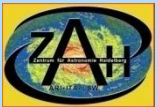


Astronomy curricula for different ages and cultural backgrounds

Dr. Cecilia Scorza,
Haus der Astronomie
and Centre for Astronomy (ZAH)
Heidelberg University



Astronomy curricula for different ages and cultural environments

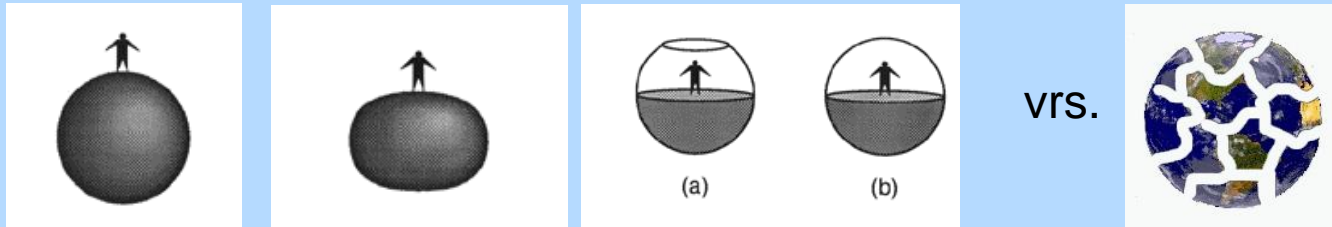
Content

1. Guidelines from the developmental psychology
2. Mythical **and** scientific thinking in the UNAWE approach
3. Astronomy and cultural environment
4. Astronomy for very young children (ages 4-6)
5. Astronomy for children (ages 6-8)
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7. Summary

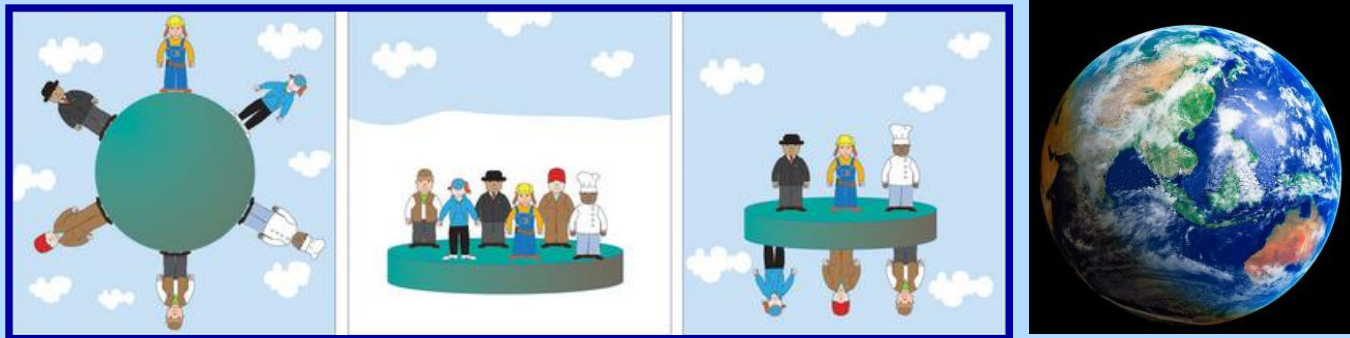


1. Guidelines from the developmental psychology

„Mental models“ (Vosniadou) vrs. „Fragmentary knowledge“ (Nobes)



A very interesting comparison study „**Culture and children’s cosmology**“ carried out in Australia (59 children) and England (71 children) ages 4 to 9 (Siegal, Butterworth and Newcombe 2004)



Summary: „Knowledge of the Earth is not easily acquired by direct experience and observation, but instead **through learning from others**...it is appropriate to expose young children to scientific concepts about the Earth **early on** to ensure that they have the best starting point for developing a full understanding of the planet, and its place in the Universe, later on in life“. (Siegal, Nobes and Panagiotaki, Nature Geoscience, March 2011)

