STUDENTS` SCIENTIFIC ACTIVITY AS A MECHANISM OF METHODOLOGICAL AND TECHNOLOGICAL SUPPORT OF THE PROFESSIONAL ESTABLISHMENT OF FUTURE SPECIALISTS

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Abstract: The paper substantiates the relevance of enhancing the role of science in professional training of future specialists. Analysis of scientific literature, scientific and methodological sources discussing questions of the role and importance of developing students' scientific potential and their spheres of scientific interests is presented. Factors affecting the development capacity of student science at higher educational institutions are detailed; the young students' scientific potential, the sphere of their scientific interests, and their attitude to scientific activity have been identified. The authors also outline and substantiate possibilities of enhancing the effectiveness of the activity line adopted by higher educational institutions for forming scientific research competencies in students.

Keywords: the information society, young students, scientific interests, scientific activity, the academic process.

1 Introduction

At the beginning of the 21st century, there was a surge in the relevance and importance of questions concerning methodological and technological support of the professional establishment of future specialists, regardless of their focus area and profile. The early 21st century was characterized by professional school's adopting the distinct stance expressed in the necessity of training future specialists in line with new challenges of the time, with the requirements of the oncoming information technology epoch. In the world community, specialists and scientists of all developed countries keep looking for yet new approaches, means, and techniques, developing models and technologies to help enhance the future specialists' level of professional training in conditions of professional learning.

As for training of young specialists, higher target professional level has resulted from many causes (pervasive globalization, the oncoming information epoch, capitalist production requirements, escalation of fierce competition among countries of the world community, marked growth of the role of science in the development of the countries' social and economic, military potential worldwide, etc.).

Currently, the realia are that as demonstrated by sociological surveys of all kinds, the contemporary Russian higher professional education is one step behind the needs of time and labor market. According to the data of the survey conducted by the Federal State Statistics Survey and the NRU HSE, 91% of Russian employers believe that "university graduates lack practical skills for work". Meanwhile, as noted in the research, over 25% of graduates get excessive education. Managers of Russian companies are dissatisfied with graduates' self-organization skills, ability to analyze, solve problems in non-standard situations, and they assess the graduates' professional preparation as 3,5-3,7 points of 5 (Russia: Why do Millions of Graduates Work not in Line with Their Speciality?, 2018).

As for both the Russian professional education system and needs of the developing labor market, the actual situation taking shape does not satisfy both parties – nor does it satisfy the Russian state and society in general. This problem is of the multi-factor nature, and its solution largely depends on coordinated effort of three parties: the Russian state, the system of education, and the labor market.

Practice shows serious difficulties, too, experienced by Russian higher professional education in its development. Here, causes are numerous (unjustified dismantlement of the previous pattern of the system of education; uncertainty in elaborating its development strategy, poor financing; disruption of the education management system at all levels; Russian young people's loss of stable motivation for systemic learning, and others).

Although education is adopted as the priority line of the state policy, improvement of the scientific constituent of Russian education is slow and challenging. Given the powerful development trend of the information environment, the science factor within the system of professional training of future specialists, regardless of their focus area and profile, currently represents an important point of the state policy engaged in development of the Russian state and its national security. Thus, the development of students' scientific activity within professional training turns into a highly urgent task.

This circumstance has stimulated the scientific group to work out the outlined range of problems and solve some questions of raising the level of student science.

2 Literature Review

When discussing topics related to the role of development of education and student science, many researchers indicate the necessity of upgrading the modern education, considering it to be the priority line in social and economic development of the Russian state and society (Kotukhov, 2014; Martynov, 2016; Chistyakova, 2016; Kislov, 2017; Nikitin, 2017; Subetto, 2017; Nagornova et al., 2018; Egorychev et al., 2019, 2020; et al.). Today a lot is also said about internationalization of science and education and its influence on the activities and career development of researchers (Chigisheva, 2015a; Chigisheva, 2015b).

So, speaking about the necessity of upgrading Russian education, A. N. Kotukhov (2014) notes quite fairly that "…if we are too late to "swing into the train of globalization", then we risk staying on the margins of the mainstream civilization development forever" (p. 653).

