

# ESA Education on the Web

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## The missions of the Education Office

Education is important. According to the ESA Convention, it is one of the Agency's mandatory activities, and it was also specifically mentioned in the second Long-Term Space Policy Committee Report, endorsed by the ESA Council at Ministerial Level (see ESA SP-2000, Actions 18 and 20).

The role of the Education Office was further emphasised at the end of 2000, when the

organisation of the Directorate of Administration was revised. The Office is *'responsible for proposing and following up the implementation of education activities aimed at reinforcing in a pan-European manner ESA's contribution to promoting education in the space field'*, and more specifically:

- developing co-operation and partnership agreements with national agencies, government bodies, universities, associations, etc., including the European Union
- administering agreements with organisations such as ISU or EURISY, managing issues related to contributions
- developing ESA educational 'outreach' activities for university students by:
  - fostering the creation of possibilities for students to actively work on space projects before graduating
  - offering them the opportunity to work on real projects together with professionals from ESA, national space agencies and European industry
- organising educational measures for younger students by:
  - promoting space-related activities to attract the attention of young people (primary, secondary and post-secondary levels)
  - developing special projects, programmes and promotional competitive actions
- developing a programme of high-level post-graduate scholarships for staff, nationals of Member States and international candidates, in cooperation with the Personnel Department
- co-ordinating the education activities of other ESA Directorates and consolidating the necessary resources.

Education activities at ESA are developing at a fast pace. The Education Office itself has been enlarged to co-ordinate all education-linked activities at the Agency. However, all ESA Directorates are developing their own activities, and many partners outside ESA are also active in this field. There is thus a need to develop tools to present the different activities in a coherent way to allow anyone, especially young people and teachers, interested in space education to easily find the information that they need. For this reason, the ESA Education Office is developing a web site that will cover all activities linked to education, whether they are proposed by ESA or by some of our partners. This article provides an overview of the main topics that will be developed over the next five years.



### 2nd report of the Long-Term Space Policy Committee:

#### Action 18: European Space Education Programme

Purpose: Contribute to the creation of the talented work force needed for the 21<sup>st</sup> century by providing a European focus for Education on space matters, and stimulating interest in science and technology.

#### Action 20: European Space Policy Institute

Purpose: Create a European focal point for the analysis and academic discussion of European needs, capabilities and long-term prospects in space.

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In order to fulfil these tasks, the Education Office is now composed of four permanent staff, two of whom work at ESTEC in Noordwijk (NL) and two at ESA Headquarters in Paris, with a fifth one joining at ESTEC in 2002. Up to eight Young Graduate Trainees are also part of the Office and are responsible for specific projects. Each Directorate also has some education activities of its own, and one of the roles of the Education Office is to coordinate the various activities so that all of the efforts within ESA are exploited in the most efficient way. Corporate projects will also be carried out by pooling resources.

### Why emphasis is being put on the Web

All actions in the field of education need to be advertised and explained in a coherent way.

One of the most efficient tools available in this respect today is the world-wide web. It allows a single portal, or gateway, to be used to present all of the different educational activities carried out at ESA. It constitutes a unique address for informing and contacting everybody who is interested. It also provides links to the web pages detailing the education activities of other ESA Directorates and to the activities of partners outside ESA. All activities concerned with space in Europe can thus be found via the ESA Education web site.

### Target audience

The target audience for this Education web site will be young space enthusiasts, because they are the ones we want to reach, encourage and inspire. Many young people in the ESA Member States and around the World are already very interested in space. On our site, they can get information, ask questions, find a job, be put in contact with other space enthusiasts throughout the ESA Member States, obtain help with networking, and much more.

Today, fewer and fewer young Europeans are choosing to study and work in science, and there is a great risk that there will not be enough trained scientific or technical staff for the needs of the 21st century. Space is one of the few subjects that grabs almost everybody's interest, and it is one of the best examples not only for explaining science and technology, but also for motivating the younger generation to study these topics.

