

Ten days of astronomy for 50 children

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Abstract. We present a 10 day-long astronomical discovery class for children from 10 up to 12 years old. “Classical” workshops dealing with constellations, sky maps, sundiala, rocket construction and launching, Sun and deep sky observations are proposed to children. In addition, we present our own workshops that can be achieved by children as research projects in a scientific, literary or in an artistic way. In this context, the rôle of astronomy is both educational and social for children. Scientific rudiments are passed on from scientific educators to pupils and from pupils to their families. Astronomy is an unifying science for everyone.

Keywords. Discovery class, primary school, workshops, visual arts

1. Introduction

Our association PROVENCE SCIENCES TECHNIQUES JEUNESSE (PSTJ) was born 17 years ago in the south of France and acts in scientific education and especially astronomy. Its president, P. Cruzalèbes, its vice-chairwoman and treasurer, the authors of this article, are astrophysicists. In this association, there are 3 sectors: (1) The first one is about all scientific events and is under S. Godier’ supervision. These events usually last all day long and consist in scientific workshops, planetarium session, talk by a specialist and observations with many local amateur astronomers. (2) The second one is about cultural holidays during Easter and summer and is under the supervision of a teacher and his wife (P. & C. Chaize). These holidays a shared between astronomical and space activities as well as environmental and botanical approaches. Children also learn how to live together. (3) The last one deals with “discovery class” in astronomy and space and is under the supervision of K. Mathias. Pupils bury themselves in intensive astronomical projects: mock-up construction, painting, scientific research, observations, slide shows and rocket launch.

2. What about the class?

PSTJ classes are exclusively reserved for astronomy and space. The aim is to make children discover astronomy from 4 scientific and artistic angles which are: (1) Observations (400 mm telescope, Coronado) (2) Fundamental rudiments (3) Tests and practical experiences (4) Visual arts. This choice is caused by the will to present astronomy under all its aspects taking into account the children’s sensibility.

2.1. Observations

There is a typical planning organised into 3 parts: morning, afternoon, evening and following a logical and pedagogic increase. At the beginning, children take their first step

towards the sky discovery through the constellations identification and making a sky map. This leads to naked-eye observations in the evening. The next day, 2 workshops on light (Gougenheim 1981) and telescopes prepare children for observing with optical instruments. At the same time, children observe the Sun with 2 types of optical instruments: a “solarscope” and a Coronado (with a H α filter) and draw what they see (spots, flares, prominences). Finally, several evenings are devoted to observations (Moon, planets and deep sky objects).

2.2. *Basic rudiments*

Basic rudiments allow to make young people more aware of the scientific approach and to acquire knowledge and methodology. Slide shows, demonstrations, bibliography and teaching are the main aids. Slide shows are about the Sun, the Solar System and the stars from birth to death. Demonstrations are about light properties (Gougenheim 1981) : straight line path, energy carrying, photons, light diffusion and breakdown. The Moon phases, the seasons including the Earth rotation and obliquity are presented (Cruzalèbes et al. 2002). To understand well the seasons, children sit in a circle in a room where the Earth orbit is drawn on the floor (20 square meters) and where the Sun-Earth-Moon system is activated. Then, to introduce space notions, a demonstration of the “Action/Reaction” principle of a rocket is done. To end, the story of the space conquest is described in broad outline. Finally, exercises are proposed on Cardinal Points, Universal and Legal Time to understand the time zone notion.

2.3. *Practical experiences*

These basic rudiments are supplemented by practical experiences. The Time notion is important to use the sky chart and the solar dial made by every child. They can tell the time within half an hour! As far as rockets are concerned, their construction last all the day long. Children put elements together step by step. They can choose the shape and the number of their ailerons as well as the shape of their warhead. Just before the launching, rocket engines are added on by a specialised leader (CNES approval). Then, each child launches its own rocket hoping it will be the higher one in the sky.

2.4. *Visual arts*

According to PSTJ pedagogy, visual art activities are linked with basic rudiments, practical experiences and creativity. That’s the reason why children realise one solar system mock-up by class respecting the size scale of 1cm for 3600 km (Naruch et al. 2002; Lenzuni 1994). According to the size of the planet (Jupiter is 40 cm in diameter), children are alone or in little groups to paint their object(s). From their bibliographic research (Cruzalèbes & Dorance 2004), they are able to choose the right planetary colours and characteristics. The Solar System is recreated in the field next to the centre with a scale of 1 over 200,000,000.

2.5. *Research projects*

To remain in the science and art category, children realise 2 other mock-ups, one of Mars ground and the other representing a spiral galaxy (Jacob et al. 2006). These mock-ups are part of the 10 research projects led by children during 5 days and allocated to each group of children (5 to 6) according to their star quiz results. To complete their project successfully, each pupil has got a technical file to fill in answering questions and drawing associated diagrams. Each children group carries out his project as a real research team and *this is our association’s specificity!* As all the children are not all scientifically-minded, we also propose 2 artistic projects, 4 literary ones, 2 technical and 2 scientific ones. In

artistic projects, pupils have to make the Meteor Crater, The Olympus Mons and the Valles Marineris Canyon on Mars ground as well as the bulge, the spiral arms of the galaxy and they also have to locate the different stellar populations (Acker 2005). In the science and literature category, 2 groups have to imagine an astronomical tale (one for each class) and 2 other groups have to stage an astronomical play related to Mythology. In the science and technical category, 2 groups have to work on a technical project (astrophotography and thermoelectricity) and 2 other on a research project (magnetism and greenhouse effect). In each case, children study the rudiments in several particular conditions and take measures.

2.6. *Who is it for ?*

The discovery class is aimed at primary school children. During 10 days, PSTJ is at your service with 4 scientific leaders who welcome 60 Parisian children from 10 up to 12, their 2 teachers and 4 to 5 coordinators whose job is to take care of the children's everyday life. We stay in a vacation centre located in the Hautes-Alpes.

2.7. *Where do they take place ?*

(1) The centre. We live in a vacation centre in the mountains named 'LE GRAND CHAMP' and located at a height of 1100 meters. Its exceptional qualities are the darkness of the night due to non intrusive light, the 12 hectares around the centre and the very warm welcome of the owners P. and J.J. Fortin and their staff (1 cook and 2 waiters). Cooking is great! Games, animals, books brighten up the children's stay. (2) Correo Observatory. On top of that, we offer to children the opportunity to visit an impressive associative observatory not very far from the centre where they can observe stellar objects through a 520 mm and a 300 mm telescopes. This association is our partner.

3. Conclusion

Here the stories of two teachers of the "11Discovery Class" in 2006 and 2008 : *"The children are very happy to have lived such a great experience! The tests given on Monday (without any revision) showed that many notions had been understood. Well done! On the other hand, there is no more discipline problem, thank you, discovery class! Yesterday, an American student came in my classroom to observe the French education system. She was very impressed by this astronomical adventure and by the work done by the children."* (N. Esperin) *"Our exhibition is over and all was great. The children were very good at taking their parents around the exhibition, presenting the workshops as if they were astrophysicists. I think that the self-governing projects of that discovery class produced something special on the children. Thanks for all from me and all the children who wrote in their report: "It's very important to leave for a discovery class because the teacher doesn't know all about astronomy and it's better to help her!!!"* (M.H. Cadoux)

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