

46. TEACHING OF ASTRONOMY
(ENSEIGNEMENT DE L'ASTRONOMIE)
(Committee of the Executive Committee)

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1. Generalities

Commission 46 on Teaching of Astronomy is a Committee of the Executive Committee of the IAU. It was organized thanks to the initiative and great efforts of M.G.J. Minnaert in 1964 during the 12th General Assembly of the IAU in Hamburg. Prof. E. Schatzman was the first President of the Commission. Since that time a great deal of work has been accomplished, a large amount of information has been gathered and certain efforts to organize a number of Projects have been made. The experience of the Commission and its Organizing Committee is the most precious result of its work. The benefit to the Commission is the result of hard work of the majority of its members very well known for their activity. Rules and guidelines of operation for Commission 46 were proposed and adopted at the 15th General Assembly of the IAU in Sydney. The main objective of the Commission is to further the development and improvement of astronomical education at all levels throughout the world. But this purpose outlined so generally gives no answer to the question what the Commission should do. The easiest way is in finding some routine and plausible work to accomplish. The results of such work can be immediately materialized in contrast to ideas and pieces of information which require a lot of work to have them brought into life. But in any case the indispensability of Commission 46 is stressed by (i) the increasing importance of astronomy in the world of civilized life and by (ii) contradiction between fundamental importance of astronomy to human progress and its poor representation in the world educational system.

Almost all existing educational systems cannot take into consideration special courses in astronomy because teaching programmes are already very heavy. That is why we have astronomy incorporated into school curricula (and in some cases even as a separate item) as a result of tradition.

Commission 46 members suggest that a general discussion about the teaching of astronomy at school level as a separate subject should be held. It may be helpful when dealing with school authorities in different countries.

The chief difficulty of the Commission work is the scarcity of funds. It is obvious that any financial help the Commission could provide would benefit introducing of astronomy primarily in developing countries. This statement was proved in 1978 by the success in organization of a school for Young Astronomers in Nigeria. Among the purposes of this school was the demonstration of the necessity of astronomy education to educational authorities in Equatorial Africa. It seems that the Nigeria school spent about \$8000.- provided by the IAU Executive Committee in the

most effective way one can imagine.

It must be stressed that Commission 46 is not only a professional union of teachers of astronomy but also a group of people working out special approaches to introducing more astronomy in the Modern Conceptual System throughout the World and at the same time trying to prove these approaches by their own experience. This means that the progress in Commission 46 work strongly depends upon the national representatives' activity.

2. Membership

Dr T. L. Swihart and Prof. J. L. Climenhaga have retired from Commission 46 having made great contribution to the astronomical education development. Commission 46 appreciates very much their activity and expresses its gratitude. Dr D. L. Du Puy was coopted to succeed Prof. J. L. Climenhaga as a Canadian national representative. Four other members were coopted to represent newly adhering countries: Dr Chun-Shan Shen (Dean, School of Science Tsing Hwa University, Hsinchu, Taiwan), Dr P.J. Treanor now succeeded by Dr J. Casanovas (Vatican City State), Dr Kyung Loh Yu (Seoul, Korea), Dr T. Kiang (Ireland).

Commission 46 learned with great regret of the death of Father P. J. Treanor on 18 February 1978. Many astronomers lost a personal friend and colleague while Commission 46 has been deprived of a member sympathetic to astronomical education. Now 43 countries are represented on Commission 46 as compared with 39 by the end of 1976.

3. IAU Commission 46 Newsletter

Commission 46 at the Grenoble General Assembly decided to institute a Newsletter as a vehicle of communication between its members and others with interests in astronomical education. To date, three Newsletters have been published and distributed (No.1 June 1977, No.2 December 1977, No.3 June 1978), a fourth is being put together and it is hoped the fifth will reach all Commission Members before the Montreal General Assembly.

The Newsletter is edited by D. McNally (University of London Observatory) and produced and distributed by D. Wentzel (University of Maryland). It is a pleasure to acknowledge the generous support of the project by the University of Maryland through their reprographic and distribution services. This support is amounting to about \$200.- per year and much appreciated by the Commission.

This new project of the Commission noticeably changed the general character and increased the efficiency of the Commission work. The prime aim of the Newsletter is to provide a means of communication between members of the Commission and others interested in the teaching of astronomy. The editorial policy is to publish short (1-2 pages) articles, letters, puzzles, cartoons or any topics which bear directly on the joint interests of the Commission - astronomy and education. All IAU members and those of Commission 46 especially are asked to formulate their ideas, suggestions and views concerning teaching of astronomy in the form suitable for publication in Commission 46 Newsletter. Those who wish to receive the Newsletter please write to Dr Wentzel. Astronomy Programm, University of Maryland, College Park, MD 20742, USA.