The target age group for the ESA education activities is 6 to 28 years, that is from primary level to the end of their studies. This gives us a

chance to cover the whole education process and to reach as many young Europeans as possible. Girls, who have to be specifically encouraged to study what are unfortunately traditionally considered as 'male' subjects, will profit from an early start at primary-school level.

If we want to reach all young space enthusiasts, one of the challenges that we have to face is language. We will put a lot of effort into translating the material into as many languages as possible, and arrange for experts of all nationalities to answer questions from all across Europe. ESA's Member States and the European Commission will play an important role in that respect, either by generating material in their official languages or by providing translations.

### Main elements

The web site will have many 'chapters' in order to cover all aspects of education and address all possible questions. A short description of what is planned for each section is given below:

#### 1. Learn about space

**"Information"** will give the basic information on space and space programmes (e.g. information on what space is, what is it used for, and the ESA programmes), using words, drawings and animations easily understandable by even the youngest readers. Links will be provided to the more specialised pages of the Programme Directorates for those who want more detailed information, and to information on sites of external partners.

**"What is space"** will include the basics about the space environment and its characteristics, the basics of spaceflight (e.g. different orbits and their various uses). The main elements of a spacecraft will also be explained (mechanics, thermal control, orbital control, power...).

**"What is it used for?"** will give examples of the various disciplines that benefit from space. There will be links to the corresponding ESA Programmes.

The Programmes too will be explained in simple terms, with links allowing those who want to know more to go directly to the pages of the appropriate ESA Directorate and the full explanation. Drawings will show the different parts of the spacecraft and how they are used.

**"Past education projects"** and their results will also be presented, as they can provide ideas for future projects and form part of the information on space. For example, descriptions of the experiments flown on



previous Student Parabolic Flight Campaigns will explain the purpose of the experiment, why it was important to do it under microgravity conditions, and its results.

As many questions are related to working in the space sector, such as 'How can I become an astronaut?', we are including a section about **professions** at ESA and in the space sector in general. It will give young people an idea of the studies involved and the nature of the work. It will of course not be limited to astronauts, but will include engineers and all their different disciplines, scientists, lawyers, administrative support, technicians, translators, and many others. The information may be purely factual, but may also be in the form of an interview with someone doing the job.

Young people want and need to see in order to understand. We cannot limit ourselves to words, drawings and photographs. **Small videos** of or **virtual visits** to the most interesting or impressive venues will be included, such as the ESTEC Test Centre, the ESOC Control Rooms or the launches in Kourou. Seeing Envisat on a vibrating table or Artemis inside the Large Space Simulator at ESTEC has a much greater impact than just an explanation of the tests.

A **Space Quiz** with some 90 questions is already available in French and English. It will be improved in the coming months and links added to more detailed answers, so that it will not be only a game, but also a way of learning more. The game encourages the young people to reflect, more than when reading pure information, to analyse the question and think about it before answering.

## 2. Projects that ESA offers or sponsors

The ESA education projects listed here, some of which will have external sponsors, are directed towards the youth themselves, teachers, schools, associations or any institution that deals with young people. They include conferences/courses given by ESA staff or partners in the schools, programmes to train teachers, outreach projects and training positions within ESA. The goal is to ensure that whatever good ideas are put forward are widely advertised and promoted.

