COMMISSION 46
ASTRONOMY EDUCATION AND DEVELOPMENT
Education et Développement de l'Astronomie

Newsletter Supplement
National Liaison Triennial Reports 2002

Commission 46 seeks to further the development and improvement of astronomical education at all levels throughout the world.

Contributions to the newsletter are gratefully received at any time.

PLEASE WOULD NATIONAL LIAISONS
DISTRIBUTE THIS SUPPLEMENT
IN THEIR COUNTRIES

The newsletter and this supplement is also available at the following website
http://physics.open.ac.uk/IAU46

TRIENNIAL REPORTS FROM NATIONAL LIAISONS

The triennial reports from National Liaisons have been collected into this supplement. Each report has required more or less editing – an initial light edit by Jay Pasachoff, followed by further editing by me, at the very least to attain a modest uniformity of style. Several reports were received in plain text email, so (unless instructions were included) modifiers of the basic Roman alphabet characters will have been absent – I doubt if all of these have been put back! If there are any mistakes or obscurities please let me know as soon as possible and I will make amends.

To enquire about specific points in a report please contact the National Liaison directly.

Barrie W Jones
Newsletter Editor
b.w.jones@open.ac.uk

ARGENTINA

Astronomy is offered as a university career at three National Universities. At those of Cordoba and La Plata the Licenciado (MSc) and Doctor (PhD) degrees in Astronomy can be obtained. Starting in 1994, the University of San Juan also offers 5 years study towards a career in astronomy, with the possibility of achieving a Licenciado degree. Several courses on Astrophysics are offered to the physics students of the universities of Buenos Aires and Rosario, where it is also possible for the physics students to conduct PhD research in Astrophysics.

Astronomy is taught as an optional subject at some secondary schools at different cities in the country, while others include several astronomy topics within their Physics courses. Both in secondary and elementary schools, one of the main difficulties for the teaching of astronomy is the lack of astronomy education in the teachers. In view of that, some of the astronomical institutions are offering update courses and printed materials for secondary and elementary school teachers.

All of the major institutions devoted to Astronomy (such as the Observatories of La Plata, Cordoba, San Juan, Rosario, Instituto de Astronomia y Fisica del Espacio and Instituto Argentino de Radioastronomia) offer guided tours for the general public, and popularization talks for school students and public.

Public educational activities are also conducted at several planetariums (such as those of Buenos Aires and Rosario).

The traditional observatories of Cordoba and La Plata open their telescopes weekly for general public visits. The major optical facility in the country, the Complejo Astronomico El Leoncito (San Juan) can also be visited at daytime and offers special tours at nighttime which include CCD imaging with a 20-cm telescope.

An IAU-UNESCO International School for Young Astronomers will be held at the Complejo Astronomico El Leoncito (CASLEO, San Juan) during August 2002.

Nidia Irene Morrell
nidia@fcaglp.fcaglp.unlp.edu.ar

BELGIUM

The structure and curriculum in secondary education is becoming very different in the three language communities in Belgium, and so it is impossible to present a coherent view of astronomy education in secondary schools. Most astronomy education is covered by individual initiatives by teachers, by contacts with the amateur societies, and through visits to the Planetarium of the Royal Observatory of Belgium (http://www.astro.oma.be/PLANET/menu.html).

Teaching of astronomy at universities has undergone a fundamental change with the introduction of the new Bachelor and Master structure which is being debated now and which will become effective in a couple of years. Details of the new scheme will be given in the next report.

Chris Sterken, University of Brussels, Pleinlaan 2, 1050 Brussels, Belgium
csterken@vub.ac.be

BOLIVIA

Today, almost all activity in the area of astronomy in Bolivia revolves around the Max Schreier Planetarium (MSP), which belongs to the Physics Institute of the University of San Andres, at La Paz (UMSA). MSP began its activities in October 1978. It is named after Dr Max Schreier, a prominent Austrian scientist and a teacher for several generations of astronomers and geodesists in Bolivia. The activities of the MSP are primarily aimed at diffusing and promoting astronomy to the public and schools, and encouraging academic research and investigation. This is achieved through the running of a planetarium, an observatory, library, publications, friends organization, and events program.

1 MSP owns a NOVA III projector, by Spitz, a gift from the USA in 1969. This equipment has a 6-meter-diameter dome and has a maximum capacity of 40 people. The planetarium's astronomy shows are the best known activity of MSP. The shows are attended annually by over 10,000 school children. The numbers of students that visited MSP in the last 3 years, are as follows.

Year	State schools	Private schools	TOTAL
1999	5003	6121	11124
2000	6755	4170	10925
2001	6906	4300	11206

2 The Astronomical Observatory of Patacamaya (AOP) was founded in 1973, by a Bolivian-Russian agreement. Since 1983 it belongs to and is run by MSP-UMSA. It is located 100 km from the city of La Paz, at latitude 17deg 15min 57sec S, longitude 67deg 57min 7sec W and altitude 3789 m. The equipment includes a 16 inch Celestron telescope, an AFU-75 Russian astro-camera and a CCD SBIG ST-5 camera. The purpose of the AOP is to awaken student interest in the marvellous sky of the Andean Altiplano (350 students per year, approximately). In addition, students from the Physics Department of UMSA use the observatory for research purposes.

3 The MSP manages a small library on astronomy. It is open to the public and is an important resource for students from high schools. In response to demand, members of the MSP have been producing publications covering popular and special interest topics.

4 In May 2001, MSP opened an exhibition of meteorites, donated by the American collector Blaine Reed. The collection has more than 40 pieces, including the meteorite Zagami (from Mars), DAG 400 and NWA 482 (from the Moon), Murchinson CM2, Kapoeta (AHOW), Millbillillie (AEUC), the 30 kg regmaglite Campo del Cielo and the first certified Bolivian meteorite Sevaruyo (H5).

As a consequence of the opening of the Blaine Reed Collection, MSP began a campaign for the search of meteorites that have fallen in Bolivia. Guidance is given to people involved in the search for meteorites. This program has already produced the discovery of the meteorite Sevaruyo (H5), in June 2001.

5 With the aim to take astronomy to the people, MSP leads a 10-year old outreach program called 'Star Party'. Members of the planetarium and physics students (UMSA) perform astronomy shows in different locations around the city of La Paz and a number of rural locations.

6 The friends organization, Club de Amigos del Planetario, was formed in 1996, as a response to the high level of interest expressed by many people and amateur astronomers who wanted to be involved in and to support the activities of the MSP. Their $30 membership also allows a number of publications for the benefit of students and visitors.

7 Another programme managed by MSP is Cultural Astronomy (Archaeoastronomy y Ethnoastronomy). We began with a planetarium programme 'The Aymara Constellations' (that eventually was adopted by Madrid Planetarium), followed by the publication of a number of annual poster-calendars (1993-2002). A thesis in archaeology was developed by a member of MSP on 'Astronomy of Guaranies', and members of MSP are in the Organizing Committee of the 51st Archaeo- and Ethno-Astronomy Congress, to be held in June 2003, in Chile.

8 A monthly bulletin 'Intijiwaia' has been edited continuously since 1996, especially for the members of the Club de Amigos. The Aymara name Intijiwaia (the dead of the Sun) became internationally famous during the total solar eclipse in 1994.

The mentioned poster-calendars also have native names, the recent ones being
1999: Yasitataguasu (The bright star i.e. Venus – Guarane language)
2000: Inti (The Sun – Quechua language)
2001: Diand = Da Rape (The path of the Ostrich i.e. the Milky Way – Guarane language)
2002: Qhana Qinaya (The luminous cloud i.e the Great Magellan Cloud – Aymaya)
Some posters are still available on request.

Finally, a former Director of MSP (Dr Francesco Zaratti), translated into Spanish Donat Wentzel's booklet 'Astronomy for University Physics Courses' (1999). At present, five hundred copies have been sent to physicists in most of Latin-American countries. This translation was awarded an international prize for technical translation in Spanish (Union Latina, 2000).

MSP has a website since 1998, where ephemeris and astronomical news is reported. This website (http://www.umsanet.edu.bo/org/astro) gained a national prize in the same year 1998.

At present, due to the rebuilding of its infrastructure, the planetarium is temporarily closed to students. However most of the MSP's activities continue, to the benefit of the public.

Francesco Zaratti and Gonzalo Pereira
planetar@umsanet.edu.bo

BRAZIL

The Brazilian participation in the projects SOAR (4-m) and GEMINI (8-m) telescopes gave a new observational scenario to the astronomical community. Recently, astronomy teaching in Brazil has followed similar technological advances and substantially advanced scientific teaching. In spite of serious difficulties suffered by the financial support agencies – resulting from budget cuts for scientific development – since last year three main educational projects focused on astronomy were contemplated with significant support. Several research institutions are involved, and fundamental and secondary schools are collaborating. The number of students who will benefit from these new educational projects is growing and is expected to reach important levels in the next few years. This report will describe the goals of these projects as well as the teaching activities of astronomers from different universities and research centres.

Virtual Observatory and Robotic Telescopes

Motivated by recent progress on robotic telescopes and also increasing interest in education of the general public, several research centres dedicated efforts to improve educational methods, most of them focused on astronomy because of its multidisciplinary nature. Astronomers of different Brazilian institutes, basically individually, have worked to improve the scientific content of these efforts. Recently, several of these astronomers started a common project using robotic telescopes in basic education. The main goal is to provide to students the opportunity to operate remote robotic telescopes with the facility of astronomical observing programs – the concept of 'virtual observatories'. Each research institute has at least one partner school. Astronomers and teachers are collaborating to improve the astronomy, physics and maths teaching/learning process. Projects of study, research and astronomical observations will be based on several virtual observatories (in Brazil and other countries). More information can be obtained at http://www.observatoriovirtual.pro.br Partial support has been obtained from the Vitae financial agency.

CESAB (Comissão de Ensino da Sociedade Astronômica Brasileira)

The Teaching Committee of the Brazilian Astronomical Society assembled several astronomy teaching groups in Brazil and headed a unified project that received for the first time important support from the financial agency CNPq. The intention is to supply teaching projects with instrumentation (telescopes, computers, spectrographs, CCDs, etc.) and means to develop didactic material (mostly printed publications and CD-ROMs) in the Portuguese language; such materials have been rare and have been needed for a long time. This project, named ENSINAST, has recently started and the first results are expected to appear very soon. The Brazilian Astronomical Olympiad (OBA) is one of the most important activities managed by CESAB, with the collaboration of the Rio de Janeiro State University (UERJ). In 2000, the first OBA selected 5 students (among a few dozen) that attended the International Astronomy Olympiad, and last year 20 students were classified to participate in this event. In 2002 about 4600 schools are subscribed for the next OBA. The organizers have obtained, for the first time, substantial support from CNPq that is similar to the above-mentioned scientific educational grant, launched by the Brazilian government. Among 10 teaching projects, astronomy has been designated as two of them.

Teaching and outreach activities of some Astronomy Research Centres

1 The Pico dos Dias Observatory, operated by Laboratório Nacional de Astrofísica (OPD/LNA) in Itajubá (MG), every week offers guided visits to the local schools (1100 students and 360 teachers per year). During the visit to the Observatory installations, the OPD/LNA staff presents a talk related to the telescopes, the instrumentation, and the SOAR and Gemini projects. Astronomy outreach talks have also been offered to the general public, in particular to retired people, who have attended about 10 seminars per year.

2 In Rio de Janeiro (RJ), fundamental and secondary schools participate in a teaching project prepared by the Valongo Observatory (OV/UFRJ) that offers talks about the ancient history of the observatory, planetarium sessions and hands-on activities (solar observations, for example). Night sky observations and specific seminars are offered to college students and different groups interested in astronomy.

3 Astronomers and researchers at Feira de Santana University (UEFS) have organized in the neighborhood of Salvador (BA) both teaching and outreach activities. Included are graduate astronomy courses, summer schools (with attendance of about 300 people each year) and visits to the Antares Observatory. The last includes planetarium sessions and seminars, which have an audience of about 12 000 students each year.

4 The most visited URL that offers a basic astronomy course was developed by IF/UFRGS researchers (http://astro.if.ufrgs.br), and is also provided in Spanish. This course gives a broad view of astronomy and has also been presented in printed form. All 1000 copies were sold within the first year of publication. An updated edition of this book is under preparation. UFRGS also developed an 'itinerant observatory' that takes a telescope to the Porto Alegre (RS) outskirts and neighboring villages, offering to students of the less favored schools the opportunity to observe the sky and to have a first contact with astronomy.

5 Astronomers from the University of São Paulo organized the Virtual Observatory project in collaboration with five other institutions located in different Brazilian regions. The new installations of the Astronomy Department in the University campus – previously located in the ancient Observatory of São Paulo – provided facilities to the teaching projects involving college students. Another improvement is the outreach courses to retired people that has been offered more frequently and for a larger number of participants.

6 The Space Research Institute (INPE, São José dos Campos) recently built a small observatory to receive students and teachers from local schools to have night-sky observations and other activities such as talks focused on astronomy, slide lectures, etc. INPE astronomers have developed hands-on science activities in collaboration with a partner elementary school, using astronomical aspects to stimulate the interest of the young students about introductory physics and chemistry concepts.

7 The UFRN (Natal) working group on educational projects has developed several activities related to astronomy teaching, namely, courses for teachers; an itinerant planetarium; astronomy graduation courses; and a recently created programme of post-graduate study on teaching of sciences, which intends to offer master degrees on astronomy teaching.

