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Memorie della

Universe Awareness

An inspirational programme for economically disadvantaged young children.

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Abstract. The beauty of the sky and its connection with the human development have inspired generations with wonder. Astronomy conveys the excitement of science to the public. Considerable resources are devoted to outreach in developed countries, with spectacular images produced by modern astronomical facilities and astronomical discoveries that change our views of the Universe.
Universe Awareness (UNAWE) is a programme for children between 4 and 10 years old. The formative ages of 4 to 10 years are crucial in child development. Children of that age can appreciate the beauty of astronomical objects and develop a “feeling” for the vastness of the Universe. Exposing young children to such material is likely to broaden their minds and stimulate their world-view. The programme concentrates on economically disadvantaged young children because most other children will be exposed to some knowledge about the Universe and disparities between advantaged and disadvantaged children increase with age. Venezuela hosted a successful pilot project in 2006. From spontaneous observation of the sky to a teacher-training workshop in the ”Centro de Investigaciones de Astronomía” in Mérida, this was a wonderful experience for participants and organisers alike. This shows how successful the UNAWE programme can be.

Key words. Astronomy outreach – astronomy education – ethnoastronomy

1. Introduction

Astronomy outreach programmes are numerous and diverse both in scope and in targets. Nowadays every major astrophysical research project invests time and resources in the communication of research and observatories worldwide organise public observing nights. The large number of amateur astronomy clubs demonstrates the scale of public interest in astronomy.

A large majority of astronomy outreach programmes focus on science education and target the general public or children in possession of a certain background and education. Astronomy is and has always been a broad and inclusive topic. While the interface with other

Send offprint requests to: C. J. Ödman disciplines such as the arts has often been used to enliven astronomy courses (e.g. Fraknoi (2002), Fraknoi (2003)), the opposite is rarely the case. Indeed, astronomy is often perceived uniquely as a science.

Although the sky is common to us all, astronomy has not often been explored as a tool for peace education. The realisation of our place in the Universe broadens the mind beyond common boundaries and shows the potential of astronomy to be instrumental in the development of human values.

Universe Awareness is a new programme for very young children in economically disadvantaged regions and developing countries that intends to exploit the full potential of astronomy.

The idea of Universe Awareness was first put forward by George Miley. Following a multidisciplinary workshop at the European Southern Observatory headquarters in May 2005 (Miley & al. 2005), an international steering committee was set up along with two sub-committees, for education and organisation. The educators, teachers, astronomers, anthropologists and public outreach professionals taking part in the workshop came from fifteen different countries on four continents.

2. Goals

The aims of the Universe Awareness programme are to reach as many children as possible. The ambition is mainly to communicate the beauty and scale of the Universe, not to deliver dry scientific facts.

The concept of Earth awareness is key in the process of highlighting the multicultural aspects of astronomy. This is likely to stimulate children's perception of the planet in attempt to plant the seeds of an education for peace (UNESCO 1989).

The development of cognitive skills will be taken into account in the design of the UNAWE material which will adopt a complete set of didactic approaches adapted to various cultural and educational environments.

3. Uniqueness of astronomy for child development

Astronomy is outstandingly suited for the aims of the UNAWE programme. The subject of astronomy is the sky which is equally accessible, or inaccessible, to all.

As a science, astronomy stimulates children's curiosity. Where possible, they will take part in experimental and investigative activities. They will learn about their surroundings beyond what they would normally be able to explore. It involves other scientific subjects such as chemistry and biology. Astronomical research drives the development of new technologies that deliver stunningly beautiful images of the universe.

Astronomy plays an important role in our cultural heritage.

All cultures carry with them myths and stories about the sky and the stars, their formation and fate. The inclusion of ethnic origins of astronomy is not only important to ensure that the programme is culturally relevant and exposes children to a diverse human family populating the planet but also to give children more than one approach to build a mental representation of the universe.

Astronomers are the ultimate historians, seeking to understand the origins of our universe. Looking at the night sky we are seeing things that occurred many thousands of years ago, when humans did not exist, when dinosaurs were alive, even before the planet existed.

Owing to the nature of the questions asked by astronomers, there are common grounds with various other disciplines such as philosophy and sociology. People have turned to the sky for answers to their most profound questions for centuries.

Perhaps more importantly, astronomy is an exciting field. The exotic objects and the extreme conditions found in space are the perfect backdrop for exciting adventure stories. Astronomical images are great food for children's imagination.

