

# Training Highly Qualified Specialists through Students' Research Activities

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**Abstract** – The economic development of the Tyumen region, the digitalization of manufacturing, the new jobs' creation caused the problem of qualified staff shortage. This article reveals the possibility of using students' research activities as a factor in the training of highly qualified specialists in demand on the labour market. To identify the readiness of students to research activities, we interviewed the first and third-year students and teachers. We focused on the lack of activities in junior courses to maintain the interest that encourages them to engage in research. As a result, the number of students engaged in scientific activities falls from course to course, and material values become the main motive. The authors developed proposals for enhancing the research activities of students.

**Keywords** – science, student, motivation, scientific activity, training.

## I. INTRODUCTION

The task of any higher educational institution is to increase the competitiveness of their graduates in the labour market, and this requires the formation of general cultural, general professional and professional competencies provided by the relevant federal state educational standards of higher education (FSES HE), that is, to help the graduate become competent in solving various tasks of future professional activity [1].

In the context of the modernization of higher education and the development of research and innovation, the phased implementation of federal state educational standards of different generations is the main goal of the strategic development at universities. According to the FSES of HE, bachelors receive education resulting in the solution of professional tasks by the type of professional activity and training profile.

Research activity is a type of professional activity for graduates of a bachelor's degree and occupies a special place. According to FSES in HE in all training areas, research is an integral part of bachelor's training and, of course, affects the quality of education and enhances motivation for further professional activities, the competitiveness of graduates in the labour market and contributes to satisfaction with their own professional activities and the use of its results in the future [2].

The experience of recent years confirms the need to prepare a graduate of a bachelor's program able to work in difficult specific working conditions. As a result of training, a graduate must possess certain knowledge, skills and abilities. It is general education and vocational training that provides general and professional broad-mindedness, the ability to navigate and flexibly integrate into new socioeconomic, technological and organizational situations, to master the new content and forms of education [3].

All professional tasks that a graduate of bachelor's degree should solve, in accordance with research and professional activity, can be formulated as follows:

- participation in theoretical and experimental studies of certain processes or phenomena;
- participation in the analysis of the state and dynamics of the studied processes;
- systematization of the analysis of the state and quality indicators of study objects;
- study of scientific information, domestic and foreign experience on research topics;
- participation in the creation of theoretical models to predict processes and the phenomena studied;

- participation in the development of plans, programs and research methods;
- preparation of reviews, annotations, compilation of abstracts and bibliographies on the topics of research;
- participation in seminars, conferences and symposia, design and preparation of publications based on the results of ongoing research.

Students' research work is based on renovating, preserving and enhancing the traditions of regional, Russian education systems and world experience, encourages students to continuous self-development, social and professional mobility and orientates them in related fields of activity.

Conducting an analysis of psychological and pedagogical literature, many authors describe students' research activities as a kind of the creative, cognitive activity aimed at mastering students' independent theoretical and experimental work, modern methods of scientific research and experimental technique [4].

The main goal of the research activities in higher education is to develop and support scientific research as the basis for the fundamentalization and training of skilled workers by the needs of the state and society.

The main tasks of higher educational institution in the field of scientific research include:

- development of science and creative activity of scientific and teaching staff and students;
- priority development of basic research as the basis for the creation of new knowledge, the development of new technologies, the formation and development of scientific schools and leading scientific and pedagogical teams in the most important areas of science and technology;
- ensuring the training in higher institution of qualified specialists, scientific and teaching staff of higher qualifications based on the latest achievements of scientific and technological progress;
- research and development of theoretical and methodological frameworks of the higher educational formation and development, strengthening the scientific influence on the solution of educational problems, on maintaining and strengthening the basic determining nature of science for the development of higher education;
- effective use of the scientific and technical potential of higher education to address the priority tasks of updating manufacturing and conducting socioeconomic transformations;
- development of new, progressive forms of scientific and technical cooperation with scientific, design, technological organizations and industrial enterprises to jointly solve the most important scientific and technical issues, creating high technologies and expanding the use of university developments in manufacturing;

