московья и других регионов страны о сотрудничестве в области довузовской подготовки. Университет в этом плане оказывает школам организационную, методическую и кадровую помощь.

Актуальность совместных действий подтверждена решениями столичного правительства. 27 августа 2013 года на его заседании городской глава С. Собянин рассказал о пилотном проекте по организации профильного обучения в высших учебных заведениях, расположенных на территории Москвы: «Мы договорились с ректорами о проведении такого эксперимента – создании при вузах 10–11 классов, где можно получить полноценное образование и, с другой стороны, подготовиться в конкретный вуз» (http://www.mos.ru/authority/activity/education/index.php?id_14=26723).

Обучение в подобной форме позволяет школьникам получать знания непосредственно от преподавателей вузов. Уже с 1 сентября 2013 года в Высшей школе экономики, Московском государственном университете путей сообщения (МИИТ), МИФИ и РГГУ планировалось иметь 671 старшеклассника в пилотных классах, констатировал и.о.руководителя департамента образования И.Калина.

Интерес вузов к этому проекту растет, и в дальнейшем их количество среди сотрудничающих со школами увеличится. В соответствии с результатами опроса Московского центра качества образования, уже 11 тыс. учеников 8–10 классов выразили желание учиться в лицеях, находящихся в составе высших учебных заведений.

Финансирование обучения старшеклассников в вузах должно осуществляться за счёт бюджета города Москвы по единым нормативам. ●

ON IMPROVING THE QUALITY OF MATHEMATICAL KNOWLEDGE

Vinogradov, Valentine V. *– D. Sc. (Tech), professor, the first vice-rector – vice rector for education of Moscow State University of Railway Engineering (MIIT), Moscow, Russia.*

Kochneva, Lyudmila F. *– Ph.D. (Tech), associate professor, head of the department of mathematics of Moscow State University of Railway Engineering (MIIT), Moscow, Russia.*

Platonova, Olga A. *– Ph.D. (Physics and Mathematics), associate professor, head of the department of higher mathematics of Moscow State University of Railway Engineering (MIIT), Moscow, Russia.*

ABSTRACT

Decline in the level of mathematical knowledge at school, along with a general deterioration of competences of prospective students entering technical higher education institutions exacerbate the quality of acquisition of knowledge in engineering disciplines. Lecturers of Mathematics and Physics departments of MIIT in cooperation with the schools of North-East Administrative District of Moscow created a program of additional study of mathematics, which is designed to reduce the gap between the current level of school training and requirements of higher education institutions to newcomers, beginning to study at universities. The article presents the first results of a promising cooperation.

ENGLISH SUMMARY

Background. *The issues of improving the quality of education are touched upon in numerous publications in the press, at themed conferences, educational community have long recognized the relevance of the related tasks, and the consequences of increasing loss of knowledge among the younger generation of Russians. Department of Education of the Government of Moscow, as well as other regional specialized agencies appealed for improving the quality of training of school children of the capital in the most serious academic disciplines (mathematics, physics, computer science, foreign language). It was supposed to involve in the implementation of the planned program not only school teachers but also professional teams of lectures of Moscow higher education institutions. Location of MIIT with its powerful innovative educational base in the North-East Administrative District gave an impetus to the idea of combining intellectual and organizational resources of the University and the schools of this administrative district.*

