THE PEDAGOGICAL UNIVERSITY OF THE FUTURE

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ABSTRACT

In the article is regarded the question concerning the reasonability of school teachers' training in profile pedagogical Universities on the bases of the fundamental research studies, done by the staff of the University.

UDC CODE & KEYWORDS

■ UDC: 378 ■ A Profile Pedagogical University ■ Fundamental Research Studies ■ The Center of Transfer Technologies ■ Development of Innovative and Importing Backup Remedies ■

INTRODUCTION

Yaroslavl State Pedagogical University was founded in 1908 due to the Order of Emperor Nikolai II. In 1945 the University was named after the Great Russian Teacher K.D.Ushinsky. In 2008 YSPU named after K.D.Ushinsky due to the Decree of the Russian Federation Government Chairman V.V.Putin celebrated its 100 anniversary, having prepared during these years 75 000 certificated specialists.

In present the University, being a huge center of education, science and culture, is training specialists in 45 directions, 9 specialties of doctoral candidacy and 40 specialties in postgraduate education. There are about 10 000 students in the University, 300 post-graduate students, 30 doctoral candidates, 1000 employees including about 100 doctoral candidates, 350 candidates of science, associate professors.

YSPU named after K.D.Ushinsky is a multi-profile University, regarding its predestination in training of teachers, journalists, and specialists in the sphere of advertising, tourism, sport, publishing business, pharmacology etc., in training of the University teachers and researchers. Classes with students are organized in the University on the bases of functioning 35 scientific schools recognized by the public in 14 fields of the scientific knowledge. During last 5 years 8 University research officers became prize-winners of the Russian Federation Government and the President's Awards in Science and Education. University governing body considers teachers' training in the research sphere to be the most important, training their research activity skills in order when they come into school; they would be creative teachers able to bring up these qualities in their pupils.

Annually 45 initiatory topics are included into the University thematic researching plan, 20-30 themes are financed from different sources – federal purpose programs, sector programs, tasks and contracts with the Ministry of Education and Science, grants of the Russian Fund of Fundamental Researches and the Russian Humanitarian Scientific Fund, contracts with enterprises of a real economic sector of Russia, the USA and other countries. Amount of the University scientific activity financing for the last 5 years consisted of 400 million roubles, in 2010 – 160 million roubles. Due to the results of scientific researches in the University publishing house every year there are published 30-40 monographs, 10-15 manuals, 200-250 teaching aids, quarterly scientific magazine "Yaroslavl Pedagogical

Bulletin" which is included into the list of the Higher Certification Commission (VAK of RF). There are 9 Councils functioning to defend doctoral and candidate dissertations where 100 dissertations are defended annually.

There is a fundamental library in the University which possesses a unique fund of manuscripts and rare books (1,3 million of items). There is a corporate net in the University connecting all the buildings, administrative, scientific and educational departments consisting of seven local nets and ten servers. In 2008 the University became a winner of the project of the federal purpose programme of education development "Management and Development Net Interaction of Institutions of Higher Professional Education with Scientific and Industrial Organizations in the Interests of Staff Support of Huge National and Regional Projects in the sphere of Aircraft Building, Mechanical Engineering, Energetics, Machine Tool Construction, Building, Pedagogical and Judicial Education". Due to this project the University received educational and scientific equipment to the sum of 45 million roubles.

The greatest success in scientific researches and their commercialization, teachers' training, University lecturers and researchers during the last years was achieved by the scientific school in the sphere of Organic Chemistry and its example is a very important in keeping and developing the system of creative teachers' training, teachers accustomed to research processes in a pedagogical higher school.

On the bases of the Decree of the Russian Federation Government dated from April, 2010 #218 "About the Measures of Government Support in Developing Cooperation of Higher Educational Institutions and Organisations Realising Complex Projects on Making High-Technology Production" in 2010 the Agreement between the Ministry of Education and Science and Close Corporation "R-Pharm", between Close Corporation "R-Pharm" and Yaroslavl State Pedagogical University named after K.D.Ushinsky the agreement was signed on development work on the theme "Working out Technologies of Producing Importing Backup Active Pharmaceutical Substances". The full cost of research and developing works is 360 million roubles, the main targets are to work out the synthesis schemes of active pharmaceutical substances for remedies with international nonproprietary names. There must be worked out 35 technologies of production, experimental-industrial regulations to receive 35 active pharmaceutical substances.

Due to this agreement in 2010 it was made and assembled experimental-industrial equipment on developing technologies to produce medical substances. Financing was made from non-budgetary funds of the participants of this agreement realisation.