There are many other ongoing projects that should be mentioned, but could not be summarised in a few lines. The activities presented here are just a sample of the work that has been recently done in different Brazilian regions.

Jane Gregorio-Hetem
jane@astro.iag.usp.br

CANADA

This report covers the period 1999.5 to 2002.5, and was compiled with the help of the Education Committee of CASCA: Canadian Astronomical Society – Société Canadienne d'Astronomie.

During that period, the Canadian astronomical community embarked on a major education and public outreach (E/PO) initiative. It is led by CASCA, an organization of professional astronomers, in partnership with the Royal Astronomical Society of Canada (RASC) – an organization of primarily amateur astronomers, the planetariums and science centres, and other astronomical organizations. It is funded by: the PromoScience programme of the Natural Sciences and Engineering Research Council of Canada; Enterprise, Opportunity, and Innovation Ontario; and by CASCA itself. It is administered by the CASCA Education Committee, with guidance from a broad-based Advisory Board. Already, needs surveys have been done among some target groups. E/PO also figures prominently in a Long-Range Plan for astronomy in Canada, developed by CASCA in partnership with the National Research Council (NRC) of Canada. NRC's Herzberg Institute of Astrophysics has opened a major Visitor Centre at its headquarters in Victoria. Another centre – ASTROLaB du Parc du mont Mégantic (www.astrolab.qc.ca), near the Observatoire du Mont Mégantic in Québec – promotes astronomy to over 25 000 visitors each year.

E/PO developments are regularly reported in CASCA's on-line newsletter (see www.casca.ca) and in the Education Notes column in the Journal of the RASC. Plenary speakers and sessions on E/PO are being included in the annual conferences of CASCA and the RASC. A list of Canadian astronomy clubs can be found at www.skynewsmagazine.com/pages/clubs.html, including about 30 Francophone clubs under the 'umbrella' of the Fédération des Astronomes Amateurs du Québec – FAAQ (www.astronomiequebec.ca).

Elementary and Secondary School

The Pan-Canadian Science Project (Percy 1998, JRASC 92, 38) is gradually being implemented in Canada's schools, and it includes mandatory astronomy topics at the grade 1, 6, 9 and 12 level. Dodd (2002 JRASC 96, 114) has recently published a comprehensive review of the place of astronomy in the Canadian science curriculum. Teachers – especially at the elementary level – have little or no background in astronomy, or astronomy teaching. Astronomy education research is taking place at a few universities, including Montréal and Toronto. This and other research has shown that teachers have the same deep-rooted misconceptions about astronomy as students do (see www.oise.utoronto.ca/~ewoodruff for an on-line misconceptions questionnaire, and information about the 'co-investigation' strategy). The teachers need and deserve the support of the astronomical community. The E/PO initiative mentioned above will target astronomy educators, broadly defined. The RASC is producing a Teachers' Guide to Astronomy, and the FAAQ already produces a variety of useful French-language resources for teachers. Most of Canada's planetariums and science centres, many university astronomy departments, and many astronomy clubs have developed programmes for teachers, often in partnership with school boards and science teachers' associations. Montréal's planetarium, for instance, has developed 'travelling kits' to help teachers prepare astronomy activities in classes.

College and University

In Canada, as in the US, astronomy is most commonly taught to non-science students, who are required to take some science courses as part of their degree requirements. Enrolments continue to be high. A large and increasing number of non-science students also take astronomy courses in two-year Community Colleges and University Colleges, where students generally transfer to the universities to complete their degree. Decreased government support for universities, and an emphasis on research at the expense of teaching, has strained the resources for undergraduate teaching.

Distance education astronomy courses are offered at the introductory level by Athabasca University and in French by the Télé-Université. These courses are based on printed materials but supplemented by electronic media. Enrolments have increased markedly in the past several years, showing that home study students desire accredited astronomy courses.

Graduate education has continued to develop. The Graduate Student Committee of CASCA (GSC-CASCA) has lobbied for the creation of graduate-level summer schools in Canada, and some universities are making attempts to fill that request. The Herzberg Institute of Astrophysics has a funding program which supports graduate students' travel to telescopes which Canada supports, either for observing runs, or for data processing and analysis. Graduate students have shown a strong interest in E/PO, and GSC-CASCA organized a one-day workshop on this topic in 2002. Graduate students participate actively in E/PO at most universities, sometimes through partnership programs such as Let's Talk Science (see www.letstalkscience.uwo.ca), and also through open houses, science fairs etc. The large number of impending retirements in the universities suggests that the job market may be stronger than previously for the present cohort of graduate students.

Planetariums and Science Centres

Planetariums and science centres continue their work, though there is still no major planetarium in Toronto to replace the McLaughlin Planetarium which closed in 1995. In Calgary, the Digistar projector was replaced, making way for next-generation technology. Attendance in planetariums continues to grow; Calgary attracted a record high in 2001, with 170 000 visitors. Montréal hosted the International Planetarium Society's biennial meeting in 2000, welcoming over 400 delegates from around the world. Several planetariums across the country presented shows on climate change and global warming issues, a subject dear to the heart of our current federal government. Planetarium shows that were mostly pre-recorded in past years, are now returning to the live style, in which the lecturer interacts with the audience to encourage critical thinking and a 'minds-on' mentality.

Other Public Education

Public awareness and understanding of astronomy is promoted by almost every part of the Canadian astronomical community. The RASC, through lectures, star-parties, print and electronic resources, reaches over 400 000 Canadians a year; other local amateur astronomy clubs nationwide reach tens of thousands more. International Astronomy Day is widely celebrated.

Canada is fortunate to have excellent science journalists such as Terence Dickinson, science programmes on radio and TV, and astronomy articles in newspapers and magazines – notably SkyNews (see www.skynewsmagazine.com). The Observatoire du Mont Mégantic produces a calendar, in collaboration with the FAAQ, based on astronomical images obtained by graduate students from Université de Montréal and Laval. The calendar also includes information about light pollution problems and solutions. Calgary and Oshawa have adopted lighting policies which should significantly reduce light pollution, and dark-sky reserves have been established in British Columbia and Ontario. In 2002, CASCA initiated the CASCA-Westar Lectureship, which sponsors two-day visits by professional astronomers to smaller centres across the country.

John R Percy
jpercy@utm.utoronto.ca

COLOMBIA

In elementary school, we pursue a commitment to introduce elementary notions, such as the planetary system, Earth and its movements, and seasons. This is done usually in Natural Sciences or Geography courses. Some high schools, especially in the capital city Bogotá, own small telescopes, 20-25 cm (8-10 inches) in diameter. The students in these high schools, including small children, may attend observation sessions in which they watch sunspots, the Moon, planets

like Mars, Jupiter and Saturn, and some galactic clusters. But all these new developments are private enterprises rather than government policy.

In some universities, there are courses of general astronomy and introductions to astrophysics, aimed at engineering and science students. The Universidad Nacional offers also courses in Celestial Mechanics, Stellar Astronomy, Astrophysics and Cosmology for physics students. As in elementary and high school education, several universities in Bogotá and in some other places in the country have small telescopes that are used not only for observational purposes in sessions for the general public, but also to develop small observational projects, with several students in some of them. Next year, in order to commemorate the 200th anniversary of the establishment of the National Astronomical Observatory, the Universidad Nacional de Colombia, Bogotá, will initiate the programme of Master in Astronomy, the first and only one in the country. The students will start their thesis work using the research projects currently available at the Observatory.

The existing planetariums in the country are active with programmes directed to the general public. In some of the universities with telescopes, there are observational programmes also directed to the general public. At the National Observatory, an observational session is programmed each Friday. The Observatory offers a course, called 'Astronomy for Everybody', for the general public; it is also attended by students preparing for non scientific careers.

E Brieva
ebrieva@cable.net.co

CROATIA

General Information

The school system in Croatia at the moment consists of obligatory elementary school (8 years), secondary schools (3-4 years) or gymnasiums (4 years), and universities (graduate studies usually take 4 years). A new educational curriculum is in preparation with the intention of its becoming compatible with the school systems of states in the European Community. Astronomy can be offered as an non-obligatory course in most schools, depending on the teachers desire to offer it. Croatian astronomers and teachers involved in teaching astronomy are gathered around the Croatian Astronomical Society (CAS).

Elementary school

Basic astronomical facts are included in the courses on life science, geography, physics, and mathematics. The astronomy can be offered as a non-obligatory course from the first school year up to the final 8th year. A curriculum for such courses is prepared by CAS in coordination with the Croatian ministry of education and sport. A few basic books targeted at pupils of various ages do exist, and new ones will (we hope) appear in the near future.

Secondary school

Again, basic astronomical facts are included in courses of geography and physics. Astronomy can be offered as a non-obligatory course and the curriculum produced by CAS is of modular design, starting with basic astronomy and covering celestial mechanics, Solar System, galactic astronomy and astrophysics. The modules can be freely chosen by the teacher so that he or she can adjust the content and the level of his lectures to his students. Several books targeted to secondary schools are widely used, and most schools also provide Internet access to their pupils, so part of the learning can be done on Internet-available material, both in Croatian and in English.

Teacher training
It is organized as courses, each several days long, co-organized by the ministry of education and CAS. There are 1-2 such courses yearly.

Gifted children
These are being catered for by special programmes supported and supervised by the ministry of education and carried on by CAS staff, and in many cases also by members of the national association of amateur astronomers. Astronomy contests for pupils from elementary and secondary schools are organized yearly. The contests have 3 levels (municipal, regional and state). Children are required to show their knowledge of astronomical facts and to present their own practical work at the regional and state contests. The most successful pupils at the state contest are invited to participate in one of several summer schools of astronomy that are offered by several different organizations in Croatia.

The traditional summer school of astronomy organized by the CAS and the ministry of education and sports is now in its 32nd year and offers courses in basic practical astronomy to pupils from 5th class of the primary school up. The public observatory of Visnjan organizes the Visnjan school of astronomy which is targeted to more advanced pupils (secondary school-university age). This school is international in character and hosts participants and lecturers from Croatia and abroad.

University education
Astronomy is an optional course in the study of physics at the four universities in the country: Osijek, Rijeka, Split, and Zagreb. The astronomy course is obligatory for future teachers of physics. Astronomy is also an obligatory course at the Geodesic Faculty of the university of Zagreb. Astrophysics can be studied in the 4th year of the graduate study of physics at the university of Zagreb. Although there is no independent study of astronomy, students can achieve astronomy-related MSc and PhD degrees under the study of physics. Some observational work is possible at the Hvar observatory. The public Observatory of Visnjan offers access to the equipment and professional support free of charge.

Public education
Croatia has one planetarium (Zagreb) and four public observatories (Visnjan, Kutina, Rijeka and Zagreb). In addition there are about a dozen amateur astronomical societies scattered all over the country. These societies also offer observing and other astronomy-related activities to the general public from time to time. Croatia also has a long tradition of an Astronomy Day, with many activities organized for the general public by the CAS and amateur societies countrywide.

Internet
Most schools and all universities can use Internet resources (usage is free of charge for all educational and scientific institutions), and several Croatian Internet sites devoted to the natural sciences, including astronomy, exist and are constantly expanded and updated.

Dr. Zeljko Andreic
Thin Film Laboratory, Division of Materials Physics, Rudjer Boskovic Insitute, POB 180, 10002 Zagreb, Croatia
andreic@rudjer.irb.hr

EGYPT

This report covers the period from 1999 to 2002. There have been no fundamental changes in the state of astronomy education in Egypt since the last report (IAU- newsletter 'The Teaching of Astronomy', edition 45).

The Astronomy Department of Cairo University conducted a regular programme (a type of preparatory programme), especially for engineers working as technical assistants in Egyptian observatories. The programme is designed for eleven months followed by an examination. The courses include: General Astronomy, Spherical Astronomy, Celestial Mechanics, Astrophysics, and Solar Physics, two hours per week for each course. In addition, four hours per week, there are tutorial and astronomical calculations using computers. Candidates passing the exams with grades A or B are allowed to register for MSc courses as regular students.

Two main events have stimulated a general interest in astronomy and space studies, in the period mentioned above. The first was the solar eclipse of August 1999. This eclipse stimulated public interest in astronomy. Many of the amateurs observed the eclipse using small telescopes and some others visited Helwan observatory to watch the eclipse. The second event was Colloquium number 2 on 'Astronomy and Space Researches', held in the conference hall of Cairo University 13-15 April 2002. The scientific programme contained six sessions, two sessions per day. BSc students in astronomy were invited to attend these sessions. The subjects of the sessions were: Solar Physics, Galaxies and Clusters, Relativity and Cosmology, Space Dynamics, Stellar Astronomy, and Astro-Egyptology. The colloquium contained more than thirty scientific papers, in addition to six review articles. The interaction between BSc students and the participants has left a good impression which has been reflected on the examination results of the students. The session on Astro-Egyptology was public and attracted many from outside the community of astronomers.

M I Wanas, Astronomy Department, Faculty of Science, Cairo University, Egypt
wanas@frcu.eun.eg

FINLAND

General Information

Astronomy is maintaining its popularity in Finland, and the membership counts in amateur astronomical societies keep rising.

Elementary and Secondary Schools

In elementary schools, astronomical subjects are only touched on in the geography or physics courses. At the secondary level, many schools give special astronomy courses. Finland is taking part, with five other European countries, in a project of the European Association of Astronomy Education, to plan a common European curriculum for secondary level. University Institutes for Continuing Education have been organizing yearly 1-3 astronomy courses for teachers to raise their competence in the subject.

