

## **Astronomy On-Line - the World's Biggest Astronomy Event on the World-Wide-Web**

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### **Abstract.**

This educational programme was organised in a collaboration between ESO, the European Association for Astronomy Education (EAAE) and the European Union (EU) during the 4th European Week for Scientific and Technological Culture. Astronomy On-Line brought together about 5000 students from all over Europe and other continents. Learning to use the vast resources of tomorrow's communication technology, they also experienced the excitement of real-time scientific adventure and the virtues of international collaboration.

## **1. Introduction and Background**

While the main task of the European Southern Observatory (ESO) is to provide state-of-the-art observing facilities to the European astronomical community and otherwise support European astronomy, there have also been efforts to advance the knowledge about astronomy among the general public, and, in particular, among students.

ESO provides, on a regular basis, press releases to the European media. There are arrangements at all ESO facilities for the general public to visit. The "Open Door Day" at the ESO European Headquarters (Garching, Germany) regularly draws thousands of visitors. Various "ESO Exhibitions" are shown in different European countries and material is provided to science museums and planetaria. This is a formidable task, given the necessity to not only cater to different levels of education, but also to audiences with different languages and cultural backgrounds.

## **2. Astronomy On-Line**

The programme is a collaboration between the European Association for Astronomy Education (EAAE) and the European Southern Observatory. It is

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sponsored by the European Union (EU) via the European Commission (EC) through its Directorates XII (Science and Technology) and XXII (Education) and was initiated in conjunction with the 4th European Week for Scientific and Technological Culture in November 1996. Chile was included in the arrangements as host country for the ESO La Silla and Paranal Observatories.

During Astronomy On-Line, a large number of school students and their teachers from all over Europe and other continents as well, together with professional and amateur astronomers and others interested in astronomy, participated in a unique experience that made intensive use of the vast possibilities of the World-Wide-Web (WWW). It is obvious that such a programme cannot be a series of lectures with the goal of bringing the full audience to a well defined level of knowledge. Indeed, the main challenge of the programme was to attract interest on many different levels, yet to allow students to evolve from the level of aroused curiosity to the level of personal contact with professional astronomers.

Through the WWW, the participants 'meet' in a 'marketplace' where a number of different 'shops' are available, each of which tempt them with a number of exciting and educational 'events', carefully prepared to cater for different age groups, from 12 years upwards. The events cover a wide spectrum of activities, some of which have been timed to ensure the progression of this programme through its three main phases. It is all there: from simple, introductory astronomy class projects to the most advanced on-line access to some of the world's best telescopes, from discussions with peer groups to on-line encounters with leading professionals.

Astronomy On-Line is not just about 'trivial' data retrieval or about enhancing the seductive drive into virtual reality. For example, through the possibility of designing and conducting a real observing run on some of the major, professional telescopes, it offered the opportunity for hands-on experience to students even in the most remote areas. In addition, they were able to 'meet' some of the professional astronomers at the participating observatories on the WWW and discuss subjects of mutual interest.

Apart from its astronomical and natural sciences component, a particularly fascinating perspective of the project was that it significantly contributed to an understanding of the usefulness and limitations of the communication technologies that will increasingly govern all our daily lives. Other side benefits, of course, included stimulating schools to go on-line and prompting international cooperation among young people. Another important aspect is that the programme did lead to the natural involvement of business and industrial partners in the local areas of the participating groups. Moreover, its unique character and international implications was very inviting for extensive media coverage, both in human and scientific/technological terms.

### **3. Steering Committees and Participants**

A preparatory meeting of the Executive Council of the EAAE and EAAE National Representatives in 17 countries was held at ESO and an International Steering Committee (ISC) was established. The ISC was responsible for the planning of the main activities in Astronomy; it met in September 1996 to evaluate the progress and to define the further actions and goals. The EAAE

National Representatives set up National Steering Committees (NSC) to coordinate the Programme in their respective countries. More countries, in particular in Eastern Europe, joined in in the meantime.

The NSCs consist of educators, scientists, representatives of leading planetaria, Internet specialists and, in some places, also representatives from sponsors (Internet providers, PC hardware suppliers etc.). Most NSCs established good liaisons with their National Ministries (of Education).