The Newsletter is now the means of circulation of letters to the membership from the Commission President. Articles of general interest are also carried as is news of members of the Commission. Other communications concern vital and serious problems of astronomical education. The flow of suitable articles is building up and it is hoped that members will make increasing use of this means of communication in the future.

It must be taken into account that with the growth of the popularity of Commission 46 Newsletter the possibility of increasing its circulation should be considered. This means that financial support must be found from IAU Executive Committee or from UNESCO like that existing for "International Newsletter on Chemical Education." This continued support is given to the Committee on Teaching of Chemistry of the International Union for Pure and Applied Chemistry.

4. The Tendency of Astronomical Education

The former President of Commission 46 has carried out a great amount of work to investigate the present state of Astronomy in the World Education System. The Commission continued this work during 1976-1979 triennial concentrating its attention on the problem of tendency of astronomy as an educational tool in various countries. A special Questionnaire concerning the present state and immediate needs of astronomy at school level was organized through the Newsletter. It is interesting that more than 30% of the Questionnaire answers state that the best way to introduce astronomy in school is to have it as a separate item of the curriculum. The result of the Questionnaire analysis will be given elsewhere.

5. The International Schools for Young Astronomers (ISYA)

In Grenoble Commission 46 recorded that the ISYA was the project of the Commission of highest priority. The great work of the ISYA Secretary Dr Kleczek must be emphasized. According to the actual Rules and Guidelines for the operation of the ISYA accepted by the Commission in Grenoble, the President of the Commission each time informs the General Secretary of the IAU of the programme for each proposed School only when approved by the Sub-committee including for the current triennial Prof. L. Houziaux, Prof. D. G. Wentzel, Prof. D. McNally, Dr J. Kleczek and the President of the Commission.

During the period 1976-1978 there were organized two ISYA, one of them in Brazil, the other in Nigeria. Both Schools have been very successful and fully justified the support given by the IAU. Unfortunately the problem of finding funds limits the number of schools which can be organized.

The ISYA in Brazil was a great success. It was held November 16- December 16, 1977 in Rio de Janeiro in commemoration of the 150th anniversary of the foundation of the Observatorio Nacional. The School raised the professional standard of its participants and thus contributed to the development of astronomy in Spanish and Portuguese speaking countries. It brought together young astronomers from different countries and led to a closer co-operation between astronomers of those countries. The most valuable innovation is that the activity of this School has not ended on December 16th 1977. It is planned to publish a complete scientific draft report and to maintain a permanent contact by correspondence with all 29 of its students in order to stimulate their careers and a cooperative sense of work. The curriculum was organized by 23 Professors and Associate Professors. The large Professor-

to-student ratio demonstrates a high efficiency of the School. The programme of the School incorporated 11 courses on different topics of modern astronomy and astrophysics and four different kinds of seminars.

The great efforts made by the School organizers must be emphasized. The success of the School in Brazil was largely due to the great effort and excellent work of the Observatorio Nacional Staff and in particular to Prof. Luiz Muniz Barreto, Director of the Observatorio Nacional and President of the School. The School had a generous support and full understanding of Dr José Dion de Melo Teles, President of the Conselho Nacional and received financial help from CNPq. The IAU financial support attained 8125 US \$ or more than 38% of total School funds.

The 9th ISYA was held July 31- August 19, 1978 in Nigeria University (Nsukka). It seems this School was a real social event for Equatorial Africa followed by certain changes of the position of the Astronomical Education in this developing continent. The purpose of the School was to introduce astronomy into Equatorial Africa both as a science and as a school teaching subject. Special attention was paid to intense practical training in general astronomy and astrophysics and problems connected with specific practical needs e.g. solar energy utilization. In this case students-to-professors ratio was 28:7. According to general opinions the School fulfilled its purpose and had a high level of efficiency.

As a result the first in Equatorial Africa Department of Astronomy at the University of Nsukka was formed, headed by Prof. S. Okoye. Regular courses of astronomy started in autumn 1978. As a common project of several countries and several African universities co-operation the possibilities of an equatorial radiotelescope were discussed.