Taking a critical stance to the current condition of the country's professional education and its upgrade rates, A. G. Kislov (2017) points out that "… professional education, in high-tech, science-based professions at least, has to become advancing" (p. 9). As viewed by the authors, Russian education must achieve the world level in all focus areas and profiles.

It has to be noted that Russia's higher professional school is trying to develop mechanisms helping it function successfully, while accepting challenges of the new time. With regard to this, the most important mechanism for any higher educational institution of the country to act efficiently is the integral educational process of future specialists' professional training in all social spheres of Russia. It is in this process that all resources are contained to enable the country to massively deploy its vast social and natural potential available, responding to challenges of the new time (Belovodskaya, 2017; Bodina et al., 2018; Fedulov, 2019; et al.).

I. I. Belovodskaya (2017, p. 179) writes that higher school professional training needs new orientation of the pedagogical process, which is associated with the use of new pedagogical approaches, educational technologies, and the content of professional training of modern specialists. Meanwhile, the latter are expected to be able to solve difficult scientific and technical, design and engineering problems in the production process independently.

Discussing the same topic, Yu. P. Fedulov (2019) notes that currently, new trends for the system of education clearly manifest themselves in the world community, and they have to be taken into account when upgrading the said system. So, he outlines the principal trends as follows:

- they keep expanding the range of academic and organizational measures aimed at both meeting the students' diverse interests and developing their abilities;
- at higher educational institutions, the educational process is characterized by large-scale reinforcement with modern information technologies, extensive use of the Internet with its richest resources and rapid development of distance learning forms for students;
- the objectives, content, and technologies of higher professional education are updated on a regular basis; they adjust curricula proceeding from achievements of the scientific and technical, social advance, as well as requirements of the world standards of education.

The above and many other trends and processes having emerged at the beginning of the 21st century also require the new approach to organizing the professional training and upbringing (establishment) of the new person. This person must be able to respond to the endless flow of challenges brought by the oncoming information epoch – the society of knowledge where, as put by V. I. Vernadsky (1998), science will act as the determining "geological force" capable of creating the new rational world (noosphere).

However, as noted by many Russian researchers and experts, at present, the country's system of education is not quite ready to provide the labor market with proficient specialists for developing high-tech productions and organizing the sphere of various services getting more and more complicated.

It can be summed up with confidence that Russian professional education is currently in a difficult situation requiring fundamental comprehension of its upgrade process in part of the future specialists' professional training. This situation necessitates reinforcement of the scientific and creative constituents in the upbringing and educational process of higher educational institutions, too.

3 Research Methodological Framework

This research was both analytical and empirical in nature. It was built upon works of prominent Russian scientists (Aleksandrov, 2018; Belovodskaya, 2017; Beschasnaya & Shemchuk, 2018; Bodina et al. 2018; Gavrin & Rebysheva, 2015; Subetto, 2017, et al.) relying on their scientific concepts, theories, provisions, and principles determining design and performance of the research. The leading research approach is the dialectic one based on the laws of dialectics which allow using basic methodological principles (the scientific character, consistency, objectivity, systemicity, etc.) and viewing the problem in an integrated and consistent way. *The objective of the research* is to analyze the scientific potential and spheres of scientific interests of the RSSU students and to identify promising focus areas for developing it using the obtained results. *The principal tasks of the research are as follows*: to conduct analysis of scientific literature, scientific and methodological sources discussing questions of the role and importance of developing the students' scientific potential and their spheres of scientific interests in conditions of professional training at the university; to conduct a survey of the RSSU students for finding out their scientific potential, sphere of scientific interests, and attitude to scientific activity; to identify conditions enhancing motivation for scientific research work in the teaching staff (TS) and students of the university.

The selective survey involved 894 students (respondents) of years 1-4 (bachelor degree students) and years 5-6 (master degree students). The participants were representatives of 14 faculties of the Russian State Social University (RSSU) studying in the focus areas of training provided by the faculties of: social work, A. G. Schnittke higher school of music, the humanities, information technologies, communicative management, medicine, linguistics, psychology, social sciences, administration, physical training, ecology and technosphere safety, economics, and law. The age of the questioned ones ranges within 18-25, with 590 of them being young women, and 304 – young men. The information collection methods included talks and questionnaire survey.

