

Indonesian Olympiad in Informatics: Significant Advancements between 2010 and 2014

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Abstract. Indonesia has participated in the IOI since 1995 and has achieved 2 golds, 16 silvers, and 24 bronzes so far. A national report published in Olympiad in Informatics, 2010, Vol. 4 has covered the experience between 1995 and 2010. As a follow on, this article describes significant progress in the Indonesian Olympiad in Informatics (abbreviated as OKI in Indonesian) since 2010. The progress was driven by clearer structure of stakeholders and processes, updates on national curriculum, the establishment of national contest management system and more active alumni involvement which supports a more stable performance for OKI team (abbreviated as TOKI in Indonesian) in IOI. We analyze briefly each progression which might be relevant to other countries facing similar challenges.

Keywords: informatics, olympiad, training, national report, secondary education.

1. Introduction

1.1. 1995–2010

As also explained in our previous national report (Kurnia and Marshal, 2010), the following is a short summary of Indonesian Olympiad in Informatics (abbreviated as OKI in Indonesian) between 1995 and 2010.

OKI, more frequently addressed as a team rather than as a system: OKI team (abbreviated as TOKI in Indonesian), is an informatics contest started in 1995. The main goal of TOKI is to introduce the young generation in Indonesia to informatics through a form of competition, as the formal curriculum of pre-university education in Indonesia does not include any informatics education. In addition, TOKI organizers coordinate the selection and training process of students to take part in the IOI.

The number of participants of TOKI itself has grown from 1 in 1995 to 1495 in 2009 with the primary sponsorship of the Ministry of National Education. Indonesia has participated in IOI every year since 1995 (with the exception of 2003 due to visa problems) and has achieved 2 golds, 11 silvers, and 16 bronzes up to IOI 2009.

The uneven development and accessibility of infrastructure, and the limited quantity and quality of human resource are among the main challenges faced in organizing TOKI. To overcome the challenges: multi-tiered competition structure, online training, a subset of Pascal language called Pseudopascal and OKI Bureaus came as solutions. While the measure was not there yet to judge the progress, we saw that these solutions produced some improved results.

1.2. 2010–Today

In the past 4 years, generally, informatics competition “fever” among senior high school students has come into effect as more and more TOKI alumni managed to directly or indirectly attract juniors to participate. The effect is also amplified by the rising internet penetration in Indonesia (Lukman, 2013).

As a result, some improved results can be observed. Five more provinces were “unlocked” in the past 4 years, Aceh, Riau Islands, Lampung, Babel Islands and East Kalimantan as can be seen in Table 1 even though the ones that went to the IOI still come from the 8 provinces, with no changes in the past 4 years (please refer to Fig. 2). At the same time, even though Indonesia still cannot be classified as a top performing country in IOI, its performance was improved and became more and more stable recently as can be observed in Fig. 1.

Behind the positive fever aforementioned, some significant advancements were driven such as a clearer structure of stakeholders and processes which will be further described in Section 2 and updates on our national curriculum, establishment of our national competition information system and more active participation from alumni which will be further described in Section 3.

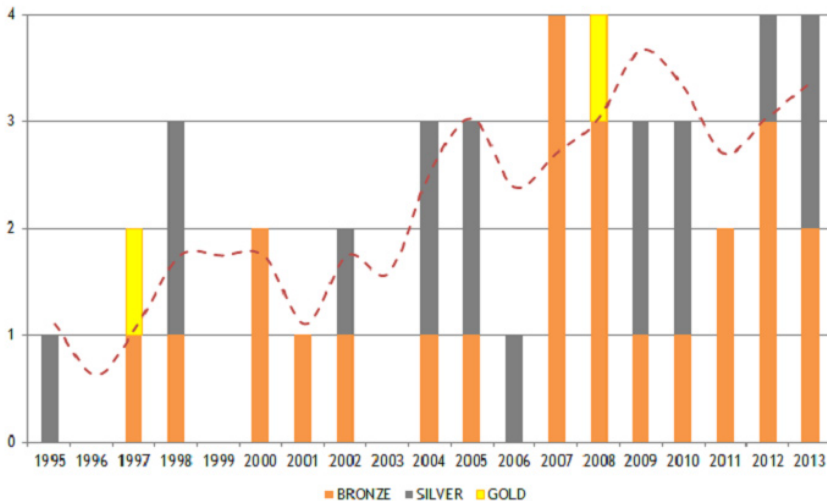


Fig. 1. Indonesian participant medal achievement at IOI 1995–2013.



Fig. 2. Indonesian participant province origin at IOI 2002–2014.

2. Stakeholders and Processes

In the past 4 years, stakeholders involved in the Indonesian Olympiad in Informatics, from the beginning all the way until departure for the IOI, are getting clearer roles. As of today the structure is well illustrated in Fig. 3.