In 2011 the project of our University - "Creation of the Center of Transfer Technologies, Working out Innovative and Importing Backup Remedies and Staff Training for the Pharmaceutical Industry" - was included into the Federal

Purpose programme "Development of Pharmaceutical and Medical Industry in the Russian Federation during the period up to 2020 and Further Perspective".

This project at the same time is:

- infrastructural – promoting to work out and organize the industry of domestic pharmaceutical production mastering the process of releasing importing backup pharmaceutical production in the market;
- innovative – promoting the formation of the integrated and effective system of making researches, creation of developments, technologies transfer and leading out into the market innovative and importing backup domestic medicines of the world level quality;
- scientific-educational – promoting to form the federal system of training the new type staff for the pharmaceutical industry.

The project supposes to build a scientific-research building of the Center – a business-incubator of a laboratory type with floor area 8600 square meters, which will become a modern base of technology transfer and staff training for the pharmaceutical industry. Design and building works on making the scientific-research building of the Center are planned to be done in 2011-2014, and Center's exploitation will be in 2015.

The project supposes to create research infrastructure for the pharmaceutical branch in the region, working out technologies of getting new high-performance domestic innovative and importing backup remedies.

The project provides the development of the system of training and mastering staff's qualification for the pharmaceutical enterprises and research centers of the Yaroslavl region industry and their fixing in the sphere of science, education and high technologies of the pharmaceutical industry.

The targets of the center's creation:

- formation of the integrated and effective system of making researches, creation of development, technologies transfer and leading out into the market innovative and importing backup domestic medicines;
- creation of technologies transfer;
- working out innovative and importing backup remedies;
- staff training for the pharmaceutical industry.

In order to achieve these targets the center would solve the following tasks:

- development of innovative medical combinations on the bases of high-performance technologies of subtle organic and combinatorial synthesis, further pre-clinical researches and transfer of innovative projects from abroad;
- working out industrial technologies of the substance synthesis of innovative and importing backup remedies and further transfer of these technologies into production;
- making new special educational programs and practical courses to train scientific specialists who deal with developing and production of the innovative pharmaceutical product;
- training staff for the enterprises of Yaroslavl and other pharmaceutical clusters with necessary professions and qualifications for specialists having (or students getting) natural science, technical, medical, pedagogical or classical higher education;

- training scientific-pedagogical staff of higher qualification (candidates and doctors of science on profile specialties) for the higher schools and research centers of Yaroslavl pharmaceutical cluster;
- increasing competitive ability of regional economy by means of contribution into the development of the pharmaceutical cluster.

In the frames of the project cycles of pre-clinic researches will be done directed onto receiving great and various series patentable focused libraries of combinations satisfying special demands. These libraries of combinations have a great interest for Russian private and federal pharmaceutical companies which do not have their own departments on the synthesis of great amount of chemical combinations. Results of these researches must provide receiving innovative products – experimental samples of new potentially biologically active organic combinations satisfying modern demands to the pharmaceutical agents. These combinations are necessary to make further pre-clinic researches and tests (high-performance bioscreening, animal tests) in order to make new remedies (antivirus, antibacterial, anticancer, immunomodulatory, to cure diseases of the central nervous system etc.). Expected amount of work:

- not less than 50 thousands of new samples of potentially biologically active organic combinations by the end of 2015 and not less than 200 thousands by 2020;
- not less than 3 pre-clinical candidates by 2015 and not less than 10 – by 2020;
- not less than 2 clinical candidates by 2015 and not less than 5 – by 2020.

The project supposes working out of science intensive and highly intellectual multistage ways of getting a wide range of high-clean active pharmaceutical substances which are the base for high-performance remedies necessary for production in the Russian Federation and consistent to production with leading domestic manufacturers of ready-made pharmaceutical forms. On the bases of these works will be created modern universal technological schemes of chemical (subtle organic) synthesis and experimental-industrial regulations of scalable processes aimed at transfer into production of high-clean active pharmaceutical substances. Plant capacity on developing processes will provide needs of the Russian Federation due to the wide range of the remedy list. The peculiar feature of the represented works will be high results of productive efficiency, quality, and resource-saving and environmental safety. Expected amount of work – not less than 10 experimental-industrial regulations scalable operations of getting high-clean active pharmaceutical substances (innovative and importing backup) by the end of 2015 and not less than 100 – by 2020.

