

**Application form for participation in the
European Science on Stage festival
from 25 – 28 April 2013 in Słubice – Frankfurt (Oder),
organised by Science on Stage Poland and Germany**

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Project title: The sky in your hands

Abstract: (max. 700 characters incl. spaces):

“The sky in your hands” is a project created in 2009, the International Year of Astronomy, which goal is to create an image of the Universe for the visually impaired and blind public as close as possible to the real world, seeking to foster other skills related to the understanding of science. It includes a planetarium show with an audio component and tactile semi-spheres that public can touch and follow a story about constellations and other objects in the Universe. A touchable exhibition with relief images is also available. Now this open source project goes inside the classroom using simple and inexpensive materials to teach astronomy and inspire teachers.

Involved disciplines: Astronomy

Key words: constellations, solar system, tactile materials, visually impaired students, blind students, team work, inclusive learning.

Age group (Age of the students): 6-12 years old

Materials used in this project: Tactile images, texts in Braille, touchable semispheres 3D, a 3D model of the Moon, an audio story, cheap, recycled materials to build tactile or images (paper, card, wool, cotton, tissue, cloth, plastic, modeling clay,...), scissors, glue.

What is innovative about your project?

Through this project a teacher can take astronomy to visually impaired or blind students. It promotes a cooperative learning methodology and the development of collaboration between informal learning in planetariums and formal science learning at school. The goal of this

project is to create an image of the Universe for the visually impaired and blind public as close as possible to the real world. It also seeks to foster other skills related to the understanding of science and to pursue equality through a shared knowledge of the world.

What can other teachers implement from your project in their class?

Teachers can implement the methodology and the materials from this project to teach astronomy to all students in particular to those visually impaired or blind.

Personal quotation concerning the project: The approach to blind children through this project was amazing! For the first time they discover what constellations are and they could touch the surface of the Moon! Many questions have arisen. It was really wonderful to witness how learning can be pleasant. We want to inspire other teachers to also try and take this free open source project to their students.

Project description: (max. 12.000 characters incl. spaces / approx. 2,5 pages)

“The sky in your hands” – the project

UNESCO declared 2009 the International Year of Astronomy (IYA2009) commemorating the first time that Galileo pointed his telescope to the sky. It was a global celebration of Astronomy and its contributions to society, culture and human development. Its main goal was to inspire citizens worldwide to think about their place in the Universe through a way of discoveries. Activities of different kinds were held worldwide to increase interest about Astronomy in particular, and Science in general-- from its influence in everyday life to how scientific knowledge helps in building a freer, equalitarian, better world.

Therefore, some of the main IYA 2009 goals were to increase the scientific knowledge of society, to promote the universal knowledge about basic science, to support and improve the teaching of science, to show a modern image of science and scientists.

The Spanish IYA2009 National Node created the National Project “Astronomical Activities for People with Special Needs”. The National Project’s working group was composed of 8 researchers coordinated by Amelia Ortiz-Gil from the Astronomical Observatory - University of Valencia (Spain). They wanted to make Astronomy available to all kinds of public, including those with special needs.

One of the projects that were carried out was the planetarium show for blind people “The Sky in Your Hands” makes use of sounds with the support of tactile elements, which can be easily adapted to different types of planetariums. It was based on similar activities carried out by Sebastián Musso (“Cartografía Celeste Auditiva”) and Buenos Aires’ Planetarium (“Planetario para Ciegos: el Cielo para todos”), both in Argentina that tried to bring Astronomy’s beauty to a visually-impaired public. In particular, the planetarium show “The Sky in Your Hands” has been developed by Mariana Lanzara and José Carlos Guirado Puerta, under the coordination of Amelia Ortiz-Gil. The Hemisfèric Planetarium and the Spanish national organization for the blind (ONCE) collaborated in the implementation and evaluation of the show. The project was partially funded by the Spanish Foundation of Science and Technology (FECyT) and the University of Valencia.

So the goal of this project is to create an image of the Universe for the visually impaired and blind public as close as possible to the real world. It also seeks to foster other skills related to the understanding of science and to pursue equality through a shared knowledge of the world.

The planetarium show is 25 to 30 minutes long and it has three differentiated elements: a visual projection, a special soundtrack and a tactile support. The first is simply a star field projection that can be static or dynamic, according to the type of planetarium used. The

second one consists of a soundtrack with sound effects and a narration explaining a few selected Astronomy facts related to the projected images. As a complement, each person in the public holds a tactile semi-sphere on his/her knees at the starting position. With it, members of the audience are able not only to follow the story in a personal and effective way, but also to reinforce their perception of the concepts introduced in the activity. In this show, the audience makes a trip through different constellations, their legends and special sky objects while they are projected on the dome.

The script is narrated by two different speakers. The first tells the astronomical storyline, which is about a trip to different constellations. The second one points out specific directions to enable the blind person to use the tactile semi-sphere correctly. When the show starts, the narrator offers some brief instructions to the public on the use of the tactile half-sphere, such as where is the starting position and the meaning of the different elements on it. However, there is a slower, previous live introduction showing the use of the half-sphere, in order to answer the questions that could arise from the public about it.