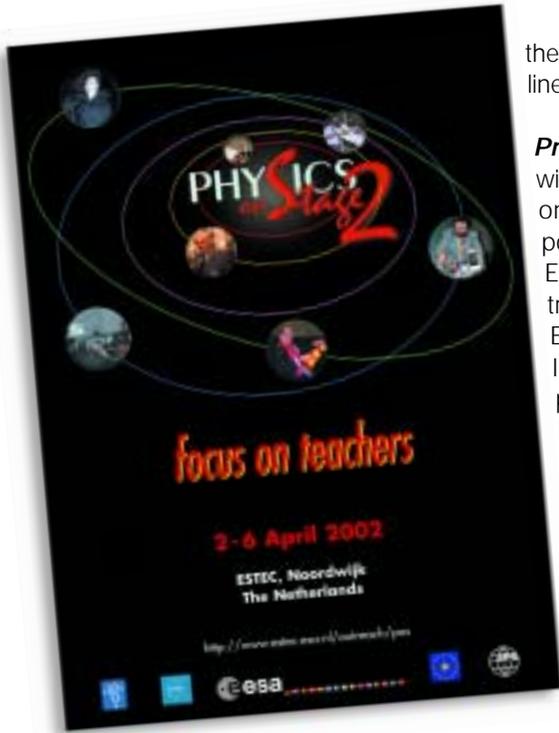
The following are examples of existing or planned projects that might appear in this chapter on the web site:



**Organising conferences/courses** in universities and schools, with the emphasis on space. These can be courses in the schools of the children of ESA staff, or in the vicinity of ESA Establishments, and can be given in any Member State language. Courses or discussions can also be organised remotely using the video-conferencing facilities available in all ESA Establishments, and could even include transmissions from the International Space Station for 'direct-from-space' discussions. Courses may be recorded on videotape and DVD for further distribution. When ESA staff attend conferences or congresses, they could contact the local schools to arrange a visit.

**Training teachers**, and encouraging them to exchange experiences through initiatives like 'Physics on Stage', held for the first time in November 2000 at CERN in Geneva (a similar event will take place in April 2002 at ESTEC), or offering courses on space to European teachers to greatly increase the number of students being reached (multiplier effect). Support will be given to these teachers after





their courses, in the form of on-line help, teaching material, etc.

**Proposing training positions** with all information needed (and on-line registration for the positions proposed directly by ESA) concerning end-of-study training, fellowships (within ESA or at universities), the International Space University programme, and the future European Space Policy Institute.

**Co-ordinating the Young Graduate Trainee (YGT) programme**, which gives students who have recently graduated the opportunity to gain one or two years of work experience. The YGTs

working in the Education Office, for example, are responsible for many of the Office's outreach projects.

**Outreach projects for university students**, such as participation in the annual International Astronautical Federation (IAF) Congress (100 to 400 students depending on the location), the SSETI initiative (teams of students across Europe design a complete spacecraft via the Internet), yearly parabolic-flight campaigns (carrying experiments developed by student teams), participation in the International Space Station Programme (1% of the European resources will be allocated to student experiments), the 'Teach and Track' project (sending students to developing countries with a small, autonomous satellite receiver in their backpack to teach young people there about space and the benefits of space technology), and many others.



Outreach projects for primary/secondary level students promote school or group projects so that space is studied more intensively, combining different disciplines to help the students understand the complexities of the subject. On-line courses will be offered in a next step for easier contact with the experts. These courses will also be offered on videotape and DVD. The projects also include integrating space into school curricula, through a dialogue with the Ministries of Education and publishers and providing accurate and attractive elements to be included in the school books.

### 3. Publications and Other Material

The broad spectrum of ESA Publications and material from other sources will be listed here, including PDF files downloadable via the Web. Other items, such as the colouring books prepared by the Technology-Transfer and Science areas, will also be listed so that children can easily order them.

We will also be developing supporting material for dissemination either free of charge or against a nominal charge via ESA Publications Division or the ESA Space Shops. Some of this material will be distributed to space museums or associations at cost price. This will include postcards of some of the best ESA images from the Science and Earth Observation Programmes, for example, and cardboard mock-ups of ESA spacecraft (with an explanation of the spacecraft and its mission in as many languages as needed). Specially tailored video material will also be prepared to support courses and discussions.