University Education

Finland is negotiating with the European Southern Observatory to become a member of ESO, and this may be reflected in research and teaching activities in the universities. Nearly 200 students attended the latest yearly basic course of astronomy at Helsinki University, and similar courses are given in Turku and Oulu Universities, as well as in half a dozen other localities.

Public Education

Ursa Astronomical Association continues its strong role in public astronomy education, and its membership has risen from about 8000 at the end of 1998 to over 10 000 at the end of 2001. The

number of amateur astronomers in Finland as compared to the total population (about 5 million) is larger than in any other country in the world. Ursa has also portable planetariums which are rented to schools with or without an instructor. Attendance in these planetariums has been 8000-17 000 visitors yearly. As a novelty Ursa is lending teaching material (slide sets, books, telescopes, Solar System models) to schools and kindergartens free of charge. Ursa's popular internet site is found at www.ursa.fi/

Heikki Oja, heikki.oja@helsinki.fi
Markku Sarimaa, markku.sarimaa@ursa.fi

GERMANY

There is a steady increase in the interest in astronomy and space sciences among the general public. Astronomy in elementary schools and secondary schools (Gymnasia) comes more in focus as a motivation for natural sciences. Especially in the context of a European education evaluation project (Pisa- Studie) the great deficits in natural sciences in Germany are recognised.

Numerous astronomical amateur societies and clubs (approximately 3000), 100 planetariums, various local broadcasting stations (100), and the multitude of the television channels in special presentations (minimum once a week) are popularizing astronomy. The astronomical institutes at universities and the great astronomical science institutes offer public astronomy courses and lectures several time a year.

The published literature in the form of books and journals is enormous (approximately 150). Especially one bimonthly journal must be mentioned: the Magazine for Astronomy and Space Science for Classes (Astronomie und Raumfahrt im Unterricht; a free copy on demand). It is a teachers' journal useful in all German school types. Five of the greater planetariums (diameter 20 m) in Bochum, Hamburg, Mannheim, Stuttgart, Wolfsburg, are equipped with the new ZEISS-Technology (Universarium IX).

Johannes V Feitzinger, Sternwarte Bochum, Ruhr-Universität Bochum
feitzinger@bochum.de

GREECE

Astronomy education in Greece is done through universities, the National Observatory in Athens, and high schools. The education encompasses theoretical, observational and experimental work.

Universities

The Universities in the cities of Athens, Thessaloniki, Heraklion, Patras and Ioannina have a minimum platform of the following subjects: Introduction to Astronomy, Observational Astronomy, Solar Physics, and Cosmology. These courses are for physics and mathematics students. As well these universities have Master's and PhD Diplomas. The University of Athens for the last two years as well operates a telescope within the University campus to train the students, as well as offering public nights. The University of Thessaloniki trains primary and secondary school teachers, and also has certain activities pertaining to general public education. The University of Ioannina also trains primary and secondary school teachers and other groups and societies in the town formally or informally.

National Observatory of Athens

The Astronomical Institute of the National Observatory of Athens (NOA), in the last two years has organized the 'Open Gates' programme for the public at its visitor centre. As well, the staff of NOA regularly receive high schools at the observatory's dome. Since September 1996 it is organizing the 'Summer Schools in Astrophysics' for 70 school students (of Attica district) under the jurisdiction of the Greek Ministry of Education.

Schools

A reform took place 3 years ago in the educational system of the secondary schools. This reform affected also the place of the subject of astronomy at school. In the 2nd class of Lyceum, the subject of astronomy is not optional anymore (~50 hours in a year). This course is an introductory one to the astronomical Universe. At the end of the year students take exams at school level in astronomy.

The reform was accompanied with a change in the school book and a change in the curriculum of the subject 'Astronomy'. The topics that are covered in the new book are

- History of Astronomy
- Observations and Instrumentation
- Solar System
- The Sun
- The Stars
- Galaxies
- Cosmology
- Space probes
- Our place in Space

The new element that this book brings into the classroom, are the various activities that are included at the end of each chapter.

As well, astronomy elements can be found in science subjects. Some schools perform pilot projects by introducing research to their students, laboratory exercises, and European – international projects, mainly through the Internet.

Margarita Metaxa, 63 Ethnikis Antistaseos, 15231 Athens, Greece
mmetaxa@compulink.gr

HUNGARY

As a consequence of the political changes actually being shaped, a gentle breeze has reached our educational system. Besides the traditional state-owned or public schools a lot of private elementary school and junior and senior high schools are participating in the mission of educating youth. Given the complexity of the system, no general statements can be composed. Restricting ourselves to astronomy education, it is a pity that our science is not a compulsory subject for 6-18 years old people anywhere. At the elementary schools some basic astronomical knowledge is incorporated into general science topics. In junior-high schools mainly the neighbourhood of the Earth and the Solar System is explained within the framework of geography, and a bit of gravitational physics is covered. At upper levels the teacher has more influence on the programme of her/his classes, and many of the physics teachers incorporate larger bits of modern astronomical knowledge into the syllabus of their courses.

During the three year period in question practically all of the Hungarian secondary schools have been connected to the Internet as a result of national projects (schools of lower level are to be networked soon with a substantial percentage being on-line now, based on local resources).

Both teacher and student is allowed to navigate amongst various astronomical and space science sites.

Quite a lot of younger colleagues, and especially those who graduated at the Eötvös University/Faculty of Sciences and became familiar with modern astrophysics, make substantial efforts to develop new interdisciplinary subjects or attractive teaching scenarios. The most active ones compiled and published textbooks for the participants of their courses and there was a colleague who drew his students into the preparation of their book. That one is considerably different from the well-known type of astronomy textbooks but is popular indeed amongst the pupils who are socialised by TV channels, computer games and the cinema. There is a steadily increasing demand for astronomical projects, competitions in physics, and the geographer who enjoys passing on basic or excitingly fresh astronomical ideas. In these schools, one often finds the resources (first of all money, of course) to run an amateur club or to build a small observatory and equip it with home-made reflectors or commercially available refractors/catadioptric telescopes. Some of these schools acquired an electronic imaging device (video or CCD camera) too, and their pupils vie with one another to secure hotter and more perfect or shocking astrophotos.

The Hungarian Astronomical Association (HAA) regularly organizes nation-wide competitions and announces them in their monthly magazine ('Meteor') and in the journal of the Hungarian Society of Natural Sciences ('The World of Nature'), and in the scientific/technical weekly 'Life & Science'. HAA has recently got its own observatory (Polaris) in the north-west of Budapest, and runs it with great success, but also has a lot of local groups and public observatories in the provinces. The Association regularly publishes the 'Hungarian Astronomical Almanach' ('Csillagaszati Evkonyv') and owns a reshaped home page (www.mcse.hu), which has an English version too. HAA collects the astronomy-enthusiasts during the long summers of our country on mountain tops, where astronomy camps are opened for introducing more and more people into the mystery of the cosmos. It was a great success for Hungarian amateur astronomy when a group of young students won the first place at the international competition 'Life in the Universe'. They received a wonderful prize: a free excursion to Chile in order to visit the Very Large Telescope, the world's largest optical instrument.

At the Roland Eötvös University of Budapest, astronomy has been taught as a compulsory subject for would-be-teachers of physics or geography as well as for geographers, cartographers, meteorologists and physicists. Those students who were eager to become astronomers could join the discipline's regular courses in the fifth semester. That has been the rule for decades and during the so-called socialist era there was a ceiling or quota set to four persons per year who were allowed to enroll in astronomy. Recently the system of educating the astronomers of the future has been changed. Undergraduate studies in astronomy began officially in 1999 at another university, where students of astronomy join the astrophysical research concentrating on variable stars and small bodies in the Solar System (University of Szeged). This institution has its own observatory which is open to the public every Friday evening. Regular workshops for amateur astronomers are held every year. In 2001 Eötvös University of Budapest modified its system of educating would-be astronomers too. The quota for enrollment in astronomy courses (which can be started from the first semester now) was set to twenty and the steadily growing number of applicants urged us to allow some students to learn astronomy above the quota.

PhD courses in astrophysics are also run at the Eötvös University and two to three theses are submitted a year. The opportunity to learn astronomy abroad is attainable too since international agreements of equivalency assure that semesters fulfilled and exams passed or credits collected at foreign universities are to be honoured by the Hungarian universities. Actually about 50 percent of our graduate students and all of the PhD students spend at least one semester abroad and have the possibility to learn those aspects and branches of astronomy which are not seriously studied here. These first steps are often followed by scientific collaboration or longer

stays at the host institutions which normally offer grants or post-doctoral positions to our excellent students.

Budapest, 2002 September 15
Gabor Szecsenyi-Nagy, ELTE/Eotvos University of Budapest, Department of Astronomy, PO Box 32. Budapest, H-1518 Hungary
szena@ludens.elte.hu

INDIA

Educational activity in astronomy in India falls in three categories: research institutions; science centres and planetariums; and amateur groups and societies. Amateurs organize public lectures by professional astronomers in addition to exhibitions and star parties for general public. In this they receive support from various official channels. Planetariums, in addition to their regular shows, pass on information to local press about astronomical events. Astronomy forms a small part of the activity of science centres.

Very few universities in India offer degrees in astronomy (or allied sciences). It is left to research institutions to prepare students for PhDs and also to offer astronomy as an add-on to interested college and university teachers as well as students.

During vacations, many institutions conduct 4-8 week summer camps for BSc and MSc students. Research institutes and planetariums also publish booklets for free distribution, participate in exhibition organized by other agencies, answer public queries, and encourage visits to their facilities. National Science Day on 28 February is celebrated as an open-house day by astronomical and other research centres. Faculty members contribute popular articles to local and national newspapers and magazines. Media often approaches these organizations whenever there is a major astronomical event (such as an eclipse, planetary conjunction or meteor shower). Public interest often focuses on astronomical aspects underlying astrology.

The Tata Institude of Fundamental Research (TIFR), Mumbai, in association with the Astronomical Society of India (ASI), has played a major role in sending teams of students to participate in the International Astronomy Olympiad since 1999, where they have acquitted themselves creditably.

In 2000, India participated in a major way in NASA's 'Red Rover Goes to Mars' programme. Three high school students from India were part of an eight-member international team of student navigators. From among the nine students scientists, three were from India. This programme in India was conducted by the Indian Space Research Organization, Bangalore.

The Inter-University Centre for Astronomy and Astrophysics, Pune (IUCAA), has a separate cell dedicated to a public outreach programme. It already has a science park and is now busy setting up a science centre in its campus. IUCAA organizes fortnightly public lecture-demonstrations, an annual drawing, essay and quiz competition, and a six-week school student summer programme.

A new initiative involves helping residential engineering colleges set up research-oriented astronomy clubs. Towards this end, the Government of India's Positional Astronomy Centre, Kolkata, is collaborating with the Indian Institute of Technology, Kharagpur, in setting up a small observatory.

Rajesh Kochhar and Arvind Paranjpye
rkk@nistads.res.in

ISRAEL

The Third CONCAM project (Noah Brosch,Tel Aviv University)
The Wise Observatory was selected to host the third CONCAM in the global network of automatic panoramic cameras, after Mauna Kea and Kitt Peak. The CONCAM is a fisheye-CCD combination that images the sky from horizon to horizon every ~5 minutes. The images show stars down to 6th magnitude and can be used for various classroom demonstrations of introductory astronomy. The CONCAM images are public domain and can be freely accessed on the global Web.

One interesting application was the use of CONCAMs during the Leonid meteor shower in 2001, when more than a dozen fireballs were imaged over the Wise Observatory. The meteor activity associated with the Leonids was widely publicized, and public viewing took place in 1999, in conjunction with the international observing campaign MAC-99, which was centred in Israel.

Edugaming-A Virtual Activity (Orly Kovo, Science Oriented Youth Unit, Tel Aviv University)
In the course of the last year a virtual activity in astronomy has been taking place in the Science Oriented Youth unit at Tel Aviv University. We developed a special model of virtual activity called Edugaming – learning through games, self experience, competition and collaboration between the students. This model emphasizes interactive components and gives a special place to the synchronised ones.

The model was operated with various populations such as gifted students, science oriented youth, students from abroad, school classes and students who were working individually from home.

Annual Astronomy Olympiad (Meir Meidav & Hagai Netzer,Tel Aviv University)
On 24 March 2002, the final stage of the 8th Annual Israeli Astronomy and Space Science Olympiad took place at Tel Aviv University.(The first was held in 1994). This yearly Olympiad is dedicated to the memory of Professor Dror Sadeh, a renowed Israeli physicist and astronomer, who died in October 1993. More than 400(!) young contestants, aged 15-17, participated in the first stage, a written test with questions covering various areas in astronomy and space sciences. (At the first stage of the first Olympiad there were only 40 entrants). Only 80 contestants progressed to the second stage, which included both multiple-choice and open-ended questions. The top five contestants went on to the final stage, which is the most exciting one and is always open to the public. The performance of the contestants in all the stages was excellent.

'Thinking Journey' Activities (Yoav Yair, The Open University of Israel and CET)
The Open University of Israel has been involved in the development of a new conceptual approach to teaching astronomy at the 8-12 level. The 'Thinking Journey' model is based on extensive use of updated spacecraft imagery combined with dynamic 3-D simulations of planetary objects. A CD-ROM with Virtual Reality capabilities was developed in cooperation with the Center of Educational Technology (CET), with special activities based on observing the surfaces, atmospheres and motions of the planets. This was part of a unit dedicated to Mars exploration, which was experimentally tested in 2002.

