

46. TEACHING OF ASTRONOMY (L'ENSEIGNEMENT DE L'ASTRONOMIE)

PRESIDENT: D. McNally.

VICE-PRESIDENTS: E. V. Konovich, D. G. Wentzel.

ORGANIZING COMMITTEE: L. Houziaux, H. E. Jorgensen, J. Kleczek, E. A. Müller (ex officio),
M. Rigutti, T. L. Swihart.

1. GENERALITIES

The practice of *Circular Letters* to members of the Commission has been maintained. It was an aim to write two such letters annually though the interval between is not necessarily six months. The response to the letters has been valuable and encouraging. It is a source of tremendous satisfaction to hear of the effort being made by individual members of the Commission. It is through such hard work that astronomy will be able to play a further role throughout the entire field of education.

Not all aspects of the educational scene are so encouraging. The atmosphere in which international education operates is as rarefied as the atmosphere of any international enterprise. An uncomfortable feeling arises that some discussions are simply not in contact with the realities of the situation. Theory exceeds practice and, as astronomers, we need little reminder of the difficult situation that arises when an excess of theory is chasing a paucity of observation. Again there is an uncomfortable feeling that bureaucratic thinking plays too great a part in educational thinking. While it must be accepted that education cannot escape the bureaucratic embrace there should be a constant reminder that education is about the development of the intellect and skill and refers in the last analysis to individuals. Astronomers, as a group, are rugged individuals and it should be the duty of members of this Commission to see that no matter what the educational system is, it leaves room for rugged individuals to rise above mere bureaucracy.

Despite the foreboding of the last paragraph one is aware that astronomy is making headway in penetrating the hide of education. The pressure for astronomy is from below and it is encouraging that by and large, a response to that pressure is being made. But astronomers are not distributed generously and time scales for progress are therefore astrometric (but not cosmological). Astronomers who take a deep interest in education face heavy demands upon their time. A start has been made in introducing astronomy at all levels of education. The demand is there, but the response from our profession cannot be concomitant with the demand. The fight to win a place for astronomy in education is not over, indeed the real fight has barely begun, though the preliminary skirmishing has been satisfactory from our point of view. Many outside astronomy (who cannot be expected to know better) and, unfortunately rather more than one would like to see inside astronomy (who should know better) remain unconvinced of the educative values of astronomy. The doubters must be continually assailed, but it is the public at large whose interest in and enthusiasm for astronomy provide continuing encouragement to persevere with the fight.

The Commission will have to address itself in the future to the problems of how to sustain the growing involvement of astronomy in education on the basis of little growth in the numbers of astronomers in the current world financial situation. The task of the Commission, ably championed by the late Professor Minnaert and fostered enthusiastically by Professor Schatzman and Professor Müller, has grown no lighter with the passage of time.

2. WORK OF THE COMMISSION

A. *Collaboration with International Teaching Organizations*1. *ICSU Committee on the Teaching of Science (CTS)*

The Executive Committee appointed D. McNally the IAU representative on the Committee for the Teaching of Science of ICSU. The full committee met in Paris in May 1974 and will meet again in 1976. The number of meetings of the full CTS have had to be reduced because of financial pressures.

a. *Education of Teachers for Integrated Science*

The CTS spent considerable time in discussing the outcome of the Maryland Conference on the Education of Teachers for Integrated Science. That conference (to which Prof. E. A. Müller made a substantial contribution) had been extremely successful in producing plans and materials for teacher training for integrated science. The proceedings of the conference have been published by UNESCO in the New Trends series. The success of the Maryland conference in winning acceptance for integrated studies now demands follow up studies and evaluation over a period of years. The CTS spent some time in discussing how it might contribute to this necessary work. Prof. J. D. Lockhard of the University of Maryland reported on the follow up and evaluation would be the responsibility of ICASE (International Council of Associations for Science Education) with financial support from UNESCO. The CTS would continue to play what part it could in assisting these evaluation studies. Astronomy can play an important part in integrated science because of its interdisciplinary nature. It is hoped that astronomers will take initiatives in seeing that at local level astronomy will play an important and effective part in integrated studies in science. IAU members can promote and foster teacher interest in astronomy. It would be of value both to other members of the Commission and to the CTS if members could report the progress of the development of national programmes of integrated studies.

b. *Seminar on 'Integration, Coordination or Separation of the Sciences at University Level'*

While integration among the sciences at school level seems valuable the case is not so obvious at University level and the seminar on 'Integration, Coordination or Separation of the Sciences at University Level' at the CTS gave a welcome opportunity to explore this topic. The contributions to this seminar have been published as a booklet by ICSU.

