imparted due to timetable facts from the above mentioned section.

So we start to met all the Tuesday evenings from October to March on our centre's biology laboratory. There, we developed the investigation, both on the ítems we selected and their pedagogy to apply it to the selected ages. We needed to develop activities capable of attract their attention, entertain them and make easy for them the acquisitions of



the concepts. We ask our teacher for help and he gave us some methods and tricks. With his help, we finish all the activities. It was hard to make this project, and some of us came home one or two late evenings with any "war bounds", but the effort give us a project to be proud of it.

When the time was running out and we were going to present our first speech our teacher get us out in one of our classes, to practice and improve talking in front of people. It wasn't until then that we realized that one of us had afraid to talk in front of people. With support we were able at last to make her talk in front of the kids without a problem.

The frist group of cycles, that was imparted in our school (Obra Diocesana Santo Domingo de Silos) had the following timetable

		7th of March (2016)	8th of March (2016)	9th of March (2016)	10th of March (2016)	11th of March (2016)
15:30	until	4°E	4°D	4°C	1°D	2°E
16:15						
16:15	until	4°A		4°B	2°B	1°C
17:00						
		14 of March (2016)	15 of March (2016)	16 of March (2016)	17 of March (2016)	18 of March (2016)
15:30	until	1°A	1°B			1°E
16:15						
16:15	until	2°A	2°C			2°D
17:00						

The chosen talks were: "Comets and meteorites" for 4° of primary and a fusion of "Galaxies" and "Constellations" that were equal for 1° and 2° of primary. 375 childrens get benefit from the cycle.



The first day in which we expose, the person that was the responsible of the subject was not able to attend because o for an illness, but we could take care of it the others. Fortunately she was fine the next after that and she could handle it again. That day we realized that was a need the share of information between us in

order to prevent the same thing in a near future

Like we have mentioned before, thanks to the program “Ciencia Viva” we propose our cycle to another centres, we even distributed informative leaflets at a scientific fair for elementary schools at the Faculty of teaching of the University of Zaragoza, which we include in another document. Because of that, the School “Puerta Sancho” ask us for three cycles with the following timetable:

	5th of April (2016)	6th of April (2016)	7th of April (2016)
15:30 until 17:00	Group: 1° of Primary	Group: 1° of Primary	Group: 1° of Primary
	12th of April (2016)	13th of April (2016)	14th of April (2016)
15:30 until 17:00	Group: 4° of Primary	Group: 4° of Primary	Group: 4° of Primary
	19th of April (2016)	20th of April (2016)	21th of April 2016
15:30 until 17:00	Group: 5° of Primary	Group: 5° of Primary	Group: 5° of Primary

At first 225 childrens of that school were going to get benefit of our activity, but for some issues that we will explain later it only reached 75 of them.

The requested topics were: “Constellations” and “Galaxies” for 1° of Primary; “Stars evolution” for 4° of primary, and a modification of “Comets and meteorites” for 5°: they didn’t tell us what they exactly want, so we create a cycle only for them. On it we mixed space travelling, black holes, theories of parallel universes and theoretical problems that would arise with our interpretation of time.

However, when we went to the other school, the first term of them was given in a week, but when we were meant to start the second cycle, the school ask us to wait one more week for their own issues. We actually wait one more week, but the School tell us again that the end of the evaluation was near and they had to cancel it. Anyway it was an experience that make us more wise.

We also did a public exhibition of our Project in our school that showed:

- **Planetary:** Taking advantage of what we designed for first ages we build a portable planetary, with cloth and wire, a balloon covered with mache paper with holes and a laptop with a projector that we used to Project complex images, that let us talk about mythology related with constellations to the children that came.
- **Black hole race:** To explain the matter of gravity to the children, we recycled some toilet paper tubes, painting them as starships and ballasting them with small stones or, (any of them), with neodymium magnets that were attracted by a metal surface in one desk on their way. We pasted the middle of some wool threads to the classroom wall, and introduced their endings on the tubes, so the children could move the rockets pulling away the thread endings.

- **Meteorodrome:** We designed a space with three different layers of colored sand, covering some pads, so children could jump onto it and learn the geological signature of meteors, but due to a last time relocation, we have to change this demonstration for another one: a simulation free program obtained from the web where children could design their meteors and see the effects of the impact.
- **Constelations game:** A knowledge gymkana for children. They must find some information about stars hidden by all the school during the open doors day.

The open doors day had a wide range of visitors from all ages, most of them families of the students, and new pupils of our school..

Added to this main article, we send you a rar archive with photographs taken during the meetings.

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Reference

We obtained the information needed to our meetings from:

- Book "Ciencias Naturales de 2º de E.S.O." from Santillana Editorial.
- Collection of astronomy articles from the scientific magazine "Muy Interesante", published for "Grupo G+J España".
- Collection of astronomy articles from the scientific magazine "Newton Siglo XXI. El espectáculo de la ciencia", published for "Unidad Editorial, S.A.".
- Wikipedia website: <https://es.wikipedia.org/wiki/Wikipedia:Portada>
- Nasa website: <https://www.nasa.gov/>

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