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Development of Specialists' Training Environment for Interdisciplinary Research Projects Using RASA Center in Tomsk as an Example

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At present, the Russian system of higher professional education stands at a pivotal moment. Challenges of globalization and international competition for talented specialists pose new problems for the Russian universities. The article considers experience of Tomsk Polytechnic University in development of environment for training students in interdisciplinary research projects in collaboration with leading scientists and research-educational centers.

Key words: university management, international research collaborations management, research environment development, interdisciplinary research projects, training research staff.

To respond to the international trends and temps of development in 2013 a project of increasing Russian universities' competitiveness was created for the leading world research-educational centers – Project 5-100¹. The basic goal of the Project is “to enhance the capacity of research potential of the Russian universities, strengthen their competitiveness in the global market of educational services”². By 2020 five leading universities of the country are to be included in TOP-100 world universities list according to the QS international rating³.

What does the university competitiveness in the world educational market consist of? According to the QS rating methods a university position in the world market is determined by the values of six indicators with different share⁴: Academic reputation – 40%, reputation among employers –

10%, the ration of students' number to the number of research-teaching staff (RTS) – 20%, citation per one RTS – 20%, share of foreign RTS – 5%, share of foreign students – 5%.

Hence, the universities-Project participants develop the strategy of the indicator achievement in their “road maps” to be ranked upward in the QS rating and increase competitiveness in the global market of educational services. It is just globalization that is one of the prerequisites of the Project development: “If we do not have globally competitive universities, talented specialists will go abroad to study and live there. But if there were some competitive universities, would the most people stay here?”⁵.

According to the data of 2012 in the period from 1989 to 2004 about 25 thousand researchers left Russia, 30

¹ Ukaz № 599 Prezidenta Rossiiskoi Federatsii «O merakh po realizatsii gosudarstvennoi politiki v oblasti obrazovaniya i nauki» [The Order № 599 by the President of the Russian Federation on the Measures of Implementing the Government Policy in the Sphere of Education and Science] (in Russ.).

² O Proekte.5-100 [About Project 5-100], Available at: <http://5top100.ru/about/more-about/>

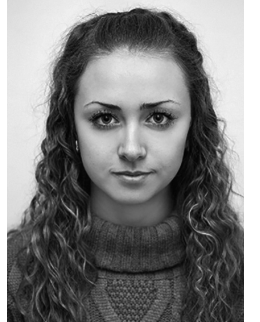
³ Official site of QS Top Universities, Available at: <http://www.topuniversities.com/>

⁴ Methodology of QS Top Universities, Available at: <http://www.topuniversities.com/university-rankings-articles/world-university-rankings/qs-world-university-rankings-methodology>

⁵ Iz interv'yu rektora Tomskogo politekhnicheskogo universiteta P.S. Chubika zhurnalu «Ekspert» [From the interview of Tomsk Polytechnic University rector P.S. Chubik to Expert journal, Available at: http://news.tpu.ru/actual/2013/11/11/20625/?title=universitety_konkuriruyut_za_ummy&print=1



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thousand researchers work on temporary contracts abroad [1]. Based on the latest research, of all Russian students learning abroad only quarter of them plan to return, but 45% are going to stay there, but with the possibility to contact with countrymen [2]. Hence, creation of attractive environment for talented young men is one of the key problems for the Russian universities and the country in general.

The universities-Project 5-100 participants developed unique strategies to place the top positions in the international ratings based on their unique competencies and resources, history and traditions. Thus, National Research Tomsk Polytechnic University, one of the leading participants of Project 5-100, defines its strategic goal as: "Development of TPU as a research university – one of the world leaders in the sphere of resource-efficient technologies solving the global problems of humanity on the way towards sustainable development". Among the key tasks of TPU there is "development of research at the international level; globally competitive engineering education; strategic partnership with academic and business communities, training and involvement of students, researchers, and teachers; transformation of the university into that of mostly Master-Postgraduate type"⁶.