Work results would be implemented into scientific researches and the educational process in the form of new programme-methodical maintenance (electronic text-books, tutorials, reference and information and work books, e-libraries etc.) corresponding to the modern level of knowledge in the sphere of living systems.

The projects suppose to organize training of enterprises' staff of Yaroslavl pharmaceutical cluster with the necessary professions and qualifications for specialists having (or students getting) natural science, technical, medical, pedagogical or classical higher education. Staff's training will be done in the following 8 qualifications and professions:

- «The Engineer-Researcher on Working Out Innovative Medical Products»;

- «The Chemist-Technologist on Synthesis of Substances»;
- «The Chemist-Analyst of Chemical-Pharmaceutical Manufacture»;
- «The Technologist on Ready Made Remedies - Pelletization, Packaging and Ampouling»;
- «The Manager of Pharmaceutical Engineering»;
- «The Auditor (inspector) on Use of Operating Standards of Manufacture (Rules GMP)»;
- «The Engineer-Programist of Pharmaceutical Manufacture»;
- «The Engineer-Economist of Pharmaceutical Manufacture».

At present YSPU (and consequently the Center founded on its base) has the right and possibilities to do the following professional training and retraining:

- professional retraining with getting Diploma about the additional specialty (more than 500 academic hours);
- refresher training with different themes with getting the Certificate about the refresher training (from 100 up to 500 academic hours);
- short-time refresher training on the programs of the given field with getting the Certificate about short-time refresher training (72-100 academic hours);
- seminars and workshops with getting the certificate of the University (up to 72 academic hours).

At the end of studying there would be given Diploma and Certificate. The Center would cooperate with branch corporations, universities and federal governing structures, initiate working out of professional and educational standards, have the function of gathering and analyzing the world experience of innovative solutions and advanced technologies. In its work the Center would rely on the concept of Long Life Learning, the federal industry policy and the accepted branch strategy. In long time perspective the center's activity would provide high-qualification specialists, their involvement into the business sector, their constant creative development and reproduction. The total amount of the trained specialists would be 100 specialists by 2015 and by 2020 – 1000 specialists with qualifications and professions which are necessary to work at enterprises of Yaroslavl and other pharmaceutical clusters.

Training of the highest qualification staff (candidates and doctors of sciences on profile specialties) would be done that would provide the reproduction of scientific and scientific-pedagogical staff of higher qualification at their position in the sphere of science, education and high pharmaceutical industry technologies. During 4 years 7 candidates of science and 1 doctor of science would be trained.

At creating the Center it is planned to buy and locate on its territory a great base of modern equipment which is simultaneously used on the principle of collective use in technological, scientific-research and educational processes. The base is planned to provide with the following high-tech and advanced devices and machines:

1. A nuclear magnetic resonance spectrograph Varian Inova 500 NMR with the peripheral equipment
2. Liquid chromatomass-spectrometer Shimadzu LCMS – 2020 with the peripheral equipment – 3 items
3. CHNS-O element analyzer EuroVector EuroEA3000
4. Liquid chromatograph Shimadzu CL-30

5. IL- Fourier spectrograph Varian 640-IR
6. Thermoanalyzer DTA 404 PC/4/H Eos
7. Automatic titrator for titration on Fisher's method Mettler Toledo C30 – 3 items
8. Automatic titrator for the acidic-core water titration Metrohm 848 Titrino Plus. – 3 pcs.
9. Preparative chromatograph Shimadzu LC8A – 3 pcs.
10. Temperature-controlled glass nutsch filter with a mixer and reception glass capacity of 20 l.
11. Scales analytical – 20 pcs.
12. The rotor-type evaporator with a flask for drying powders Buchi R215-S. – 10 items
13. PH-meter laboratory stationary. – 5 pcs.
14. Complete adsorptive installation of receiving nitrogen "Grasis" MBA-800.
15. Drying box vacuum VDL EX 115. - 20 pcs.
16. The module of heating-cooling (thermostat) ITH 150 – 10 pcs.
17. Rotational evaporators Heidolph LABOROTA 4002 control/HB/G5. – 20 pcs.
18. Rotational evaporators Heidolph LABOROTA 20 control. – 20 pcs.
19. Vacuum-drying box Binder VDL23. - 20 pcs.
20. Exhaust chemical boxes – 100 pcs.
21. High-speed granulator with the big effort of shift Glatt
22. A dryer granulator Glatt
23. Tablet press Fette
24. The semi-automatic machine of washing up bottles Bausch&Stroebel
25. Sterilizer SBM
26. Lyophilic dryer Telstar – 3 pcs.
27. Reactors Jentec – 5 pcs.
28. The semi-automatic machine of pouring out solutions Bausch&Stroebel
29. Boxing-insulator
30. The hydrogen generator
31. System of clearing air with filters
32. The silent compressor
33. UV – spectrophotometer Shimadzu 1800
34. Gas chromatograph Shimadzu GC - 2010 Plus+autosampler 5000
35. PVK-1,6-12 the high-temperature chamber heater 1650 °C
36. Infrared Fourier spectrometer Shimadzu IRPrestige-21
37. HPLC: Shimadzu LC-20 Promenence. – 2 pcs.
38. Water cleaning system – 4 pcs.
39. The thermostat with registrar Binder BD-115 3 pcs.
40. Automatic digital polarimeter Autopol V
41. Laboratory scales– 50 pcs.
42. The generator of nitrogen GA-100

