

## **Astronomy Communication 101: Working with Young Children**

### Introduction

Talking astronomy with young children is not the same as with teenagers or with adults. Whereas most science communication is about facts, talking to children needs a stronger emphasis on creativity, imagination, discovery and reasoning.

Young children are on a journey to discover the universe around them. This applies first to their immediate surroundings, but their curiosity does not end there. Astronomy is a unique topic to benefit from children's boundless appetite for discovery and to stimulate the development of some of their core thinking skills. Here are a few thoughts and suggestions on how to make sure discovering the stars and the universe is the rewarding journey it promises to be.

### Specificities of work with young children

#### **Dance, sing, draw, create**

Children are on a crash course to learn about the universe. They soak up every piece of input they get. They constantly surprise their parents and teachers by how much they pick up: they can suddenly start dancing something they've seen on TV; they'll suddenly blurt a swear word no one knows where they heard, etc. This means that young children are looking and listening but also touching, smelling, moving around, tasting, etc. This is why we advise to engage children in many sensory ways. It makes them feel what they learn, it intensifies the emotional experience and that results in a much deeper form of learning.

#### **Build the universe**

Children own what they create. If they paint astronomical subjects or build models, not only do they have to make sense of their imagination, there will be a story associated with each image, which the child will remember. The story is a support for the knowledge. Building such stories seals the knowledge – with understanding – in their memory. It becomes part of their universe.

When working with young children, creative activities are not important just as sources of input; they are also crucial means of expression for young children. If a young child gets excited about something and then is asked to invent a story, chances are that what got that child excited earlier, will appear in the story, one way or the other. Pay attention to what stories the children make up. They can be revealing of their understanding.

Every day young children live, they learn, they build their universe. If we want the beauty of the universe and the perspective astronomy gives us to feature in it, we must give them the space to adopt it. Inspire them with beautiful images; captivate them with adventurous stories; entertain them with surprising perspectives. Then those things will find their place in the universe of the child.

#### **Children know more than they can express**

We often make the mistake of wanting to assess children's knowledge of facts. This has several drawbacks.

Firstly, it emphasises a way of learning that does not stimulate independent thought and reasoning. Secondly, all facts come across as having the same importance and this can be misleading. Take for example these two facts:

- (a) The biggest planet of the Solar System is called Jupiter.
- (b) The sun shines even after it sets.

The second fact is unquestionably a fact. The first one, however, depends on context (a name is a cultural attribute, not a physical characteristic). Putting these two facts on equal footing can send a misleading message.

Thirdly, children may understand much more than they can express, making a question and answer format unsuitable for proper assessment.

We therefore encourage that if assessment is required, that children's creations be looked at, and the children's attitudes: how inspired and enthusiastic they are by what the topics that have been presented to them. Assessment of young children should also never be just a judgement of children's performance or capacity but very much an assessment of the educator's ability to engage young children.

### **Contradictions and false assumptions**

Young children frequently harbour contradicting thoughts. This is not a bad thing; it is often a mandatory stage in the development of a coherent picture of the world around them. As adults we evolve in a world where things are true or false, where people are right or wrong. This is a judgement that can hamper children's development. If a child comes with a funny claim on, say, the shape of the Earth, it may simply be the path it takes to reach a conclusion much closer to the truth. Stopping its ongoing thinking by saying that they are wrong may prevent them from thinking further and revising that conclusion for themselves and sometimes forces them to take what is being said for true without making sense of it themselves.

Therefore, we always encourage to proceed with questions, and to stimulate reasoning. Trying to fit input they have received in their picture of the universe is what leads children to 'false' intermediary conclusion in the first place. Stimulating a continued thinking and reasoning with, e.g. new input can help them reach more complex conclusions and more sophisticated understanding.

### Work with Teachers of very young children

The reality is that pre-school level educators and teachers are often very afraid of science. They have an image of science that spells complicated, difficult, only suitable for a few particularly brainy. We need to break that image. We propose three steps to help:

#### **Empower them, encourage them**

Teachers have to feel confident to talk about what they don't know with the expert. There needs to be a relationship of mutual trust in which the astronomer respects the pedagogic skills of the teacher as much as the teacher respects the scientist's knowledge. Once such a relationship has been established, it is possible to build a programme that will enrich the children's learning.

We recommend to the scientists that they keep things as simple as possible, but that does not mean dumb things down, it means making them accessible: add more steps to the explanation, take more time, try out more

#### **Lower the threshold**

Don't scare them! Yes, astronomers can be scary... Start with day and night. Start with what you would tell the young children. In fact, it is never wrong to tell them what you would tell the children themselves. It is very important that they feel comfortable about astronomy.

#### **Get the basics right**

Chances are that the teachers' astronomical knowledge will contain a number of common misconceptions. It is important that the teachers are given the means to not propagate misconceptions but they should not be judged for harbouring them.

In reality most misconceptions can be clarified with very simple principles (day and night for the phases of the moon, for example) and if the teacher is given an explanation that they can give a child, it will work.

### Working with visually impaired children

When preparing an activity with blind children there are a number of aspects that can be used to make the experience enjoyable. The following points apply to models as well as to environments in which activities are carried out:

- Shapes
  - o Shapes of stars, galaxies, nebulae, rockets, moons, craters, etc.
  - o Shapes of rooms, mazes, etc.
- 2D/3D: reliefs or 3D models
- Textures: Think of the tactile experience
  - o Use appropriate materials, e.g. fluffy materials for gaseous nebulae
  - o Leave voids empty: if you build a 3D models, don't fill voids with transparent supports (thin wire, etc.)
- Dynamics: If something moves, make it move (e.g. spiral galaxies)
- Temperature
  - o Light bulbs can be used to give off different levels of heat
  - o Many things can feel hot or cold without input: metal feels cold, wood feels warm, etc.
- Sound
  - o Sound can make a space feel big, or small. Think of echo, of how much outside noise leaks in, and use the acoustics to your advantage.
  - o Sound can be surprising. A model where touching something emits a sound instead of lighting an LED in a display is a simple way of making something blind friendly. In particular, sound is excellent at illustrating time-domain phenomena.
- Atmosphere
  - o Close your eyes and feel the space in which you are carrying out. Try experiencing your model/activity with your eyes closed, you'll be surprised at how much you pick up.

These are also thoughts and they are not an exhaustive list of what you can do but it should help make us not be afraid of doing astronomy with visually impaired children and be open to engaging with them as well as with anyone else.

### Conclusion

These recommendations come from the Universe Awareness experience, where tens of people have reached out to young children with successes and challenges and learnt from it. Feel free to use these, to adapt them, to improve on them, and to come to your own conclusion. As always, we would be very grateful if you could share your conclusions with us.

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Note: One aspect that has not been touched upon here is belief systems. That is another topic but as a general approach, it is a good idea to think of it as creativity, contradictions, something that belongs in children's minds.