Web-based activities in conjunction with the mission of the first Israeli astronaut Colonel Ilan Ramon, scheduled to fly on the shuttle Columbia, were conducted from the CET with more than 60 schools and 2000 pupils throughout the country. The 'Surfing in Space' project involved the planning, design and virtual missions by students to various objects in the Solar System, with the assistance of astronomy experts and direct contact with the astronauts.

The Space Year (The Israeli Space Agency)

Last year was 'Space Year', celebrating our nation's first astronaut mission. The Israeli Space Agency (ISA) promoted numerous educational activities, cooperating with the Ministry of Education to encourage several projects that involved school children from all around Israel.

Thirty-seven schools prepared mirrors for the StarShine-II satellite and shipped them to NASA. They used a special website with observation instruction to follow the decay of the satellite's trajectory.

A microgravity experiment of crystal growth was planned and designed by high-school children, and will be flown on board the space shuttle Columbia and performed by the first Israeli astronaut. During this flight, a space-to-ground video conference will be broadcast with the active participation of school children.

Various public lectures and teacher seminars were given by ISA, which also supported museum astronomy exhibitions and the publication of a special stamp celebrating Israel's first astronaut.

Astronomy Activities **(**David Pondak, 'Blossoms of Science' – National Center for Learning Astronomy, Jordan Valley College)

The activities in 'Blossoms of Science' are divided into five branches:

- Portable astronomy laboratory – Every year 10 000 students participate in so-called 'astronomy days'. The portable astronomy lab visits100 schools per year with its team of five astronomy guides. The guides open five astronomical stations, and students work in small groups in the stations.
- Astronomy science camp – Every summer, 200 junior high students participate in a 5-day science camp at Jordan Valley College in groups of 2-3 students, and each group submits an astronomy project at the end of the camp.
- The largest astronomical website in Israel – The Center maintains an astronomical website that contains: lessons, activities, students' astronomical projects, astronomical resources, and the Hebrew version of 'astronomy picture of the day'.
- Astrotop – A matriculation astronomy project for high school students, developed in cooperation with Tel Aviv University, headed by Prof. Meir Meidav.
- Astronomical teacher workshops – In the last three years 120 high school and elementary school teachers participated in an astronomy workshop conducted t by 'Blossoms of Science' Center.

-

'Earth in Space: Activities and Concepts' (Y Nussbaum, Science Teaching Department, Weizmann Institute for Science, Rehovot)

The book 'Earth in Space: Activities and Concepts' (in Hebrew) offers a series of activities necessary for building essential concepts in astronomy. The various activities require exercising 'spatial thinking', without which one cannot deal meaningfully with astronomy information and concepts. The activities make use of unique and original 2D and 3D models. The series leads to the understanding of the astronomical basis of the coordinates of Earth, the causes of the seasons and the various aspects of the Moon's periodical appearance.

An Experimental Course for College Students (Y Nussbaum, Jerusalem College, Jerusalem)

Conventional astronomy courses do not seem to provide prospective teachers with the competencies and confidence for teaching astronomy in school. An experimental course for science students at a teachers college in Jerusalem, was held in summer 2002 for five days in a desert area of southern Israel. Twenty-five students participated. The course included lectures, exercises, activities with models, sky observations, computer simulations, Internet search, video movies and more.

Meir Meidav
meidavm@post.tau.ac.il

JAPAN

Overview

People's interest in astronomy is growing because of different new discoveries, from near-Earth asteroids to black holes, which have been carried out by new big observing systems such as the Hubble Space Telescope, several 8-10 m class telescopes, etc. Every week one can see some related articles in one newspaper or another.

The number of planetariums and public observatories reached values of about 300 and 100 respectively, but started to decline because of the difficult economical conditions in Japan.

A new school curriculum was introduced at the elementary and junior high schools in 2001 and at the senior high school in 2002. Since these reformations cut many school hours of science, there is much confusion at individual schools.

The number of scientific and astronomical institutes (including universities) with public outreach programmes increased much in the last couple of years, and the number of young astronomers and educators interested in astronomical education has also increased.

In conclusion, activities of astronomical education in Japan go along the better direction, but the social environment in astronomical education, such as the school curriculum and planetarium activities, have suffered draw-backs.

Reformation of school curriculum

Reformation was carried out at the elementary and junior high school in 2001 and at the senior high school in 2002. School hours have been reduced because all Saturdays have become school holidays, and a new curriculum called an integrated study was introduced. Additionally, under a basic idea that most of the lower level pupils should be able to follow lectures, many concepts, in our case, scientific concept, were cut out. For example, at the elementary school, only two phases of the Moon can appear in the text book. At the junior high school, only the Solar System and stellar constellations can be taught.

The basic idea of our government is to keep an equal level of education to nearly all pupils. However, if we follow this, pupils at the higher level will have to wait for those at the lower level to catch up, and we will start to lose their interest in any curriculum, especially in sciences. The inevitable result of this is that pupils at the higher level and whose parents can pay the higher education cost will try to go to private schools. Certainly, many arguments were made, and finally the Minister of Education, Culture, Sports, Science and Engineering (MEXT in short – science gets in via the 'X') declared that pupils at the higher level can study further topics. This has caused further confusion in the schools. What should school teachers do? At the moment there seems no answer, but we have to hope for some solution after extensive discussions.

Social facilities

When the Japanese economy was good (called a bubble economy), by 1990. many local governments had tried to build social facilities such as music halls, sports stadiums, and libraries. Some local governments built planetariums and public observatories, because they have domes on their roofs which are symbolic monuments. However, most local governments did not consider much how important it is to operate the facilities properly. These operational activities relied on part-time workers or volunteers. Then, with the onset of difficult times in the Japanese economy, local governments started to cut those workers in order to reduce expenses. Japan once

had the second largest number of planetarium and public observatories in the world. Now, the number is going down year by year.

Public outreach by astronomers
The Astronomical Society of Japan holds a session for high school pupils during every semi-annual meeting. Some of professional observatories arrange three or four day schools to study some specific topic such as optical spectroscopy, optical imaging, radio astronomy, etc. In Japan all the universities and national institutes will lose their status as national organizations and become organizations independent of the government from April 2004. They will then get their operating budget depending on evaluation of activities carried out during the previous 3-5 years. To get good public support, they have started to show their activities to the public. In astronomy, these activities are now accelerating. Young astronomers and educators are very active in public outreach programmes, and there is much hope that astronomical education will improve.

Syuzo Isobe
isobesz@cc.nao.ac.jp

LATVIA

General information
The past three years for astronomy education in Latvia was a period of stabilization.

Public understanding and outreach
There are some pluses and minuses in public understanding and outreach. The Latvian Astronomical Society, which has about 130 members, was rather inactive, except for a successful expedition to the 11 August 1999. total solar eclipse site in Hungary. Plans for the development of an Amateur Astronomy Center equipped with a 55 cm telescope, perhaps robotic, were not fulfilled. The greatest disadvantage is that there is no planetarium open to a wide public. Latvia is the only country around the Baltic Sea without a planetarium.

On the positive side, sky demonstrations at the Astronomical Tower in Riga, equipped with a 22 cm reflecting telescope, grew in popularity. A Youth Astronomy Club was established in 1999 and held regular meetings twice a month. A summer star party 'Aquila' each year attracted about 80 participants, and one was visited by a large group of astronomy amateurs from Lithuania. The popular science magazine 'Starry Sky' is still published four times per year, but the yearly Astronomical Calendar is no longer a separate edition, but integrated into 'Starry Sky' and shortened. The mass media express constant interest in astronomy events and frequently ask astronomers to comment on them. At the same time the influence of astrology is growing – many newspapers and magazines publish horoscopes. For the general public the words 'astronomer' and 'astrologer' are almost synonyms.

Primary school education
A new National Curriculum is being prepared and will be implemented in schools from 2004. New textbooks are under development now. They contain more astronomy topics than previously because the new curriculum's emphasis on skills development and science education, especially for pupils of age 10-12. In later grades of primary education (age 13-15) astronomy elements are included in the physics course. New physics textbooks were published during this 3 year period.

Secondary school education
Astronomy is now a separate subject, but sadly is chosen only by 12% of students. This number has not changed during past 3 years. A new National Curriculum is under development for

secondary education. Starting from 2004, all schools will be divided into two groups. In the first group, natural sciences and mathematics will dominate; in the second group humanities and social sciences will. This process has already started. Students in the first group learn physics, chemistry and biology as separate subjects. New physics textbooks are under development now. Students still can choose astronomy, but from 2004 astronomy will no more be a separate subject – it will be integrated in physics. Only some schools will continue to teach a separate astronomy course using existing textbooks and teaching aids

For students of arts and humanities, a Natural Science course that includes some astronomy elements will be given. New textbooks for this course are translated from English. In short, at present a small proportion of secondary school students get a deep insight in astronomy; in future there will be fewer astronomy topics but they will have a broader audience. Which way is better?

Yearly astronomy contests for advanced high school students were continued. In a yearly National Conference of Students, a Scientific Work an Astronomy section was established. Younger students can attend the Astronomy Circle in the Technical Creativity Palace and also take part in a separate yearly contest. The Association of Astronomy Teachers organized several teachers' workshops. Close collaboration with the European Association for Astronomy Education (EAAE) was established. Some teachers attended the International Summer Schools of EAAE in France, Portugal and Germany. Several new Internet home pages devoted to astronomy were created (www.liis.lv.astron/, www.astro.lv, www.rsp.lv/astro/). The first one is most suitable for high-school students and the general public, the other two for younger children.

Undergraduate and graduate education

The situation remains unchanged. General astronomy courses are given at four universities for bachelors of physics, geodesy and pedagogy. Masters' degree and postgraduate astronomy studies are available only in the University of Latvia, the central university of the country. In 2001 the International Nordic-Baltic Summer school in Radio Astronomy was held in Latvia.

Ilgonis Vilks
vilks@latnet.lv

MALAYSIA

The majority of educational activities in astronomy and space science in Malaysia are carried out at the National Planetarium in Kuala Lumpur.

Educational activities on a daily basis at the National Planetarium include large-format movies and planetarium shows, interactive exhibits on astronomy and space science, and a Viewing Gallery with coin-operated binoculars on top of the observatory tower. Sundials and an Ancient Observatory Park can be found in the garden area of the National Planetarium. Souvenirs and astronomical observing equipment can be bought at the souvenir shop.

Besides these ongoing activities at the National Planetarium, there were also programmes on astronomy and space science for schools and the general public for promotional purposes. Activities for professionals include lectures on space science and technology given by invited speakers. Several workshops and seminars were also held.

The Planetarium organized the Primary and Secondary School Space Science Quiz Contest at the national level for the Prime Minister's trophy and the Secondary School Astronomical Club and Astronomical Activity Competition at the national level for the MEASAT trophy. Astronomical short courses for teachers and trainee teachers were conducted every year.

Outreach programmes for the public covered the whole country. Publications included brochures, pamphlets, bulletins, astronomical magazines, and conference proceedings. Other activities include regular star gazing programmes, coordination of ad hoc astronomical events for

the public, such as solar and lunar eclipses, meteor shower and comets observation, and coordination of the United Nations World Space Week celebration at the national level.

Mazlan Othman
(via Zamri Mohd Shah)

NETHERLANDS

The Netherlands Research School for Astronomy (NOVA) together with the Netherlands Astronomical Society (NAC) are actively engaged in promoting astronomy in secondary education. Following a steering role in the definition of the astronomy component within the Science Curriculum (being taught to many students in higher secondary education), a binder plus CD-ROM containing supporting astronomy material was produced and sent to all (550) relevant Dutch schools. A NOVA website, dealing with astronomy education among other things, became on-line. This website, www.astronomy.nl, includes a newly conceived virtual tour through the Universe. Posters anchoring this website were produced and disseminated. Increased contact between secondary school teachers and professional astronomy is aimed for. A national Dutch Astronomy Teacher's day to be held in November 2002 is in preparation.

Peter Barthel
pdb@astro.rug.nl

NEW ZEALAND

Astronomical education activities at the University of Canterbury

Over the last 3 years there have been three new initiatives from the University of Canterbury. Two involve public outreach, while the third is a new formal first year course in the Department of Physics & Astronomy.

The latter is entitled 'The Cosmos: Birth and Evolution' and in its first year (2001) there was an enrolment of more than 160 students. It is a general interest course, essentially for non-science majors.

The public outreach activities were a week-long astronomy camp for senior secondary students, which included talks, exercises and an overnight visit to Mt John Observatory, New Zealand's research observatory, and developing and presenting astronomy material (as PowerPoint presentations) to middle year secondary students in the Canterbury region.

The graduate programme in the Department continues to attract high calibre students in a range of observational and theoretical topics. There are about 12 students currently in the programme, with the majority undertaking a PhD.

Education at the Carter Observatory

Carter Observatory continues to run an active education programme under the 'Learning Experiences Outside the Classroom' scheme of the Ministry of Education. In the last year 9500 students took part in our programme from all over the country.

The main stress of our work is on getting students taking part in scientific investigations. A large library of resource material has been prepared to assist teachers and students in their work. Special attention has also been given to the astronomical knowledge of New Zealand's native Maori people.