### 4. Contests and exhibitions

Special events like launches will regularly be accompanied by contests for children. Although they cannot be classified directly as 'educative', such contests are important for attracting many children. One can then easily add education information around these contests. The contests will of course be on the web, together with information on exhibitions linked to space in Europe. Details about rentable ESA exhibitions will also be provided.

### 5. Partners

External partners – National Space Agencies, the Directorates for Research and for Education and Culture of the European Commission, associations, school networks – will be listed here, with links and basic information about

#### Conferences/Courses that can be given by ESA staff in various languages (non-exhaustive list):

- ESA in general
- Detailed project or subject (XMM, biology, Space Station, environment...)
- Occupations in the space sector
- ESA and its partners
- What is a spacecraft and how does it work?
- What is space used for?
- Life in space
- Space and law
- Technologies in the space sector
- Technology Transfer – benefits on Earth
- How to finance international organisations

what they offer. Links with the youth pages of the National Space Agencies will be included, as well as information about the types of partnerships that ESA has with universities and space-related associations, such as the support to the International Space University and Astrorama (training of teachers and classes for children on space).

#### 6. Ask an expert

An important element will be the new service 'Ask an Expert'. On-line sessions will be organised for special occasions (e.g. in the framework of the EC's *Netd@ys*). All questions posted to the [education@esa.int](mailto:education@esa.int) mailbox will be answered by experts, and the most interesting ones will be published, either by integrating the answers into the 'Learn about Space' or 'Frequently Asked Questions' sections.

#### 7. Friends of ESA

It is planned to set up a special network of young European space enthusiasts, who can serve as ambassadors for ESA in their schools, universities, etc. Teachers will also be invited to register and to indicate what they expect from us.

Older university students will also be able to register as candidates for the Young Graduate Trainee programme. Today, only two selections per year are made and interesting candidates may be lost because they have been recruited elsewhere in the meantime. With this new registration process, the database will be refreshed and applications examined and followed up much more regularly.

#### Internal and external networks

The task of co-ordinating the ESA activities implies the existence of an internal network, formed by all staff involved directly in education activities. In addition, a database will be maintained of all staff volunteering assistance, indicating the subjects that they can teach, the languages they speak, the geographical areas to which they can easily go or where they go regularly, and the courses they have already taught.

As ESA is not the only organisation in Europe dealing with space education, for maximum impact it needs to pool its efforts with those of the other players also. The external network should therefore include the Member State space agencies, space associations, schools, Ministries of Education or Science, the European Commission, etc. There are also potential partners outside Europe, for example the International Space Station Partners.

Hopefully we will be able to link to their activities and they to ours, in order to organise common/joint activities. Part of this external network will be built with the help of the newly created Advisory Committee on Education (ACE), formed by representatives of the Member States and staff of the Education Office.

#### Time-frame

A lot of work has been done since the creation of the Education Office, but many projects still need further development. Some will take several years to reach fruition. Basically, what has been presented forms the basis for a five-year plan. The various activities and networks will be built progressively. The number of young people interested in space in Europe is impressive, and the first ones to join the 'Friends of ESA' team will have the chance to help shape the web site and its content. They will also act as 'guinea pigs', in helping us to be sure that the activities that we are proposing are well tailored to their needs and interests.

#### Closing remarks

The final aim is that any young European or educator who needs information about space or wants to start a project about space will know that they will find the information and help that they need on the ESA web site. ESA will be the place where all information about European space-education activities will be brought together. This will save time and no important information will pass unnoticed. We will need the help of all ESA staff and all ESA partners to build these networks and provide full information about what is going on in space in a comprehensive and easily comprehensible manner for children and students of all ages. This is the only way to make sure that we reach as many young Europeans as possible and have the best chance of helping them to learn about space, science and technology. We will also be helping to train them to manage the space projects of tomorrow!

For further information concerning the ESA Education Office, or to contribute to its projects, write to [education@esa.int](mailto:education@esa.int) or visit [www.esa.int/education](http://www.esa.int/education).