The object of the seminar was to arrive at a sense of direction for development in University teaching. That direction was not however clearly defined. It was recognized that Universities were in a difficult position. On the one hand intense specialization prevented taking a broad perspective in science while on the other hand a broad view of science did not give adequate preparation for particular specialisms. It was interesting to note that those branches of science which encompassed interdisciplinary work were generally well disposed towards integrated studies at University level. Subject areas with little interdisciplinary contact favoured a continuation of separation of science studies.

At this meeting I argued that the form a university course should take depended on the individual, his aims, experience and interests. For example, a person keen to make contact with astronomical research would wish to study in depth in order to prepare for such a career, and would perhaps suffer from too much integrated study. Another preparing for a non-specialist career could greatly profit from an integrated approach to science studies in that he would make contact with a wider range than is met within a specialist degree course. Most students would occupy a position between these extremes.

There appeared to be a trend towards groups of sciences with common interests. Environmental sciences (e.g. astronomy, geology) which are based on physical and mathematical sciences tended to support integration of physically based sciences. Medical and biological

sciences seemed to form another group. Material sciences suggested a different way of integration within the physical sciences. Integration seen as embracing all science did not win great support. Integration among related disciplines was something to consider. Coordination did not seem to find much favour as a half-way stage except as a practical basis for organising a balanced course. Separation of disciplines was seen by all as the only satisfactory way to organize studies in depth.

It was a valuable seminar. A great deal of ground was covered which served to highlight the difficulties faced in the teaching of science today. It was hard to avoid the impression that the concept of specialist degree courses as the major means of science teaching would play a diminishing role in science teaching despite its immense success in this century. That such courses would remain was undoubted but perhaps the bulk of science teaching effort might lie in other directions in the future.

c. Improvement of Teaching Standards in Universities

It was felt by many members of the CTS that some effort should be devoted to raising standards of teaching at university level. Few university teachers have any form of instruction on how to set about teaching and the results of modern research into evaluation of teaching methods are not widely known. While some progress is being made through, usually voluntary, short courses the CTS felt that it should take a positive initiative in this field. Discussions centred on what contribution the CTS could make and a small subgroup under Prof. C. A. Taylor has been formed to produce, with financial support from UNESCO, a series of brief booklets to embody modern research on teaching procedures. D. McNally will serve as an Editor for this series.

d. Mathematics for Science

Attention was given to an apparent decline in the standards of numeracy. While more and more sciences are now demanding that mathematics is a prerequisite, there is a strong feeling that ability to apply mathematical techniques to problems has declined. The feeling of astronomers on this topic was sought through a subsequent Circular Letter and confirmation of the CTS view was found. In some countries formal instruction in mathematics ceases in the early teens. In others an excessive concentration on algebra obstructs its application to scientific problems. The use of computers in the teaching situation, while not widespread, has variable effects. As a correspondent pointed out the solution may lie in closer liaison with the teachers of mathematics. Nevertheless the harmony of the complaint is so marked that it is hard to avoid the conclusion that something has gone wrong and that consideration will have to be given to ensure that prospective students in science get adequate preparation in applied mathematics and numerical methods.

e. Environmental Education

For the future the CTS discussed the role that environmental studies might play in education below university level. It was seen that such a concept could provide a useful framework for integrated science in the developing countries. Most of these countries need to be aware of their natural environment either from the point of view of mineral or fuel resources or from the point of view of agriculture. It is hoped to take this topic further at future meetings. Members of the Commission are reminded that Astronomy can make a contribution in this field not only from the point of view of establishing the constraint on the Earth imposed by the Sun and its own intrinsic properties, but in providing simple direct methods for surveying and navigation. Members with proposals in this field should contact the President of the Commission.

II. COSTED

The Executive Committee appointed D. McNally to serve as the representative of the IAU on

COSTED. Unfortunately he has been unable to attend any meetings of COSTED because of lack of travel funds.

