

*Materials of Conferences***SOME METHODOLOGICAL STRATEGIES OF THE STUDENTS' INTEREST FORMATION TO THE SCIENTIFIC RESEARCH**

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The analysis of the factors, having influenced the students' tendency formation to the scientific research, has already been conducted. Moreover, it has been shown, that the environment is practically affected the motivation formation to the scientific research, in which the student is found himself. The formation technologies of the scientific skills in the teaching and research laboratories, having created at the enterprises on the chairs' initiative, are being provided. The methodical questions of the final subject conferences, laboratory practical and independent work organization, with due regard for the programs of the students' personal creative growth are also being considered.

The raw orientation of the Russian economy, the low social status after the thesis defending, the low percentage of the theses defending after the post – graduate course, – all this is practically led to the students' motivation decrease to be engaged in the scientific work. So, the State programs of the Russian further development for the 2013–2020-es are being focused on the use of the obtained scientific research achievements. Then, the poor school training, the priorities change in the life, the age peculiarities, the specific engineering training are practically the main factors, having influenced the students' motivation to the scientific research.

**Purpose of the Study.** The factors study, having influenced the motivation formation for the scientific research.

**Material and research method.** The factors' study, having influence the students' inclination to the scientific research, has been conducted by the students' groups interviewing from the various Institutes of the Higher Education, Colleges and Universities in the Tomsk city, the teachers, the heads of the teaching, educational, scientific and research laboratories, the students' parents.

**Research results and their discussion**

*The Degree Influence of the Discipline Mastering.* According to the research, the interest to the scientific research is practically appeared just after the discipline mastering at the level of about 75% of the curriculum volume. The hybrid training and blending learning are the most promising ones, having combined practically all types of the training and learning, that can be further improved the materials presentation for

any students' type. So, the hybrid training and blending learning – these are the lectures, practices and laboratories parallels. All levels of the development is suggested the master – class, video – fragments, laboratory practice conducting discussion and demonstration directly in the teaching and research laboratories. The testing trajectory, in which all the learning methods are practically intertwined, has already been shown, that psychological barrier is being reduced to the complex technology at the students.

*The Group Project Learning* – this is the fragment scientific research decision by the small team of the students from two or three people – this is the source of the students' creative applications. So, the democracy in the group project is practically allowed the students, as how to be participated and to be engaged in the scientific and initiative works, well as to offer their projects. Thus, the other Institutes of Higher Education, Colleges and Universities experience (e.g. TPU, TGU, TGASU) has been shown, that about 40% of all the students are being engaged and involved in the group projects. So, the Group Projects – this is the communication between the treatment courses, the opportunity to see the work of others and to be weighted oneself. The practice – oriented learning function, the humanitarian and aesthetic one, and the educational one are being assigned on the group projects. Thus, the students are given the opportunity: “to be expressed themselves in the team”, “to be felt the leader's occurrence situation”, and to be played “the role of the manager or the subordinate”.

*The Interdisciplinarity.* Currently, the science – is the sum of physics, chemistry, mathematics and many other areas of the knowledge. The introduction of such interdisciplinary subjects and courses, as “Patenting”, “History and Methodology of Science”, “Applied Engineering Tasks”, and others is practically further developed the students' interest to the scientific research.

*The Laboratory Practical Training Session.* The studies have been conducted at the laboratory practical workshop on the technical disciplines oriented (e.g. Technology, Electronics, Optics). So, the interest excitation in the scientific research can be practically realized at the laboratory practical workshop, through the compulsory modules partition on the creative tasks [1]. Thus, the student has the right to choose the creative development of any fragment of the compulsory modules, which is developed the interest to the work and, it, moreover, is created the necessary reserve in the scientific and research, and practical activity of the student.

The approximate scheme of the laboratory workshop building has been presented in the Figure.

- a) level; b) laboratory works at the enterprise; c) No. lab.;
- d) creative task; e) gifted ones identification;
- f) courses' fragments and VKR; j) projects coordination;
- h) planning, restructuring, service fragments; i) multi – variance;
- g) equipment study, emulation, master-class; k) individual statements; l) No. group.

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The Laboratory Practical Training Session Building Scheme

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So, the laboratory practical training session is practically conducted by the three – level scheme. Then, the students' activation is laid in the increasingly individual task and the operational "final review" just after each session. The excitation level of the program of the creative growth is practically based on the student's opportunities agreement and the degree of confidence. The laboratory practical training session, in the form of the physical experiment [2] is caused the most popular and the students' motivation.

*The Teaching and Research Laboratories.* The teaching and research laboratories and the student design office are practically allowed to realize the most advanced to date "the hybrid training and blended learning". So, the students' intercourse interaction in the scientific work is acted, as the factor of the support for the senior ones the undergraduate students. The stimulatory effect of the assignment has the title of "The Activist NIRS" and "The Excellent NIRS".