Galaxy – Te Korurangi

Three years ago, in an effort to promote astronomy relevant to the southern hemisphere amongst children and teachers, the children's space and astronomy magazine 'Galaxy – Te Korurangi' was launched as part of an initiative of the Education Section of the Royal Astronomical Society of New Zealand. The magazine has now been registered as a Charitable Trust. The support of the astronomical and science community throughout Aotearoa New Zealand has been superb (Aotearoa is the Maori name for New Zealand). A particularly gratifying aspect has been the interest that has been taken in the Maori and aboriginal astronomy and we have published some children's work in 'Te Reo', thus fulfilling one of our main aims, which was to make people aware of the cultural heritage of the southern skies.

The Restoration of the Gifford Observatory

In March 2002 the Gifford Observatory, originally established in 1912, was reopened by one of its most illustrious early users, Sir William Pickering. The new fibreglass dome fitted to the original brick and plaster building which had undergone extensive earthquake proofing using a new technique of inserting spiral rods into the existing bricks, houses the original 5¼ inch Zeiss refractor. The observatory is named after A C Gifford, 'Uncle Charlie', an outstanding mathematician who taught at Wellington college for many years and was one of Aotearoa New Zealand's most assiduous promoters of astronomy. It is hoped that further instrumentation and additional telescopes will extend the use of the Observatory for further research applications.

Brian Carter
brian.carter@carterobs.ac.nz

NORWAY

Norway has a population of 4.5 million people, including 600 000 students in primary schools, 200 000 in high schools and 200 000 in colleges and universities. School starts at age 6. The official languages are Norwegian and Sami.

Children are in general interested in astronomy and space research, and are often better informed than their teachers because of information available through the Internet and other media. The activities of the Norwegian Astronomical Society, described below, have increased general interest in astronomy considerably during this triennium.

The country has three permanent planetariums, of which the largest one in Tromsø, with 90 seats, has been closed because of lack of funds. The other planetariums are of school class size, and have been frequently used together with at least four mobile planetariums that have visited schools in various parts of the country.

The curriculum for primary schools was changed in 1997, and has some astronomy for grades 4, 8 and 10. The schools have become more project oriented, and many teachers have introduced astronomy projects as part of their teaching.

The curriculum for high schools was changed in 1994, and it contains some astrophysics, for example information from light. For the highest level in physics, stars, galaxies and cosmology are included.

Norway has four universities: in Oslo, Bergen, Trondheim and Tromsø. A full education in astronomy and astrophysics at all levels exists only at the University of Oslo, where a new Bachelor and Master programme will be introduced starting in 2003. The universities in Trondheim and Tromsø have up until now offered astrophysics specialization as part of a degree in physics at the masters and PhD level, but this will be discontinued from 2003, in an effort to concentrate the resources in one educational institution. A bachelor degree in physics from one of the other institutions will in the future qualify for masters and PhD studies at the University of

Oslo. The number of students in astronomy in Norway is stable. A new internet-based introductory course in astronomy and upper atmosphere physics, at the University of Tromsø has recruited students from all over the country, in particular amateur astronomers and some teachers. Public interest in astronomy is high and increasing.

The Norwegian Astronomical Society, which is an organization for amateurs and other interested people, has grown from 1200 to 1900 members during the triennium, and is the largest amateur organization in Scandinavia. It has 10 observational groups, and is an umbrella organization for 28 local astronomy clubs, which have additional members. The Norwegian Astronomical Society issues a bimonthly magazine 'Astronomi', and organizes an annual Astro Fstival in Oslo that attracts 10 000-20 000 people. Many local clubs do the same. It also sends material to schools, in particular an 'Astro-Calendar', where astronomical events for each month are listed. This calendar has become popular, and is followed up with national contests among school children at certain age groups. About 10 000 children participate in that. The Society has an information service for its members and also for the general public, and was used on the radio and television about 150 times per year in the triennium.

Jan-Erik Solheim, University of Tromsø and Oslo
janerik@phys.uit.no

PHILLIPINES

During the last three years, astronomy in the Philippines has undergone major developments. In May 2001, a computer-based, 45 cm telescope was installed at the PAGASA Astronomical Observatory, located inside the campus of the University of the Philippines (UP) in Diliman, Quezon City. The installation of the highly technical equipment signified a new beginning of astronomy in the country, particularly in the field of education and research and greatly supported the new mission of PAGASA to revitalise astronomy in the nation.

The 24th General Assembly of the International Astronomical Union (IAU) held in Manchester, United Kingdom in August 2000 also marked an important occasion for the country's astronomy. The application for Associate Membership of the Philippines to the IAU was approved during the meeting.

On October 23, 2002, Dr Hans Rickman, General Secretary of the IAU, visited the Philippines for the signing of the Memorandum of Agreement (MOA) between the IAU and PAGASA, which aims to establish cooperation between the two entities. The cooperative activity, which is under the IAU Program 'Teaching for Astronomy Development', involves the visit of lecturers who are invited to raise the astronomical background of the staff at PAGASA. Visits may be combined to form an intensive training course.

Likewise, the activity plans to establish a variable star/minor planets observation programme, wherein the IAU will support the international travel of the astronomer who will supervise the activity. The observation program will utilise the 45 cm telescope.

The signing of the MOA also coincided with the visit to the country of Prof Yoshihide Kozai, Director of Gunma Astronomical Observatory (GAO) of Japan, and who acted as one of the witnesses. It should be noted that GAO is the site where the Chief of the Astronomy Research and Development Section (AsRDS) undertook a seven-month training on astronomy and astronomical observation as a participant sponsored by the Japan International Cooperation Agency (JICA), during the period from 29 March to 14 November 2001. GAO also renovated the spectrograph of the 45 cm telescope donated to the Philippines, in order to be able to attach a CCD camera. GAO also donated equipment to PAGASA, which she used during the training, that included an ST8 CCD camera with a water-cooling device, and a black and white TV with VTR camera.

With regards to university education, it was in the first semester of school year 2002-2003 that the National Institute of Physics (NIP) of UP offered, for the first time since its establishment, an undergraduate astronomy course entitled 'Physics and Astronomy for Pedestrians' or Physics 10. The course will serve as an introduction to the different aspects of physics and astronomy, from its emergence up to its current developments. It will be a 'walk-through' course for people who enjoy physics and astronomy but want to be spared the tedious details.

Cynthia P. Celebre, Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA), Science Garden Complex, Agham Road, Diliman, Quezon City, Philippines, 1100
cynthia_celebre@hotmail.com

POLAND

General Information

The Polish Astronomical Society together with the Polish Amateur Astronomers Society organized on 18 February 2002, a meeting to honour the 80th anniversary of the bi-monthly magazine 'Urania'. It was an occasion to review the activities of many small local amateur groups. It seems now easier to organize astronomical summer camps and observation meetings with the help of some local funding.

Primary school education

Basic astronomical notions are being introduced in a new subject, 'Environment', together with geography and biology.

Secondary school education

In both types of schools – gymnasium and lycee – physics ought to be taught together with astronomy. However, the amount of astronomy taught depends on having knowledgeable teachers. To help teachers, an Association for Science Teachers has been founded by enthusiasts from the Physics Didactic Laboratory of Torun University. They edit their Bulletin and organize conferences every year. In July 2000 Torun University organized an international meeting on 'Science and Mathematics for the Information Society', sponsored by the Tempus/Phare JEP 12267/97 project. About 180 participants, teachers of physics, astronomy, and mathematics, from all educational levels, from Poland and a few European countries, attended the conference. The proceedings were published in 2001 both in Polish and English.

University education

The larger universities organize every year 'Science Festivals' to attract future students. In Warsaw, Festivals are connected with astronomical seminars for teachers organized by the Astronomical Centre of the Polish Academy of Sciences.

Cecylia Iwaniszewska, N Copernicus University, Chopina 12/18, 87-100 Torun, Poland
cecylia@cc.uni.torun.pl

PORTUGAL

General information

In the period covered by the present Report the activities in astronomy continue to increase in all the areas: public education, school education and research activities. Specific programmes for

promotion of science maintain the good opportunity for direct contact between astronomers, both professionals and amateurs, and students, teachers and the public in general. A large number of astronomical groups were organized all over the country, all very much active in the promotion of astronomy. Programmes for science research funding make possible good conditions for the development of many astronomical research projects.

Public understanding and outreach
The programme 'Astronomy on the Beach' was maintained during the period covered by the present Report. This programme is intending to introduce astronomy to the large number of people that, in summer, spend holidays in beaches along the Portuguese coast, mainly through public sessions of night sky observations. The programme 'Astronomy in Summer' went on also, with a large number of astronomical activities, in summer, all over the country. Such activities were organized not only by professionals but also by many amateur astronomical associations. In another programme, 'Scientific Week', astronomy also has an important role. Among many scientific events during the week, there are several astronomical activities, including lectures, open discussions and practical observations. Finally, also to be mentioned are the many educational activities, all over the year, organized by astronomical observatories, research centres and planetariums.

Primary school education
Although there are no great curricular changes at primary school level, it is to be mentioned that there are opportunities to stimulate cooperative projects in astronomy between astronomers and primary school teachers. This is a way to make astronomy more popular among primary school students.

Secondary school education
The programme 'Ciência Viva' is facilitating close cooperation between secondary school teachers and astronomers. As a consequence, the interest of school teachers in astronomy continues to increase: visits, lectures, demonstrations and night sky observations. Also, more and more schools are now getting their own astronomical telescopes, and more teachers are having postgraduate education in astronomy.

Undergraduate education
As mentioned in previous reports, there are specific undergraduate degree-courses in astronomy in Portuguese universities. Also, astronomy is taught in several other degree-courses, in science, engineering and military schools.

Postgraduate education
Also as mentioned in previous reports, master's degree-courses in astronomy are regularly offered by Portuguese universities. The number of PhDs in astronomy has increased greatly in the period covered by the present Report.

J Pereira Osório
Matemática Aplicada, Faculdade de Ciências, Universidade do Porto, Rua do Campo Alegre 687, 4169-007 Porto, Portugal
jposorio@fc.up.pt

RUSSIA

Astronomical educational activity during the last few years in Russia (and not only there) was widely summarised by a special JENAM-connected colloquium on astronomy education held at Moscow State University 27-28 May 2000. Participants from more than ten countries delivered about 50 presentations. The title of this colloquium, 'The Increase of Cultural Role of Astronomy on the Edges of Centuries', reflects the main idea, which inspired the participants. E V Kononovich (2001) edited the presented reports in a special issue. During the two days of sessions, many vital problems of astronomy education were considered, including the general organization of astronomy teaching, teaching methods, additional teaching, and teachers' education. The importance and effect of the Astronomical Olympiads were also discussed. The Russian Ministry of Education takes into account that astronomy should be the fundamental component of higher professional education in Russia, but as yet that idea is not supported by its proper position in middle school. The colloquium joined participants from different parts of wide Russia (including Siberia), Spain, and some other countries including those of the former Soviet Union (Poland, Rumania, and Uzbekistan). Astronomical literature on different educational and wide public levels regularly appears in Russia e.g. Gorbatskij (1999), Surdin (2001), Kononovich and Moroz (2001), and Dubkova (2001, 2002).

References

Dubkova, S I, 'Walking Over the Sky', Moscow, *Belyj Gorod*, 2001, 111

Dubkova, S I, and A V Zasov, 'Atlas of the Star Sky', Moscow, ROSMAN, 2002, 64

Gorbatskij, V G, 'Gasdynamical Instabilities in the Astrophysical Systems', SPb, SPb Universyty, 1999, 166

Kononovich, E V (Editor), 'The Increase of Cultural Role of Astronomy on the Edges of Centuries', *JENAM 2000 Connected Colloquium 1: Astronomical Education, SPb*, 2002, 63

Kononovich, E V, and V I Moroz, 'General Course of Astronomy', Moscow, *Editorial URSS*, 2001, 542

Surdin M, 'Birth of Stars', URSS. 2001, 261

Edward V Kononovich
Stenberg Astronomical Institute of Lomonosov Moscow State University, 119899 Moscow, Russia
konon@sai.msu.ru

SLOVAKIA

Astronomy is taught at secondary school in Slovakia only as a part of physics, when there are students interested in it. In addition, it depends on a willingness of the teacher and an official agreement of the school director. A proposal that astronomy would be one of the optional subjects for the school-leaving exams was put forward to the Ministry of Education.

At the Slovak Central Observatory (methodical centre of the Ministry of Culture), they are running three-year courses of fundamental astronomy for students who have finished secondary school (about 30 students in a course).

Astronomy at a professional level is provided at the Faculty of Mathematics, Physics and Informatics (FMPI), Comenius University Bratislava, as one of the specializations in physics. A

guarantee for this specialization is provided by the Astronomical Institute FMPI, to which also belongs the Astronomical Observatory in Modra. Students perform their practical exercises at the observatory and acquire observational data for MSc theses. On average 5 undergraduate students are in a course per one school year. Research at Modra observatory is mainly oriented to the field of interplanetary matter and solar physics.

Since 1997, it has also been possible to study astronomy at the university level at the P J Safarik University in Kosice, where lectures are given by astronomers of the Astronomical Institute, Slovak Academy of Sciences, Tatranska Lomnica (with about 3 undergraduate students in a course). Fundamentals of astronomy are also provided for the students of physics at all Pedagogic Faculties in Slovakia.

Three-year courses of astronomy are also running at the University of the Third Age at the Comenius University Bratislava with about 70 students in a course.

Pavel Palus
Astronomical Institute, Faculty of Physics, Mathematic and Informatic, Comenius Univeristy Bratislava
palus@fmph.uniba.sk

SOUTH AFRICA

With astronomy now established as a part of the new South African school curriculum, with a theme called 'Earth and Beyond', both Hartebeesthoek Radio Astronomy Observatory (HartRAO) and the South African Astronomical Observatory (SAAO) have increasingly focused on running workshops for teachers, in addition to hosting members of the public and school groups.

