

Italian Olympiads in Informatics

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Abstract. We describe our 6-years long experience in training and selection of the Italian team for the IOI. Based on this experience, we outline our proposals and how we intend to proceed to improve the effectiveness of these processes.

Key words: training, problem solving, programming competition.

1. The Beginning

During the year 2000, the Italian Ministry of Education and the Italian Association for Informatics (AICA) came to an agreement to organize the Italian participation to the IOI. To this end, they formalized a National Committee for the Olympiad of Informatics (COI) whose primary objective is select and train the Italian Team for the IOI. AICA was already engaged with the Ministry of Education in promoting learning of Informatics in Italian Schools and this new cooperation was well inserted in the old one.

From the year 2002 COI organizes the Italian Olympiad in Informatics, as the final event for the selection of the National Team for the IOI.

In the 7 years of participation in the IOI, the Italian Team score is: 1 gold, 4 silver and 10 bronze medals.

2. The Organization Scheme

The Italian Organization is based on the National Committee for policy-making and decision process and on a Technical Group for treatment, development and administration of all specific activities relating selection and training processes.

2.1. *The National Committee for the Olympiad in Informatics (COI)*

The COI promote, coordinate and manage all decisions and actions relative to selection and training of students and make the choices to form the national team. The COI is composed by nine members:

- one delegate from the Ministry of Education,
- one delegate from AICA (Italian Computer Science Association),
- three experts from higher schools,
- four experts from University and Research.

These members elect a chairperson who lasts in the job for 3 years.

To carry out his program, COI has organized his work in two groups: a scientific group and an administrative group.

The scientific group is composed by the chairperson of the COI, two members from University and one expert not member of the COI. Purposes of this group are:

- to approve and validate texts for selection steps;
- to organize training activities;
- to suggest the composition of Italian Team for IOI;
- to prepare the budget for these activities.

The administrative group is composed by three members of the COI (one is headmaster of high school and manager of the full budget). Purposes of this group are:

- to manage contacts with schools;
- to organize logistics for selections steps and for the National Olympiad;
- to prepare the budget for these activities.

On the basis of sponsorship and budget proposals, the COI approve the overall budget for the next year. Members of the COI cannot receive any fee (only refunds for traveling expenses are allowed). The budget for the year 2006 is shown in the last section.

2.2. *Technical Group*

To organize and manage technical activities related to the selection process and to administer and perform training courses, the COI employs a technical staff (computer scientists from research institution, University and high schools) coordinated by the expert of the scientific group not member of the COI.

Main tasks of this group are:

- to provide problems (Tasks) for selection steps;
- to administer and evaluate selection papers and programs (with the support of computer tools);
- to teach and train the winners (gold and silver medalists) of the National Olympiad;
- to support the COI in the final selection procedure to build up the national team.

3. The Annual Process

Starting from the second participation to the IOI, Italian activities have been organized in the following phases (Table 1).

3.1. School Enrolment

By the middle of September, Minister of Education invites high schools to participate to a national selection (enrolment fee is 50 euro per school).

3.2. First selection (involving about 500 schools)

About 12000 students are involved in this selection. This tests take place by the middle of November; it consists of 15 logical problems and 15 programs: for each item, students must select the right answer out of 4 given choices. The National Committee select the text and a local teacher administers it. The best students of each school (from 1 to a maximum of 5) are invited to a Region Selection.

3.3. Second Selection (in 20 Regions)

About 1200 students are involved in this selection. The test takes place by the end of January in 20 different sites and is somewhat similar to that of the IOI (3 problems, not very difficult, to be solved in 5 hours). The National Committee prepare and manage the test. An ad hoc system has been designed and implemented in order to send the problems and to collect the answers of each student, via Internet. The best 75 students of this selection (at least 1 for each region, for promotion purpose) are invited to the National Selection.

3.4. Third Selection (Italian Olympiads of Informatics)

By the middle of March, in one site (different every year) we organize the Italian Olympiads of Informatics inviting the 75 best students of the Region Selections and the young winners of the Italian Olympiad of the previous year. This selection is quite similar to that of the IOI; at the end the best students receive medals (5 gold, 10 silver and 20 bronze).

Table 1
The annual process

October	school enrolment;
November	first selection in the enrolled schools (about 500 schools and 12–15000 students);
January	second selection in 20 region points (1200–1500 students);
March	third selection (National Olympiads: 80 students);
April–May	training stage and team formation.

3.5. Training and Team Formation

The gold and silver medal winners are invited to follow two (sometimes three) stages (5-6 days each, between the end of April and the beginning of June) at the University of Pisa. At the end of the second stage, a final selection is organized to select the best 4 students to form the Italian team for the next IOI.