- development of innovative activities to create and develop new or enhanced products, a technological process, a service or a new solution that improves organization and management in the scientific, technical and industrial-technological spheres, updating products, services and manufacturing;
- improving management in the field of creation and commercialization of intellectual property, as well as stimulating the creation and use of intellectual property through the formation of an effective university policy in the field of intellectual property as organizing and intensifying factors of scientific, scientific-technical and innovative activity and the entry of scientific teams into the world market high-tech products providing a balance of legal and property interests scientific subjects respecting the results obtained;
- expanding international scientific and technical cooperation with educational institutions and firms of foreign countries to enter the global system of science and education and joint development of scientific and technical products;
- creating of a qualitatively new experimental-manufacturing base for higher education;
- attracting additional budgetary and extra-budgetary financial resources to the higher education sector of science. [5]

The functions of students' research work in the higher educational process are presented in the system:

- educational: to provide theoretical and practical research methods, experimental techniques, methods of applying scientific knowledge;
- organizational and orientation: the form the ability to navigate in sources, literature; development of skills to organize and plan their activities; selection of information processing methods;
- analytical and corrective: student reflection, introspection, correction of educational and cognitive activity;
- motivational: to develop an interest in research activities, cognitive needs; stimulation of self-education, self-development;
- developing: to develop critical, creative thinking, acting in standard and non-standard situations, justifying, upholding one's point of view, cognitive, communicative, special abilities, etc.;
- educating: to form of moral and legal identity; fostering adaptability in a changing social environment; the formation of adequate self-esteem, responsibility, commitment, strong-willed self-regulation, courage in overcoming difficulties, other abilities and character traits. The educational function also includes the education of professional vocation, professional ethics.

The system of higher professional education includes several areas for applying and implementing types and forms of students' research activities:

- enriching traditional academic forms of educational process organization: lectures, seminars, practical and laboratory studies, by performing research-type tasks;
- developing extracurricular forms of involving students in scientific activities, for example, writing scientific reports, articles, preparing reports, conducting olympiads and scientific conferences, developing projects for receiving grants, optional forms of training, forms of scientific cooperation between the university and manufacturing, etc.
- introducing less common species for higher education collective forms of scientific and practical activities of students: research circles, teams of young researchers, etc. [6].

Any activity needs motivation, which determines the focus on certain objects and ways of interacting with them. Currently, one of the most important pedagogical problems is the problem of motivation.

The analysis of psychological and pedagogical literature revealed many works devoted to this problem. So the authors Vilyunas V.K. [7], Bozhovich L.I. [8], Lomova B.F. [9] and others present a psychological analysis of the activity structure as a dynamic system of actions driven by the complex interaction of the resulting image with the motivational component of the activity. According to Hekhausen X [10], motivation explains the choice of various actions, the intensity and persistence of their implementation to achieve results.

This means that only adequate motivation ensures the effective implementation of research activities and the disclosure of the future graduate identity.

In our opinion, motives do not only encourage a person to act but also give a person's actions and personal actions a subjective meaning. If a student has a motive on self-development and professional growth, then already at the university he seeks to get a positive result from educational, professionally-oriented, research activities that acquire deep professional and personal, subjectively significant meaning for him.

Many scholars see motivation as an internal position of the individual; as a process of motivating oneself and other people to activities to achieve personal goals and organization goals, as a set of psychological reasons explaining a person's behaviour, it's beginning, orientation and activity. Motivation explains the purposefulness of the action, organization and sustainability of holistic activities aimed at achieving a specific goal [11].

A consistent study of the motivational, substantive-active, reflective component is the main thing in preparing students for research work.

## II. SUBJECTS AND METHODS

The motivational component is the main component for the implementation of students' research activities. We decided to study the issue of students' motivation in

organizing and implementing research activities at the university.

To identify the readiness of students to research activities, we interviewed 78 first-year and third-year students of the Northern Trans-Urals and 20 faculty members.