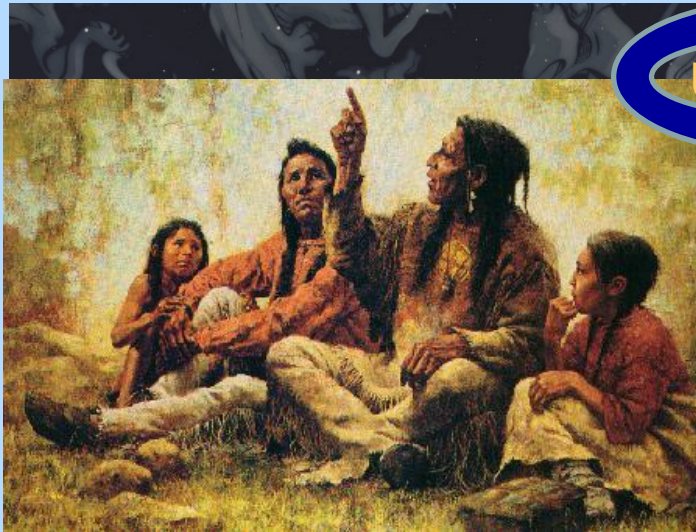
2. UNAWE: linking mythical and scientific thinking

Goals:

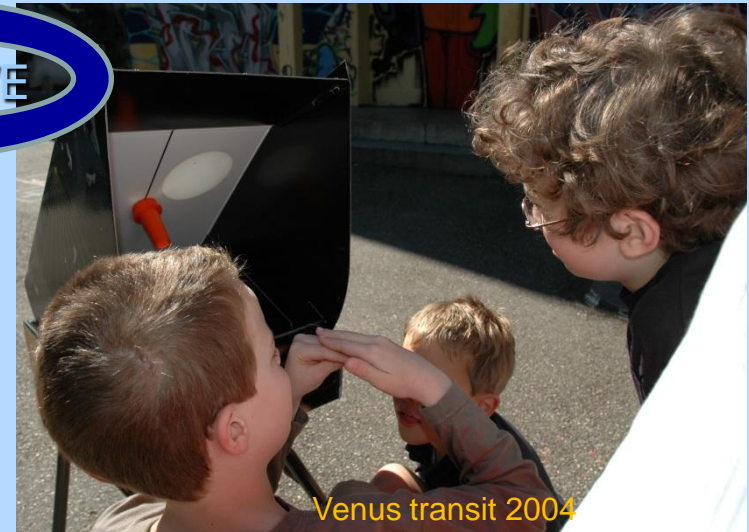
- **Inspire** young children and **stimulate their interest** in science and technology.
- Show them that nature can be interrogated by **rational** means.
- Foster global citizenship and tolerance via **intercultural activities**.

Mythical thinking: is natural, universal

Scientific thinking: can be learned



Inspiring, fascinates and fosters observational skills → Very important for UNAWE because of the preservation of cultural roots and intercultural work



The search after causal relations (why and how phenomena occur), hypothetical thinking, observations, experiments and explanations.

„For it is owing to **their wonder** that men at first began to philosophize...the lover of myth is in a sense a lover of wisdom, for **myth is composed of wonders**“

Aristoteles

"**Myth is truthful**, but figuratively so. It is not historical truth mixed with lies; it is a **high philosophical teaching** that is entirely true, on the condition that, instead of taking it literally, one sees in it an **allegory**."

Paul Veyne, history professor

The inspirational power of these images...a golden door to intercultural education and observational skills!

Throught out: show astronomical objects under a mythical and astronomical view



3. Astronomy and cultural environment

The fascination that astronomy exerts on children is **cultural independent!**

The story of Thebe Medupe. He was born in a poor village outside Mmabatho in South Africa. His first contact with astronomy was beside a fire place where the elders told Setswana stories about the stars....

Dr Medupe: "I went ahead and built my telescope. I was 13 years old at the time. The first time I looked at the moon with it seeing craters, mountains and valleys I was hooked. That's when I knew for sure that I was going to become an astronomer."





Los Andes, Galileomobile 2009



UNAWE India



UNAWE Tanzania



Street children in Colombia (2006)

4. Astronomy for very young children (ages 4-6)

- **Observational skills:** what the children are able to **see by themselves**
- **Classification activities** and the **naming** of objects

We see (and remember) what we can name!