Thus, the experience has been shown [3], that the successful integration of the research, educational and industrial activity is quite possible only with the involvement of the employees of the firms and companies, as the teachers of the special subjects and disciplines of the curriculum and the use of the laboratory and technological base, as the chair, well as the production partner. The motivation is being increased at the students, that it is quite allowed to organize the full practices passage, the real coursework and projects implementation, the final qualifying works and the master's theses preparation, as well as the scientific and technical publications preparation. The variety of the interactive technologies are being practically implemented in the teaching and research laboratories. These are included the following: the meetings with the scientists and scholars, the heads of the departments, the works presentation at the conferences of the different, (e.g. especially, international) level and more et. al. The leading specialists and experts of the educational and scientific laboratories, having attracted to the educational process, contribute the increase of the quantitative and qualitative assessments of the management level by the students during the practice, the course design, or the final graduate works implementation.

*The Creative Activity in the Discipline.* Just after the main modules completion of the discipline, the student can get the creative task. So, the scientific research, having conducted by our chair, have already been shown, that any creative task, no matter, how attractive externally it did not seem the students, it cannot be entered into the training until, they have the necessary skills for its implementation. So, the series of the successive creative tasks is converted to the results, which are worthy of their further publication, and then, it is being transformed into the student's creative further growth program. That is why, many graduates are grateful to the chair for the submitted creative tasks, having already grown into the occupation and vocation.

*The Personal Creative Growth Program* [4] is practically suggested the creative tasks continuity, in relation to the student's inclination. So, in the process of the creative tasks carrying out, the student is practically led to answer the question: how and where does he see himself in a year (e.g. 12 months), two years (e.g. 24 months), three years (36 months)? The Personal Creative Growth Program in the first year – this is the ways development to be overcome the difficulties: communication with the curator, the resources mobilization. Along with the "Introduction to the Occupation" educational discipline, the laboratories tours and the meetings with the teachers are the significant elements. The motivators to the learning – are the history of the discoveries, the history of the graduates (e.g. the positive, negative ones). The goals formation and the program content are taken their place in the subsequent courses. The students are usually given the right to study the disciplines "by their choice", and to be developed the communication type "one with many". So, the participation in the scientific and research projects implementation within the group of a few people is practically being formed the special space for the engineering activity. It is quite necessary to the head of the group project, that "it is come" at the student, as the students are at such age, that they work by their interest, and not by their debt. Thus, "notebook" with the work plans records, experiments schemes, and the references to the literature is the significant element.

*The Subject Conference.* The conference is practically held on the basis of the creative and

independent assignments by the disciplines. At the end of the semester, each student practically performs at the subject conference on the final results of his “creative” activity. So, the presentation is consisted of the separate modules: the challenge state, the solution method, the simulation studies, the carried out scientific research, the obtained results and the conclusions. So, the presentation quality is practically reflected the local and the promising level of the creative growth program realization. Thus, the preliminary discussion of the works is encouraged the student a higher level of the accountability.

### Conclusions

Thus, the conducted monitoring has already been shown, that the specialists and experts formation, having passed the track data, is usually occurred in 3–5 years (e.g. 36–60 months). About 50% of them defend the theses for the graduate school. So, the bad students do not happen. There are only the bad conditions. Those students, who are not capable of the creative activity, work successfully in the scientific and industrial sector, and they are often become the heads of the departments of the promising technologies.

### References

1. Orlikov L.N., Shandarov S.M. The Program Formation for the Student's Creative Growth at the Laboratory Practical Training Session. // “The Higher Education Today”. – 2014. – № 8. – P. 63–65.
2. Orlikov L.N., Shandarov S.M. The Experience in the Organization of the Laboratory Practical Training Session in the Teaching and Research Laboratories. // “The Modern Education: Actual Challenges of the Professional Training and Partnership with the Employer: The Proceedings of the International Scientific and Methodological Conference”. (Tomsk, January, 30–31, 2014). – Tomsk: 2014. – P. 131–132.
3. Orlikov L.N. The Experience in Identifying and Implementing of the Students' Creative Inclination in the Physical Experiment in Teaching and Research Laboratories. / L.N. Orlikov, S.M. Shandarov, L.Ya. Serebrennikov, G.I. Schwarzman: “The Proceedings of the XIII-th International Teaching – Methodological Conference Countries of the Commonwealth of the Modern Physics Workshop” (Novosibirsk, September, 23–25, 2014 [Edited by N.V. Kovalev and M.B. Shapochkin]. M.: The Publishing House MFO, 2014. – P. 157.
4. Orlikov L.N., Shandarov S.M. The Student's Creative Growth Program – the Basis of Support for the Cognitive Activity and the Bachelors' Contingent Retention // “The Specialists' Layered Training: E-Learning and Open Educational Resources: The Materials of the I-st All – Russian Scientific and Methodological Conference”. (Tomsk, March, 20–21, 2014). URL: [http://portal.tpu.ru/eltpu/conference/conference\\_tpu\\_20\\_21\\_march\\_2014/section\\_1](http://portal.tpu.ru/eltpu/conference/conference_tpu_20_21_march_2014/section_1) (date treatment 15.05.2015).

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