

Using astronomy's history to engage new audiences

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Abstract

While much astronomy communication focuses on the results and practices of contemporary astronomers, the history of astronomy can provide a useful tool to engage new audiences with the subject. The historical approach provides an opportunity to encourage science citizenship by exploring how the practices and impacts of astronomy have changed over time and across different cultures. This paper will explore how the Science Museum plans to communicate astronomy via its history in future planned gallery and web products, and the benefits of combining science education with a historical approach.

Introduction

As well as being International Year of Astronomy, 2009 marks the centenary of the Science Museum. It is one of the UK's national museums, with a collection of over 200,000 objects (of which about 7% are on display at any given time). Over 2 million visitors a year visit the galleries, which are a mix of object-rich displays, hands-on interactives and multimedia experiences.

The museum's current coverage of astronomy is minimal, as the bulk of the collection has been in storage for some years. The collection spans from the 10th century to the present day and includes items of international significance, such as the Kew Photoheliograph (the first astronomical instrument designed to photograph) and the 6ft mirror from Lord Rosse's Great Telescope. 3D artefacts are complemented by an extensive pictorial collection and the holdings of the Science Museum Library, whose treasures include a copy of Galileo's *Sidereus Nuncius*.

The congruence of IYA and the museum's centenary provides an exciting opportunity to deliver some major audience outputs on astronomy for 2009. These could be in a variety of formats (exhibition, events, web) but for maximum impact and audience benefit should make use of the historical collection.

Why use history?

The benefits of history in science education have been summarised by Matthews (1994). He identifies seven benefits, briefly:

- better comprehension of scientific concepts and methods;
- "parallelism": the connection between conceptual development in individuals and the historical development of science;
- cultural value;
- understanding the nature of science;

- counteracting scientism and dogmatism;
- humanising science, making it less abstract and more engaging;
- demonstrating connections within science and with other disciplines.



Figure 1 – Illustrations of the Moon from Sidereus Nuncius, 1610



Figure 2 – This 1677 star map by Harumi Shibukawa, one of the first people to use a telescope in Japan, combines his systematic observations with concepts from Chinese field-allocation astrology. It is a useful illustration of how astronomy has developed by assimilating knowledge from different cultures.

Science Museum / David Exton

These advantages apply equally to museum gallery presentations. In fact, historic scientific objects — the material culture — are ideal for delivering these benefits. They had makers, users, uses and roles within their contemporary society. They can be displayed to testify to the tentative nature of science, to show how problems were solved and concepts changed or were replaced. Objects with known associations can celebrate the contribution of women or other under-represented groups. The collective nature of science can be documented with apparatus used by teams. Historical objects can aid the understanding of conceptual and contextual aspects of science. But the history of science also furthers understanding of the procedural aspects or parallelism as described above — see, for example, Wang and Marsh (2002). Visitors' ideas about science are drawn from many periods in science's history, so this approach enables the choosing of stories that will resonate with them.

The historical approach enables the telling of long-term stories about science, spotting trends and painting big pictures; showing that it is not just scientific knowledge that continually changes but also scientific drivers and practices. The historical view better illustrates the connections between science and social, cultural and economic trends. The distance of time gives us a better understanding of the importance of different historical events and allows us to take a critical view of science while minimising the risk of offending current players.

Another key factor in using historical themes is that a holistic approach to science, with examples showing how it has changed over time, is becoming increasingly familiar to a very important audience for the museum — school groups. The growing emphasis on a critical evaluation of science rather than an imbibing of facts saw a new GCSE science curriculum being introduced in September 2006. This aims to give students opportunities to acquire an understanding of *how science works and its essential role in society and how uncertainties in scientific knowledge and scientific ideas change over time*¹. The hope is that school visitors will engage with the museum's collection, finding in the displays the material evidence which they can interpret and evaluate, adding to what they have learned from their school textbooks.

Astronomy: a cultural perspective

The proposed approach for the museum's astronomy outputs is to examine astronomy and its history from a cultural perspective, and explore what our studies of the stars say about us as human beings.

Looking at the historical development of astronomy across different cultures helps to give a more complete picture, showing how encounters and exchanges between different knowledge systems shaped the subject. This approach can also help in reaching out to more diverse audiences.

Major developments in astronomy, and the consequential shifts in world view these sometimes resulted in, will of course feature strongly, but it is also important to emphasise the role of astronomy in daily life to help visitors relate to the subject. From the story of the giant instruments at India's Jaipur observatory (built for accurate measurements to help reconcile the Hindu and Muslim calendar systems, but rendered obsolete by the news of the Copernican theory), to the 1919 eclipse expeditions that supported the predictions of Einstein's general relativity and created a media sensation, there is a rich vein to draw on.

Learning outcomes

The target audience for the interpretation is:

- School groups aged 11-16 and their teachers;
- Families with children aged 12+;
- Independent adults.

Asking "who's the audience?" is increasingly common in the development of galleries and events. The target audience acts as a marker against which decisions about content and delivery are made, and makes it possible to evaluate success. Likewise, learning outcomes are written with the target audience in mind. The model of learning used in the Science Museum is drawn from the constructivist models of George Hein — learners are active participants rather than passive recipients, and construct their understanding of the world by adapting mental models to accommodate new experiences and information (Gammon, 2003). The table below shows the intended learning outcomes for this project:

¹ National Curriculum schemes of work can be accessed at www.nc.uk.net

Outcome	Description
Cognitive	Acquire new knowledge or accommodate it into existing schemas; reinforce prior knowledge or set it in context; apply existing knowledge; draw analogies With reference to the National Curriculum (science, history, citizenship) for the schools audience.
Affective	Challenge beliefs, attitudes and values; increase understanding and empathy with others' viewpoints. With particular reference to the process of science, and its social and cultural context.
Social	Develop skills of co-operation, communication, helping others to learn, developing social capital. Especially intergenerational dialogue in family groups.
Developing skills (mental and physical)	Investigation, observation, classification, assessing evidence, drawing conclusions With particular reference to historical objects.
Personal	Increase self-confidence, inspire interest, curiosity, awe and wonder, motivate to investigate further. Especially in astronomy, its history and the Museum's collections.

Table 1 – Learning Table

Widening access to the collections

Should planning and fundraising be successful, it is hoped that the museum will stage an exhibition opening in late 2008, in time for the 400th anniversary of Lippershey's telescope patent, and run this through 2009. This would be complemented by web material, school group visit resources and a series of events.

The collections are not just a resource for the Science Museum's staff — anyone working with the history of science is welcome to make use of them. A wide range of images, information and educational resources including games can be found on the Science Museum's websites² and everyone participating in IYA2009 is encouraged to visit.

References

- Gammon B. (2003), Learning in museum environments. Internal Science Museum document, can be provided on request.
- Matthews M. R. (1994), Science Teaching: The Role of History and Philosophy of Science. Routledge, New York.
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² www.sciencemuseum.org.uk and the collections website www.ingenious.org.uk