The ISC prepared a detailed programme description together with basic guidelines that served to co-ordinate the work of the NSCs. They in turn provided organisational and technical information (e.g., computer and communication link specifications) to the participating groups, sponsors and supporters of the programme.

The first task of the NSCs was to issue a call for participation to interested schools, astronomy clubs and other astronomy-interest groups in their respective countries. This was done during the summer of 1996 and continued after the beginning of the new school year.

The participating groups consisted of a teacher and his/her students or of one or more astronomy enthusiasts. Groups of young astronomy-enthusiasts without a teacher and amateur astronomers were also welcome and many joined. Each participating group had to register officially via the Astronomy On-Line WWW pages. A summary of technical requirements for access to the WWW was available on the Web. In those cases where access was not yet available at the school, this was sometimes arranged by 'sponsors' in the local area (planetaria, institutes, businesses or private benefactors).

The full information was made available on the two central computer nodes of the Programme which were continuously updated as the elements were specified in increasing detail. The Astronomy On-Line WWW Homepages can still be reached at <http://www.eso.org/astronomyonline/>

Most communication via the WWW took place in English. However, the appropriate areas of the National Astronomy On-Line Homepages were often in the local language and when communicating with other groups in their language area, some groups did use their own language.

#### **4. Implementation**

The World Wide Web provides a mechanism which is both convenient and widely accessible. While maximizing the visibility of the project it also acquainted the target audience with modern computing concepts, which was not only beneficial for the students, it has also been one of the foundations of astronomy as an almost all-digital science.

The Astronomy On-Line Programme was based on the concept of a WWW 'marketplace' with 'shops' that could be consulted by the participants. The 'shops' were 'open' at specified times, some from the beginning of the program on October 1, 1996, and others later. The 'shops' displayed a variety of 'goods' (activities) at different levels of complexity in order to attract participants of different age groups. The following shops were installed:

1. General information: Information about the Programme, and Help facilities. List of participating groups. Links to related Web sites.
2. Collaborative

projects: Projects which required observations by many groups, all over the continent, thereby leading to 'joint' results. 3. Astronomical observations: Preparation of a real observing programme, submitted and executed by telescopes at participating, professional (and in some cases, amateur) observatories. 4. Astronomical software: Use of a variety of general astronomical software (orbits, eclipse predictions, etc), which could also be taken over for future use at the schools. 5. Use of astronomical data on the WWW: Retrieval of data (images, text, archive data), available on the WWW at different sites. This shop also included educative 'Treasure Hunts' on the Web. 6. Prepared exercises (Try your skills): A variety of prepared, astronomical exercises of different level. 7. Talk to the professionals: Talk over the WWW to professional astronomers and educators. 8. Group communication: Connect to other Participating Groups. 9. Newspaper: Publication on the WWW of the results of the various activities, etc. Announcements about the Programme and its progress.

Astronomy On-Line was divided into three phases, lasting from early October to November 22, 1996, and reflecting the gradual development of the associated activities. During this period, a number of special projects took place, for instance in connection with the Partial Solar Eclipse on October 12, and the amount of information on the Astronomy On-Line Web pages grew continuously.

The NSCs established national computer nodes for the Astronomy On-Line Programme. In many cases, this was done in collaboration with a national university/observatory or with a (sponsoring) Internet provider. In several places, it was done in conjunction with the already existing EAAE Nodes.

The National Astronomy On-Line Home Pages had two main features:

1. A national component, dedicated to the activities in that country, and
2. A mirror of the 'ESO Astronomy On-Line Home Page' (which acted as the central 'European Homepage').

In addition to their function as carriers of information, these WWW nodes plus the national home pages also acted as an on-line advertisement for the Programme. ESO produced a colour poster which was distributed by the NSCs. ESO also provided VHS tapes with a specially prepared feature video that was used to promote the Astronomy On-Line Programme.

## 5. Conclusion and Outlook

The programme met all expectations by stimulating interest in astronomy and related sciences. The participants experienced in a very direct way how science is done and acquainted themselves with important aspects of the scientific working methods.

On the educational side, many participants were introduced to the benefits of the WWW for the first time and they became familiar with the incredible opportunities of communication and information extraction which are available through this new medium.

At the same time it was noted with great satisfaction that the Ministries of Education in several European countries took this opportunity to begin the implementation of systems for continuous Internet and Web access from the schools.