

SCHOOL COMPETITION ON STATISTICS: COOPERATION BETWEEN THE RUSSIAN ASSOCIATION OF STATISTICIANS, ROSSTAT AND UNIVERSITIES

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In 2017 Russian Association of Statisticians (RASt), the Russian Statistical Service (Rosstat) and several universities jointly organized a school competition on statistics (“Trend”). This event has become a major interest for the organizers. For the RASt, it is a strategic goal, Rosstat is interested in promoting official statistics among schoolchildren and universities prepare potential students for themselves. In the first round, schoolchildren have two options of their choice. (1) “Learning to collect statistics” requires carrying out a survey in school to collect statistical data and prepare a presentation “Portrait of a peer”. (2) “Learning to analyze statistics” requires analysis of data from the official website of the Rosstat regional office. In the second round, the winners participate in the online quiz using the Rosstat network.

INTRODUCTION

Technical competitions of different kinds among pupils of age 11-16 are widely used in the Russian Federation as a method of identification of talented children, as well as an informational tool aimed at improving the all type of literacy. These are academic competitions held on different territorial levels, starting from districts and going up to national and international level. Some of them have an acknowledged by the Ministry of Education of the Russian Federation status of an Olympiad. This status normally gives the opportunity for winners to ensure the enrolment without exams in the high-ranked universities. Another type of competition i.e. an academic contest - allows the winners to apply for a student scholarship in the future. Very deep analyses of the importance and positive impact of academic competitions of different kinds and levels on the “gifted education” and educational system in general in Russia may be found in Yurkevich V.S., B.M. Davidovich (2009), O.V. Shatunova, A.B. Sergeeva (2014).

Within this acknowledgement of a years proven methodology of working with gifted children, in the interest of increasing literacy in the field of statistics the Russian Association of Statisticians (RASt) together with the Russian Federal Statistical Service (Rosstat) found it highly important to start organizing the First All-Russian Contest on Statistics “Trend” in 2017-2018.

As a discipline, Statistics has been recently included into the qualification group of Mathematics in Russian Classification of Education. This is in line with international practice. But the contents of traditional mathematical competitions for pupils are still not covering all necessary statistical issues, thus there is a strong necessity to organise an autonomous purely statistical competition. Moreover, the recently established educational standards for bachelor and master degrees in Statistics allow us in the future to upgrade our competition status to the All-Russian Olympiad in order to prepare the potential students, and to serve as an enrolment criterion in universities for the most talented ones.

STRUCTURE AND DETAILS OF THE COMPETITION

The All-Russian contest “Trend” is a two-round competition, including *regional* and *national* levels. The uniqueness of the organizational part of the contest is a collaboration between the educational institutions and non-educational organizations.

As it has been stated above the contest organizers were RASt responsible for management, monitoring, documentary support of the contest and Rosstat, providing resource support and online platform for the second round of the contest. The partners of the contest included St. Petersburg State University of Economics, responsible for the methodological part and contents of the contest. The partners of the contest were Moscow Centre for Continuous Mathematical Education, Laboratory of Probability and Statistics. The Organizing committee comprised 5 members from the Rosstat, RASt and International Institute for Statistical Education of Higher School of Economics.

The contest falls under the decree of the President of the Russian Federation "On measures of state support for persons who have shown outstanding abilities". The winning of the contest "Trend" together with becoming a full-time student gives the possibility to apply for a grant of the President of Russia in the amount of around 330 dollars per month.

The contest was held in more than 110 schools in 24 Russian regions with more than 350 registered participants. There were also 24 regional organizing committees and jury groups responsible for organizing the 1st round of contest in schools and choosing the winners locally.

1st round of the contest

The 1st round of the contest was organized at the regional level and served as a qualifying round for the national level of the competition. Each region chose one winner and three awardees within one nomination by the maximum amount of points.

The participants were allowed to compete within two nominations:

- "Learning to collect statistical data";
- "Learning to analyse statistical data".

In "*Learning to collect statistical data*" nomination the formal task was to "Conduct a research on the "Portrait of my peers" (school class, section, club, music, art, sports school, etc.)."

The pupils were to prepare a research (define the object of observation, units of observation, including no fewer than 30 respondents, studied period of time and single duration of the survey for all respondents no longer than two weeks), make a survey (practical part), analyse the results (analytical part).

The participants of the nomination were composing the questions with the presupposed answers, formalizing the response form. The questions should have been designed in a way guaranteeing maximum honest and willing response from the respondents taking into account the reasonable size of the survey. After the survey was done the participants were supposed to generalize, group, analyse and present the results in the form of graphs and tables together with analytical summary of the research. The methodology for survey analysis included examples of simple and combinational grouping of data results (Table 1)

Table 1			
Example of proposed combinational grouping of results			
Gender	Age, in years		Total
	<14	=>14	
Girls			
Boys			
Total			

In case the participants were preparing multidimensional survey and combinational grouping of results the following organizational plan was proposed to be followed.

Table 2		
Example of the organizational plan		
№	Work stage	Duration
1.	Task setting for data collection	from ... to ...
2.	Defining the research object, survey unit, time and duration of the survey	from ... to ...
3.	Questionnaire design	from ... to ...
4.	Survey implementation	from ... to ...