From the represented list it is seen that high-priced imported industrial equipment would be used at creating of the Center. The use of this high-priced import industrial equipment is proved by the absence of Russian production ones.

Technologies used in the Center provide:

- use of high effective basic technological equipment corresponding to the demands of norms and rules licensed in the Russian Federation;
- rational equipment arrangement providing it to be used in a safe way of the technological process;

The system of the technological process management would be made on the bases of modern control equipment and program-technical devices of control, management and training. The choice of automation technical devices is done with taking into consideration demands for the technological

process, properties of the controlled substances and explosibility and fire risk of the building.

The Center is financed by the Federal budget. The total amount of funds for creating the Center of technology transfer, working out innovative and importing back-up remedies and staff's training for the pharmaceutical industry, is 677 million roubles during 2011-2014 and are shared in the following way:

2011 year – 67,0 million roubles

2012 year – 70,0 million roubles

2013 year – 150,0 million roubles

2014 year – 390,0 million roubles

The Center will influence the social and economic spheres in a positive way.

As the result of the Center important conditions would be done to realize the targets formulated in "Development Strategy of the Pharmaceutical Industry in the Russian Federation up to 2020" ratified by the Order of the Ministry of Industry and Trade of the Russian Federation # 965 dated October 23, 2009, in the federal Law of the Russian Federation dated April 12, 2010 # 681 "About Circulation of Remedies" and other documents regulating federal social development. First of all the main step would be made in decreasing the level of government's dependence from import remedies – the level state bio safety.

The remedies that would be made in this Center would be in 4-100 times cheaper than import analogs.

This Center allows increasing the efficiency of domestic developments of innovative domestic remedies of the new generation. It lets to increase the quantity of highly qualified specialists possessing advanced knowledge in a wide range of technical, natural science disciplines first of all the disciplines of the chemic-pharmaceutical profile. The Center will provide new working vacancies as for highly qualified specialists as well as for young specialists that would prevent Russia from "brain draining".

The creation of the Center has the following effect:

- saving of finances of the federal budget, budgets of the Russian Federation Subjects, local budgets due to the concentration of finances directed into one organization which is responsible for all parts of the ratified calendar plan and technical task;
- increasing of competitiveness of the domestic pharmaceutical industry in general and economy of the Yaroslavl region in particular by means of the growth of innovative products and further commercialization of the created technologies in the sphere of pharmaceutical industry;
- appearance of economically proved bases to develop existing and creation in the territory of the Yaroslavl region new pharmaceutical enterprises which will use the Center's developments;
- growth of amount scientific-research and experimental-design works and the innovative activity, formation of the scientific-research developments market, to obtain experience and knowledge in the sphere of commercialization of the scientific potential, increasing the educational service demand.

Conclusion

In the Russian Federation there are many scientific-educational centers (SEC), the main mission of which is cooperation and interaction of scientific researches and

educational programs of a higher school. The established Center has a little bit different SEC targets and tasks. The main difference is that it will not only implement research results into the educational and scientific-pedagogical process but at the same time it will solve a greater problem – development and transfer of modern and different branch technologies for the real production of importing back-up and innovative medical products which is created and developed in the frames of the regional (Yaroslavl) pharmaceutical cluster. Thus, nowadays there are no structural analogs of the supposed variant of the Center. Its creation will have a great meaning in solving the tasks of Russian industry modernization.

At the same time the Center makes an absolutely different situation in Chemistry teacher's training. Student-chemists will have the ability to practice in super advanced laboratories, to work with the scientific staff that in a certain way, in our opinion, will make important consequences for teacher-innovators' formation. Our task is to disseminate this successful experience of chemists into other specialties.