Astronomy for young children (ages 4-6)

Starting point: **The moon**

It can be seen from the city or from the countryside

It can be seen during the day and night

It changes it's form → observational skills

It has a spherical shape (like our Earth)



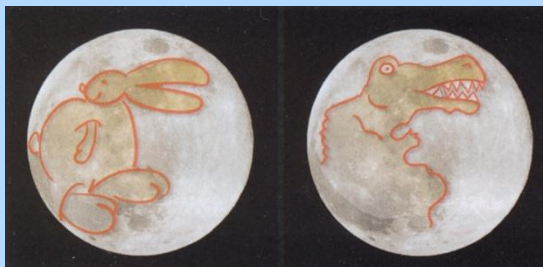
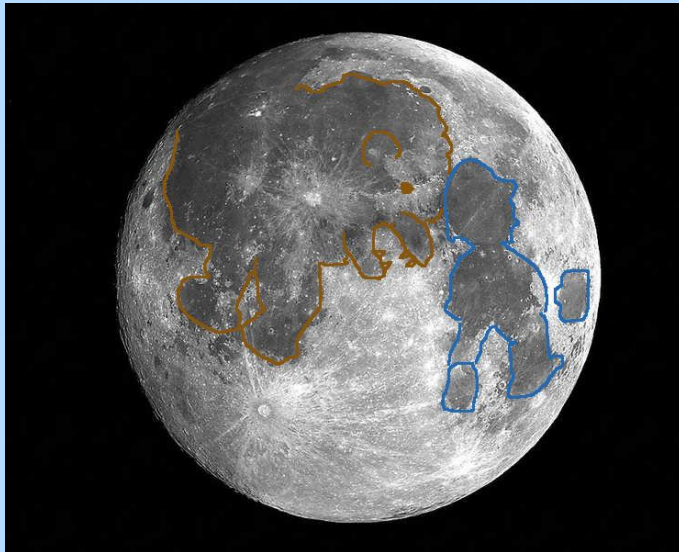
It is amazing to see with a telescope

It is multicultural!

Astronomy for young children (ages 4-6)

The Moon

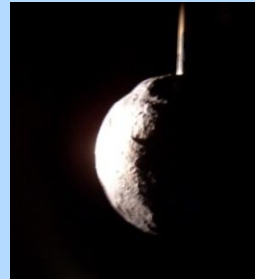
„Mythical eyes“



„Scientific eyes“

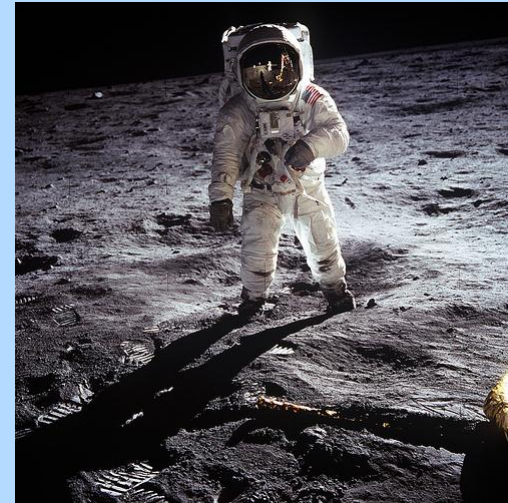


Reflected light!!



A moon lab

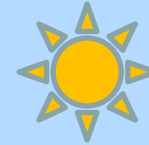
Visiting the moon...Space exploration



Astronomy for young children (ages 4-6)

The Earth

- No „up“, no „down“, everywhere space!
- The „iluminated“ Earth (day and night)
- Identification figures: perspective change
- No explanations but dialogues and stories!



Pretend play



UNAWE-Germany



Pretend play



..Expose young children to scientific concepts about the Earth **early on**...



