

“Chapuzón cósmico”: astronomical workshops for children

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Abstract

We present a set of six Astronomy outreach workshops for children called “Chapuzón cósmico”. These workshops took place at the Museo de la Ciencia y el Cosmos of La Laguna (Tenerife, Spain), from autumn 2015 to spring 2016 and reached about 240 children. They were carried out using a very dynamical and participative approach, so as to stimulate the children’s natural curiosity for Science. The topics ranged from the Moon and the nearby planets to the furthest galaxies and stars. In this work, we present in more detail the followed methodology, the material and the main activities of the different workshops. We also present the “Principio Cero” outreach project that was born with the workshops.

1 Introduction

“Chapuzón cósmico”¹ is a set of six Astronomy outreach workshops for children between 5 and 12 years old. The main goal of this educational project is to awake the children’s curiosity and passion for Astronomy at an early age, and also to provide them with some basic Astronomical concepts in an entertaining and participative way. All the workshops were designed following two fundamental ideas: learning through play and learning by explaining.

- Learning through play: during the workshops, the children actively participated in different games and activities. This increases their motivation and collaboration, and makes it easier for them to assimilate the new concepts they are learning.
- Learning by explaining: all the workshops had a main activity that took most of the time. The final result of this activity was an object that the children could later bring home. This forces the children to synthesize and better assimilate the new concepts they are learning. At the end of the workshop, they explain and describe to the rest of

¹“Cosmic Dip” in english.

the class the object they have created. At home, their parents or siblings will hopefully be curious about the object so the children will have to rethink and explain one more time the new concepts gained during the workshop.

In the following sections, the development of the workshops is described in more detail, as well as the main topics covered in each of them.

2 The workshops

The workshops took place at the Museo de la Ciencia y el Cosmos² in La Laguna (Tenerife, Spain) from autumn 2015 to spring 2016. They were divided in two blocks of three different workshops each. In order to reach the maximum number of children, each of the workshops were held twice a day, consecutively. Around 20 children attended each session, making a total of 240 kids in the 6 workshops (12 sessions). A photo taken during one of the workshops can be seen in Fig. 1.



Figure 1: Children actively participating during one of our workshops.

Although each of the workshops covered very different topics, we used the same methodology in all of them, following the ideas exposed in Section 1. We started by introducing the subject, whether it was the Moon or the life of stars. In this introduction, we included different activities in order to get an idea of the children's previous knowledge on the topic. As an example, we asked the kids what did they know about the subject and wrote their ideas in post-it notes that we stuck on the wall. At the end of the workshop, we asked the same questions and checked whether their previous ideas were correct. If they were not, we

²The Science and Cosmos Museum.



Figure 2: Children building a model of the Solar System with playdough in the workshop about our celestial neighborhood.

corrected them and added the new concepts they had just learnt with more post-it notes of a different colour. This way, children were aware of how their knowledge had increased and were more capable of synthesizing their ideas. During the introduction, we also tried to get the children involved by asking them questions or making little experiments.

Next, as the main activity of the workshops, we divided the children into small groups and we let them make an object on their own that they could later bring home. This type of activity has three different purposes. First, the children have to synthesize the concepts they have learnt during the workshop in order to build the object. This helps them fix their ideas. Also, the fact of explaining something to other people reinforces the learning. Bringing the object home will surely induce a conversation about it with parents, siblings or friends, and children will be somehow forced to explain the new concepts to them. Last, the object itself is a reminder of what they have learnt during the workshop.

At the end of the workshops, each kid or group explained their work to the rest of the children in order to better fix the concepts they had just learnt.

In the following sections, we explain the topic and the main activity of each workshop.

2.1 What do I see up in the sky?

The first workshop was entitled “What do I see up in the sky?” and was addressed to children in the range of 5-8 years old. The main goal of the workshop was for them to recognise the different celestial objects that we can observe in the sky with the naked eye, such as the Moon, the stars and the Sun, and to understand their motions. To do that, we made 3 types of masks representing the Earth, the Moon and the Sun and we played a game in which the

children had to simulate the celestial motions of each object. At the end of the workshop, they were able to take the masks home.