Both HartRAO and SAAO have been working in close collaboration with many NGEOs in developing resources for classroom use and as teaching aids. A number of these workshops take place at the respective observatories, but many others take place at locations throughout the country: at schools, science centres, expos and other educational centres.

Several South African universities have teamed up with HartRAO and SAAO to run a National Astronomy and Space Science Programme (NASSP) for postgraduate students. Based at the University of Cape Town and using scientists from participating institutions, NASSP will be training 21 postgraduates each year.

Several universities that run astronomy courses have also become involved in Education and Public Outreach (EPO) in astronomy, notably the University of the Free State which is building a small visitor centre to accommodate its EPO and the amateur community.

The occurrence of the two solar eclipses in Southern Africa (21 June 2001 and 4 December 2002) have led to a heightened awareness of astronomy and many schools have benefited from presentations by both professional and amateur astronomers. Several Centres of the Astronomical Society of Southern Africa have been very active in talking to schools and the public in addition to running an intensive programme raising public awareness of the need for dark skies. The planetariums in Cape Town and Johannesburg have also been very active and again the special eclipse presentations and functions led to interactions with thousands of members of the public and schools.

The construction of the Southern African Large Telescope (SALT) now well under way, the High Energy StereoScopic (HESS) array becoming operational, future involvement in the World Space Observatory (WSO), the construction of several smaller telescopes in Sutherland, the refurbishment of the Boyden telescope in Bloemfontein, the upgrading of facilities at HartRAO, and potential SA participation in the Square Kilometre Array, SKA, all indicate that astronomy is alive and well in the subcontinent. Many astronomers are exploiting these icons of

modern science to promote astronomy education with obvious benefits to the larger scientific and education communities.

Case Rijsdijk
South African Astronomical Observatory (SAAO), P O Box 9, Observatory 7935, South Africa
case@saao.ac.za

SPAIN

General Information

The interest in astronomy from students, teachers and the general public is not decreasing, but the current situation with regard to the Spanish curricula is not better than that of some years ago. There are some points that prove that there is a general interest in astronomy and space science, but the Ministry of Education does not seem to have this impression.

A proof of this general interest is that this year (2002) the Spanish Open University (Universidad Nacional de Educación a Distancia UNED) has decided to organize its Summer School for teachers on the topic of Astronomy. The scientific organizer is the Observatorio Astronomico Nacional de Madrid and they are expecting approximately one hundred participants.

School Education

In the old curricula it was possible to select the subject of astronomy in those secondary schools which offered it. Currently, the structure has changed with the new curricula. In general, the number of hours for teaching science was greatly reduced. physics and maths teachers who taught astronomy some years ago are not able to do so because astronomy no longer exists as an optional subject (throughout the country), and also, in their respective subjects the class time has been reduced significantly. Therefore, teachers have a lot of difficulties finishing the contents of their subjects. Clearly, they do not have any possibility to explain astronomical content that is not included in the syllabus.

The few concepts of astronomy that appeared some years ago are practically not present now. In the majority of the country there is only a workshop on astronomy (for 15-16 year old students) that presents some practical aspects, but without enough time to consolidate them. Also astronomy appears in some subjects, such as biology or chemistry, but in this case the teachers do not cover the content because they do not have enough time.

However, the interest in astronomy is present in the schools. There are some European Programmes, for example, 'Physics on Stage', 'Life in the Universe', and 'Catch a Star', which have been very well received by students and teachers. The number of participants has been good and the quality of the work has been very good, as proven by the good results obtained with regard to the prizes. In line with this, to join in with the European programmes to promote astronomy, the Instituto Astrofísico de Canarias IAC, has become involved in the programme 'Catch a Star' in Spain and is giving the Spanish winner a visit to its Observatory in the Canary Islands. IAC always shows a special sensitivity to the teaching of Astronomy.

The IAC continues with the Fundacion Santamaria promoting astronomy courses, but in the last years they decided to change its structure in order to reach more teachers on the peninsula. In the past, the courses were organized on Tenerife, where a group of Spanish and Portuguese teachers were invited for a week, which included a visit to the Observatory. Now they organize their courses outside the islands, in the continental zone of Spain, and the members of IAC have to travel to the peninsula. It is therefore possible to organize more than one course, because they can organize them during the normal academic year and it is not necessary to wait for the holiday period.

The situation in primary schools did not change in relation to the previous report. Astronomy appears briefly and distributed throughout several subjects. Sometimes the solution for the teachers consists of going to the planetarium with the students in order to cover the astronomical content.

There is a lot of courses of astronomy organized by universities and teacher training centres, but it is not easy for teachers interested in using the knowledge they receive in the classroom because they do not have the opportunity. In general, in our country we enjoy a nice sky without clouds that can offer the opportunity to show the stars to the students, but some times it seems difficult to organize observations.

The Spanish Association for Teaching Astronomy (ApEA) continues its activities organizing a national conference every two years. Since the last report ApEA has organized the 3rd and 4th of these in the Science Museum of Granada and Murcia respectively. The number of teachers participating was about one hundred. Currently, they are preparing the new meeting for 2003 in Zaragoza.

University Education

In Spain university students interested in studying astronomy have to study physics or mathematics. When they finish their PhD It is not possible for them to receive their doctorate in astronomy, but only in physics or mathematics.

As a consequence of the interest in space science in our country, there are some universities starting a new degree in astronautical engineering next year. It will be necessary to wait some years to know the results of this offer, but at present the prospects are excellent.

The Technical University of Catalonia organized the 6th International Conference on Teaching Astronomy in Vilanova i la Geltru (near Barcelona) 23-25 November 2000. There were around 100 participants from 22 countries from Europe, America and Japan. After three full days the participants prepared a declaration (see Appendix) to give to the current president of Commission 46 of IAU, Syuzo Isobe, who presented one of the general lectures. There were many contributions from university and secondary school teachers interested in teaching astronomy.

Public Education

There are no structures for public education in astronomy. There only exist offers from planetariums and science museums.

There are some interesting conferences organized for retired people by several universities, but the offer is not structured and sometimes includes a theme of astronomy mixed with various topics.

Appendix 6th International Conference on Teaching Astronomy (Declaration)

Teachers, educators and astronomers from 22 countries, from Europe, North and Latin America and Japan met in Vilanova i la Geltru (23-25 November 2000), invited by the Technical University of Catalonia (Spain), for the 6th International Conference on Teaching Astronomy (Rosa M Ros Conference Secretary).

They reported and discussed the important role of astronomy in education, their teaching activities, experiences, and pedagogical strategies in astronomy education using a multidisciplinary approach.

As a conclusion of this conference they emphasize the importance of putting together several experiences carried out in different cultural contexts. They recommend that IAU Commission 46 should facilitate official contacts with authorities aimed at developing the teaching of astronomy. They stress that teaching material must be developed by educators and teachers themselves, in close co-operation with astronomers, in their own cultural context and

validated through interaction and co-operation between teachers and astronomers in meetings such as this one.

Moreover, the access to these teaching resources must take place on a non-commercial basis, preserving the different cultural approaches.

Rosa Maria Ros
ros@mat.upc.es

SWITZERLAND

University Education

Regular astronomy courses are given at the universities of Basel, Bern, Geneva, Lausanne, Neuchâtel, Zurich and in the Swiss Institute of Technology, Zurich.

Geneva and Lausanne participate in PhD teaching in collaboration with the universities of Grenoble and Lyon. This curriculum is called L2G2. It offers exchange facilities for teachers and students between the different Universities, and it leads to an International Certificate of Astronomy and Astrophysics.

The Swiss Society of Astronomy and Astrophysics (SSAA) organizes the Saas-Fee Advanced Course every year. About a hundred doctoral and post-doctoral level participants attend these courses given by three lecturers. The topics of the last three conferences were

- physics of star formation in galaxies, 1999 (D Lin, F Palla, H Zinnecker)
- high-energy spectroscopic astrophysics, 2000 (R Sunyaev, S M Kahn, P von Ballmoos)
- brown-dwarfs and planets, 2001 (T Guillot, P Cassen, A Quirrenbach).

Secondary and Primary schools

In Switzerland every canton (there are 23 of them!) benefits from great freedom in the organization of its own educational system. Nevertheless, one of the common points throughout all systems is the flagrant absence of teaching in astronomy! Isolated efforts are made by some teachers, but they concern only a small fraction of pupils and students.

The Geneva Observatory, in collaboration with the Lyon Observatory, organized two summer schools for Swiss and French teachers : 'Our Solar System' (1999) and 'The light : stars' messenger' (2000). 24 teachers attended the first school and 27 the second one.

The 'Liaison Enseignants – Astronomes' (LEA, Linkage Teachers – Astronomers) organized several astronomy school projects in collaboration with teachers and several continuing education modules for them.

Public information – solar eclipse 1999

1999 was the year of the total solar eclipse in Europe! Even if this eclipse wasn't total in Switzerland, the astronomical community used it as a powerful means of scientific communication:

- Numerous talks about the eclipse were given throughout the country.
- A booklet was edited (170 000 copies) by the Geneva Observatory, the Swiss Federal Office of Public Health, the Swiss Council for Accident Prevention, and the Physikalisch-Meteorologisches Observatorium Davos/World Radiation Center, and was delivered to every school in Switzerland.
- An exhibit about the eclipse, produced by La Société Astronomique de France, was presented in 44 different public places in the country.
- The reception of a TV broadcast, realized by the CNED (Centre National Français d'Enseignement à Distance), was organized at CERN.

- La Passerelle Science-Cité of the Geneva University (http://www.unige.ch/science-cite/welcome.html) realized 'A trick of the Moon', an exhibition combining science with poetry that allows visitors to discover a part of our Solar System reduced to the scale of Geneva's waterfront (http://www.unige.ch/science-cite/jeulune/moontrick.html).

Other public education

Independently of the total solar eclipse of 1999, several astronomers of different Swiss Institutes are involved in public information. They use various methods:

Conferences for amateurs, commercial firms and others organizations are regularly given in every part of the country.

In 2000 The Wright Colloquia, very famous public lectures organized every two years in Geneva, was about 'Time, Matter, Energy – From Stars to our Genes'. Five evening conferences, each followed by a round table, were provided to a general audience. The speakers were Gustav Tammann, Alex Müller, Joseph H. Taylor, Michael Rosbash and Claude Roulet.

The University of Geneva organizes an astronomy course for the general public every year. It is given by a Professor of the Geneva Observatory (1999: 'Astronomical Images and Cosmic Visions, part I: The Solar System'; 2000: 'Astronomical Images and Cosmic Visions, part II : Stars and Galaxies'; 2001: 'The Invisible Universe').

The Physikalisch-Meteorologisches Observatorium (Davos) organizes guided tours of the observatory for 10 to 20 groups every year. The Geneva Observatory, with its show room, is open to the public (2000 visitors per year). The ISDC (Integral Science Data Center, Geneva) organized guided tours for students and pupils.

Public observations are organized at the Geneva Observatory monthly.

The Geneva Observatory hosts an 'Ask an Astronomer' website (http://www.unige.ch/science-cite/astroqr/suite.html).

The Geneva Observatory was a partner of the 'Night of Science' organized by the City of Geneva in 1999 and 2000.

Other activities events included the following.

- The extrasolar planet search group of the Geneva Observatory was very active in the various local, national and international media.
- The 'Radio Suisse Romande, La Première', a national radio broadcast programme, proposed an astronomical chronicle in collaboration with 'La Passerelle Science-Cité' of the Geneva University.
- Two main Swiss newspapers publish a monthly paper written by astronomers of the Geneva Observatory.
- The Mimescope Company (http://www.unige.ch/mimescope/) created and performed a show inspired by astronomy ('The Comet Makers'), and another one about stellar evolution ('A Star's Song'). 'The Comet Makers' was performed 20 times between 1999 and 2001 and 'A Star's Song' was performed 26 times between 1999 and 2002.

D Raboud
Geneva Observatory, 1290 Sauverny, Switzerland
Didier.Raboud@obs.unige.ch

TUNISIA

Education

In secondary schools for 14-16 years old, astronomy is included in the programme of physical science. In high school it is taught to students in physical science. Astronomy is taught as an

option in three universities. In the regular training of secondary teachers in physics, each teacher gets two weeks of training in astronomy.

Institute of 'Animation' for Youth and Culture

Studies lead to the diploma 'Technician in Astronomy'. It is obtained after four years of study. In the first year the topics are as follows.

- Introduction to astronomy
- System of coordinates
- Instruments of astronomy
- Solar System
- The Sun
- Stars (constellations, magnitudes, etc.)
- Utilisation of a sky map

Second year

- Presentation of 'logiciels' for astronomy
- Initiation to computer calculation for astronomy
- Astrophotography
- The system Earth-Moon-Sun
- Solar physics
- The stars (HR diagram, structure, evolution, etc.)

Third year

- Introduction to atomic physics
- Spectroscopy
- Nucleosynthesis
- Groupings of stars
- Galaxies (evolution, classification)
- Cosmology

Fourth year

Realization of projects in astronomy in Tunisia through evening observations, sundials, astronomic phenomena such as solar eclipse, the Hale-Bopp comet.

Society of Astronomy in Tunisia (SAT – Societé Tunisienne d'Astronomie)

SAT trains people who will encourage clubs in astronomy. This training is regular and takes place three times per year through holidays: one week in December, 10 days in March-April), one week in July). The training includes lectures in astronomy and observations with and without a planetarium.

