

IAU's Interaction with Young Astronomers

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Abstract. The IAU promotes astronomy as a tool to strengthen science education of young people in developing regions through its International Schools for Young Astronomers (ISYA) and a Teaching for Astronomy Development (TAD) programme. This article describes briefly the strategy, organization and development of these programmes. The contents of the courses, tutorials and aims for longer-term effects of these programmes are described with focus on the ISYAs.

Keywords. IAU educational programmes, International Schools for Young Astronomers (ISYA), Teaching for Astronomy Development (TAD)

1. Introduction

The IAU's interaction with the young generation of astronomers is an important and highly appreciated activity of the union. It involves young people from developing countries who are at critical moments of their research careers in regions where resources and possibilities for higher education are limited or even unavailable.

The educational programmes were initiated by IAU Commission 46, Astronomy Education and Development, that recognized the importance of supporting education in astronomy and science in general. The first discussions started at the XIIth IAU General Assembly in Hamburg in 1964, where it was argued for international cooperation in the domain of astronomy teaching and training of astronomers. One then started planning for courses in modern Astronomy for current and future science teachers in developing countries. These courses should involve the basics of astronomy, teaching techniques, including available laboratory material.

At the following General Assembly in Prague in 1967 it was agreed to start the first "*International School for Young Astronomers (ISYA) and Science Teaching Courses in Astronomy*". For the second category, which initially was referred to as "Visiting Professor Project", it was said that its role was "...to provide contacts between places remote from the main centres of astronomical research which could benefit by the visit of an astronomer teaching a course of particular interest to them and possibly helping them to develop a research and/or teaching programme ..." (Perek 1967, p. 227).

2. Operation and development

The *Visiting Professor Project* was later modified and in the '80s referred to as *Visiting Lecture Program* and thereafter became the *Teaching for Astronomy Development (TAD)*. The aim of the TAD is to stimulate and enhance local educational activities and local programmes while the objective of the ISYAs is to contribute to the astronomical education and training advancement in the host countries and neighbouring regions. The ISYAs are based on three-week schools for typically MSc and PhD students, while

the intensive courses of instructions for organizers and teachers at various TADs usually last one or sometimes two weeks.

The activities and challenges associated with these programmes are described well in two articles by, respectively Gerbaldi (2006) and by Gerbaldi *et al.* (2009). These articles are available from the IAU ISYA web site. These authors know what it takes to prepare and to run these programmes from their personal involvements over a number of years. My knowledge about the beginning and development of the ISYAs and the TAD programmes is largely from what Michele Gerbaldi, Jean-Pierre de Greve and Edward Guinan are telling us. These three individuals, in addition to Kam-Ching Leung and Itziar Aretxaga, must all be thanked for their tireless, insightful contributions as leaders in the operation of the ISYAs, at various times during the past 30 years. In addition, the initiative and start of the programmes shall in particular be credited to Josip Kleczek, Edith A. Müller and Donat G. Wenzel.

The three-week ISYAs are intensive postgraduate schools in regions where students have limited opportunity to be exposed to full extent up-to-date lectures in astronomy. The majority of usually ten well-qualified teachers are invited from active international astronomical research institutions and universities. The local facilities and capacity of the team of teachers and tutors of the schools accommodate normally 30–50 students. The curriculum of an ISYA is a balanced standard set of coherent lectures that cover observations and theories of selected fields of astronomy and astrophysics, plus training in reduction and calibration of observational data. When available, the courses also involve use of nearby observing facilities for training with modern instruments. It is increasingly essential that the students become familiar with the virtual observatory concept. Furthermore, the students are given opportunities to prepare and to give their own short presentations in English to an audience. Seeing each other more or less every day during three weeks provides good chances for students and teachers to get to know one another quite well, establish trust and friendship, which can stimulate to continued educational and even science collaboration. Longer-term educational and scientific interactions between students and teachers are one of the main objectives of the ISYA programme.

In the planning of an ISYA, one ensures that a notable number of the students also are accepted from surrounding countries where availability of modern education and research are seriously limited, similar to that of the host, or even worse. The relative fraction of students from neighbouring countries, in the 51 years of the ISYA programme, is on average close to 50% and usually ranging between 30 and 75%.