Future trends of astronomy development in Equatorial Africa were the subject of a General Discussion all ISYA participants involved. On the whole the School brightened conceptual possibilities of a certain group of physicists, most of which became very interested in astronomy. Here is the beginning of astronomy activity in Equatorial Africa as a result of the most busy ISYA there was until now. The programme was very crowded and exhausting for participants and lecturers as well, but it was compensated by the excellent organization of the School. It must be emphasized that without the full support of the ex-president of Nigeria Right Honourable Dr Nnamdi Azikiwe and the enthusiasm and efforts of the School President Prof. Okoye and ISYA secretary Dr Kleczek the School would not have been possible.

6. Astronomical Education Material

This is a decade of Astronomical Education Material (AEM) Project operation. The idea was suggested and approved by Commission 46 during the Prague Assembly in 1967 and the world-wide list of the AEM first appeared as a result of great work undertaken by Prof. E. A. Müller in 1968. A great part of Commission 46 and its Organizing Committee members was involved in this work. During the past ten years two Ad-denda each covering a three years period have appeared. The third one is to be prepared for the Montreal Assembly. Its compilation is the responsibility of all members of the Commission. During triennial 1977-1979 the Editorial Board consisted of B. F. Peery and R. R. Robbins: material in English, L. Mavridis and A. E. Jørgenson: all languages except English and Slavic ones, E. Kononovich and C. Ivaniszewska: Russian and Slavic languages.

AEM looks like an important reference compendium though its usefulness is inhibited by a limited circulation. The necessity of its permanent continuation is needless to discuss. But it seems plausible to discuss some improvements to make AEM more efficient and apt for future development. As a first step in this respect the Commission has asked opinions to renew the distribution list of the material.

The Third Addendum will use the same standard as previous ones. But it may be reasonable to alter it in a certain way in future.

7. Project Contratype

D. Wentzel and M. Gerbaldi continued their efforts to make Project Contratype (PC) alive. With the support from the Solar Physics Division of the American Astronomical Society a set of 60 slides together with their descriptions were produced. The distributor is the Royal Astronomical Society and Hansen Planetarium, Salt Lake City, Utah, USA. While the idea for these came from PC project, the result is not part of it. It may be concluded that PC project realization based on commercial ground has been achieved. But this is not the way originally planned to follow. It is well known that it is difficult to find even small funds in free currency especially for developing countries. That is why there is little interest in PC project on Commercial ground. Up to now several attempts to find an organization willing to produce about 40 copies of several slides failed. It seems that the original idea which was supported by the Commission needs another way of realization.

The conclusion is that up to now there is no significant progress in Project Contratype since commercially attractive slides should be in colour, come grouped by topic and with descriptions useful for non-specialists.

8. Visiting Professors Project

Since the Grenoble Assembly, the Project was submitted to the members of the IAU through the IAU Bulletin No.38 by Prof. M. Rigutti. Also a note by Dr D. McNally appeared in the Newsletter No.1. In the Bulletin No.39 a letter from Dr H. Ghielmetti from the Instituto de Astronomia y Fisica del Espacio, Buenos Aires, Argentina was published. This has been the unique request for visiting professors. No offers were received.

It seems therefore sufficiently clear that, if the Project is not to be dropped, a new way of managing it has to be found.

It should be considered if a programme of visiting professors might be coupled to the ISYA project. All or part of the teachers of an ISYA might be used (with a not very high additional cost) to organize short courses appropriate to a visiting professor programme. Teachers of an ISYA might be asked if they are willing to cooperate also to this programme with lectures or other similar activities at university or college levels. This kind of activity might be performed either during or before or after the ISYA. Of course, this idea makes possible only one (or two) visiting professors' programme every three years but it could be a starting point. If it works, it could be made known everywhere and, particularly, to the IAU.

9. National Activity

As usual individual National Reports will be published separately. Here only general remarks and main points are given. The result of individual reports survey is that more attention and public interest in astronomy continue to develop all around the world. The number of students visiting Astronomical Observatories in various countries has considerably increased in recent years. For example in Portugal almost every school day groups of students accompanied by their teachers come to the observatories to hear some talks about astronomical problems. As stated above great national activity has a tendency to increase in Africa, namely in Nigeria, Tanzania and Ghana, and the first in Equatorial Africa Department of Astronomy was formed at the University of Nsukka. At the University of South Africa students can take astronomy as a major subject at an undergraduate level, but not, as yet, at a postgraduate level. Commission 46 hopes to see active representatives from many African countries as its members and consulting members.

There is a significant progress in those countries where astronomy was introduced into school practice years ago as in Czechoslovakia, Spain, Sweden, both German Republics, England, the USA, the USSR, etc. For example the teaching of astronomy in Sweden has passed through several revolutionary stages of development during the last couple of years. The revision of astronomy secondary school programmes is in progress or in preparation in Japan, Paraguay, Italy, Czechoslovakia, USSR and others.