SAT also participates in the training of teachers at secondary school, in producing books and in the programme of education.

Association 'Jeunes Sciences'

Regular activities include observations using some simple instruments. It runs for one week in the summer for young people, 14-16 years old.

Cité des Sciences

This is a new building, not yet finished since 1998. The part built includes a planetarium that for four years has permitted regular activities. There are also lectures for the public of all ages, special sessions when there is an event as eclipses, comets, and regular conferences on astrophysics, astronomy, cosmology. Tunisian and foreign lecturers are used.

Zohra Ben Lakhdar

zohra.lakhdar@fst.rnu.tn

TURKEY

Astronomy education is offered at the university level (4 years) at four state universities: Ege, Ankara, Istanbul and Erciyes. These four universities have about 800 astronomy students altogether. Several courses on astrophysics are also offered to the physics students of other universities: The Middle East Technical, Akdeniz, Bilkent, Boğaziçi, Çanakkale and Çukurova. In the same universities, some non-technical astronomy courses are offered as elective courses in physics departments to students from other departments. In these universities it is possible for the physics students to obtain MSc and PhD degrees in astronomy.

A distance-education astronomy course is offered in English at the introductory level by the Physics Department of the Middle East Technical University. Enrolments in this course have increased markedly in the past several years, showing that non-science students desire accredited astronomy courses. The astronomy graduates usually find jobs, just as the graduates from other basic science departments, in computer-related business.

Amateur astronomers in Turkey are not well organized and not active enough, although they have an association. There are also amateur astronomy clubs formed by active students in some universities. The six university observatories (Kandilli Observatory 1990, Istanbul University Observatory 1936, Ankara University Observatory 1963, The Middle East Technical University Observatory 1990, Çanakkale University Observatory 2001, and The National Observatory 1997) serve as the research, application and education centres in astronomy. The physics departments of some universities and some private colleges in Istanbul, Ankara and Izmir have small telescopes for educational purposes. The public days, the star gazing programmes and the observational programmes of astronomical events such as solar and lunar eclipses, meteor shower and comet observations, are organized in the observatories and in some of the physics departments.

In the ***secondary schools***, a full non-compulsory course in the 10^{th} or 11^{th} grade has existed on the books since 1973 in the curriculum for science students. However, the course is rarely given because of the lack of astronomy teachers. A new textbook has been compiled by five university professors.

In the ***elementary schools***, only the basic notions and concepts of astronomy are introduced, in courses such as geography, natural sciences and physics. Emphasis is placed on descriptions of the movements of Earth and Moon, phases of the Moon, seasons and the planetary system, and the Sun as our natural light and heat source. No special training for teachers has been officially organized. However, in large cities, the staff of the university observatories organize lectures, seminars, observations etc. for elementary and secondary schools.

The astronomy interest of the general public in Turkey has been positively affected in recent years by: popular news on astronomical phenomena, public days in the university observatories, activities of the amateur groups, the launch of the Turkish communication satellites, the construction of The National Observatory, and by participation in the Russian Spectrum-X gamma-ray project. Some negative effects, on the other hand, are due to (i) increasing interest in UFO'logy and astrology, (ii) shortage of resources to produce educational materials, (iii) absence of public planetaria, and (iv) a very insufficient number of astronomy teachers in the high schools.

Osman Demircan, Çanakkale University Observatory, Physics Department, TR 17020, Tűrkiye
demircan@comu.edu.tr

UKRAINE

In 2001, due to the efforts of the Ukrainian Astronomical Association, the subject 'Astronomy' was restored as an obligatory course in Ukrainian schools. As a result of the competition, approximately 12 programmes of astronomy for the schools and lycea were approved.

In 2001 the textbook 'Astronomy' (in the Ukrainian language, 25 000 copies, authors Prof Dr I A Klimishin and Dr I P Kryachko) for Ukrainian schools was issued. Another textbook on astronomy in the Ukrainian language is being prepared at this time.

Since 2000, in Odessa's I I Mechnikov National University, three Gamow's Odessa Astronomical Summer Schools for Young Scientists were held: 'Astronomy and beyond – Astrophysics'; 'Astrochemistry'; and 'Astrobiology'. They were attended by many participants from the countries of NIS and Eastern Europe.

Since 2000 the 'Odessa Astronomical Calendar', designed for schoolchildren, students, professionals, amateur astronomers and others, has been published. There were 3 releases of that edition: in 2000, 2001 and 2002. The Calendar for 2003 is being prepared.

Some problems of astronomy teaching were discussed during the annual scientific conferences in Ukraine (Lvov, Odessa, Uman, Belaya Tserkov, etc.). Those conferences were organized by Uáá and Lvov, Odessa, Uman universities.

Under the supervision of Prof O A Zheleznjak (Uman) the 'Astronomical School of the Young Scientists was held in two Ukrainian cities Belaya Tserkov and Uman. Since 2000, 5 volumes (two per year) were issued of the magazine 'Astronomical School's Report' (editor-in-chief is Prof Dr P I Fomin).

Since 2001 on the basis of Department of Astronomy and Astronomical Observatory of Odessa National University, the Planetarium began to operate, where teachers and staff astronomers deliver their lectures on astronomy for school pupils, students and amateurs.

In 2000 at the Lvov I Franko National University, the Department of Astrophysics was re-opened. Together with the Astronomical Observatory of Lvov I Franko National University, this structural division started to prepare high-level specializts in astronomy.

V G Karetnikov
vgkar@alpha-serv.net

UNITED KINGDOM

I have very recently taken over as the UK National Liaison, and so in order to get this report out in time it is necessarily brief. There was no report from my predecessor covering the previous reporting period (1997-1999), and so I have tried to indicate some trends that stretch back more than the three years 2000-2002 of the current reporting period. Alan Pickwick, Chair of the Education Committee of the Royal Astronomical Society, provided me with some of the information in this report, particularly for schools.

Schools

A National Curriculum for primary (elementary) and secondary schools was introduced some years ago. Initially it included a fair amount on 'Earth & Space', but general curriculum overload led to two major revisions, as a result of which the astronomy content has declined – in secondary schools to one of 37 units of science study. Particularly at secondary level the content has moved away from seasons and phases of the Moon, and, linked to physics and Earth science, now focuses on a range of modern topics including plate tectonics, the search for extraterrestrial life, black holes, and the Big Bang. In addition, there are opportunities for introducing astronomical topics in skills development, such as in project work and information technology. There is also

one examination course devoted entirely to astronomy. It is sat by about 300 16 year-olds in schools and by about 300 adults in further education.

For the age range 16-18, in England, Wales, and Northern Ireland, there is an astronomy option within the Physics A-level syllabus, but there is no equivalent in the Scottish Highers. The option accounts for about 5% of the physics A level, with pupils taking 3-4 A-level subjects, mainly for university entrance.

A Schools Observatory is being set up that will give pupils and teachers access to robotic telescopes, including 5% of the time on the 2-metre Liverpool Telescope on La Palma, and most of the time on the two similar Faulkes Telescopes, one on Hawaii the other in Australia. Other telescopes will also be available. More on this in the next triennial report!

The Association for Astronomy Education continues to promote astronomy, mainly in the schools.

Universities

Over the past few years almost all the university physics departments in the UK have become physics & astronomy departments, and almost all the astronomy departments have merged with physics departments. Physics departments have seen astronomy as a way of attracting students into the study of physics and of motivating students. This has not resulted in much growth of student numbers in physics, but has probably prevented further decline.

Though it is still possible to get a first degree in astronomy and astrophysics, almost all students now study astronomy as part of a physics or physical science degree, regardless of whether they are going on to postgraduate study of astronomy. The liberal arts astronomy courses, so common in the USA, are almost unknown in the UK, though the Open University, with its credit-based degree, does offer a short course of this nature that is extremely popular. A few other universities also offer such courses.

Most students who have degrees sufficiently good for postgraduate study, and who want this to be in astronomy, can get doctoral studentships. Afterwards, a substantial proportion go no further, either out of choice, or because of the limited number of postdoctoral opportunities in what is, compared to physics, a small profession.

Amateurs

Amateur astronomy continues to flourish in the UK. The British Astronomical Association and the Society for Popular Astronomy (which celebrates its 50th anniversary in 2003) each have over 2000 members, ranging from ‘armchair’ amateurs to skilled observers with impressive equipment. The Federation of Astronomical Societies coordinates the activities of the many local societies.

There has been at least one major Pro-Am meeting in the last three years, and another is planned for 2003. Access to the robotic telescopes (see ‘Schools’) will promote Pro-Am activities in the near future.

The public

There is great public interest in astronomy in the UK (as in most other countries). This is met by books, newspaper articles, broadcast media, and the Internet, the latter including an ‘ask an astronomer’ site run from the University of London Observatory. There are several science centres, either exclusively devoted to astronomy (for example, the Royal Observatory Greenwich, the Royal Observatory Edinburgh, Jodrell Bank Observatory), or with a significant astronomy component (for example, the Science Museum London). Where the UK is rather badly off is in the number of planetaria. There are few of these. Moreover, the one at Armagh has recently closed (perhaps temporarily), and the London Planetarium has reduced the education content of its shows.

In 2003 there will be one of the occasional UK National Astronomy Weeks. In the past these have aroused considerable public interest. This one will be centred on the close opposition of Mars in August. Interest will be further fuelled by the launch of Mars Express, that will carry the UK's Beagle 2 lander to the Red Planet.

Barrie W Jones, Department of Physics & Astronomy, The Open University, Milton Keynes, MK7 6AA, UK
b.w.jones@open.ac.uk

UNITED STATES OF AMERICA

American Astronomical Society

The American Astronomical Society continues its increased emphasis on astronomy education, with both an Education Officer, Bruce Partridge, and a full-time Director of Educational Activities, Susana Deustua, who is now based in the headquarters in Washington to establish propinquity with granting agencies. The Annenberg Prize for education had expired, after being awarded in 1992-1996 to Carl Sagan, Dorrit Hoffleit, Andrew Fraknoi, Donald Goldsmith, and Fred Hoyle, respectively. A new education prize, 'to recognize outstanding contributions to the education of the public, students and/or the next generation of professional astronomers', went to Frank Drake in 2001 and to Michael Zeilik in 2002.

The AAS's website, at www.aas.org/education, contains information on their activities. In the Harlow Shapley Visiting Lectureship programme, they sponsor two-day visits to undergraduate campuses that otherwise lack astronomy. The Priscilla and Bart Bok Award is for outstanding research projects at the Intel International Science and Engineering Fairs. At many meetings of the society, they sponsor workshops on the teaching of introductory astronomy. Yearly meetings of the chairs of departments are also held to discuss educational and other matters of common concern, a one-day meeting at a hotel near O'Hare Airport in October 2002 as an example.

The AAS adopted a revised mission statement and long-range plans in June, 2002.

Mission: The education mission of the American Astronomical Society is to (1) enhance the contributions of both the AAS and its members to science literacy for all, (2) broaden educational opportunities for all, with particular attention to groups under-served in the physical sciences, and (3) ensure that undergraduate and graduate programmes in astronomy prepare both the next generation of professional astronomers and broadly trained individuals with strong technical and scientific backgrounds.

Goals: Improve undergraduate and graduate education in astronomy and promote science literacy for all. In the Society, and more widely in the astronomical community, advocate greater attention to, encouragement of, and rewards for excellence in astronomy education, and for research on teaching and learning in science. Advocate astronomy and astronomy education in national and state education forums, and to the scientific and education communities. Advocate astronomy education to government and other funding agencies.

In 2001, the AAS sponsored two national meetings to review and assess educational goals for the introductory astronomy survey courses widely taught to non-majors in American colleges and universities. They were held at Berkeley and Harvard. The goals are posted at www.aas.org/education.

A *Policy Statement on Research in Astronomy Education* was adopted by the Executive Committee of the AAS in 2002: 'In recent years, astronomy education research has begun to emerge as a research area within some astronomy and physics/astronomy departments. This type of research is pursued at several North American universities, it has attracted funding from major governmental agencies, it is both objective and experimental, it is developing publication and

dissemination mechanisms, and researchers trained in this area are being recruited by North American colleges and universities. Astronomy education research can and should be subject to the same criteria for evaluation (papers published, grants, etc.) as research in other fields of astronomy. The findings of astronomy education research and the scholarship of teaching, when properly implemented and supported, will improve pedagogical techniques and the evaluation of both teaching and student learning.

'The AAS applauds and supports the acceptance and utilization by astronomy departments of research in astronomy education. The successful adaptation of astronomy education research to improving teaching and learning in astronomy departments requires close contact between astronomy education researchers, education researchers in other disciplines and teachers who are primarily research scientists. The AAS recognizes that the success and utility of astronomy education research is greatly enhanced when it is centred in an astronomy or physics/astronomy department.'

NASA

NASA requires Education and Public Outreach as part of all approved grants. Each of the major missions has a substantial educational presence, including Web resources. Special education-related grants, teaming scientists with educators, are available through NASA's Initiative to Develop Education through Astronomy and Space Science (IDEAS) programme. The websites for the Space Telescope Science Institute (www.stsci.edu) and the Chandra X-ray Observatory (chandra.harvard.edu) are particularly outstanding for the availability of images that are posted often. The infrared-astronomy Web page for the Space Infrared Telescope Facility, expected to be launched and to be renamed in January 2003, is at sirtf.caltech.edu.

