Nobel hopes competition as a means of developing the cognitive interest of students

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Abstract. The importance of carrying competitions among students of general education institutions and the effectiveness of these activities as a means of developing the cognitive interest of students are shown. The article describes the experience of carrying competitions among schoolchildren and students of colleges, accumulated in the Kazan National Research Technological University. It is shown that these activities allow to reveal the creative potential of participants, and form the interest in engineering and design activities, which subsequently affects the choice of school leavers who are in demand in the modern labour market of specialties and professions.

The cognitive interest is the most important person quality which has its selective focus on objects and environmental phenomena that is characterized by a constant desire for new, more complete and deep knowledge. The cognitive interest and activity of students are important indicators of the effectiveness of the learning process, providing conditions for the acquirement of the education content, stimulating the development of search for creative activity, motivating for self-education. The development of cognitive interest, intellectual and creative abilities, identification, support, development and socialization of gifted children are becoming one of the priorities of modern education [1].

One of the directions for creating optimal conditions for the development of cognitive interests of gifted children is the participation of children in various kinds of quizzes, olympiads and competitions.

The report of the government of the Russian Federation on the implementation of the national educational initiative "Our new school" in 2010 says: "It is important to develop a creative environment for identifying particularly gifted children in every secondary school. It is required to develop the system of olympiads and competitions for schoolchildren..." [2].

The competition is one of the recognized forms of work with gifted children. The participation in the competitive movement plays an important role in the formation of the personality of a child, educating a sense of the responsibility for the started work, purposefulness and hard work. Subject competitions
not only support and develop interest to the subject, but also stimulate the activity and independence of students in preparing questions on topics; they help competitors form their creative world. Due to competitions, students can test their knowledge, skills and abilities in the subject not only for themselves, but also for the comparison their level with others.

Kazan National Research Technological University holds an annual competition of research and creative works "Nobel hopes" for schoolchildren of grades 7-11 of general education organizations, students of professional educational organizations of vocational secondary education (not only from Tatarstan, but also from Russia and CIS states). This largest competition of such a high rank for young scientists has been held since 2008 and it covers all the leading natural sciences - chemistry, physics, biology, computer science, mathematics and the block of humanities - history, sociology, economics, which are also developed at university.

The Honorary President of the competition is Konstantin Novoselov who was 2010 Nobel Prize Winner in physics and now a professor at the University of Manchester. Novoselov is the youngest Nobel Prize Winner. The prize was awarded to him as well as to his teacher Andrey Geim for creating a new material with unique properties that is the graphene.

After visiting the University of Manchester as part of the research university development program, a group of KNRTU employees met with Konstantin Novoselov. The Nobel Prize Winner was interested in the offer to head the jury of the school competition. He expressed his agreement in a letter to the rector of KNRTU, where he appealed to young researchers not to be afraid of difficulties and mistakes and to remember that an intensive interest, anxiety for knowledge and discoveries determine the development of the modern world and society as a whole.

The KNRTU Nobel hopes competition is held in the following sections:

- water and biotechnology;
- ecology;
- sociology;
- Russian history and history of Tatarstan;
- nutrition;
- fashion and design;
- tourism;
- chemistry; physics, mathematics;
- IT technologies;
- nanochemistry and nanotechnology;
- mechanics, engineering and technology.

Due to the competition, participants acquire research skills, learn to put forward a scientific hypothesis, make found practical conclusions and outcomes that will help them in their future scientific activities. The participants also get acquainted with KNRTU and this is an invaluable experience for their future student life.

In 2019, the Nobel hopes competition was held in two stages: stage 1 was from October 15, 2018 to February 14, 2019; stage 2 was from February 15 to May 15, 2019. Research and creative works in various categories were accepted for the consideration. The topics of the works could be formulated independently or selected from the topics presented on the KNRTU website.

The first stage of the competition is held in absentia. The finalists of the first stage are determined by the competition commission which was based on the analysis of the submitted works. In the second stage of the competition, a conference is held where the public defense of the works of the winners of the first stage takes place. The performance of the participant in the final of the competition is evaluated by the jury.

The results of the first and second stages of the competition are evaluated according to the criteria on a ten-point system. Whereby, the following indicators are taken into account [3]:
• significance and novelty of the topic;
• correspondence of the project with the topic;
• complexity, completeness and volume of the research;
• justification of the selected methods, conclusions and recommendations;
• independent thinking, logical presentation of the results;
• the degree of elaboration of the research of predecessors, consideration of the data obtained by
  them when discussing their own results;
• originality of formation.

The competitors with the maximum number of points win. At the final stage, the participants who
took the first, second and third prizes, and the absolute winners are determined:

• one first place;
• two second places;
• three third places.

The competition jury also identifies the laureates of the competition, i.e. participants who
demonstrated their knowledge and skills, but did not become winners.