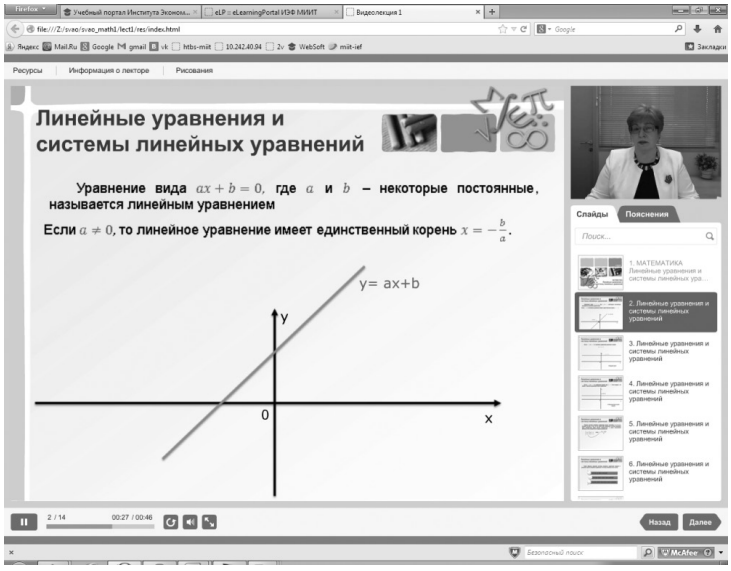
Objective. *The objective of the authors is to provide some useful data on a new approach to enhance knowledge of school children in mathematical disciplines, which is implemented by MIIT and school of North-East Administrative District of Moscow.*

Methods. *The authors use descriptive method.*

Results. *It is in four areas of education, highlighted by the Moscow department, there is the most conspicuous gap between schooling and requirements of a higher education institution to students, starting their learning. Deep and strong basic school knowledge is the basis of successful acquisition of university programs in engineering disciplines and future career of today's students.*

To implement the objectives of improving the quality of school children knowledge, in particular, in mathematics, lecturers of mathematical departments of MIIT conducted analytical and methodological work related to the assessment of the current state of school training, identifying the most pressing issues and identifying measures to eliminate them. Representatives of physical departments of the University conducted similar operations.

After discussion with school teachers of North-East Administrative District a program was



Pic. 1. O. A. Platonova conducts a video lecture.

developed for additional study of mathematics that uses a unique modular approach with the ability of continuous development and subsequent changes in the individual modules. A distinctive feature of this created complex was using the portal MIIT- schools of North-East Administrative District.

Guidance papers and webinars, which are posted on this portal, caught the interest of many school children and arouse many questions.

In addition, there are video lectures on fundamental topics of the course in mathematics, as well as system of training tasks, which are free to be used by visitors of the portal.

The practical significance of the joint program of a school and a higher educational institution is the ability to:

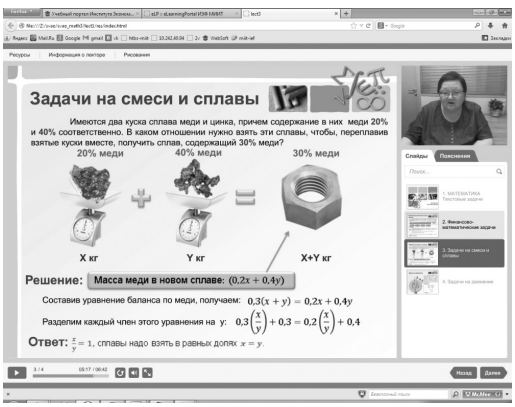
• give a deeper knowledge of complex subjects of the course in mathematics to meet the requirements of future university programs;

• change the sequence of presentation of program modules, taking into account the variety of textbooks used in schools;

• study video lectures on the portal (in any quantity and at any time);

• use a system of special training to test knowledge.

Classes on the proposed program require regardless of time expenditures to identify children with high intellectual abilities, interest in independent cognitive activity and to create conditions to bring their talent to light.



Pic. 2. L. F. Kochneva conducts a webinar.

Analysis of the final school tests (EGE) showed massive difficulties in dealing with the so-called text tasks using the notion of a module. Namely, their specificity is the closest for duties of an engineer or an economist. After all, the solution of any text task means mostly an ability to construct a mathematical model of the process in question, and to find an adequate method of calculation. University lecturers constantly face challenges, when students have to interpret correctly the texts proposed for consideration.

One characteristic nuance: EGE results show that a particular school child is consistently good at solving tasks of one type and also consistently makes mistakes in the tasks of other types. The university has prepared and tested an innovative system of training assignments on specific types of tasks (group B). This gives a school child a chance to learn to deal with just those kinds of mathematical tasks that he is not good at.