COSTED (Committee on Science and Technology in Developing Countries) has responsibility for the development of all aspects of Science and Technology as they affect the developing countries. While the activities of the IAU are somewhat peripheral to the major needs of COSTED, it is essential to have close liaison with COSTED so that where and when the IAU can be of direct assistance, action can be taken speedily. Since the Visiting Professors' Project (see Section C) is in virtual abeyance because of financial pressures it is important to be able to act with the assistance of COSTED if any member of COSTED is seeking assistance with an astronomical project. Again COSTED has been informed that this Commission is ready to help, in association with UNESCO, to establish short in-service astronomy courses for teachers on the pattern of those held so successfully in Kenya in 1973.

III. UNESCO

Contact has been maintained with UNESCO in regard to educational matters. Mrs S. Haggis, Division of Pre-University Science and Technology Education and Mr S. Passman, Division of Science Education are sent copies of the Circular Letters of the Commission.

B. *The International Schools for Young Astronomers (ISYA)*

Since the last triennial report of the Commission was completed, 3 ISYA have been held – in Lembang, Indonesia; San Miguel, Argentine and Athens, Greece. All these schools have been very successful and fully justify the support given by the IAU.

I. *Lembang*

This school was held at the Bosscha Observatory, Lembang from July 23–August 18 1973 immediately prior to the Sydney General Assembly by the invitation of Prof. B. Hidajat. The topics covered by the school ranged from Jupiter to Galactic Structure. Considerable emphasis was placed on instruction in observational techniques and the reduction of data. The school was conducted by 8 lecturers of which 6 came from outside Indonesia. There were 8 students attending the school (1 from India, 5 from Indonesia, 1 from Japan and 1 from S. Africa). The school was supported by a contribution from the IAU (\lesssim \$6000) and local sources. The report of the school was presented to the Commission at the Sydney General Assembly.

II. *San Miguel*

The school was held at San Miguel from May 13–June 7 1974 on the theme Physics of Solar Plasmas, the Sun and Interplanetary Medium and Solar Energy. The school was jointly organised by the IAU and the Commission Nacional de Estudios Geoheliofisicos (CNEGH) of the Argentine. The 3 divisions of the school ran in parallel and participants attended one division only. The school was conducted by 20 teachers of which 3 were from outside S. America, the host country supplying 14 teachers and the director of the school Lic. J. R. Seibold. There were 60 students attending the school (39 from Argentine, 9 from Brazil, 7 from Chile, 2 from Peru and 1 each from Bolivia, Paraguay and Venezuela). The interests of the school were confined to solar physics and the uses of solar energy. The school was supported by a contribution from the IAU (\sim \$8000) and from CNEGH (\$12,000).

III. *Athens*

The school was held in Athens from September 8 to October 4, 1975. The topics of the school were less specialised but were associated with astronomical research which could be carried out by telescopes of medium aperture. The school was conducted by 9 teachers all of whom were from outside Greece; 8 seminars were given by distinguished visitors not associated with the

lecture courses and included the President and General Secretary of the IAU. The school was divided into 3 parts: regular lectures, seminars and practical training at Penteli Observatory (Sept. 8–22); regular lectures and a course on the objectives of eclipse observation on the island of Thera (on track of annular Solar eclipse of April 29, 1976) (Sept. 23–27) and the remaining, optical, part of the course devoted to post-school training at various Greek Observatories and Astronomical Institutions. The school was attended by 74 students (39 from Greece, 35 from 15 other Mediterranean countries). The school was supported by a contribution from the IAU (\$8000) and contributions (totalling \$20 000) from Greek sources namely the Greek Ministries of Education, Coordination and Planning, and Culture and Science, the National Foundation of King Paul and the Eugenides Foundation.

IV. *Remarks*

It will be noticed that the costs of these schools show some disparity and are rising. It is therefore of some interest to look at the cost of the schools and a breakdown per student and per day is given in Table 1.