Data Collection and Analysis Toolkit

The survey included three stages:

- *the theoretical one* (analysis of scientific literature on the said problem);
- *the empirical one* (collection of materials characterizing the students' scientific potential and sphere of scientific interests, their attitude to scientific activity);
- *the final one* (processing of the research materials and based on them elaboration of promising problem-solving lines).

Results of the first (theoretical) stage of the research have enabled the authors to clearly lay out the second (empirical) stage, conducted within the time span of April 04 – December 21, 2020. The empirical research toolkit was developed which included the questionnaire "Your opinion on the university students' scientific research initiative in their professional training" for surveying the students of RSSU.

The questionnaire consisted of 3 units as follows. *Unit 1* "Some information about you" contained the request to specify the faculty, professional focus areas of training, year of studies, sex, and age of the students. *Unit 2* "Professional training" had only 3 items concerning the academic performance of the surveyed ones and their satisfaction with the process of learning. *In unit 3* "Scientific research work", there were 15 questions, with 14 of them suggesting answer options to choose from, and one of them implying free expression only. The questions touched on various aspects of organizing the university's student scientific research work, its role in their professional training, the students' extent of satisfaction with the said organization, and so on. Meanwhile, almost all suggested questions had the free answer option to voice one's opinion. The obtained results of the sociological survey of the RSSU students were subjected to mathematical processing, scrutinized, generalized, and conclusions have been made as appropriate.

4 Results and Discussion

This scientific research addressing the development of students' scientific potential and spheres of scientific interests in conditions of their professional training is associated with the following reasons. First of all, the Russian state and society need specialists of the new level possessing the high scientific resource and innovation thinking up to challenges of the oncoming information technology epoch. It is also conditioned by the necessity to advance the upbringing and educational process at the university as for the focus areas associated with cultivating the high level of the students' (young students') scientific potential, foster their interest in scientific research activity within the professional domain being mastered. Finally, higher educational institutions need promising methodological and technological support of the professional establishment of future specialists.

4.1 Analysis of Scientific Literature, Scientific and Methodological Sources Discussing Questions of the Role and Importance of Developing Students' Scientific Potential and Their Spheres of Scientific Interests within Professional Training at Higher Educational Institutions

The research required an in-depth analysis of scientific literature dealing with questions of the role and necessity of developing the scientific potential in young people studying at the modern higher educational institutions. So, various concepts, scientific provisions, and theories touching on the theoretical and methodological framework of the problem of this research have been analyzed, compared, and contrasted. It has been found that currently, many aspects of the problem of the modern professional education functioning and progress, as well as the question of training of highly-skilled specialists for all spheres of the society, draw the attention of both foreign and Russian scientists and specialists from the most diverse domains (politicians, philosophers, social scientists, historians, economists, and so on). Alongside this, the following principal scientific fields related to the outlined problem of the research conducted have been identified; they are also worked out in the scientific and educational community extensively:

- the role and importance of the modern science and education in development of the world community;
- the phenomenon of risk in the sustainable development of modern society associated with setback of the institution of general and professional education;
- conceptual bases of philosophy, methodology, and anthropology pertaining to the development prospects of modern education;
- kinds of competencies, quality, assessment of development state and prospects for modern education;
- students' scientific research activity at higher educational institutions, its effect on the process of forming professional readiness in future specialists;
- pedagogy and psychology of higher school: optimization of the young students' professional training process.

It has to be noted that both Russian and foreign scientific literature contains rather numerous materials addressing the development of scientific potential in students as the pivotal competency of higher educational institution graduates. Irreversibility of the powerful trend of sociocultural and information technological processes witnessed by the modern world community of the early 21st century is understood and recognized, too. Proceeding from this, most authors share the viewpoint that it is the scientific constituent that acts as the necessary (profile) basis in professional training of future specialists in virtually any focus area (Gavrin & Rebysheva, 2015; Filatova, 2015; Suprun & Khalikova, 2016; Aleksandrov, 2018; Beschasnaya & Shemchuk, 2018; Tamochkina, 2018; et al.).