India



Venezuela



Tanzania

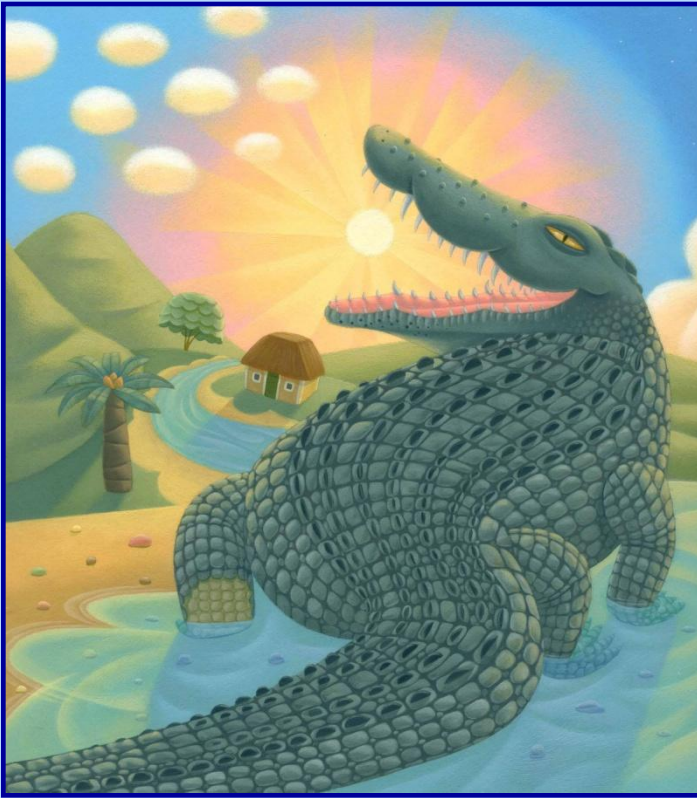


Mérida, Venezuela

Astronomy for young children (ages 4-6)

Our star, the Sun

Myths



The crocodile that swallows the sun

Observations



Sunlight phenomena:

Light and shadows

The Sun as a heat source

The Sunlight and life on Earth



Astronomy for young children (ages 4-6)

Our neighbours, the planets

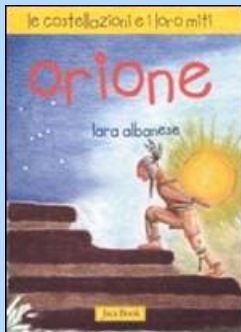
Emphasis on: colours, special features (red spot in Jupiter..), sizes and names



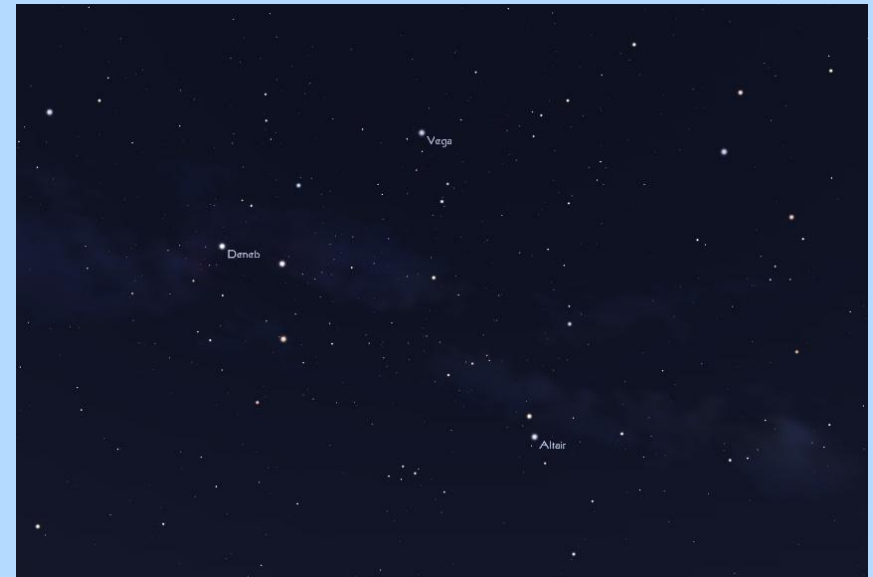
Astronomy for young children (ages 4-6)

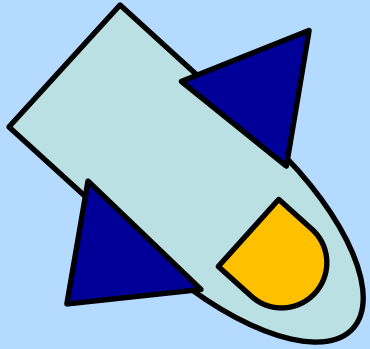
The world of the constellations / visual memory

Myths, stories and more stories



Recognizing some bright constellations





Intercultural education with „Lunik and Sonja“ (E.Ts)



Lunik and Sonja are foreigners...

They need our help,
They don't speak our language!