Table 1. Unit costs of the ISYA 1973–75

		\$ per student	\$ per day	\$ per day per student	No. of Students	No. of Teachers	Duration days
I.	Lembang	783	232	29	8	8	27
II.	San Miguel	333	769	13	60	20	26
III.	Athens	378	1037	14	74	9 (+ 8)	27

It is not clear how these costs should be adjusted for inflation during the period 1973–75 except in so far as a general rise in costs would be expected during the period. It will be noticed that in terms of cost per student, large schools are cheaper. If cost effectiveness in accountants' terms is required of future ISYA then large schools must be sought with a minimum of teaching staff from outside the host country. If the ISYA are to bring teaching staff from outside the host country then costs are bound to be higher to an extent dependent on the distance of the school from major astronomical centres. If the ISYA are further required to be held in regions well removed from major astronomical centres then fewer students will be available and travel costs high, and so high unit costs by at least a factor of two will be inevitable. Despite the higher unit costs the IAU should continue to support ISYA in areas far from major astronomical centres. The extra costs must be set against the intangible benefits of having access to visiting astronomers.

In terms of cost per student per day, it is clear that an ISYA offers instruction, board, assistance with travel at remarkably competitive rates. The IAU gets good value from its schools. The Commission and the IAU are deeply grateful to Dr J. Kleczek in acting as Secretary to all these schools. Without his enthusiasm and energy these schools would not exist. He carries a considerable burden of responsibility in the organisation of each school and in its successful functioning. The Commission is also sincerely grateful to Dr B. Hidajat (Lembang), Lic. J. R. Seibold (San Miguel) and Prof. M. Moutsoulas (Athens) for their work in organising the day to day affairs of these schools. It is on such people that the success of the schools depends so vitally. The Commission also extends its sincere thanks to all those authorities who have contributed so generously to funding our schools – The Executive Committee of the IAU, the authorities in Indonesia, CNEGH in the Argentine and the Ministries of Education, Coordination and Planning and Culture and Science, the National Foundation of King Paul and the Eugenides Foundation in Greece. Our thanks are also due to all the lecturers who gave so freely of their time and energy to make a success of these schools.

Further schools in the Middle East and Carribean areas are in the planning stage by Dr Kleczek and we look forward to more successful ventures.

The Commission sincerely urges the Executive Committee to look favourably on the financing of these schools. They are an important means whereby astronomical standards can be raised. The daily cost per student is satisfactorily low. The ISYA represent the most significant single contribution that the IAU can make towards astronomical education. Indeed, a more permanent international centre would be of value so that this important work could be given a more continuing basis.

C. *Visiting Professors Project*

No funds were allocated to this project at the Sydney General Assembly. No enquiries were received and so the project is effectively in abeyance apart from a Presidential request to astronomers to consider making stop-overs in developing countries for the purpose of giving seminars at astronomical institutions and public lectures. However, in the absence of funding the status of this project will have to be seriously considered at the forthcoming General Assembly in Grenoble. The Commission is indebted to Prof. M. Rigutti for taking charge of this project.

D. *Astronomical Educational Material*

The world-wide list of Astronomical Education Material (AEM) prepared for the Brighton General Assembly (1970) was updated for the Sydney General Assembly (1973) and will be updated once again for the Grenoble General Assembly (1976). The compilation is the responsibility of all members of the Commission, but the burden chiefly falls on the shoulders of the collators of the material namely:

E. V. Kononovich:	material in Russian and Slavic languages;
H. E. Jørgensen:	all other languages except English, Russian and Slavic languages.
T. L. Swihart:	material in English language.

The Commission is indebted to these three collators for their devoted work.

The value of AEM is clear – it is a useful basic source of reference for texts and illustrations. However, in these inflationary days, the production of the updates is becoming financially burdensome. The rising costs of paper, secretarial assistance, duplicating and postage are a problem for budgets already eroded by inflation. It is a matter of considerable urgency to consider how this important work should be financed in the future without imposing additional financial strain on willing institutions.

At the instigation of A. J. Meadows and D. McNally a catalogue of astronomical films updating the AEM list of 1970 has been prepared by the British Universities Film Council (BUFC). A copy of this list has been sent to all members of the Commission. Further updated copies are available from BUFC (Royalty House, 72 Dean Street, London W1V 5HB, U.K.).