A group of Russian authors (Bezruchko et al., 2018) have attempted to identify the following clusters of competencies of the nearest future.

1. *Ability to interact and co-operate with others*. It makes up the first and largest cluster of "competencies of the future".
2. *Thinking and problem-solving*. This cluster ranks second in size, incorporating 15 competencies.
3. *Aptitude for learning and openness to the new*. This one rounds out the above top three, respectively.
4. *Innovation and creativity*. This set of competencies implies first of all braveness, readiness for experimenting creatively and making mistakes.
5. *Digital knowledge and skills*. This group includes programming, the knowledge of fundamental robotics, and the ability to understand and use new technologies.
6. *Awareness and self-management*. This involves the ability to control one's attention, find meaning in work and life, resilience, the ability to build one's own plans and to understand oneself in general.

The said authors note that "these six clusters encompass around 80% of "competencies of the future"... They are no individual skills to be "leveled up" quickly, but they are elements of one's personality" (Bezruchko et al., 2018).

It is quite clear that specialists have to seamlessly integrate the professional and the personal within themselves in the nearest future. According to the authors, this requires elaborating the new educational paradigm, new methodological framework in organization and fulfillment of the upbringing and educational process at higher school.

Many modern Russian researchers (Filatova, 2015; Tamochkina, 2018; Nagornova et al, 2018; et al.) are convinced of the necessity to update the upbringing and educational process in higher professional education and to orient it to forming the research competency in future specialists.

L. B. Filatova (2015) writes: "Scientific research work is a professional activity, so it is important to consider the process of staged and consistent cultivation of specialists' research competency during their studies at higher school and postgraduate education" (p. 47).

O. A. Tamochkina (2018) believes that training of highly creative specialists is unthinkable without involving creativity, creative self-fulfillment, and building up students' creative potential in conditions of higher school.

When the future specialists' level of preparation for activities in the information technology society is discussed, there is certainty that the said specialists have to possess not only the required total of basic and special knowledge, but also certain skills of creatively solving practical problems; they also have to continuously upgrade their qualification and quickly adapt to changing conditions. All these qualities have to be shaped at higher educational institutions by means of students' active participation in scientific research work. The latter gains increasingly high importance at the current stage and turns into one of the principal components in professional training of future specialists.

Analysis of the array of scientific materials discussing the student science development problem allows making the following conclusion. *In conditions of modern Russian higher educational institutions, professional training of future specialists, regardless of their focus area and profile, requires the consistent and focused state policy. This policy has to be targeted at the systemic upgrade of professional education; within the latter, the priority place has to be given to preparation of future specialists for scientific activities in their professional domain.* So, A. S. Gavrin and L. V. Rebysheva (2015) are sure that "In the modern conditions, the role of the state in developing science and education is a prerequisite for building up the spiritual, intellectual, scientific and technical, social and economic progress of the Russian society and state, as well as for maintaining its national security".

4.2 Sociological Survey of the RSSU Students Aimed at Finding Out Their Scientific Potential, Sphere of Scientific Interests, and Attitude to Scientific Activity

The first unit of the questionnaire, "Some information about you", was dedicated to some data required for the survey: name of the faculty, code of the professional focus area of training, year of studies, sex, and age of the students (see the data given in the section "Methodological framework of the research").