5.	Control of completeness and correctness of answers given	from ... to ...
6.	Generalization. Preparing the tables and graphs.	from ... to ...
7.	Analysis of results. Preparation of analytical summary.	from ... to ...
	Total	30 days

In “*Learning to analyse statistical data*” the formal task was to “Conduct a research of the population welfare using the statistical sources.

Requirements included data collection using the following resources:

- database of regional branches of Federal service of state statistics,
- database of Federal service of state statistics (<http://www.gks.ru/>),
- specialized databases ЕМИСС (<https://www.fedstat.ru/>);
- Central Base of Statistical Data (<http://cbsd.gks.ru/>)”

Methodological instructions comprised the following steps:

- 1) to use the study books on the Theory of Statistics and social-economic statistics in order to learn the following concepts:
 - main population welfare indicators, their design and sources of data;
 - main rules for making tables and graphs;
 - methods for calculating averages;
 - variance measurement;
 - variable dynamics measurement.
- 2) to prepare the research plan addressing the following issues:
 - type of information, characterizing the population welfare;
 - indicators;
 - period of the research;
 - method of analysis;
 - form of the presentation of results;

The methodology for implementation of this task included instructions on the peculiarities of time series analysis, from the point of view of their compatibility, such aspects as differences between the data at the moment and time interval.

The secondary aim of including this type of nomination in the contest was to familiarize the pupils with the use of official statistics websites: their navigation, structure and contents.

IInd round of the contest

The IInd national round of the contest was divided into two stages: qualifying and final.

During the *qualifying stage*, the Central jury chose 10 participants out of winners of the regional round, based on their video presentations of the results of their research in the 1st round. The preparation of the video presentations of the winners of the regional round was conducted with the support of educational institutions, the territorial bodies of the Rosstat and regional branches of the RAS. Video presentations were posted on the Competition website in the personal accounts of the participants.

The *final stage* was held in the form of a full-time videoconference, using the online network of the Rosstat. At the videoconference the 10 participants took part in an oral quiz on statistical topics and the winner was determined by the maximum amount of the points scored. The points were awarded on the basis of the correctness and completeness of the answers to the questions given.

Results of the contest were directed to the Ministry of education and science of the Russian Federation. Based on these results and provided the winners are enrolled in the university in the future the Ministry of the education and science will give them the opportunity to apply for the grant of the President of Russia, mentioned above.

Moreover, some of the winners of the qualifying stage of the 1st round of the contest were awarded with special prizes, set up by the Ministry of economic development, Rosstat and UNESCO. For example, the Ministry of Economic Development of the Russian Federation prepared a Book on Economic Development of the Russian Federation in 2017, signed by the Minister Maksim S. Oreshkin.

All the other awardees also received special bonuses e.g. CD's with Statistical Encyclopaedia, Statistical handbook and a Book on the History of Russian Statistics. These prizes went in line with our main mission to increase the statistical literacy among pupils.

LESSONS TO BE LEARNT

While organizing the contest, we clearly designed the contest for children, aimed at motivating them to have more interest in statistics, rather than assessing their current knowledge in this sphere. Thus, we designed the tasks for the pupils to be able to use the format “learning by doing – learning by playing”. Due to this approach we ended up with some unexpected results.

In particular, we found out that most pupils were paying more attention to the sociologist role of the survey rather than a statistician role. This resulted in more effort put into the conducting the survey and designing the questions in general rather than collecting representative dataset. Moreover, as long as the 1st nomination involved more personal communication, simple goal and game-like form the pupils preferred it more to the 2nd nomination. The 2nd nomination required more technical skills and expertise in statistics from the part of the teachers helping pupils with studying the materials.

Taking this into account and in the interest of achieving the declared goal, we have come to the conclusion that further implementation of the contest requires preliminary training in the regions and methodological instructions for the teachers at schools.

CONCLUSION

The organization of the 1st Statistical contest “Trend” proved to be a very beneficial and valuable event. The central goal of the contest was to familiarize the pupils with the profession of a statistician and with the field of statistics in general. Although the goal was achieved, and the contest contributed to the statistical literacy in schools, some of the expected results were not received.

We will surely improve the contest towards organizing more preliminary training for teachers, as well as enlarging the list of participants by including more regions of the Russian Federation. Even though the scope of the contest was not our primary goal, we still consider it very important to move towards its increase in the future. What is more important is to invite schools from the Far East and Northern regions of Russia, especially children from schools situated in villages and small towns, thus providing them with equal opportunities and access to higher education in general and studies in statistics in particular.

Another point to be underlined is our long-term objective to upgrade the status of the contest to the international level, inviting Russian-speaking children from other countries, especially from CIS to participate and, what is even more important, to make sure that our winners are skilled enough to participate in the European Statistics Olympics (ESO). For this purpose, we will keep on designing our tasks to be comparable with the ESO and we will build up the ways to ensure our participation in the future.

Finally, we are very interested and willing to build up communication with International Association of Statistical Education and UNESCO.

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