As lecturers of mathematical departments of MIIT recorded and posted on the portal a few video lectures, it is important to emphasize that this has brought undoubted benefits, e. g. they give a school child an opportunuty to:

• work with offered materials at a convenient time;

• listen to a lecture as many times as it takes for a complete digestion of the material;

• ask questions at the next webinar.

It should be noted that video lectures are accompanied by interesting graphic material designed to make digestion more vivid and memorable (see Pic. 1, 2).

Conclusion. *The first results of the application of a developed program designed to improve the quality of mathematical training of school children demonstrate:*

– Great interest of school children from North-East Administrative District in the program;

– The need to continue this work, which is useful both for schools and for the university;

– Willingness to seek new forms of cooperation with potential students, which give school children a sustainable need to obtain professional knowledge;

– The possibility, which was proved by network interaction, to make distance learning of students more efficient in future.

Keywords: education, higher education institution, school, mathematics, quality of education, joint program, innovative approach.

REFERENCES

1. Kochneva, L.F., Platonova, O. A. Organization of interaction with schools of North-East Administrative District (mathematics) [*Organizatsiya vzaimodeystviya so shkolami SVAO (matematika)*]. Conference Proceedings «DOT: problems and methods», Moscow, MIIT, 2014, pp. 13–15.

Координаты авторов (contact information): Виноградов В. В. (Vinogradov, V. V.) – +7 (495) 684–21–10, Кочнева Л. Ф. (Kochneva, L. F.), Платонова О. А. (Platonova, O. A.) – platonovym@mail.ru.

Статья поступила в редакцию / article received 02.05.2014
Принята к публикации / article accepted 04.07.2014

In a broader context the problem of advanced adaptation of knowledge, acquired by pupils in secondary school, to the requirements determined by university syllabus is one of the most important and frequently discussed. It is of the same importance for the entrants themselves as well as for the technical universities.

It was as long as in 1996 that Moscow State University of Railway Engineering established a special faculty of pre-university training intended for 9th to 11th year pupils of secondary schools (last three years before graduation in Russia). The training is delivered in classes, par correspondence, in remote and blended forms as well as in special weekend groups. The curriculum depends on the further targeted university courses and covers all the disciplines that are considered at the enrollment, including mathematics, physics, Russian language and literature, foreign languages, Russian history, social sciences, geography, biology, chemistry. The faculty also serves a base for the club of young railway men for the pupils of 8th to 11th classes of secondary schools. The meetings and classes in the club are useful for those who would like to begin a professional rail career or is interested by technical developments in transport sphere. The courses last for 4 years. After every academic year the pupils have possibility to work at Small Moscow children railway (in Kratovo near Moscow) where they can develop practical skills of rail professions, e. g. of a locomotive driver assistant or of a locomotive driver. The faculty has traditional relations with many secondary schools in Moscow, Moscow and other Russian regions based on the agreement on pre-university training. The MIIT University rends organization, methodological assistance and staff to the schools in order to provide quality pre-university training.

The urgency of such training (realized inter alia for a long time in MIIT) has been recently confirmed by the decisions of the government of the city of Moscow. The Moscow major Sergey Sobianin during the session of Moscow government on the 27th of August 2013 spoke about a pilot project of targeted training in higher educational institutions of Moscow. «We have come to a n agreement with rectors to hold such an experiment. We shall create classes in the universities for the pupils of 10–11th classes where they can obtain secondary education and at the same time prepare themselves to enter the given university», he said (http://www.mos.ru/authority/activity/education/index.php?id_14=26723)..

The pilot classes will give opportunity to have classes using the structures of higher school and to get knowledge directly from university professors. The first stage was planned to be held in Higher school of economics, Moscow, State University of Railway Engineering, Moscow Engineering and Physics Institute (University), Russian State University of Humanities. The head of Moscow city education department outlined the growing interest of other universities to the project that would result in the growing number of participants. In accordance with the results of a survey held by Moscow center of education quality more than 11 thousand senior pupils expressed their desire to continue their studies in that type of lycees or junior colleges within the universities. The funding of training will be supported by Moscow city budget on the basis of respective common city standards. ●