We used the following research methods: analysis of psychological, pedagogical and methodical literature, generalization of the conceptual and categorical content; qualitative and quantitative analysis of the data; methods of statistical data processing.

Changing the attitude of young people to research activities and cognition as a whole makes teachers look for new approaches to organizing this type of activity.

## III. RESULTS

In general, the survey showed that students know about the concept of research activity, 85 % of surveyed students said that they were acquainted with this concept in school, but only 18 % of respondents know that there is a competition of student research work.

Under scientific research, 57 % of students understand the purposeful activity of the researcher, 30 % – the discovery of new knowledge, 20 % – the development of the subject of research, and only 2 % realize that scientific research is an integral part of the educational process.

Significant motives that encourage first-year students to engage in research activities are self-realization, social approval, success, the possibility of going to scientific conferences, etc. (69 %), learn new, professional self-development (37 %). Obtaining additional material incentives from the university (11 %), moral encouragement, and receiving bonus points in the current and intermediate certification (20 %) also play a small role in motivation.

However, by the third year, the motives that encourage research activities are changing. So, getting additional material incentives from the university (33 %), self-realization, social approval, achieving success, the possibility of going to scientific conferences, (33 %), etc come to the fore. New knowledge, professional self-development (27 %) and moral encouragement, getting bonus points for the current and intermediate certification (21 %) come to the second.

As the preferred forms of research work, first and third-year students note full-time participation in field scientific events (45 %), participation in conferences and competitions at the university (33 %), participation in circles (26 %), correspondence participation in scientific events (20 %).

When organizing research work, students note the need for a more careful attitude of the supervisor to advising students and providing them with various kinds of assistance (77 %). Besides, a significant percentage of respondents (35 %) note dissatisfaction in the material and technical equipment and other conditions necessary for the successful organization of research activities.

A survey of teachers also showed dissatisfaction in students' research activities. Most of the respondents note the

low preparedness of students for this type of activity. Namely, complexity is caused by:

- formulation of the research problem;
- setting goals and objectives of the study;
- definition of the object and subject of research;
- hypothesis research;
- selection and use of research methods;
- work with information, namely, systematization, analysis, generalization.

#### IV. CONCLUSIONS

As the study result, we suggested the lack of activities in junior courses to maintain the interest that encourages them to engage in research. As a result, the number of students engaged in scientific activities falls from course to course, and material values become the main motive.

It can be noted that educational institutions are condescending to the research activities of students and often consider them as a supplementary form of training, acting as an additional tool for the training activity.

The main direction for enhancing the research activities of students should be implementing a system of measures to create more favourable conditions for their effective research work in higher education. In particular, it is necessary:

1. Intensify the cooperation of students with the teaching staff, within the framework of joint research projects
2. Proactively engage students to research activities through participation in international and Russian leadership competitions and olympiads, such as WorldSkills, UMNİK, I am a professional, and others.
3. Timely inform about upcoming student research events.
4. Consider the views and wishes of students when planning the educational process.
5. Attract junior students to participate in the research of interdisciplinary problems, the use of the latest technologies to solve professional problems.
6. Increase the methodological competence of teachers.
7. Provide psychological assistance to students in the development of feelings of self-worth, uniqueness, that is, self-presentation.

Thus, to increase the student's motivation level, it is important to develop confidence that his efforts will lead to success, and mastering the elements of research activity, the desire for self-improvement, for creative self-realization is his internal goal. In this case, the student will be focused on the development of new skills, increasing the level of scientific competence [12].

As a result of a thoughtful combination of educational and research activities, students are becoming highly professional specialists capable of constant self-development, independent

thinking and to plan and carry out their professional activities. This encourages the creation of conditions for developing a competitive specialist as one of the tasks of modern higher education [13].

The content and form of training thus affect the student choice of value guidelines [14]. This is a complex and contradictory system unifying spiritual, intellectual, material, sociocultural, scientific, educational, environmental and demographic components of life, both of a person, family, people, and society as a whole [15].

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