

## **Observations of the Workshop Working Groups and the Workshop recommendations**

### **Observations of the Workshop Working Groups**

Workshop participants recognized that space activity inspires the young, stimulates their curiosity and motivates them to explore, care about a sustainable world and increase their knowledge. Over time such interest developed in the young will lead to the positive evolution of our societies.

Space activity, because of its long-term development and application cycle, provides opportunities for all nations to participate in a sustained way and in concert with the activities of other nations.

Space activity is extraordinarily demanding and requires the best minds, training and practices at all levels, including at the graduate level and beyond, for its successful sustained pursuit.

The participants noted that the global space community and space interest groups had long recognized the importance of the above three findings and consequently made significant efforts to disseminate data and information derived from space and about space to the world wide community and particularly to the education institutions in their countries.

The United Nations and IAF recognize the importance of space education and capacity building to achieving a sustainable world and each has specific activities under way to advance these through conferences, workshops and specific projects. Examples of these are the still relevant recommendations adopted at the United Nations/IAF workshop in October 2003 in Bremen, the UNESCO/International Space University/IAA workshop in March 2003 on Bridging Space and Education, the findings and recommendations of Action Team 17 on Capacity Building (which were adopted by the General Assembly in 2004) as the follow-up to UNISPACE III and the activities of the IAF Space Education Committee.

Despite such efforts, a remaining and significant impediment to the widespread implementation of education about space and using information derived from space is the lack of an adequate delivery system in schools, starting at the level of teachers, but even more importantly at the level of government authorities responsible for establishing curricula. There is a lack of curricula in the formal and informal education systems of the world for the school age population either about space or which use information derived from space.

The Workshop noted a need for more coordination on education and capacity development at the international, regional, national and local levels.

The Workshop noted a lack of both an established comprehensive space data bank and a depository of information on best practices regarding education, developed to a common standard that is internationally available.

The Workshop noted that the sources of funding to fully develop the education capacity of space assets still need to be identified and committed.

The Workshop noted that interest by new entrants to universities and the workforce in pursuing space opportunities depends critically on their perception of sustained opportunities for a career in the field.

## **Recommendations of the Workshop**

Taking into account the above, the Workshop developed the following overall recommendations to be pursued by workshop participants and, where appropriate, by their organizations and those other organizations that can help implement the recommendations:

### **1. Partnership and Organization**

(a) Encourage responsible space entities to work together on space education and thereby encourage, using among other mechanisms, the regional centres on space science and technology education affiliated to the United Nations, the further development and the worldwide dissemination of information about space and information derived from space. Good examples of such initiatives are the International Space Education Board established by the Canadian Space Agency, ESA, JAXA and the National Aeronautics and Space Administration of the United States of America, the Asia Pacific Regional Space Agency Forum, the Space Conferences of the Americas, the Global Learning and Observations to Benefit the Environment programme, the Space Foundation programmes, the Universities Space Research Association, the EduSpace programme of ESA, the remote sensing education programme of the National Institute for Space Research (INPE) of Brazil, and the Sharing of Experience in Space (SHARES) programme of the Indian Space Research Organisation (ISRO);

(b) Encourage responsible space entities to work with local, national and regional education authorities to better coordinate and make use of space-based information systems to enhance the education experience of young people at all levels of schooling;

(c) Encourage the United Nations and its specialized agencies to continue their efforts to enhance global space education and capacity development and to participate in promoting, among their constituencies, space information dissemination and international cooperating mechanisms, especially in countries without a developed capacity in space activity;

(d) Encourage a greater coordination, scope and multinational participation for and among the regional centres for space science and technology education affiliated to the United Nations;

(e) Design and undertake outreach programmes encouraging participation by educators and authorities in promoting the inclusion of space education into the education system;

(f) Engage young graduates in the space sector to participate in sharing their knowledge with the next generation; and

(g) Encourage worldwide participation and growth in World Space Week events.