E. *The Contratype Project*

In order to conserve master copies it had been decided that the centres holding masters would supply copies to those who requested them. The scheme takes different forms. In Moscow, the project is operated by E. V. Kononovich with the assistance of the Moscow Planetarium. Reproductions of the Moscow material are supplied free of charge. In order to ascertain demand for the material on a cash with order basis, the Paris material is being supplied at cost in the form of 2 x 2 (35 mm) slides for a trial period which will end in August 1976 by Mme. M. Gerbaldi of the Institut d'Astrophysique. The reported demand is encouraging there being 29 enquiries for the Paris catalogue resulting in 18 orders totalling 1200 slides. Except for 3 orders, all were from W. Europe. The orders were *all* placed by astronomers.

The known demand for this material both in Moscow and Paris will greatly influence the future development of this project. However, as with Astronomical Material the nature of the financial burden will need to be understood before a proper policy can be formulated. Once

again the thanks of the Commission are due to Mme. M. Gerbaldi and Drs Kononovich and Wentzel for their work in forwarding this project.

F. *The Book Project*

The Book Project was converted to a means of advertising library desiderata. Only one request for such material has been received. No response to the request was obtained, but contacts were established whereby the requesting institution was able to satisfy most of its requirements.

It seems therefore that there is not much demand for library material outside normal channels. It may be that astronomical libraries are unaware of the service offered by the Commission or it may be that there is simply no need for this service. This project will be reconsidered at the Grenoble General Assembly.

The thanks of the Commission are due to Prof. L. Houziaux for looking after this project.

G. *Exchange of Equipment*

A joint working party of Commissions 9 and 46 was established to implement exchange of equipment no longer in use for teaching purposes. Apart from a circular to establish the availability of such equipment there have been no developments in this field.

H. *National Activities*

As is the practice of the Commission, reports by members on national activities will be published as a separate document.

The remarks made under this heading in the previous report of the Commission remain relevant and well worth re-reading.

The Commission continues to recommend the advanced courses mentioned in the previous report and hopes that such courses will remain in a flourishing state. It is hoped that members of the Commission will bring them to the attention of possible interested parties.

Dr Aa. Sandqvist of Sweden has drawn attention to an interesting feature of Swedish educational practice – Study and Vocational Orientation. This is essentially a short term apprenticeship scheme whereby children still at school can gain experience of actual working conditions in industry, commerce, administration, health etc. Swedish Observatories participate in this scheme. While some vacation study opportunities exist for under-graduates, it is not usual to deal with pre-university students. The Swedish scheme appears to have many excellent features, though it must be demanding in supervision. Clearly, at pre-university level assistance with research cannot be expected from participants as is the case with university students. However, such opportunities at school would be of great value in preliminary career guidance.

I. *Future Activities*

The future activities of the Commission are numerous and pressing.

1. Close collaboration with ICSU, UNESCO and COSTED must continue. The value of astronomy as a means of assisting education in the physical sciences requires continual stress. Integrated Science and Environmental Studies offer astronomy a serious opportunity to play an important role in determining the shape of education in the future.
2. The ISYA continue to have the top priority of the Commission. These schools have a continuing value in giving young astronomers a chance to study with established astronomers of international standing. The costs of the schools in terms of daily cost/student remain fairly low though the overall cost of the school is high. The schools are the greatest single contribution the IAU can make in supporting the training of future astronomers.
3. Project Contratype and Astronomical Educational Material represents ways in which the Commission can serve those in the front line of astronomical teaching through the

provision of up-to-date relevant material. However, the financial demands of these projects are no longer negligible and some consideration must be given to their financing.

4. As pointed out in a previous report of this Commission, a useful and realistic task is the dissemination of information. It costs very little to supply help and advice but the effect can be very large. Commission members are therefore urged to do all in their power to help teachers to acquire the necessary knowledge to pass on to their classes – the benefits to the children, the teachers, and to astronomy are disproportionate to the effort needed.

Contact between teachers and astronomers is not easy to arrange. For historical reasons astronomers in many countries have been outside the mainstream of formal education. However, occasional lectures at schools and teachers centres, university extension work, week-end and vacation courses are all of immense value in introducing teachers to astronomy and astronomers to teachers. Teachers need encouragement to surmount the barrier of an apparently esoteric science. Often the barrier is rather lower than either party thinks. The concepts of astronomy are not matters of daily experience and careful presentation is needed. You know your national educational system and cultural background best. It is your responsibility to promote astronomy in your country.