Education Research

A new emphasis has been placed by some on research on outcomes and strategies in teaching astronomy, similar to the various physics-education research that has been reported for some years. Sessions at semiannual meetings have been devoted to the subject. An on-line journal, 'Astronomy Education Research' (aer.noao.edu, ISSN: 1539-1515) is supported by the National Optical Astronomy Observatories and endorsed by the American Astronomical Society and the Astronomical Society of the Pacific. Sydney Wolff and Andrew Fraknoi are editors. Many others active in astronomy education are on the Editorial Board or the Council of Advisors.

Astronomical Society of the Pacific

The website of the Astronomical Society of the Pacific (ASP) features a section for teachers and others working in space-science education. (www.astrosociety.org/education.html).

Among the items on the site are: a guide to written and Web resources for teaching about the Moon; a Web-based treasure hunt game called 'Surfing the Solar System'; current and back issues of 'The Universe in the Classroom' newsletter (on teaching astronomy in grades 3-12); a guide to readings on the contributions of women to astronomy; an annotated subject guide to outstanding hands-on astronomy activities on the Web (and some samples of activities developed at the ASP); and resources for debunking astronomical pseudo-sciences (like astrology, UFO's, and weird faces on Mars).

The site also has links to the Society's educational programs, including its new family astronomy initiative, and to its revised catalogue of educational materials for sale.

The ASP's Project ASTRO links professional and amateur astronomers with 4^{th} to 9^{th} grade teachers in their communities. They have a dozen regional sites around the United States.

Planetariums

The Planetarium Community is a diverse group, including astronomers, educators, and science centre professionals. An estimated 90-million people per year visit planetariums world wide. The

theatres vary in type – from academic institutions where principles of astronomy are taught at high school and for Astronomy 101 courses in colleges, up to the large science centres that cater for wide audiences including schools, the general public, and special-interest groups.

The International Planetarium Society (http://www.ips-planetarium.org), the professional body representing planetariums around the world, has over 600 members. IPS hosts a biennial conference, and over 450 delegates from 20 countries attended IPS 2002 in Wichita, Kansas. The 2004 meeting will be held in Valencia, Spain.

The greatest change has occurred in the large theatres that cater for general public audiences. High-resolution video-graphics projected on the dome are now able to recreate realiztic starfields without the need for the traditional opto-mechanical star projectors of the 20th century. Launch of these new products took place at IPS 2002, continuing the quiet revolution in what planetarium theatres can show on the dome. Capable of showing 3-dimensional star fields that are not necessarily Earth-based, these new digital systems offer students and general public alike an experience of the true nature of space rather than being limited to an Earth-centred view. Astrophysical processes can be displayed in full colour animation, and in some cases, accurate 3-dimensional representations of such objects as the Orion Nebula are achievable, offering new and unique ways for the general public to experience the flood of new data coming to us from astronomical research.

The offsetting loss, though, is the crispness of the starfields, which are still better with the advanced lensed starfields provided with fibre optics by Zeiss, Goto, and others.

A notable new planetarium is at the Rose Center for Earth and Space of the American Museum of Natural History, New York, which opened in 2000. Its Hayden Planetarium halfdome was completed with a bottom half, and the suspended sphere is spectacularly visible through 120-foot-high glass walls. Its architecture has made it one of the sights to see in New York City even for those not interested in the astronomy. The 'space shows' on view use only a minute or so of the Zeiss Mark IX projector and are largely conducted with the all-sky videos. No traditional planetarium shows using the Zeiss are now conducted, though the Zeiss is in use in some of the classes and along with lecture series.

Acknowledgments
I acknowledge the assistance of Bruce Partridge of the American Astronomical Society, Andrew Fraknoi of the Astronomical Society of the Pacific, and Martin Ratcliffe of the International Planetarium Society in compiling this report.

Jay M Pasachoff
jay.m.pasachoff@williams.edu

VATICAN CITY

The educational outreach of the Vatican City State in astronomy is accomplished primarily through the activities of the Vatican Observatory.

In the period 1999.5 to 2002.5 the Vatican Observatory continued its series of summer schools in observational astronomy and astrophysics. It hosted two schools, the seventh in 1999 with the topic 'Single Stars and Close Binary Systems', and the eighth in 2001 with the topic 'Stellar Remnants'. The first attracted 24 students from 20 countries, the second attracted 26 students from 19 countries. Since the inception of these schools in 1986, the Vatican City State has brought together 199 young scholars from 50 different nations, with 58 per cent of them from developing countries. The ninth school, with the topic 'Galaxy Evolution', is in preparation for the summer of 2003.

School groups and cultural groups have continued to be received at the Vatican Observatory's headquarters in Castel Gandolfo. Similar groups, though somewhat smaller in number, were also received at the Vatican Observatory's research base in Tucson, Arizona, USA, which includes both its telescope facilities on Mount Graham, and the University of Arizona's Mirror Laboratory on the campus.

The staff of the Vatican Observatory have given many popular astronomy presentations in various parts of the world. Details of all these educational activities can be found in the Observatory's Annual Reports (http://clavius.as.arizona.edu/vo/annreps.html).

Christopher Corbally
corbally@as.arizona.edu

VENEZUELA

In the Faculty of Science of the University of Los Andes many activities addressed to education have been flourishing. Actually, the educational programmes are divided in three main branches: undergraduate, graduate, and toward high school.

In the undergraduate level, there are several commissions devoted to change the structure of the curricula since the programmes must be updated and also there is the willingness to diversify the topics and to give to the students a more integrated education. For example, music, sports, research projects not leading to a thesis (in the undergraduate level we have this requirement), and arts, are not included in our programmes. Progress is been sustained and in a period of one year the new curricula are expected to come through. It is important to point out also that some research groups, operating in the departments of the Faculty, have been interested to give such education. For example, the Group of Theoretical Astrophysics (I am one of its members) has organized many expeditions for solar eclipses and lunar or asteroid occultation with students from biology, mathematics and chemistry and, of course physics.

For the graduate level, there are several graduate programmes in the four departments (Biology, Mathematics, Physics, and Chemistry) and they are of high standard. All of the professors publish papers in international journals of high impact.

For the high school level many programmes have been created and the existing ones are growing and becoming strong. These programmes are of two modalities. On the one hand there are those addressed to the high school teachers and on the other hand those to high school students. Among these programmes we can mention the School of Physics, School of Mathematics, School of Polymers, etc. These Schools are addressed to the teachers that want to update their knowledge on these topics. The concurrence is big and each year there are more participants. It is important to point out that there are invited professors that come also from overseas to participate. These schools are focused also to involve science with our every-day world. For example, there are courses that teach how physics is involved with cooking! For the high school students, there is an event called 'Encounter with Physics' and it is the only one of its kind in the country. Last year almost three thousand students participated and they came from all over the country. Sixty experiments were presented in a very pleasant way to reduce the fear of Science. I am the founder of this successful activity and I hope it will keep on going because now I am the new Dean of the Faculty of Science, and other compromises must be taken into account. Nevertheless, I have assigned the new responsibilities for the event, and this year the other three disciplines (Mathematics, Chemistry, and Biology) will join Physics.

Patricia Rosenzweig
Universidad de Los Andes, Facultad de Ciencias, Mérida, Venezuela
patricia@ula.ve

YUGOSLAVIA

General Information

The report briefly describes the present state of astronomy education in Yugoslavia and the changes introduced from 1 June 1 1999 to 1 June 2002. Astronomy education is developed only in Serbia due to a lack of astronomers in Montenegro.

Elementary Schools

No substantial changes have occurred in programmes concerning astronomical topics.

Secondary Schools

Astronomy topics are incorporated in Physics and partly in Geography. Astronomy is taught as a separate course with one lesson per week in the last year in the special Mathematical High School (Matematička gimnazija) in Belgrade and in the equivalent classes attached to high schools in seven Serbian towns. Such classes in Montenegro has no astronomy course.

Most of the teachers are not astronomers. The current textbook had its fourth edition in 2001. School teachers could learn about advances in astronomy and new ways of teaching astronomy in ten lectures presented at annual meetings of physics and astronomy teachers.

University Education

There are nine universities in Yugoslavia, out of which two are private. Astronomy is included only at five state universities. It is taught mostly in courses for physics students.

The University of Belgrade is the only one with a Department of Astronomy. There were no changes in the programme of studies. Twenty five students graduated in the astrophysical division and three in the astronomical division – 28 altogether. Eleven postgraduate students obtained MSc degrees and two candidates obtained PhD degrees.

The University of Novi Sad has introduced a credit system by which it is possible on the Institute of Physics after three years to graduate as a teacher of physics and astronomy and after four years to graduate as a physicist or an astronomer. It is to start next autumn.

The course of Astrophysics and Astronomy at the University of Kragujevac remained the same. The changes at the University of Niš and the University of Prišvtina were minor. The courses on astronomical topics were shifted to the third year and to the forth semester respectively.

It is more common now that students of physics take astronomical topics for their diploma projects. An auxiliary university textbook was published in 1999 – 'Dragan Gajić Udarni talasi u kosmosu' (Shock Waves in Space).

Public Education

Public astronomy education in Yugoslavia had been realized through lectures at public universities, on radio and TV programmes, in popular journals and books, in the planetariums, in public observatories, and astronomical societies. The Kolarčev Public University in Belgrade, the main public university in the country, organized two sets of four lectures.

The Astronomical Society (AS) 'Rudjer Bošković' in Belgrade has continued with its regular activities: publication of the popular astronomical journal 'Vasiona' – for fifty years now; courses each autumn and spring, with exams for participants; demonstration of sky and telescope to the general public at its public observatory and in the planetarium, both within the fortress of Kalemegdan in Belgrade; lectures to the secondary school pupils in the planetarium; the annual Belgrade Astronomical Weekend (BAV); and Summer Astronomical Meetings (LAS). While BAV has lectures on different subjects, LAS is devoted each year to one topic. The BAV has

been followed by visits to the astronomical observatory in Belgrade. All activities have been run by the staff of the Public Observatory and Planetarium, astronomers from the Astronomical Observatory and the University of Belgrade, students of astronomy, and astronomers amateurs.

A piece of news is the opening of the AS 'ADNOS' Planetarium on 1 February 2001. It is a ZKP-1 of Karl Zeiss in Jena. It is placed within the Petrovaradin fortress. It is used mainly for lectures for secondary school pupils. A course for school teachers was organized in September 2001. The standard two-semester 'ADNOS' courses were held on the premises of the University of Novi Sad during the academic years 1999/2000 and 2000/2001. The planetarium was used at the end of the last course. Activities have been run by the members of the AS 'ADNOS', mainly physicists from the University of Novi Sad, students, and amateur astronomers.

The AS 'Alpha', in Niš, continued with educational and observational activities. It obtained a Vixen refractor 102 × 1200 mm, equatorial, with automatic drive. The Society organized public observations and lectures. The AS 'Belerofont' in Kragujevac was mainly using the telescope and premises of the Faculty of Sciences in Kragujevac. Nevertheless, several outdoor expeditions were made to photograph comets. The AS 'Milutin Milanković' in Zrenjanin was active mainly in public astronomical education. They started the Summer School in Physics and Astronomy on lake Palić for school children in 2001. The AS named 'Magellanic Cloud' was founded in Prokuplje in May 2001. They are using a Newtonian reflector 23 cm diameter f/8 and have big plans.

The first radio astronomical club was founded in December 2000 in Bor. It was renamed the Society for Radio Astronomy Research 'Aurora' in February 2002. It organized a radio astronomy course for 12 participants and observed reflections from meteor showers.

The astronomical section of the organization of young researchers in Valjevo 'Vladimir Mandić-Manda' has advanced its activities. It has courses and educational camps. They performed an ethno-astronomical investigation in the surrounding area. One of the members won a golden medal in 2000 and the silver medal in 2001 in the competition 'Nauku mladima' in astronomy, for work on solar activity. Since 2001/2002 there has been no competition 'Nauku mladima' in astronomy, and participants with astronomy papers are directed to the competition in physics.

Stimulated by the total solar eclipse in 1999 a new astronomical group was formed in Vršac in August 1999. It is incorporated into the Nature Society 'Gea'. It was very active in work with the public.

The Petnica Science Centre (PSC) became a real centre for introduction of the young to science. Apart from regular seminars a specialized seminar on image processing ESO MIDAS was held in November 2000. One astronomy paper appeared in the issue of 'Petničke sveske' in 1999. The booklet 'Perseidi – Minor Solar System Bodies Almanac' was published in 2001 containing four astronomy papers, reports on observations, and a review of the IXth conference of the IMO. The CCD pictures of the occultation of Saturn on 3 November 2001 and of the comets were of high quality. In an unusual event for Yugoslavia, an aurora was photographed on the night of 7 April 2000.

Astronomy has been popularized also by 'Mladi fizičar' ('Young Physicist') during its 25 years of publication. Within the last five years a guide to the sky was printed.

The members of staff of the Universities and the Astronomical Observatory in Belgrade acted as lecturers, supervisors or advisers. The whole astronomical community in Yugoslavia observed all important astronomical events of these years and particularly the solar eclipse on 11 August 1999.

The use of the Internet is quite widely spread. The first Yugoslav electronic astronomical magazine has already been published for several years. Many of the above-mentioned organizations have websites and all can be reached by e-mail.

J Milogradov-Turin

Department of Astronomy, Faculty of Mathematics, University of Belgrade, Studentski Trg 16, 11000 Belgrade, p.p. 550, Yugoslavia
jelenam@matf.bg.ac.yu

END OF SUPPLEMENT