## **2. Education and Resources**

(a) Suggest that workshop participants work with appropriate organizations to urge their national authorities to establish specific mechanisms and processes for bringing space and all of its benefits for society into national education systems and develop and implement specific plans to engage the space community to assist in bringing this to reality;

(b) Suggest that workshop participants work with the Office for Outer Space Affairs to establish a plan and point(s) of responsibility for creating a database of best practices for training educators and introducing space into the education system;

(c) Suggest that workshop participants work with the Office for Outer Space Affairs to establish a plan and point(s) of responsibility for creating, maintaining and distributing free space information for education purposes in their regions;

(d) Encourage appropriate entities to develop pilot schemes for introducing space into education more widely both at the formal and informal levels. As examples of these, the Annex below lists a number of successful pilot projects and best practices presented at the Workshop;

(e) Encourage the development of the infrastructure necessary to undertake effective tele-education wherever it is needed in the world;

(f) Identify and pursue mechanisms to encourage public-private partnerships in supporting space education; and

(g) Urge the regional centres for space science and technology education affiliated to the United Nations, in coordination with the Office for Outer Space Affairs, to synergize and harmonize their regional education efforts, such as materials, methods, tools, projects, faculty sharing, etc, to generate a well integrated education programme.

## **3. Capacity Building**

(a) Encourage capacity building in developing countries to participate in space activities;

(b) Increase the effectiveness of capacity building by addressing national priorities and by focusing on the real-world application of the relevant space technology data and know-how;

(c) Encourage the United Nations and its specialized agencies to collaborate with local organizations in the development of curricula for space education and training that is applicable to regional, national and local levels;

(d) Organize advanced courses on the space technologies and their applications through the regional centres for space science and technology education affiliated to the United Nations or through local universities in cooperation with regional initiatives. In order for the courses to be more widely available to the local practitioners, the regional centres should make efforts to establish better links with the universities or technical institutes in the region to offer such courses. The training could furthermore be supported by e-learning technologies;

(e) Suggest that workshop participants work with the proper national authorities to bridge the digital divide within developing countries for e-learning purposes, where appropriate, using space-based services; and

(f) Stimulate extensive media coverage, using such outreach events as presented at the workshop, to effectively increase public support, and hence government support.

## **Annex**

Some examples of pilot projects and best practices for introducing space into education presented at the Fifteenth UN/IAF Workshop:

(a) 2003 model rocket firing in Germany and 2005 regional water rocket launching contest in Japan are good examples of promoting space education and raising public awareness by reaching students on a large scale and attracting media coverage;

(b) The regional centres for space science and technology education affiliated to the United Nations have been effectively providing postgraduate level courses to their regions. The courses are: remote sensing and geographic information systems, satellite communications, satellite meteorology and space sciences. The education involves both classroom learning and project initiation. As an example, the regional centre in India is celebrating its 10<sup>th</sup> anniversary this year. That centre alone in the past 10 years has educated around 360 students in the Asia-Pacific region and 26 outside that region. 46 countries in the Asia-Pacific region have benefited from the education. In addition to the classroom learning, about 350 projects of applications have been initiated;

(c) Space education missions to targeted countries may stimulate the national interest in sustainable space education programmes. UNESCO organized workshops in the Philippines and Nigeria in 2004 and 2005, respectively, and plans to organize more in the future. The workshops were supported by various space organizations through providing space science and technology experts to conduct the workshop activities;

(d) Space information dissemination should be demand-driven to ensure the information is desired and hence will be used. A good example is the distribution of satellite images to African users by the Office for Outer Space Affairs. Three decades of Landsat data (1970s, 1990s, and the current decade) were donated by NASA to the

Office for Outer Space Affairs for distribution to African users upon request. That project has received favourable feedback and become high in demand;

(e) Regional workshops, conferences and symposiums can be essential in leveraging the combined expertise and capacities in a region. The United Nations Programme on Space Applications has been co-organizing such activities with host countries in Africa, Asia and the Pacific, and Latin America and the Caribbean annually. Periodical evaluations were performed to assess the effectiveness of the activities for future improvement;

(f) Dedicated educational satellite systems can be a very effective tool in tele-education. Several countries have already implemented this approach successfully;

(g) Small satellite programmes that are being conducted within developing countries are showing a promise of generating significant interest within tertiary institutes;

(h) Information packages on the geography of Latin America, which are disseminated via CD-ROMs, are an excellent mechanism for providing primary/secondary schools with how the use of space technology can be used for a better life and a better knowledge of the environment; and

(i) The educational materials and teaching aids provided by several educational organizations are an excellent source of material for others to use. The GLOBE programme, the Space Foundation programmes, the Universities Space Research Association, the EduSpace programme, the INPE remote sensing education programme and SHARES programme of ISRO have been providing materials to students globally to enrich space education. The Space Foundation has a database of space lesson plans.