The results of the competition, the winners and laureates of the competition are determined by the
competition jury. The organizing committee, sponsors and other organizations and individuals can set
up their individual prizes for 6 laureates and winners of the competition. The winners and laureates of
the competition are awarded with diplomas, valuable gifts and receive invitations to study in
"Professorial schools" and in the "Orbital" summer camp at KNRTU [3-10].

The winners of the competition that are students of the final classes of general education
organizations and institutions of vocational secondary education, receive an advantage when entering
KNRTU. Educational organizations and their managers who have created conditions for the preparation
of scientific and creative works of students are encouraged by special awards of the organizing
committee and the founders of the competition [11].

According to the results of the competition, KNRTU issues an order containing a list of winners and
laureates of the competition and a decision on their awards. The order of accounting for the results of
the competition for admission to KNRTU is determined by the rules of admission to KNRTU for the
current academic year [12-32].

The Department of Computer Graphics Engineering and Computer-Assisted Design (CGECAD) of
KNRTU annually takes an active part in organizing and carrying the Nobel hopes competition for the
IT-technologies nomination.

The volume of new knowledge has been growing exponentially in the last century. In order to quickly
find the information and use it correctly, there is the field of activity – IT technologies. IT means
Information Technology. Everything related to information – search, storage and transmission - is
related to IT-technologies.

In ancient times, there were also IT-technologies. Knowledge was written on pergumyn, papyrus and
paper. The data transmission was carried out by harbinger, pigeon post. In the 19th century, humanity
opened up the radio and the telegraph. Information was stored in the libraries and archives.

But the information technology boom occurred in the 20th century, when computer technology
appeared. Computer systems have shown the greatest efficiency when working with information, so
when talking about IT, computer technologies are often meant.

Nowadays, information technologies are an integral part of our life. IT specialists, web designers,
programmers are in demand in many organizations. Not for nothing is the century, when we live, called
the age of information or information technology.
Information technology classes provide useful knowledge and skills, improve logical thinking and teach to think in an innovative and complex way.

The competition in the "IT-technologies" nomination was attended by Alekseevsky Agricultural College, Almetyevsk Polytechnic College, Arsky Agro-industrial Professional College, MAEI Gymnasium № 77 in the Naberezhnye Chelny, etc.

The complete list of creative and research works submitted for the competition is as follows:

- Computer graphics on the example of "Paint Tool SAI" and the Paint standard program;
- Development of software for an automated mission control system in the form of a web application for the department of the automated process control system;
- Development of an interactive foreign language learning system "Dictionary+" in the JavaScript programming environment;
- Studying the creation of computer viruses;
- Producing the "Lunokhod 1" model as a textbook for students;
- Creating the information and educational web-portal of the scientific society of students "Otkrytiye»;
- Windows OS security;
- Using Sony Vegas Pro 13.0 and Audacity to create an educational multimedia product;
- Building a computer – my experience;
- Electronic textbook for 8th grade in the section "Quadratic equations»;
- Development of science and robotics in the modern world;
- Application of natural optimization methods in programming;
- Creating an animated image using the tools of computer mathematics (Maple);
- Modelling an animated cascade of opening matryoshka dolls in the Maple system;
- Website security;
- Electronic educational resource for teachers;
- From the 3D model created in the CAD system to the finished product – one step;
- Logical games in the Scratch.

In the second round, the competition commission selected works:

- Creating the information and educational web-portal of the scientific society of students "Otkrytiye»;
- Development of software for an automated mission control system in the form of a web application for the department of the automated process control system;
- Producing the "Lunokhod 1" model as a textbook for students;
- Electronic textbook for 8th grade in the section "Quadratic equations»;
- Application of natural optimization methods in programming;
- Creating an animated image using the tools of computer mathematics (Maple);
- Website security.

As a result, in the second round, places were divided between the works:

First place:
- Development of software for an automated mission control system in the form of a web application for the department of the automated process control system;

Second place:
- Producing the "Lunokhod 1" model as a textbook for students;
- Creating an animated image using the tools of computer mathematics (Maple);

Third place:
- Electronic textbook for 8th grade in the section "Quadratic equations».
The competitions on IT-technologies are both difficult and very interesting. They require careful preparation and hard work. To win a prize in such a competition, a participant should put a lot of physical and intellectual effort, as well as use all their creative potential.

Participation in the competitions on IT-technologies contributes not only to the development of technical talent, but also creates a steady interest in the engineering and design types of professional activity, which gives an opportunity to get a profession that is in demand on the modern labour market. Professional competitions can be considered as a tool for effective educational and career-guidance works among young people.

Participation in these events allows to assess the level of knowledge of participants and motivate them to study the subject more deeply, identify the most capable and gifted children, contribute to the formation of personality and the development of the cognitive interest of students.

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