From 1967 until 1971 the ISYAs were funded by UNESCO while from 1979 until 1990 they received partial funding also from UNESCO via ICSU. From 2009 and onwards the Norwegian Academy of Science and Letters (NASL) agreed to cover the cost of one ISYA per year, such that the IAU now may organize three schools every two years. On this background, the IAU and NASL established an *Office for Young Astronomers* (OYA), with the aim to ensure a robust financial and organizational basis for its continued operation, in the best interests of the ISYA programme. The domicile of the OYA is the NASL in Oslo, Norway.

This joint funding covers costs for all travel of students and faculty, both within the host country and internationally. The host institutions cover other expenses during the ISYA, such as the room and boarding for students and faculty and the infrastructure for lectures and tutorials.

3. Other similar type programmes

A number of complementary international winter- and summer schools for high-level science education in astronomy in the past few decades have also been launched by other

organizations at permanent locations in various countries. As far as I am informed, these are all open for students from countries other than the host country, similar to the ISYAs. The Vatican has hosted several summer schools held at the Vatican. A notable interest for these other schools does not imply that ISYAs and TAD programmes are superfluous, but it signals a substantial need for such programmes, which the IAU is unable to provide for alone.

A more recent programme of the IAU involving younger generations is the *Young Astronomers Lunches* (YAL) that was initiated by [Gerbaldi \(2006\)](#) at the IAU General Assembly (GA) in Prague in 2006. The YALs have become a tradition in subsequent GAs. Young, early-career astronomers are invited to network with senior astronomers during a round-table free lunch. The total attendance of young and senior astronomers at a YAL is typically 150–225. Young astronomers are those who are enrolled in MSc and PhD programmes and post-docs who obtained their PhD in the last three years, or even five years ago when space permits. There is usually space for eight young and two senior astronomers at each table and the young generation is free to pick topics of interest to them, which often are related to career development, fellowships, grant writing, jobs, research topics, teaching skills and so forth. They are free to choose. These lunches are unique fora and opportunities for enhancing contacts between young astronomers from different countries and with seniors representing a broad range of fields in astronomy. The YALs are sponsored by the US NAS, NASL, AAS and the IAU *Office of Astronomy for Development* (OAD).

4. Feedbacks from students and hosts

Responses received from participating students and from hosts of ISYAs are in general positive. In fact, 10 countries have applied for and been granted two or even three ISYAs, which may be regarded as a positive reaction.

It is straightforward today to check the number of registered publications by an individual in astronomical journals, books and reports. Available lists of participating students from a limited number of former ISYAs over a 30-year time span indicate that between 60 and 70% of former ISYA students are in subsequent years registered as authors and co-authors of astronomical publications. That is of course not a proof that it was an ISYA that made her/him an astronomer, but it is still an indication of a positive influence of these schools.

Participating students are invited to fill in a “Student Evaluation” form, after each school. Such feedback, including recommendations from students and from earlier hosts, are most helpful for maintaining a meaningful, well-functioning programme. [Gerbaldi \(2018\)](#) has reviewed this type information available from a large number of ISYAs held since the first one in 1967, and her analysis is presented in a subsequent section of these Proceedings.

5. Concluding remarks

The IAU Strategic Plan 2020–2030 outlines a strengthening of the ISYA programme through a coordinated operation of the *Office for Young Astronomers* (OYA), the *Office of Astronomy for Development* (OAD) and the *Office for Astronomy Outreach* (OAO). These offices were established in recent year to promote the involvement of astronomy in education and outreach initiatives over a range of levels. The OAD is a joint venture with the South African National Research Foundation and was officially launched in 2011. By 2015 the OAD had established nine regional offices around the world with the mission to further use astronomy to realize the field's scientific, technological and cultural benefits to society. The OAO was set up in 2012 and is based in Mitaka, Tokyo, Japan,

for coordination of the IAU's public outreach activities around the world. The IAU plans to establish a fourth Office for Astronomy Education (OAE) to develop standards for teaching of astronomy as a tool for education in a wide variety of levels and disciplines. The many overlapping aspects of the four offices will, as intended, stimulate mutually beneficial collaborations. In the case of the ISYA programme one might foresee that one of the other three offices may, depending on the particular need and interest of a host, be consulted in the planning of future ISYAs.

The *International Schools for Young Astronomers* have been modified and improved over the years, thanks to a highly motivated and insightful leadership team. The new Director of the ISYA programme, Itziar Aretxaga ([Aretxaga 2018](#)) shares with us in these Proceedings her thoughts on how to keep up and strengthen the ISYA programme in the years ahead, in a team with the new Deputy Director, David Mota. The future of the ISYA is promising.

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