The roles of each stakeholder can be explained as follows:

1. Participants: with the help from senior, school, TOKI’s network, and material available online, students are required to be self-motivated. The self-motivated aspect becomes more critical as informatics is still not included in the official secondary school curriculum in Indonesia.
2. (TOKI) Alumni: directly handle the selections and trainings, and prepares their materials. Since most of them are still active participating in many programming com-

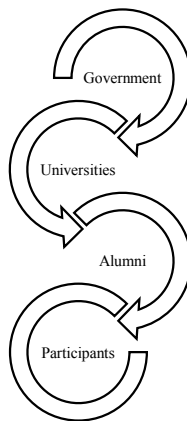


Fig. 3. Selection stakeholders.

petitions at the university level, they are more up to date and exposed to the various new problems/materials that are suitable for training in general. TOKI Alumni have become an integral part of the Scientific Committee and Technical Committee.

3. (TOKI Bureaus) Universities: maintain the curriculum, facilitating and directing the alumni and responsible for the contents and provide judges for selection purposes. There are at the moment 5 TOKI Bureaus from our cooperation with University of Indonesia, Bandung Institute of Technology, Bogor Agricultural University, Gadjah Mada University, and Sepuluh November Technology University.
4. Government (Ministry of National Education): provides and manages national budget to conduct selections and training as well as to provide scholarships for winners.

The current selection process is not much different than that was presented in (Kurnia and Marshal, 2010) as described in Fig. 4. A slight difference is that since 2010 the number of participants from each school is limited, as to allow further gap reduction between Java, Bali and Sumatra provinces and the rest, with regards to the uneven distribution of participants in the first training camp.

Because programming is not a compulsory course, the skills and knowledge of students vary (more because of students' interest and the availability of teachers as coaches), and since the selection up to the national levels involve all senior high schools students in Indonesia, the selection process up to the provincial level are meant to catch their potentials rather than their programming and problem solving skills. That is why, until now, there is no direct programming activities on the computer during the selection test up to the provincial level. The test is conducted on paper, and anything related to programming is given in Pseudopascal, as reported in (Kurnia and Marshal, 2010). Programming selection using a computer is only given in the national level.

The test in municipal and provincial levels are conducted in their own locations, and only at the national level is it conducted centrally in the same location at the same time.



Fig. 4. Selection processes.

3. Curriculum, Contest Management System, and Alumni Involvement

3.1. Curriculum

Regarding the curriculum, since 2012 the curriculum has been aligned with the IOI contest materials. By assuming that the quality of senior high school students is improving, the degree of difficulty of the test materials has been increased gradually. The significant difference is that until 2010 the test materials for national level were partly analytical and partly programming. Since 2012, the test materials for national level are entirely programming.

3.2. Contest Management System

One of the most important things in national competition and development is the availability of online training facility to allow interested students to learn, to keep their competition spirit, and to facilitate regular contests. It requires not only servers, but also a contest management system together with its administrator.

TOKI Alumni's technical team has successfully set up and maintain a TOKI Learning Centre, currently up and running with more than 14.000 users. Technical improvements are continually strived to increase its performance. Beginning in 2014, the team also conduct national contests and also invite contestants from other countries. The utilization of an autograder for training and teaching were also worked on by TOKI Alumni, and were implemented as undergraduate final projects in ITB (Danutama, 2013), (Chandra, 2013), and (Fernando, 2014).

The online infrastructure is also shared outside the computer olympiad contests. Nationally, Indonesia is organizing a National Olympiad in the following fields: Biology, Physics, Mathematics, Chemistry, Astronomy, Programming, Economy, and Earth Science.

Communication amongst contest' participants, technical team and TOKI Alumni is conducted through Facebook, where simple problem solving and many questions from beginners are answered and discussed. It turns out that Facebook is very effective means of communication for beginner participants.

3.3. Alumni Involvement

With the increasing number of alumni from year to year, a stronger and more solid alumni was built, especially since the establishment of the TOKI Alumni Association in 2011. Since most of them are still active participating in many programming competitions at the university level, they are more up to date and exposed to the various new problems/materials that are suitable for training in general. TOKI Alumni become an integral part of the Scientific Committee and Technical Committee of TOKI. Some of the alumni have worked and contributed at some prestigious IT related companies, such as Facebook, Google; and some others have successfully established their own start-ups which are recognized both nationally and internationally.

4. Conclusion and Future Work

Indonesia has participated since 1995 and will continue to actively participate in the IOI. Even though computer programming is not a compulsory course in senior high school, participating in the IOI will remain an interest for some high school students. The students learn about skills and knowledge about programming from their own interest and passion, facilitated with learning resources provided by other stakeholders. Considering the uneven distribution geographically, to select and talent scout only 4 students from about 4 million students with eligible age bracket to participate in IOI every year, is not an easy task.

The ever increasing role and contribution of TOKI alumni in the whole process of selecting and training is more recognized nowadays as the prime factor that makes it possible for the Indonesian team to raise the bar and achieve the current 'position' in IOI, as well as other programming competitions.

From the statistics presented at the beginning of this report, it can be concluded that the achievement of Indonesian team is becoming more stable gradually. The selection and training processes have become a systematic process in which the quality of the output is more measurable and predictable; no longer merely an ad hoc process. Talent scouting in provinces outside Java, Bali and Sumatra remains to discover 'hidden jewels' to improve the input. Lastly, as the outcome, the participation and achievement at the IOI also improves the spirit of competition amongst senior high school students which in turn also means improvement in quality education in Indonesia.

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