After these brief indications the astronomical show begins. By way of introduction, the narrator invites the spectator to contemplate the night sky. Then, some constellations toward the south on the winter sky of the Earth's northern hemisphere (Orion, Taurus and the Pleiades) are projected and their history and singular elements briefly explained. Following the Pleiades a brief intermission begins, which is necessary to allow the projected sky to rotate in azimuth to point towards the north and to begin with the next sequence of constellations (the users of the half-spheres also need this time to rotate them to a new position). Now the show takes the audience to some constellations of the sky toward the north: the Little Bear and the Great Bear, Leo and Gemini. During the whole trip, the public is guided through the half-sphere, to help identify the objects that are explained by the main narrator.

Following the spirit of the IYA2009, the authors wish to make all the products of this planetarium show publicly available to other theatres, institutions and everyone that wishes to use it in outreach activities. These products are:

- The soundtrack with the story line, music and special sound effects
- Script with annotations
- Tactile half-spheres (you can borrow them) or the digital 3D model to be printed by the user that can be downloaded from the website

http://observatori.uv.es/index.php?option=com_content&view=article&id=1467:discapacitados&catid=60:actividades-divulgativas&Itemid=98&lang=en&limitstart=6

In the beginning of 2011 the "Sky in your hands" went to Portugal through António Pedrosa e Lina Canas to the Planetarium in Espinho. They adapted the script of the planetarium show to Portuguese and create an exhibition of more than 20 tactile pictures about astronomy dealing with the most diverse and fascinating objects that we find in the night sky. They feel that the public should benefit more from the project. This was a collaboration between the "Navegar Foundation", Science Alive National Agency, Pavilion of Knowledge and ACAPO (Visually-impaired and Blind Portuguese Association) following the international collaboration entity association "Astronomers Without Borders" and the Astronomical Observatory of Valencia. The images were collected from Hubble Space Telescope, Tactile Astronomy, FETTU and many others and were processed in order to stand out in relief the different characteristics of objects not otherwise perceived by touch.

This exhibition presents also a model of the Moon with features in relief that dazzles us of our natural satellite with craters and seas. This was a result of collaboration with Europlanet <http://www.europlanet-eu.org/outreach/66-outreach/europlanet-funding/336-funding-case-studies-2011>

Then "The sky in your hands" went to Lisbon to Planetarium Calouste Gulbenkian and stayed there to be experienced by the public for a period of 3 months. This was a

collaboration between the Portuguese Navy, Science Alive National Agency, Pavilion of Knowledge, Espinho Planetarium and ACAPO (Visually-impaired and Blind Portuguese Association).

From observation and analyses of several group of students that visited "The sky in your hands" at Lisbon Planetarium (especially school Centro Helen Keller) and after talking to some of their teachers we noticed that some work could be done in classroom with students to make easier and more motivating their process of learning. Besides we noticed that for some schools it was difficult to travel with students to visit the planetarium. So giving continuity to all these collaborations between different organizations and considering all the efforts that already have been done, some resources and materials were created to be used in classroom. We know from our own experience and sustained by literature that collaboration between informal science learning in science centers, museums or planetariums and formal learning in school can improve science learning. It also inspires more students and facilitates their understanding of the nature of the science.

So the created resources include a 3D model of the Moon, semi-spheres with relief constellations, a 3D styrofoam version and a flat version; a set of images of different objects of the solar system and the Universe and there are the 3D files to print the images model and Braille subtitles in a 3D printer. Dissemination and support resources include leaflets, manual and guidelines for teachers and students. The soundtrack (audio file) and the script of the planetarium show are available and can be used by students during a role play. Students including visually impaired or blind students can touch the project resources to "feel" and can listen from the audio record to understand what he/she is touching. Then he/she can build a simple touchable image or model of a constellation or one object from the solar system or the Universe working in small groups. They use cheap, recycled materials to build these tactile models (paper, card, wool, cotton, tissue, cloth, plastic, modeling clay,...). They can use the audio available within the project resources or can record an audio file explaining the contents and the sequence for touching and learn from the model they build. The work groups should be constituted by visually impaired and non-visually impaired students, as different skills from different students complete each other to accomplish the task more successfully. Afterwards each group presents to others.

Another possibility is that all groups can put together their work and prepare a role-play where a story is written and read (or audio recorded and then listened) to guide hands through a sequence of touchable images or models made by them.

A workshop for training educators was planned to put hands on some of the available resources of the project and to understand how they can be used to teach curricula astronomy in a classroom. This workshop includes a presentation giving some information about the educational project, its methodology, resources, learning goals and evaluation. Then participants realize a simple activity putting hands on materials available on the tables. They work and discuss in small groups. Each group has to plan and prepare a touchable model of one or more constellations and (if technically possible) has to record 1-2 minutes audio file with a story explaining the contents and the sequence for touching and learn from the model they build. Finally each group communicates to others. The key idea of this workshop is to understand that one can choose from an open source project and use some inexpensive simple materials to plan inclusive activities with visually impaired students according to their age level, interest and curricula and to engage them in the discover of the wonders of astronomy.