The progress of astronomy teaching at the school level is growing in those countries where attention is paid to the problem of improvement teachers' qualification. High school instructors training is carried on in the developed countries as well as in various developing ones. For example, university studies for secondary school teachers in Poland are now well under way so that in the near future all teachers will have their Master's Degree. In the GDR the main new activities in the field of teaching of astronomy during the last 3 years were in the preparation and now the starting of a new form of training of teachers. Up to now, and also in the future, the majority of teachers of astronomy is trained in a post-graduate study, which can be concentrated on astronomical problems and the methodology of astronomy only.

National activity of the developed countries supports very much the world educational system through their Universities and well-known Astronomical Societies (such as The American Astronomical Society, Astronomical Society of the Pacific, Astronomy and Geodesy Society of the USSR, Astronomical Societies in Great Britain, Spain, Italy, Czechoslovakia and other countries). These countries are practising series of radio and TV programmes on astronomy. The International Planetarium Society is increasingly active. A large amount of publications of educational value has appeared in English, German and Russian. The references are incorporated in the Educational Astronomical Material, Addendum 1976-1979 mentioned above.

A lot of popular magazines such as "Sky and Telescope" and "Mercury" (USA), "Zemlja i Vselennaja" (The Earth and Universe) and "Physica y Shkole" (Physics in the School, the USSR), "Astronomie in der Schule" (DDR), "Giornale di Astronomia" (Italy), "Föld és ég" (Earth and Sky, Hungary) support actively national and international astronomical educational systems.

The problems of teaching of astronomy are often discussed during national assemblies and conferences on astronomy, some of which are specifically educational. The 2nd National Assembly on Astronomy and Astrophysics of Spain, was held in Puerto de Santa Maria (Cádiz, Spain). A course on Astrophysics was held at the International University "Menéndez Pelayo" in Santander (Spain), July 10th to 22nd 1978.

The careful investigation of individual National Reports is a very stimulating item of presidential work and gives an impressive picture of the World Astronomical Educational System. President of Commission 46 appreciates very much the material he received in time to complete this Report. The time and effort spent by national representatives of the Commission is compensated by far by the effect of this work.

10. Future Activity

The main items of future activity of Commission 46 are obvious. The organization of ISYA should follow Rules and Guidelines detailed according to the results of previous experience and accepted by the Commission. The aim of this detailed version of the Rules should be the minimization of the communicational steps preceding the decision of IAU Executive Committee to support each given ISYA. There is a suggestion to give more attention to education and exercises on beginnings of astronomy in future International Schools for Young Astronomers.

The AEM should be transformed to a more general form to contain concise material descriptions. Different AEM parts should be the items of more or less complete National Publications and Commission 46 AEM compendium must incorporate either the whole material or a part of it, suitable and recommended for international usage.

The Project Contratype should find its next stage of development more realistic and usable.

Commission 46 should directly encourage and sponsor national meetings on teaching problems. National Societies might be asked to organize meetings under the auspices of Commission 46 of the IAU and the results of these kinds of meetings might well be the basis on which Commission 46 could build part of its activity. Of course, the national representatives should be willing to cooperate for the success of this programme. And whenever it is felt within the Commission that a sufficiently preparatory work has been done, Commission 46 could organize an international meeting (e.g. a colloquium) to have a confrontation of problems, solutions, ideas, projects, etc. From this we would have a volume of proceedings which would have world-wide diffusion with obvious consequences.

All this Commission 46 work should be stimulated and organized by the Newsletter project financially supported from UNESCO funds as one may hope. All National Representatives of Commission 46 should form a large and active Editorial Board of the Newsletter. The Newsletter volume should continue to be limited to ensure quick publication. But some new centres of Newsletter distribution and printing should make the Newsletter more frequent and flexible.

11. Conclusion

As a science astronomy deals with the whole Universe. But the Universe needs urgently the Earth as a peaceful, developing planet of the Solar System. The duty of mankind is to keep the Earth in safety and prosperity. Who can now demonstrate strictly the existence of any other planet having life on it? It may be not the case. Even if it is, our planet must be considered as a sample having no duplicates. The Earth with a Civilized Life on it must occupy the first line in the Red Book of the Universe. The World Astronomical Educational System is demonstrating to all people, countries and governments this simple and essential idea. This is our modest contribution to the Peace Security Movement throughout the world.

E. V. KONONOVICH
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