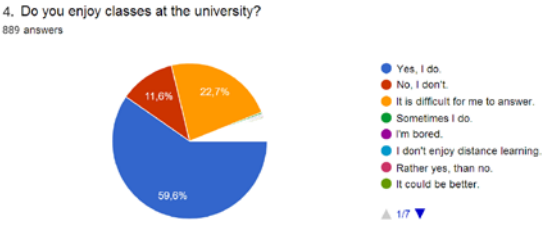
The students' assessment of the level of knowledge they get at the university. The results of sociological survey of the RSSU students obtained in the second unit of the "Professional training" questionnaire show that the students' opinion about the level of knowledge they get at the university looks not bad at first sight: the very high level was chosen by 7,2%, the high – by 20,7%, the good one – by 38,5%. The total here makes 66,4%. The satisfactory rating was given by 22,6% of the students, while the options of the unsatisfactory level and difficulty

answering the question were given by 10,1%. In general, the level of knowledge received at the university is rated as good (the very high, high, good one– 66,4%). Nevertheless, a significant quantity of the students (22,6%) assess the level of knowledge they get as satisfactory, while 10,1% give the unsatisfactory score, and 1,9% of the students have difficulty answering the question. That is, one third of the students (32,7%) take an extremely "anxious" stance. For the university, this is an alarm urging for both some reflection and for making decisions as necessary.

Similarly, the students' assessment of their own academic performance landed at a quite high level: 22,8% said they had excellent marks, 54,1% – good and excellent marks, 22,8% – mainly good marks but sometimes C marks, and 0,3% of the students said they got C marks mainly. According to results of the latest exam session, the students' self-assessment of their academic performance was positive enough. Summed up, the students who get excellent marks, good and excellent marks number 76,9%, while there are 22,8% of those mainly getting good marks but sometimes having C's. These figures are not bad, but there is the reserve getting mainly satisfactory marks – which is nearly one third of the students – 22,8%.

The rate of the students' enjoying classes at the university turned out to be at the fairly good level (see Figure 1).

Figure 1 The results of the students' answering the questions about enjoying the university classes



Source: authors' own processing

As it can be seen, 59,6% of the surveyed ones answered in the positive, with only so few as 11,6% saying no, and 6,1% marking insignificant options (such as "sometimes", "I am bored", "it could be better", "I do not enjoy distance learning"). The percentage of the students having difficulty answering (22,7%) is alarming. Satisfaction with the university studies is an important factor of well-being of the young students. So, the indicator showing that almost two fifths of the students (11,6% + 22,7% = 34,3%) are either dissatisfied or at a loss to answer kindles concern.

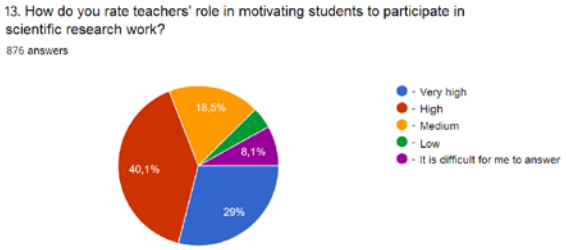
The university students' appraisal of scientific research work. The results of the sociological survey of the RSSU students obtained in the third unit of the "Scientific research work" questionnaire demonstrate that the young students' level of involvement into scientific research work is not high enough (37,7% of the students rated their participation at the medium level, 19% - at the low one, while 13,9% - at the very low level; 1,3% of the surveyed had difficulty answering the question, and only so few as 13,9% of the respondents marked the high rating). Moreover, almost one third of the questioned (28,1%) take virtually no part in scientific research work. All the above is indicative of the necessity of reinforcing this focus area in the activity of all structures of the university.

The principal reasons behind the young students' failure to get involved into the university scientific research activity are rather matter-of-fact: they lack motivation; they lack support on the part of their faculties; there are no scientific advisors; there are no conditions for working at home, and so on. The students noted some factors that could enhance their motivation for scientific research activity, too (16% of them believe it to be awareness building, 26% – introduction of material incentives). The said issues can well be addressed by efforts of the TS and administration of the university faculties.

Although the students give fairly positive and satisfactory opinions about the way scientific research activity is organized at the university, nevertheless, results of their answering the question *"In your opinion, does the process of learning at the university contribute to forming researcher skills in the students?"* look alarming. The obtained answers make one think: so few as a half of the surveyed students (54,8%) believe that the process of learning at the university helps form the students' researcher skills, one fifth of them (19,2%) answering in the negative ("It does not"), and almost one third of the respondents (26%) had difficulty answering. The findings speak for themselves: an in-depth analysis of this question is required.