5. The need for cheap multi-lingual texts remains. UNESCO are doing a fine job but they cannot be all things to all men. Any offers of authorship?
6. In view of the increasing interest in astronomy, it is being offered at various levels in education. However, courses in astronomy are one thing and the training of an astronomer quite another. Certain subjects are disappearing from mathematics and physics syllabi under pressure from new and exciting developments in these subjects. Thermodynamics is a subject in decline in many modern university degrees and in many universities atomic and molecular physics no longer receive the attention they once did. Attention to changes in university courses is essential to ensure that topics of importance in astronomy remain in the curriculum. To this end, and also to assist developing countries with training schemes for astronomers, it would be desirable to outline the basic knowledge and skills which would be appropriate for a graduate about to embark on higher degree studies in astronomy. Such a document would also be of value in assessing the background of applicants for higher degree studies. Consideration of professional standards is a long term study but essential in view of the rapid changes now taking place in university curricula.
7. A long term item for discussion is whether an International Institute for Astronomy could be of value in astronomy. The purpose of such an institute might include
 - (1) Astronomical Research at a high level.
 - (2) Provide astronomical research facilities which would be expensive in terms of research budgets for small countries and to which all astronomers would have access.
 - (3) Provide in service training facilities in new techniques.
 - (4) Provide in service courses on new developments in astronomy.
 - (5) Provide in service courses for teachers, navigators, etc.
 - (6) Award Fellowships for both research *and* educational studies.

At present no such institution exists. It would not usurp existing arrangements between astronomers nor disrupt existing arrangements for research symposia. As the level of technical sophistication in astronomy grows, the gulf between those nations which can afford it and those who cannot also grows. That gulf requires a bridge.

The demands of new educational programmes have been sketched briefly elsewhere in this report. Astronomers are few in number and the dilution factor is large. If astronomy is to play an effective role in education in the future at least one international centre for astronomy is needed. Emphasis could then be given to formalising many of the tasks of this Commission. Provision of course material can be undertaken (on the pattern of the U.K. Open University perhaps) and closer contact with the educational activities of UNESCO etc. could be developed. Such an Astronomical Institute might well form a part of an institution embodying additionally the environmental sciences of geology, geophysics, meteorology and oceanography.

The proposal requires careful long term thought to establish whether or not such an Institute could serve the interests of astronomy in a cost effective manner.

APPENDIX

RULES AND GUIDELINES OF OPERATION

- (1) Commission 46 is a Committee of the Executive Committee of the IAU.
- (2) *Objectives of the Commission*: to further the development and improvement of astronomical education at all levels throughout the world.
- (3) *How to achieve the objectives*:
 - (a) by the various projects initiated, maintained, and to be developed by the Commission;
 - (b) by disseminating information concerning astronomy teaching at all levels.
- (4) *Composition and organs of the Commission*:
 - (a) *Organizing Committee*
 - The Organizing Committee shall consist of the President, the past-President, one or two Vice-Presidents, and of those members in charge of continuing or developing one of the projects of the Commission and such others as considered necessary by the President.
 - The number of members of the Organizing Committee should not exceed the normal maximum of 10 members.
 - The current President shall serve as chairman of the Organizing Committee.
 - The Vice-President normally succeeds the President after the latter's three year term. In case of two Vice-Presidents, the first Vice-President normally succeeds the President and the second Vice-President becomes first Vice-President.
 - The term of office for the members of the Organizing Committee shall be from the end of one General Assembly to the end of the following General Assembly. Officers are eligible for re-election, however.
 - Normally, the members of the Organizing Committee should not serve more than two terms, except for Presidents, Vice-Presidents, and Secretaries of the Young Astronomers Schools.
 - The President has the responsibility to ensure that the projects of the Commission are fully represented in the Organizing Committee.
 - A year before the IAU General Assembly the President, in consultation with the Organizing Committee should propose at least two names selected from within the Organizing Committee, for the office of Vice-President in the next term. Before presenting the proposed candidates for Vice-President to the Commission, the President must undertake to establish the willingness of the candidates to accept the office if elected. Having obtained proposals, the President prepares a list of names for the new Organizing Committee and presents it to all Commission members for approval and comments, before forwarding the final list of names of the proposed candidates to the IAU Executive Committee.
 - (b) *General Membership*
 - Only members of the IAU are eligible for consideration as members of Commission 46.
 - Every country adhering the IAU should have a representative in Commission 46. This member representative is in charge of making the liaison between the activities of the Commission and the astronomy teachers and all that concerns the teaching of astronomy in the various institutions of his/her own country.
 - The representative should be approved by the National Committee of his/her country.
 - In order to ensure proper liaison the number of members from any single country should be kept small. Where there are more than one member from any one country a national representative should be clearly identified to the Commission President.
 - The members of the Commission are appointed by the Organizing Committee and must be confirmed by the Executive Committee.