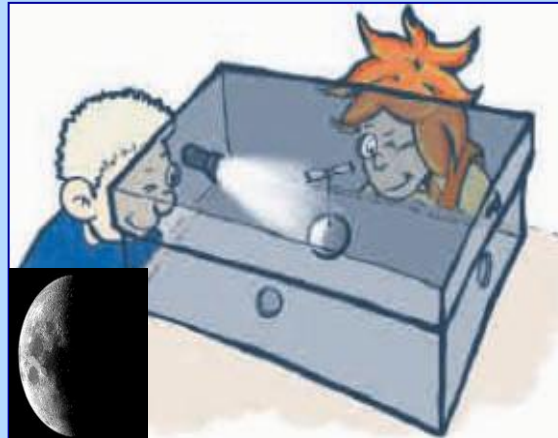
We can learn a lot from them.
We can show them our world.



5. Astronomy for children (ages 6-8)

- **Linking astronomical phenomena with our own lives / Biographies of astronomers**
Building the scientific mind: from pretend play via models to first explanations

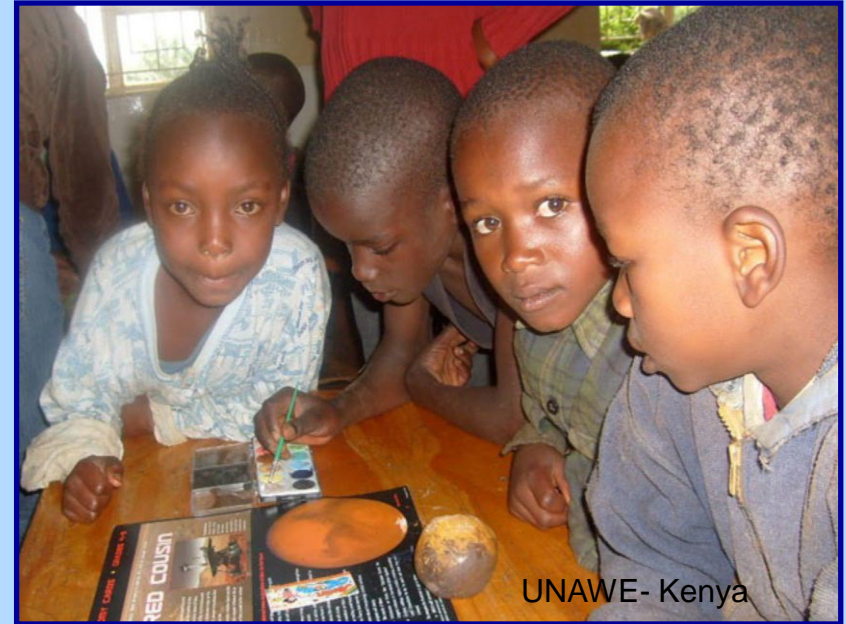
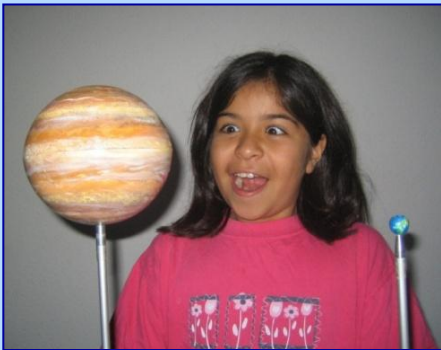
- **Observational skills:** what the children are able to see by themselves
- **Day and night cycle (time!, hours), the moon phases , our calendar**
- **The relative sizes of the sun and the moon at the sky**
- The path of the Sun
- Reading, understanding and imagining... (more and more stories)



Observing and explaining by means of models

Astronomy for children (ages 6-8)

- **The Planets:** more detailed modelling, characteristics and relative sizes of the planets
Their movement around the Sun.
Space exploration