The goal of establishing university of Master-Postgraduate type should be particularly noted. In the TPU rector's report of 2015 and plans for 2016 several goals directly related to the given task for 2016 were stated, namely: "to provide master-students and post-graduates with practical

research (by research supervisors as well) so that they could perform their dissertation works on-time and at high standard; to develop and implement a new concept of post-graduate programme, to start-up at least one new unique educational programme in every educational-research institute of TPU; to set the groups for Master "double degree" programme training, network Master programmes; Master programmes implemented for industrial partners; English-language Master programmes"⁷. Up to 2020 the goal is to increase the share of post-graduates, master-and doctoral students to 55%.

Establishment of university of Master-Postgraduate type prescribes significant transformations in all university management systems. It is necessary to provide the conditions under which the critical amount of researchers would consist of "post-graduates, master-students as well as foreign scientists with modern research competences", that will be enhanced, among other factors, by network cooperation⁸. In other words, two mechanisms will be used simultaneously – education of TPU own researchers and involvement of leading world specialists who will share their unique knowledge and educate the young generation of TPU. The second mechanism may be implemented most efficiently under the condition of international network cooperation since such a form of scientific cooperation is one of the most popular and efficient at the moment to respond the scientific challenges [3]. The university will be attractive for the talented youth and highly-qualified specialists in the world

⁶ Programma povysheniya konkurentosposobnosti NI TPU [Programme of increasing TPU competitiveness], available at: <http://xn--80abucjiihbv9a.xn--p1ai/%D0%BD%D0%BE%D0%B2%D0%BE%D1%81%D1%82%D0%B8/3503/%D1%84%D0%B0%D0%B9%D0%BB/2383/13.07.07-%D0%9F%D1%80%D0%B5%D0%B7%D0%B5%D0%BD%D1%82%D0%B0%D1%86%D0%B8%D1%8F-%D0%A2%D0%9F%D0%A3.pdf>

⁷ "Ob itogakh raboty Natsional'nogo issledovatel'skogo Tomskogo politekhnicheskogo universiteta v 2015 godu i zadachakh na 2016 god" [About results of National research Tomsk Polytechnic University in 2015 and tasks for 2016], available at: <http://tpu.ru/today/facts-numbers/reports/>

⁸ Interv'yu s rektorami TPU i TGU «Chto zhdet dva vedushchikh vuza Tomsk? Minobnauki odobril plany razvitiya natsional'no-issledovatel'skikh universitetov [The interview of TPU and TSU Rectors "What is expected to be with two universities of Tomsk?" The Ministry of Education approved the development plans of national research universities], available at: <http://sibterra.info/News/2013/10/29/alma-mater>

education-research market when TPU performs unique international research or implement unique Master and Post-graduate programmes. Besides, taking into account the fact that contemporary investigations are mostly cross-disciplinary, the interdisciplinary projects have become a constitutive element of the environment where young specialists are to be trained.

The concept "environment" was coined in pedagogical philosophy and sociology by I. Ten in the 20th century. In the 70 – 90's of the 20th century the given concept was of particular interest due to development of the theories dealing with essence, content, and structure of the environment in educational institutions [4]. Considering the concept of "educational-research environment" in the context of foreign pedagogy, it is necessary to underline inseparability of the given phenomenon with the conditions of high quality of educational and research activity in universities.

In the literature the term "research environment" is treated in the context of "educational-research environment" that implies a complex of internal and external resources, conditions, and organizational structures, which influence scientific and educational processes in higher professional education. According to Newman's definition [5], educational-research environment of a university is characterized by a set of architectural medium, management, research and academic, both formal and informal experience. Merriam [6] defines educational-research environment as a multi-component polymodal phenomenon including physical environment, emotional and psychological climate, a set of social and cultural factors that influence the level of education. Convey determines educational-research environment [7] as a set of objects, subjects, means, and technologies of collection, accumulation, transfer, and processing of academic and professional information as well as its distribution promoting the development of informative interaction among all participants of

the complex system of higher education. J. Raven considers educational-research environment as a pedagogic system of staff training [8].

As the article considers the environment of research international projects, the following definition of research environment was developed: it is a complex system including a set of all social, physical, organizational, and psychological conditions and constantly improving interactions of all participants in research process focused on effective development of research creativity, research culture personal professional qualities, competencies, and self-actualization of teachers and students in the research sphere.

While considering research environment, an important condition is to reveal the mechanisms that would provide internal dynamic development of the elements of educational and research process as well as effective development of different cooperation and integration forms with different participated parts.