UNAWE is not exclusively a science outreach programme. Because of the reasons mentioned above, astronomy is a natural subject to base this programme on.

4. Structure of the programme

4.1. Environments

Three environments have been identified, for which UNAWE material will be developed.

Basic environment:

- Minimal schooling becomes available from ages 7 - 8.
- Television is scarce.
- Educators have a poor or no training.
- Parents and community leaders play an important role.
- UNAWE programmes are broadcast on television and mobile observatories tour the country.

Intermediate environment:

- School is available from ages 6 - 7.
- Television is common at home and at school.
- There is very limited and sporadic access to the internet.
- Teachers have little training.
- Short UNAWE activities are carried out at school.

Advanced environment:

- School starts at ages 4 - 5.
- Access to the internet is available at school, sometimes at home.
- Teachers are well trained.
- UNAWE can be incorporated to the school curriculum.

In each of these environments different material must be developed and different methods applied. It is particularly important to involve teachers, community leaders and parents to ensure their approval and to get their feedback on the programme.

4.2. Material

The general characteristics of the material are as follows.

The programme has to be *modular*. There should be short activities as well as longer programmes with follow-up activities.

UNAWE has to be *adapted* to multiple languages, cultures and beliefs. Templates will be produced that are easily adaptable to a large diversity of cultures.

The material has to be *professionally developed*. We will be working with educators, anthropologists, and professional media producers: animation studios, story writers and game designers.

The UNAWE programme will carry a *strong message*. We will use a uniform set of characters that children can recognise throughout the activities and identify with.

The material must be *rooted*. In each target region, specialists and local co-ordinators will ensure that the material suits the various cultures. We will make use of the history of astronomy to show children that it belongs to their heritage (SAAO 2003).

Last but not least, the UNAWE programme must be *entertaining*. The ambition of the programme is not to produce astronomers but to give children a glimpse of the beauty and enormity of the universe. We will develop activities that stimulate the imagination. This includes games, songs and adventures.

The direct involvement of children in hands-on activities is an important ingredient for the success of such a programme. Children learn fast through playing with models. They also remember well if they can keep the models they make.

Stories, both written for the programme and taken from myths and history will provide excitement and adventure. Set on the background of astronomical environments, they will show the beautiful and exotic objects seen in space.

In some environments we will be able to organise twinning experiments between schools. This will strengthen the cultural exchange between children. Developing countries also have darker skies where children can count many more stars than in urban areas. Twinning is a way of sharing that privilege.

4.3. Contents

The educational programme is still under development and substantial input from educators and teachers in target countries will help develop it into a suitable form. In order to optimise the learning process, it is important to adopt a step-wise approach. Four core topics have been identified which lead from home to the universe.

Observing the sky is a first step to awaken children's curiosity. The observation that objects move across the sky in a coherent fashion leads to the second, and possibly most challenging topis in terms of abstract thinking: Earth awareness.

This subject is not only about understanding the Earth's spherical shape, its orbit or the seasons. It provides the opportunity to show other places, other skies, other people and other cultures and to stimulate a sense of Earth citizenship.

The third topic, the solar system, allows to make use of ancient astronomical arguments such as the zodiac to give children a feeling for the planets. Many legends and myths can be told in this context (Scorza 2002). The planets' similarities and differences with the Earth make them the perfect ground for adventure stories.

The last topic, the galaxy and beyond, pushes the scale even further. Owing to the almost two-dimensional shape of the Milky Way, children can build and play with rotating models of the galaxy and place the solar system on it. The diversity of galaxies found in the universe provides exotic and beautiful images.

4.4. Methods

Various didactic approaches have been identified to make a complete programme that can resonate with every child. Direct observations are a starting point that involves the children's attention and curiosity. Hands-on activities allow them to develop a mental image of what they have observed. Playing games, songs and telling adventures stories taking place in those astronomical settings ensure experience-based learning. This should be fun and include their own cultural heritage. Twinning activities help strengthen the human multicultural experience.

Based the topics and methods mentioned above, a modular programme for the different age groups will be developed such that short one-off activities are possible as well as coherent activities spread over a longer period of time.

4.5. Teacher training

In order to reach as large a number of children as possible UNAWE will generally be delivered by teachers. The teachers and educators involved in the implementation of UNAWE will play a key role in ensuring the pertinence of the programme. UNAWE will therefore organise teacher training workshops.

