

Humanising astronomy

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Abstract

Universe Awareness (UNAWA) is an international programme that aims to expose underprivileged children (in the age group 4–10) to the inspirational aspects of astronomy. We are currently at the stage of developing materials that will be utilised in a diverse range of environments.

This paper explores UNAWA's particular approach to developing tools which includes not only indigenous and folkloric astronomical knowledge, but also the culture of transmission of such knowledge.

A specific understanding and explanation of the Universe, the Sun, Moon and stars is present in every culture and can be found contained in its history, legends and belief systems. By consciously embracing different ways of knowing the Universe and not uniquely the rational model, UNAWA places the humanising potential of astronomy at the centre of its purpose.

Whilst inspiring curiosity, pride and a sense of ownership in one's own cultural identity, such an approach also exposes children to the diversity of other peoples and their cultures as well as the unifying aspects of our common scientific heritage. The means of creating and delivering the astronomy programme are as relevant to the desired educational outcomes as the content. The challenge in the design of materials is to communicate this stimulating message to the very young. Respect for alternative values systems, the need for dialogue and community participation, and where possible the production of materials using local resources is emphasised.

This paper touches recent experiences liaising with communities in India, South Africa, Tunisia, Venezuela and Colombia.

The limitations of current scientific outreach

Modern astronomy plays a unique role in conveying the excitement of science to the general public. Whilst other scientific disciplines are struggling to attract students, the popular interest in astronomy continues to rise. This is due in part to the extraordinary images and discoveries that are conveyed almost on a daily basis from orbiting satellites and telescopes peering into deep space. Public access to that information has re-contextualised astronomy from being an expensive and symbolic endeavour pertaining to an intellectual elite, to becoming a driving force of modern science to which the public willingly commits resources, funding and their interest. Nowadays most major astrophysical research projects invest time and services in the communication of their research. Astronomy outreach programmes are numerous and diverse, however

the majority of those programmes focus mainly on science education to reach the general public or children coming from a middle-class background and possessing a certain level of education. Fortunately in recent years, astronomical outreach has increased in developing countries.

Universe Awareness (UNAWA) is an international programme that exposes young, disadvantaged children aged between 4 and 10 years to the inspirational aspects of modern astronomy. By conveying a feeling for the scale and beauty of the Universe, the main goal of UNAWA is to give young children a broader perspective on their place in the Universe than the one they acquire from their immediate environment. UNAWA aims also to awaken children's curiosity in science and stimulate internationalism and tolerance. Included in this exposure is the placement of their culture in context with that of other cultures. The specific environmental circumstances such as the local ethno-astronomical heritage, the regional folklore, scientific tradition, and the geographical location, all inform our personal understanding of the sky; Norris (2007) notes that one child's belt of the warrior Orion is to an indigenous Australian child a canoe, or is to an astronomer a new-born star in a molecular cloud.

The benefits of early childhood care and education

UNAWA specifically targets very young disadvantaged children in the earliest years of mental cognition and the formation of their personal and social value system. The reasons for this are reflected in the current trends amongst policy makers in the international development community set out by Weikart (2000). It is now clear that early childhood care and education offer the best chance to bettering the lot of poor and marginalised children. Early intervention increases retention and improves a child's chances of continuing basic education. Significantly, the positive effect of early childhood education extends into the wider society, as interaction with very young children inevitably leads to adults being educated and supported in the process as well, as reported in Dias de Graca (2006)

Astronomy and very young children

Whilst the efficacy of early childhood care and education is not in question, it is important to consider if the concepts of the Universe and astronomy in general are beyond the capacity of children at this age. When we invite children to astronomy, the very fact that we are offering them the "mega" world beyond experience – not just the world under a microscope or the macro world that they could potentially travel to – presents a spectrum way beyond empiricism or observation as children know them. We introduce them to infinity, ask them to absorb concepts whose theories continue to change, and accept as fact extremes in speed, temperature and scale that are unimaginable. UNAWA talks about the Universe as defined by the educational researcher Vasiliki Spiliotopoulou (2005):

The Universe is everything you see, you know, or you can imagine exists around us, as far as you can possibly think.

How does UNAWA invite young children to this great concept of exploring the beautiful Universe?