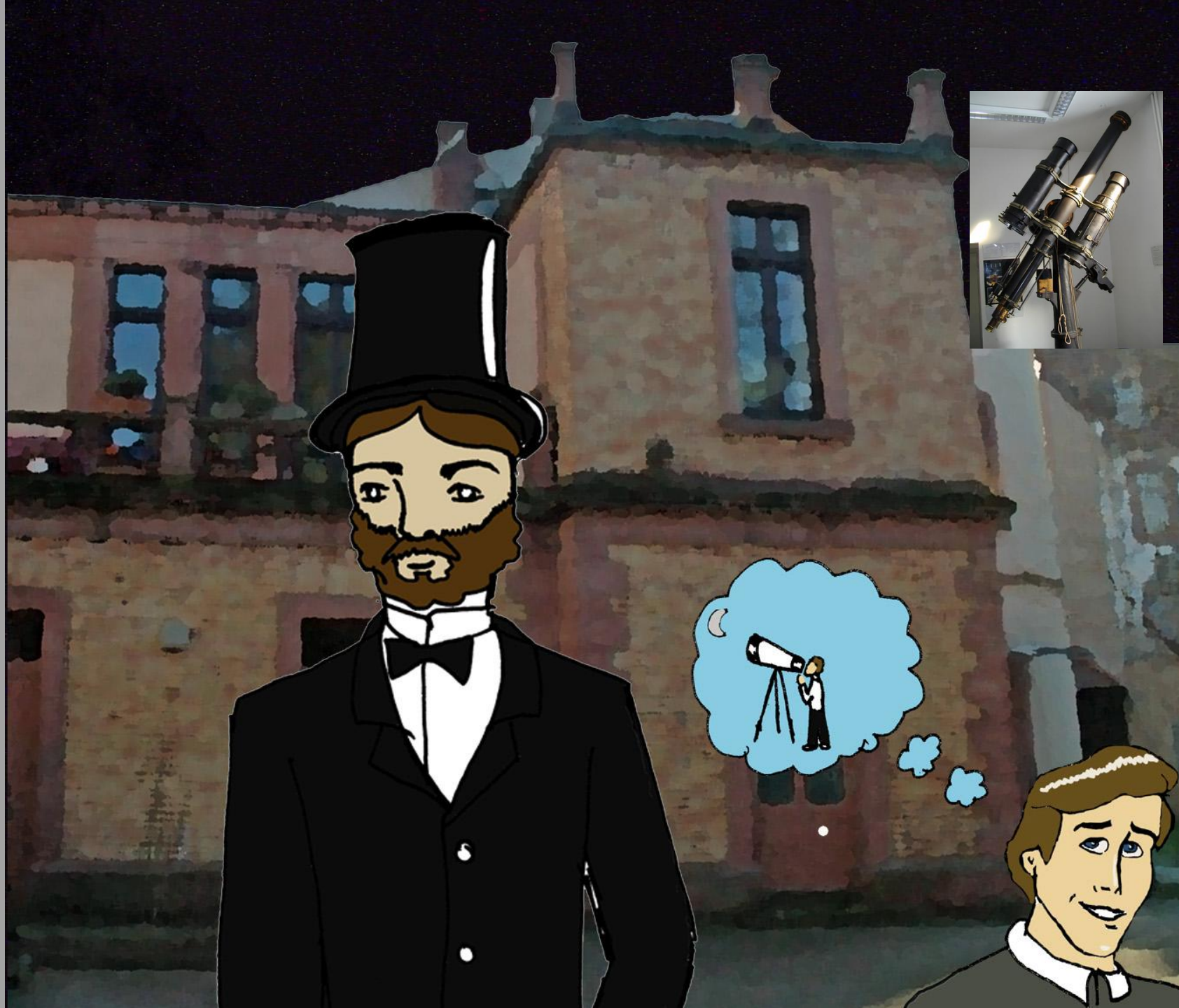
- Identification of more constellations (according to the time of the year) together with myths and stories





Sophia Appl Scorza (age 15)







Max Wolf



Nord America Nebula



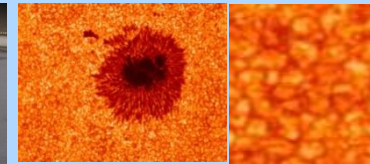


6. Astronomy for children (ages 8-10)

Observations and abstract thinking: models and explanations

- The „parallel“ Earth
- The eclipses
- The seasons
- The relative distances of the planets and their movement around the sun (orrery)

Observations of the Sun



Experiments

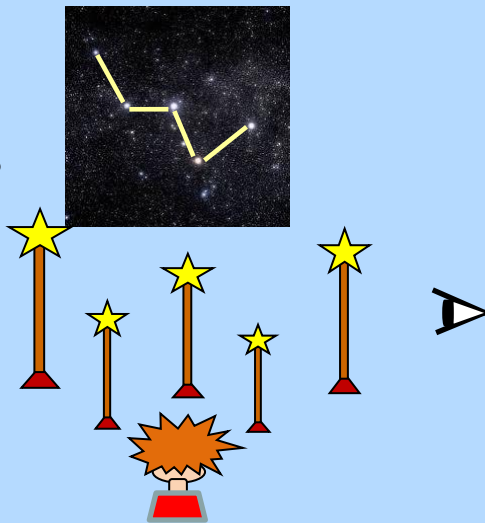


Heidelberg (Natalie)