Teachers in each of the target countries will also play an active role in the design of the material and delivery methods. This is part of the bottom-up approach we are taking and should to give educators the confidence to carry out the implementation of UNAWE in their schools.

Obtaining continuous feedback from those people involved in implementing UNAWE will be an important aspect of the programme.

The teacher training workshops and the distribution of the UNAWE programme will be coordinated in each country by a National Action Committee (NAC) which will serve as central communication point between the international programme management and the national implementation. The NACs will also be involved in raising funding at the national level.

Interdisciplinary workshops will form an integral part of the development of UNAWE and will provide a platform for exchanges of experiences and material.

5. Pre-pilot project in Venezuela

With enthusiastic support form the Venezuelan UNESCO National Commission, one of us (CS) went to Venezuela in January 2006 to start a pre-pilot project and to test the principles of the UNAWE programme.

Venezuela is an interesting country because it is very multicultural owing to its heritage and colonial history. The hostile geography of the country also leads to some communities being very isolated thus all three educational environments identified for the programme are present.

5.1. Chuao, a village on the coast

Cecilia Scorza's first destination was a village off the Venezuelan coast which is only accessible by boat. She made contact with children on the road to the village and showed them some astronomical images printed on transparencies. This sparked their interest and they started to share their own experience of the night sky spontaneously. They identified the moon as being distant and therefore apparently "following" them.

In the village children but also women showed interest. This is very positive as women often play a major role in children's education, especially at a very young age. Within hours, the children were playing a game mimicking the solar system on the village plaza.

The astronomical images printed on transparencies were a great success. Clearly the beauty of astronomical objects appealed very much to the children.

5.2. Teacher training workshop in Mérida

Dr. Gustavo Bruzual, former director of the Centro de Investigaciones de Astronomia in Mérida hosted a four-day long teacher training workshop. The attendance to the workshop was impressive: the event was overbooked although it had been advertised at very short notice and many teachers had to be turned down. Some had travelled days to come to Mérida.

The workshop was organised in collaboration with Ms. Marlene Morales-Sueke who specialises in indigenous cultures. Various class activities were demonstrated and explained in the workshop with the help of children. Teachers asked a large number of questions, many related to supertstitious interpretations of the night sky. The key was not to oppose a scientific to a non-scientific view but to emphasize their complementarity and common history.

Teachers built themselves a box containing various models and toys they could bring with them to their schools. There, they could reproduce those activities and build models with the children who could in turn keep them.

Two represenattives of the Ye'kuana tribe from the Southern Amazon joined the workshop to explain their constellations and their use of astronomy in every day life, including celebrations and seasonal holidays. Their faiths and beliefs are intertwined with astronomy and a programme like UNAWE could give them support in promoting their own cultural identity and expose them to beliefs in other parts of the world but care must be taken to avoid the confrontation of potentially conflicting points of view.

The event was followed by the formation of the Venezuelan National Action Committee which includes two astronomers, an expert in indigenous cultures, an astronomy education specialist and the coordinator of the UNESCO Associated Schools Network in Mérida.

The experience was a success and while it raised a number of relevant questions it showed the immense potential and appeal of a programme based on astronomy like UNAWE.

6. Future developments

Universe Awareness is hoping to develop a programme and material for about four developing countries and marginalised communities in four European countries and to start a pilot project in 2009 which will hopefully be elected International Year of Astronomy by the United Nations.

At present strong contacts have been established in Spain, Venezuela, and Chile in the spanish-speaking world. Within the EU we have contacts in the Netherlands, Germany, Ireland, Italy and the United Kingdon and outside Europe, in South Africa, India and Indonesia.

The immediate future of Universe Awareness should focus on fund raising for the development of the programme, the formation of National Action Committees and the educational and cultural programme.

In view of those objectives, we are organising a multidisciplinary workshop at the Lorentz Centre in Leiden in the Netherlands in October 2006 which will bring together astronomers, outreach professionals, educators, early childhood specialists, experts in development and primary school teachers from a large number of countries.

7. Conclusion

Astronomy has many facets including science, history and cultural diversity. With the beautiful astronomical images obtained from the latest instruments and their potential to entertain and stimulate children's imagination it is outstandingly suited for an outreach programme that goes beyond science education.

Universe Awareness is the first programme of its kind to adopt this cultural and scientific approach and one of few initiatives in astronomy outreach to target very young children. We believe this programme can benefit children and communities worldwide.

More information about Universe Awareness can be found on our website: http://www.UniverseAwareness.org/

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