According to the surveyed ones, the role of teachers is high enough in stimulating the students to participate in scientific research activity (Figure 2).

Figure 2 The results of the students' answering the question concerning the teachers' role in motivating the students to participate in scientific research activity



Source: authors' own processing

It can be seen that 40,1% of the students ("high") + 29% ("very high") = 69,1% - rated the said role as high and very high. 22,8% of the answers had the "medium" and "low" options, with 8,1% of the surveyed choosing "It is difficult for me to answer". Admittedly, the students show partial dissatisfaction related to their scientific advisors (e. g., the scientific advisor hardly interacts; it is difficult to find a scientific advisor). Nevertheless, the respondents believe teachers can get the students interested in scientific activity (hold scientific practical classes on certain topics; organize meetings with scientists and practitioners dealing with problems related to the faculty students' professional training; hold scientific conferences in the subjects under study; involve the students into working on their own scientific research projects, and so on).

The students' view on cultivating motivation for practicing science. The students taking part in the sociological survey (the open answers) voiced their wishes for the university management as for ways how they can spark the interest in the students to pursue science. So, creative meetings with the students can be organized; permanent scientific centers can be set up at the university to conduct research in educational and professional profiles of the university, with foreign partners to be invited on a compulsory basis, including young researchers from the number of the best students. They can also revive the scientific outreach activity on the basis of the university – hold open public lectures of the leading scientists, open debate, presentations of scientific works, etc. with compulsory involvement of young students. The university's publishing activity can be well established, too, to cater for scientific needs of the student scientific community.

The results obtained in the course of the sociological survey are of certain interest for all specialists dealing with questions of professional training of the social university students for their future professional activity.

5 Conclusion

Results of the research conducted allow concluding that the set objective has been achieved and the tasks have been completed. Careful analysis of findings has enabled the authors to word a number of provisions adhering to which makes it possible to advance promising focus areas related to the development of

student science at universities. It is this that acts as the solution of the third research problem (identifying conditions to enhance motivation for scientific research work in TS and students).

Let the principal provisions and conditions be outlined.

1. The university's teaching staff act as the principal resource, factor, and condition contributing to organization of not only the upbringing and educational process at the university but also efficient organization of student scientific research activity. Motivation of the TS for inclusion into intensive scientific research activity jointly with students can be enhanced if the following conditions are met:

- work of the university's and faculty's scientific community has to be scaled up in terms of popularizing its scientific research work;
- academic boards have to be established to hold defense of theses for the degrees of candidate and doctor of sciences in the professional profiles of the university faculties;
- information support and material basis of scientific research activity have to be improved by administration of the university and faculty.

2. *The university's scientific and educational sociocultural environment acts as an essential condition for building and reinforcing young students' motivation to be included into scientific research activity.* In its turn, this implies the necessity to:

- include compulsory scientific practical classes into the mainstream educational program in all academic subjects (addressing particular topics);
- consistently organize events for young students to meet prominent scientists and practitioners dealing with problems related to professional training according to the faculty profile;
- consistently organize and hold scientific forums (conferences, round tables, etc.) up to the profile of the profession studied, with all students participating on a compulsory basis;
- involve all students into working on their own mandatory scientific research projects within the student scientific community.

3. The system of awarding young students for their active participation in scientific research activity is a powerful stimulation factor for its development. It involves various kinds and forms of promotion for students having shown themselves in scientific activity. They can be recommended by the scientific board of the faculty (higher educational institution) for enrollment to a budget-funded place in postgraduate studies; they can be awarded personal scholarships; scientific business trips to another city or town can be provided by the higher educational institution for its best students; those having shown themselves in scientific activity can be included into teachers' scientific group, etc.

The results of the research can be of use not only within the higher education system but also at other levels of education (schools, lyceums, vocational schools, colleges), which can contribute to higher quality of the upbringing and educational process aimed at developing students' interest in scientific activity and forming the bases of their scientific research work. The said results can also be used in developing (supplementing, upgrading) the effective curricula and programs at higher educational institutions and colleges of the relevant profiles, the system of further education included.

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