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The Informatics Olympiad in Mongolia

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Abstract. The Informatics Olympiad plays key role in introducing Information and Communication Technology (ICT) to Mongolian secondary schools. It is one of the biggest ICT related competition among Mongolian secondary school teachers and students. The goals of the Informatics Olympiad are to stimulate interest in informatics and information technology, and to bring together exceptionally talented teachers and students from all over Mongolia. Mongolian Informatics Association organizes annual national informatics Olympiads in cooperation with the Ministry of Education, Culture and Science (MOECS) and other universities for the 21st year. For past years, a number of activities were implemented to enhance the informatics Olympiads, such as training of informatics subject teachers, development of training manuals and handbooks with tasks and problems for the informatics Olympiads, various activities to support participation of Mongolian teams in the International Olympiad in Informatics. In this paper, we describe national Informatics Olympiads in Mongolia, informatics education, Mongolian participation in the International Olympiad in Informatics (IOI), and related key issues and problems.

Key words: information and communication technology, informatics education, informatics competitions, programming contests, informatics olympiad, Mongolia.

1. Informatics Education

Meanwhile, the Ministry of Education, Culture and Science has used Vision-2010 as a model to implement ICT in the education sector, developing an action plan which was officially approved in 2001. The Vision for ICT in education has four major components, covering following areas:

- training: full utilization of ICT in each educational level's curriculum and contents in order to introduce opportunities provided by ICTs and gain knowledge and skills to use it;

- hardware: supply of hardware allows the conduct of training according to different level of modern ICT development and provides possibilities of free access to information;
- teaching staff: supply of teaching staffs which have the capabilities to develop themselves in terms of their own knowledge and skills in line with rapid development of ICT;
- information ware: creation of possibilities of available and accessible information service by establishing educational information database and network (MOECS ICT Vision, 2001).

The informatics education in secondary schools plays key role to reach to the implementation of the Vision for ICT in education. The informatics as a subject has been included in the secondary school curriculum in Mongolia since 1988. The old curriculum covered basic concepts of informatics, basics of algorithms and programming and it was not fully covered due to lack of hardware facilities such as computers, trainings were mostly concentrated on providing programming and algorithm development skills.

For past years, a number of activities were implemented to enhance the informatics curriculum, such as development of standards, training of informatics teachers, development of training manuals and materials for the informatics subjects in secondary schools. One of the most important steps taken by government to improve informatics training was development of first standard for informatics education during year 2000–2004. Within this standard Informatics subject taught starting from 5th grade from the academic year 2005–2006. This standard has the following advantages (Uyanga, 2005):

- development of the educational standard of informatics by using the content standard of informatics in complete secondary schools;
- focused more on competence based goal than the subjective goal;
- the content standard is based on domains of systematic knowledge of the informatics science;
- assess not only to knowledge and capability, but also the competences accumulated;
- abundance of individuals needs, more than the social needs;
- the standard is tailored to primary, secondary and complete secondary education respectively;
- the content standard has clear focus, that the trainees gain knowledge and skills to use the informatics, computer and information technology effectively and efficiently, and to resolve the issues met in real life situation and the other trainings by using them;
- needs and demands of informatics education and standards are determined based on the needs of individuals and society;
- the standard is supervised that teachers of informatics not only teach the informatics, computer and information technology, but also develop the skills of students to use them effectively and individually;
- the standard instructs that the teachers of informatics should create the environment to implement the standard successfully by supporting other teachers to widely use informatics, computer and information technology in their teaching;

- comprised the correlation between other educational fields;
- the content is well suited to the international standards according to the contents of documents and standards for ICT education by specialized international organizations;
- independent of certain tools and types of information technology.

The new standard does not cover programming, so the students have to study programming by themselves or they can choose to study it as an additional subject after consulting with their teachers.

Due to the implementation of new Informatics Education Standard in academic year 2005–2006, Informatics textbooks for 5–11 grades are being written.

Also institutions which train professional informatics teacher are planning to update their curriculum to reflect the changes. Nationwide re-trainings for informatics teachers are constantly organized since academic year 2003 as to follow the new standards. The "ICT Vision 2010 in Education Sector of Mongolia" has objectives to conduct training and re-training of teaching staff in secondary schools, expansion of professional teachers' training activities considering the increase of professional teaching staff in informatics up to 90% by year 2007. However, secondary schools still lack of professional informatics teachers. In order to increase supply of informatics teachers, government is taking various measures to foster applicants from rural areas such as by means of tuition fee discount; scholarship under local government contract; retraining of teachers etc. These measures still do not solve needs for informatics teacher. Graduates with informatics teacher certification in most cases move to work in non-educational sectors, in government, non government organizations, private enterprises and companies.