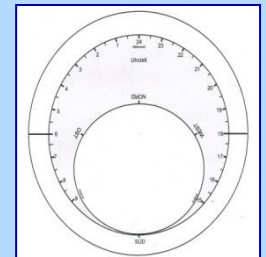
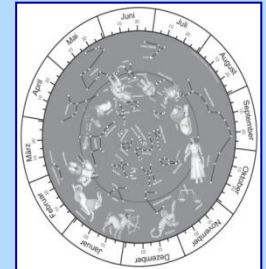
Astronomy for children (ages 8-10)

Getting deeper into more details....

- The apparent shape of the constellations



- The visibility of the constellations along the year.
- How to find the planets on the sky.



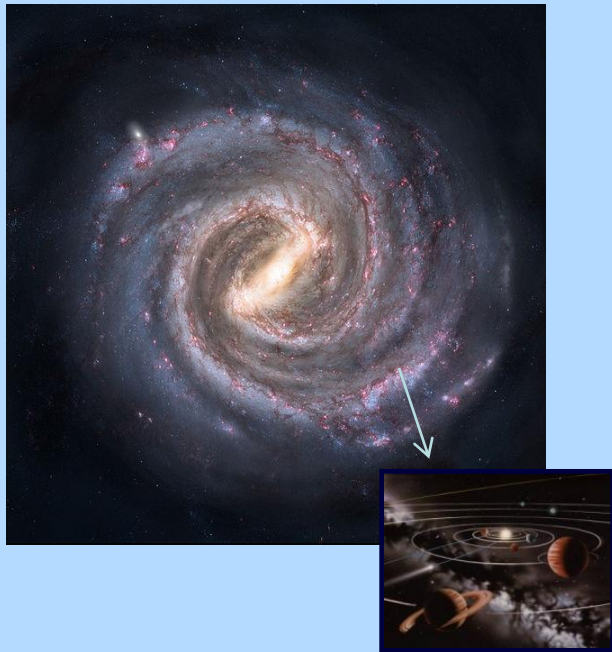
- The brightest stars in the constellations (Sirius, Rigel, Capella...)
- Their colours, relative brightness and sizes



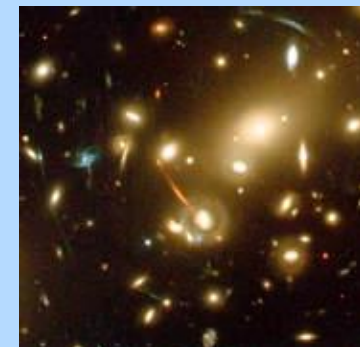


Astronomy for children (ages 8-10)

The stars of our Milky Way and our cosmic address



- The lives of the stars
- Other Solar systems (exo-planets)



Astronomy for children (ages 8-10)



Heidelberg

Performances



Mérida, Venezuela



Summary

Ages	Skills	Topics
4-6	Classification and naming of objects Observations: the moon, sun, bright constellations Listen and imagine... (stories and more stories) Playing roles / intercultural education	Classification of astronomical objects moon, comets, asteroids, planets, sun, stars, galaxies. First modelling of the Earth, Sun , Moon and the planets Space exploration
6-8	Linking astronomical phenomena with our own lifes Observations: the moon, the sun (filters!), the planets, constellations Reading, understanding and imagining: Inspiring children with biographies of astronomers	Day and night (time and hours), the moon phases , The moon and our calender, The relative sizes of the sun and the moon at the sky. The planets: relativ sizes Recognizing constellations Space exploration (Surviving on the Moon.)
8-10	Abstract thinking, models, explanations, first quantifications Observations: the moon, the sun (filters!), the planets, constellations Inspiring children with biographies of astronomers	The parallel Earth The bounded movement of the Earth and moon The seasons, eclipses The planets: relative distances and their movement around the sun (horaries) Direct observations of the constellations Finding planets with the constellations Other solar systems Our home the Milky Way (model) The family of galaxies The life of stars



MUCHAS GRACIAS!