The process of knowledge acquisition

To begin with, there are generally accepted developmental stages through which children pass through on their way to acquiring understanding of the world. These stages, first proposed by the Swiss developmental psychologist Jean Piaget, (Piaget, 1963), are sequential, not culturally specific and reflect fundamental qualitative modes of thinking. Broadly speaking, they cover the process from first experiencing the world through the senses, to the use of mental representation in symbols, words and pictures, to the application of logic and finally the ability to think in abstracts and draw conclusions.

For our purposes, Piaget's second stage, the so-called "pre-operational stage" of mental operation is the focus. Since the Piaget defined age group of 2-7 is considered – even by child development professionals — only an approximation, UNAWE's targeted age of 4-10 still pertains to being relevant.

Initial knowledge

Spelke (1994) asserts that young children are not open blank slates upon which we can simply imprint the theory of choice. A four year old does not instantly accept either the rational and scientifically proven model of the Universe, nor one that has the world resting on the back of four whales. Young children are not without some innate, naïve, and observed understandings of the physical world, i.e. the Earth is flat, unsupported objects fall down, the sky contains objects that move: clouds, sun, moon. Turning once again to Piaget, young children should actually be equipped to have the tools of epistemological observation to begin making sense of, for example, planetary phenomena. The earliest games we play with children and the earliest lexical constructions we build with them are to do with the appearance and disappearance of objects – games that should prepare them to perceive that there are several alternative possibilities as to how something disappears; objects can be occluded, can move behind or in front. From the earliest age then, children are learning, but within a so-called "different way of knowing" and most importantly, through play. Whilst still on the theme of planetary phenomena, one such example of a different way of knowing is the common perception of a "birthday". Every year children celebrate the fact that another year has passed since their birth. However, we do not congratulate them by saying, "Happy-you-just-did-a-complete-orbit-around-the-Sun-day". In a very "humanised" fashion, children absorb the concept of time's passage and our measurement of that process.

UNAWE in action

Since its inception in 2005, UNAWE pilot projects have taken place in countries all over the world. We are present in Spain, Chile, Colombia, Venezuela, South Africa, Germany, the Netherlands, Tunisia, Italy, India and Indonesia, working with existing complementary organisations and/or teachers and individuals in those organisations to build a network of professionals and volunteers.

India

Our work in India, both with the Tamil Nadu Science Forum and PRATHAM – *Mumbai Education Initiative Direct Program* – reflects the way in which the local environments set the agenda and

content of national UNAWE programmes. TNSF and PRATHAM are grassroots movements run by local, dedicated volunteers and professional activists and consist of literacy, science, hygiene, HIV/AIDS education and awareness campaigns, teacher training, and the education and rehabilitation of child labourers. The children reached by these organisations through local community groups or on the street, never make it to the venues of formal education. As a result, the materials are transmitted via traditional street theatre and music or through low literacy activities accessible to parents and children alike.

Tunisia

At the other end of the scale is the entirely formalised educational approach adopted by UNAWE Tunisia. In collaboration with the Science City in Tunis, and supported by the Ministry of Education and Training, and the Ministry of Women, Family and Elderly Affairs, a pre-existing astronomy programme has now been modified and opened to younger children. There is also a network of nationwide youth clubs operating in isolated areas that have no regular access to such resources. These remote destinations are the focus of the Science Caravan; a convoy of portable laboratories and exhibitions, of which the “astrobus” is a significant part.

South Africa

The Department of Science and Technology has demonstrated a commitment to bringing an understanding of the Universe into the homes and lives of ordinary people of South Africa and in promoting indigenous role models to key positions in science and technology, from population groups that historically had no access. Through the National Research and Development Strategy, astronomy research and researchers in the country are actively being promoted and endorsed.

UNAWE South Africa uses as one of its teaching materials, *The Crocodile who swallowed the Sun* from the South African Agency for Science and Technology Advancement. This book of beautifully illustrated stories based on ethno-astronomy gathered from the entire continent, also includes facts and the latest images from deep space reflecting both traditional and current scientific understanding.

Whether UNAWE exists in a structured, government supported environment as in Venezuela or one motivated by passionate amateur astronomers as in Colombia, the principles remain the same. The aim of UNAWE is not to create scientists, or lay the foundations for budding astronomers, it is to inspire those very young children with the beauty and awe of their physical world within its celestial perspective and the potential beyond. Fantasy and myth, story, fun and games are the means of transmitting a very profound intent: the sky belongs to us all. No matter what our culture, there is commonality in our quest for understanding the mysteries of the Universe.

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