The RASA Center in Tomsk may be taken as an example of such environment development⁹ on the basis of Tomsk Polytechnic University. The Center was established in 2015 after signing the Agreement about cooperation of Tomsk Polytechnic University and Russian-Speaking Academic Science Association (RASA). The Center was established, first of all, to develop active community of scientists from all over the world implementing unique interdisciplinary projects. The laboratories of the Center are headed by the world scientists, acknowledged experts achieved great success in the leading world universities and research centers. Using the example of the Center let us consider the way Tomsk Polytechnic University holds the events to develop research environment contributing to solution of the university problems in attracting talented people from the international educational-research market.

⁹ RASA – Russian-speaking Academic Science Association, , Available at: <http://rasa.tpu.ru/>

It should be started with the fact that the strategic goal of the Center is to attract and implement complex projects of scientists from Asia-Pacific region, Europe, USA on the basis of Tomsk consortium of universities and scientific organizations¹⁰. Hence, the Center was initially organized according to the principle of network cooperation at the regional and international levels and is to provide a place for investigations which would be attractive at the international level. To achieve this goal, the following problems are to be solved in the RASA Center:

- development of research breakthroughs including additional one to those existing in TPU;
- intensive interaction with TPU departments and laboratories;
- joint projects with the universities of Russia and the world;
- TPU collaboration with the members of RASA association;
- university staff's active participation in international research;
- high publication activity of TPU researchers.
- participation in development and implementation of educational programmes in cooperation with leading world universities.

The Center established six interdisciplinary laboratories, four of which deal with translational medicine, unique for Tomsk Polytechnic University. At the moment, in the Center there are 30 workers; laboratory staff and supervisors are recruited from recognized at the international level research-educational institutions. Masters post-graduates, and young researchers are employed in the laboratories from three TPU research-educational centers, there is network cooperation with the researchers of all institutes. The biomedical laboratories of the Center are staffed with the workers of Siberian State Medical University, Tomsk Cancer Research Institute, Cardiology Research Institute; three postdoctoral

fellows are employed from the universities of Russia and Europe. All employees have experience in training or working at leading Russian and international research centers and projects.

Apart from organizations, where scientists of RASA work, the partners of the Center are: CERN – Council of Europe for Nuclear Research (Switzerland), KEK – Organization for study of high-energy accelerators (Japan), National Institute of Health (USA), as well as leading Russian research institutions: National Research Center “Kurchatov Institute”, Ye.D. Goldberg National Research Institute of Pharmacology and Regenerative Medicine, Institute of Cytology and Genetics of Siberian Branch of RAS, I.M. Sechenov First Moscow State Medical University etc.

Let us consider the mechanisms of organization and management in the Center contributing to development of attractive scientific environment to train staff for research interdisciplinary projects.

First of all, it is research internship for teachers and students of TPU (after competitive selection) in the leading international educational-research centers under RASA researchers' supervision in the Center spheres of activity. Based on the research internship results, the scientists are employed in the Center laboratories and continue their research using crucially new knowledge and skills acquired in the internships. For example, in 2015 14 students and young researchers of TPU interned in the leading universities and research centers: the trainees having long-term courses (more than 5 months) of internship are employed in the laboratories.

Apart from internships RASA researchers supervise participation of Center staff and TPU talented youth in international conferences, write co-articles in high-ranking journals (IF¹¹ not lower than 3). After internship under RASA researchers' supervision the master-students work at

master thesis on the themes of the Center laboratories contributing to their Candidate thesis. These events develop students' and young researchers' skills in performing research at the high international level, particularly, in the course of internship and work in cross-cultural teams.

From the point of view of managerial and physiological conditions of the Center research environment, the interdisciplinary team work should be underlined, which is conditioned by staff composition, as in the interdisciplinary projects the research themes are at the interface of the sciences. It is also not of less importance that the Center staff and students collaborate with numerous partners from Russia and abroad, which contributes to the development of their personal-professional, communicative, managerial, and leadership skills, steady increase in their English language proficiency.

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¹⁰ Association of nonprofit organizations “Tomsk consortium of universities and scientific organizations”, Available at: <http://unitomsk.ru/>

¹¹ IF – Impact-factor – numerical indicator of scientific journal significance.