2.2 Exploring our neighbourhood

In this sessions, children learnt about the objects that form the solar neighbourhood, not only planets, but also dwarf planets and asteroids. Children from 9 to 10 years old navigated through rocky planets, gas giants and frozen worlds, and learnt the basic characteristics of each of them and the way they look. As the main activity of the workshop, the children were divided into teams and each one was in charge of modelling a part of the solar system using playdough. Once each component was finished, they assembled them and formed a mockup of the Solar System. This model also allowed them to learn about sizes and scales. Fig. 2 shows some kids building the Solar System mockup. At the end of the workshop, each child kept an element of the model.

2.3 Cosmic Safari

The third workshop, called “Cosmic Safari”, was dedicated to the field of galaxies. Children from 10 to 12 years old had the opportunity to learn the different types and characteristics of galaxies. We organised several games so that they could easily learn to identify a spiral, an elliptical or an irregular galaxy. We also created our own galaxy using simple materials such as water and sand. The main activity of the workshop was to write a postcard to a friend living in another galaxy. The fact of having to think about their “universal address” was a good way for them to realise their place in the Universe.



Figure 3: Example of a constellation designed by a child during one of the workshops.

2.4 Constellations: connecting stars

The second round of “Chapuzón Cósmico” started with the workshop “Constellations: connecting stars”, addressed to children of 6-8 years old. The goal of this workshop was for them to understand that constellations are simple, artificial projections of the stars in the sky and not real objects. They also learnt to recognise the most famous constellations that can be seen from the northern hemisphere. To better fix the concepts, the children were given a piece of sky, glued to a polystyrene base, and they had to imagine and create their own constellations with the available stars, using thumbtacks and colored wool thread (see Fig 3). In addition, they named their constellation and some of them even wrote a story about it. At the end of the workshop, they brought their creation home.

2.5 Discovering the Sun

The second workshop of the second round of “Chapuzón Cósmico” was dedicated to our nearest star, the Sun, and was addressed to children of 8-10 years old. During the workshop, we performed several experiments in order to show the children some characteristics of light and magnetism related to the Sun. However, the main activity of the workshop was the construction of a solar mockup by each of the children, in order to represent all the elements we had previously learned about: the different internal layers of the Sun, the solar flares, the sunspots, etc. Some of these miniatures can be seen in Fig. 4.



Figure 4: Children constructing their solar mockups during the workshop entitled “Discovering the Sun”.

2.6 Living like a star

The last of the topics covered by our project was the life cycle of the stars, addressed to children from 10 to 12 years old. In this workshop we talked about the different stages in the life of stars and showed some of the different types of stars that can be seen in the sky. We also introduced the concepts of pressure and gravity as the main mechanisms driving the stellar evolution. Divided into groups, the children designed and made a comic showing the life cycles of different stars. Due to the impossibility of dividing the projects so that each kid brought home their own comic, we prepared a booklet for them with comics showing the life of several stars.

3 Conclusions

Throughout the different workshops, not only did the children hopefully learned about the Universe, but we, as educators, gained a lot of experience and knowledge about the way to conduct outreach activities addressed to young children. We discovered that children from an early age have a lot of curiosity about the Universe, and are often aware of complex concepts. Nevertheless, those ideas need to be inspected in order to be reinforced or discarded.

The 6 workshops that we carried out focused on the active participation of the children as well as in their mutual interaction. This approach promotes an active learning, which enables the understanding of complicated concepts, even at an early age. A fundamental tool is the use of a simple, non-technical language, so that the children can easily follow the explanations.

From a more practical point of view, we found out that the duration of the workshop is a crucial parameter, specially when it comes to the youngest children: more than an hour is often too much. Another important parameter is the number of children attending the workshop: 20 could be a good limit.

In the future, we plan to continue with these workshops and to grow as an outreach group under the “Principio Cero” project³ that we have conceived. In order to promote our activities, we have created a webpage⁴ and a Facebook page⁵ of this project.

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³In english, the “Zeroth Law” project.

⁴<http://principiocero.org/>

⁵<https://www.facebook.com/PrincipioCero/>