- No member can be co-opted during the three-year term between two General Assemblies except in the following two cases:
 - (i) a newly adhering country;
 - (ii) the withdrawal from the Commission of the representative of a country.
- Any member may withdraw from the Commission but he/she must inform the President of the intention to withdraw.
- A member who has not cooperated in the work of the Commission during the three-year term may be deleted from the Commission by the President and be replaced by another IAU member of his/her country after consultation with the National Committee of the corresponding country.
- (c) *Consulting Members*
Consulting members must be intimately connected with the teaching of astronomy, but are not otherwise eligible as members of the IAU. They may be proposed for admission at the discretion of the Organizing Committee, and must be approved by the Executive Committee.
- (5) *Rights and Duties of Commission Members*
 - The Commission members may propose new projects which could help to achieve the objectives of the Commission.
 - They may ask for the services that the Commission projects offer.
 - They should endeavour to encourage the teaching of astronomy at all levels in their respective countries.
 - They must disseminate all information concerning the activities of the Commission among the teachers of astronomy in their respective countries.
 - They must keep the Commission President informed about the activities and developments of astronomy teaching in their respective countries.
- (6) *Function of the Organizing Committee*
The Organizing Committee is to be in charge of the various Commission projects approved by the Commission members.
The members of the Organizing Committee must keep the President informed about the development and activities of the projects for which they are responsible.
- (7) *Duties of the Vice-President(s)*: to assist and represent the President whenever necessary.
- (7b) President and Vice-President(s) should *not* be of the same country.
- (8) *Duties of the President*:
 - To maintain active contact with all the members and consulting members of the Commission.
 - To disseminate all received information on astronomical education and teaching to all members of the Commission.
 - To maintain and develop contacts with other international bodies related to science teaching and to represent astronomy teaching in international science teaching bodies.
 - To seek approval of the IAU Executive Committee for all major projects of the Commission.
 - To prepare a Report on the activities of the Commission at the end of his/her three-years term.
 - To ensure an adequate program for Commission sessions during the General Assembly.
- (9) *Voting in the Commission and in the Organizing Committee*
 - All official transactions of the Commission shall be approved by a simple majority vote of the members in attendance at a regular scheduled meeting of the Commission.
 - If the voting is done by mail, the transaction of the Commission shall be approved by a simple majority vote of all members answering within the deadline fixed by the Commission President.
- (10) *Finances*
 - Any financial matters (i.e. Young Astronomers Schools, Courses for Science

- Teachers, Visiting Professor, etc.) are handled by the IAU General Secretariat.
- The Commission does not deal with travel grants of any kind. These are being handled by Commission 38.
- (11) *Symposia, Colloquia, etc.*
The projects of the Commission which require extended organization and financial support are the Young Astronomers Schools, the Courses for Science Teachers in developing countries, the Visiting Professors project. If one of these projects is to be organized, the President seeks approval of the IAU Executive Committee.
 - (12) *Publications*
The Commission publishes regularly for every General Assembly the following publications:
 - (i) Astronomy Educational Material Addenda;
 - (ii) National Reports;
 - (iii) The Report of the activities of the Commission which is to be published in the Transactions of the IAU.
 - (13) *Working Groups*
If considered necessary and useful by the Organizing Committee, Working groups may be formed.
 - (14) *Change of Rules*
These rules and guidelines can only be changed by an absolute majority of those members participating in the voting (at meetings or by correspondence).

D. McNALLY
President of the Commission