2. National Informatics Olympiad

The first National Informatics Olympiad was organized in 1987. Mongolian Informatics Association is responsible for organizing all annual national informatics Olympiads in cooperation with the Ministry of Education, Culture and Science, other universities and ICT companies. There are some public and private organizations who support national Informatics Olympiad. The Olympiad is organized annually in three levels: districts, city/province and national. Students acquiring high points are admitted to the next level. The winners of the national Olympiad participate in the International Olympiad in Informatics. The Olympiad is organized in two categories: students and teachers. The students contest consists of two days computer programming and one day for teachers. The winner students receive invitation to study in IT related local universities. The Government pays tuition fee for first two year for these students. The software application competition among students is organized during Informatics Olympiad. Students usually develop a computer application using Delphi, Visual Basic, Flash and other technologies.

3. Mongolian Team in IOI

The Mongolian Informatics Association sends a team with four members to represent Mongolia at the International Olympiad in Informatics (IOI) each year. The Ministry of Education, Culture and Science allocates annual budget for the team to participate at the IOI. Mostly it only covers half of total expenses. For past years, Mongolian students and teachers have participated in IOI 1989–1991 (in Bulgaria, Belarus and Greece), IOI 1999–2000 (in Turkey and China), in IOI 2002 (Korea) and IOI in 2004–2006 (in Greece, Poland and Mexico). The Mongolian team had participated in nine IOI and received two bronze medals from IOI 2005.

The key problems of Mongolian team to participate in the IOI are followings:

- Weak English language. Due to language barriers students can not fully understand tasks, use online internet sources. It creates problems for students to attend in online Olympiads.
- Financial problems. In most cases the budget that allocated by the Ministry of Education, Culture and Science could not cover all expenses.
- Difficulty with visa. As a developing country, for Mongolians to get a visa to developed countries is a big problem. Due to visa problem Mongolian team did not participate in IOI 2001 (Finland), 2002 (Germany) and 2003 (USA).
- Lack of students skills and knowledge related to modern technologies.
- Lack of programming and algorithm development skills. Current standard for informatics education does not cover programming.

4. Key Issues and Problems

The quality, skills, interests, knowledge, and competence of the participants are increasing from year to the year. Also the teachers who prepare and train the participants are working with their students very hard. The Ministry of Education, Culture and Science and other universities and organizations in Mongolia, support the National Informatics Olympiad. Even if these organizations contribute for the National Informatics Olympiad, there are still some obstacles. ICT development is still not good enough in Mongolia. However Informatics training at rural schools are limited by computer hardware and skilled teachers supply.

1. The teachers' development and skills in rural area is poorer. The students participating in the Olympiad from the bigger and central cities show higher success rate than those participating from provinces or rural areas.
2. The National Olympiad is held once a year because of poor finance and it is one of the factors that give bad influence to the Olympiad. So the participants in the Olympiad do not have enough experiences and they make some technical and other mistakes.
3. The contents of the national Olympiad also can not meet the secondary curriculum and standard.

4. Experience of the participants is weak because they could not participate in regional and other international Olympiads.
5. The number of the participants is decreasing.
6. The number of teachers who prepare their students for the Olympiad is less and their skills is also not good enough.

Considering conditions mentioned above and current situation, it is appropriate to improve quality of Mongolian Informatics Olympiad and students' knowledge and skills.

The following steps are need to be taken in order to improve the quality of Mongolian Olympiad:

1. To organize domestic Informatics Olympiad in different levels regularly /regional, province, district, and honored contests/.
2. To re-train and prepare teachers who have enough skills for preparing their students for the Informatics Olympiad.
3. To increase the opportunity to teach programming via advanced and elective modules or training for talented students.
4. There are still some problems to be solved according to the evaluation of the Informatics Olympiad. Especially it is needed to develop and use the automatic and online evaluation system which meets the international requirements.
5. The content of Mongolian curriculum must be improved and increased.
6. The English knowledge of the students must be improved and they have to learn technical terms found in Informatics.
7. To increase and extend the scope of Informatics Olympiad among students.
8. Due to inclusion of informatics subject in primary school, it is better to organize mini Olympiads for those students.
9. Foster students and teachers to share their experiences and best practices.
10. To develop an electronic database for Informatics Olympiad tasks and problems.

5. Summary

Mongolian Informatics Association has been very active and contributed in Mongolian Information and Technology development since it was established. In the future it will do lots of things to develop ICT education, to increase the Olympiad development and to meet the Olympiad quality to the international standard. Mongolian Informatics Association works hard to contribute Mongolian Information and Technology Development and make its strategic and operational plan closer to Electronic Mongolia National Program, Concept of ICT Development of Mongolia by Year 2010, and ICT Vision 2010 in Education Sector of Mongolia.

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