During the current year, two on-line training periods were successfully experienced before and between formal training. The objective of these on-line activities was to give basic theoretical knowledge and to stimulate student capabilities.

4. Comments and Development Strategies

In Italy, Informatics is quite absent in high school regular curricula. It is necessary to promote initiative to stimulate interest in this discipline (among students and teachers alike).

The actual organization of selection and training activities is not satisfactory; it does not assign enough time to training activities (remember that most students have no training in regular courses). We are studying to arrange all the activities of selection and training as lasting two years, so that we can involve a greater number of students and lengthen the time of specific training between Regional Selection and team formation.

Taking into account that Italian high school last for 5 years (with students 15–19 years old), the COI is inclined to act in the following way:

- to accept enrolments of all students in high school (this is active from 2006, before only students of the last three years were accepted);
- to teach formal courses (at least a basic course and an advanced one) and then to develop selection and training activities during two years;
- to make earlier Regional and National Selections to allow a longer time for training;
- and finally, to promote a closer work between teachers of school and university staff involved in this project.

The project is an ambitious one and must be checked from various points of view:

- Is the cooperation between different entities (Ministry of Education, Universities and School teachers) possible?
- Are the students motivated to make a two-year training for a non-standard curriculum?
- Is there a budget to cover it?

However, we prefer to stimulate local experience and to continue the presentation of the project in order to promote the discussion on these ideas in the IOI environment. In particular, we present two courses, the basic and the advanced one, that belong to the project.

4.1. Basic Course

This course is intended for students of the first two (three) classes (15–17 years old) with the aim of introducing general concept of computer programming and simple recursive scheme. The attendance to this course is free; any school can be involved with the payment of a symbolic fee (e.g. 50 euro).

The objective is to involve (many) hundreds of schools; that is possible only with:

- the cooperation of at least a teacher for each school involved in the project;
- the availability of e-learning system to support distance learning.

Every year, at the end of the course, the best 30–50 students could be invited (and granted) to attend a free summer course to facilitate the attendance of the advanced course of the next year.

4.2. Advanced Course

This course is intended for students of the last two (three) classes (17–19 years old) with the aim of introducing “*algorithmics (the spirit of computing)*” and practising IOI-like problems.

Each year, at the beginning of October, a selection could be organized; the best students passing the admission test can follow the advanced course.

During the year two other selection can be organized and the best 40 could be invited to the National Olympiad of Informatics.

The gold and silver medallist will follow training and team formation activities as described in the previous point 2.5.

5. Conclusions

Following the suggestions described in the previous section we hope to obtain these results.

- To increase the involvements of schools in programming curricula.
- To stimulate a greater number of students toward the study of algorithms and computer science.
- To improve competence of students in problem solving.

A great and consistent help could be given by activities promoted by the IOI International Committee to facilitate cooperation and exchange of experiences among countries as for examples:

- **To approve the syllabus,**
- **To modify the structure of the competition** (not only make the problems harder and harder),
- **To offer free tools** to support distance teaching and learning and to administer and evaluate tests.

6. Budget for Year 2006 (Euro)

<i>Income</i>				
AICA support				89.000
Fee paid by schools to join Olympic selection				24.900
Ministry support				60.000
			TOTAL	173.900
<i>Expenses</i>				
		AICA	MPI	TOTAL
COI and Groups Meeting		9.000,00	4.000,00	13.000,00
Contribution to schools for regional selection		30.000,00	0	30.000,00
Starting annual activities	Advertising, press, posters, bill	2.500,00	2.500,00	5.000,00
National Olympiad	Refunds for traveling expenses: COI members, teachers and students	2.500,00	11.000,00	13.500,00
	Stationery, gadget, medals and plates	3.000,00	0	3.000,00
	Contribution to Institute managing the budget	0	3.400,00	3.400,00
International Olympiad	Enrollment, traveling expenses,	5.000,00	6.000,00	11.000,00
Secretarial staff		0	2.500,00	2.500,00
Training in Pisa	Refunds for overnight stay and traveling expenses for teachers and students studenti e docenti	2.600,00	9.300,00	11.900,00
Manager, teachers and tutors for activities in Pisa		22.000,00	0	22.000,00
Technical assistance for networking and evaluations		14.000,00	0	14.000,00
Rewards		11.000,00	0	11.000,00
Assurance for students and teachers		0	500,00	500,00
Reserve fund		7.000,00	500,00	7.500,00
TOTAL		108.600,00	39.700,00	148.300,00

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