The European Proceedings of
Social and Behavioural Sciences
EpSBS

www.europeanproceedings.com
e-ISSN: 2357-1330

*https://doi.org/10.15405/epsbs.2020.01.71*

# IFTE 2019
# 5th International Forum on Teacher Education

# THE FORMATION MODEL OF FUTURE SCIENTISTS PROFESSIONAL TRAINING

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## *Abstract*

Relevance of the research: The relevance of the problem under study is determined by the need for diagnostic monitoring of the training of future scientists and the insufficient development of methodological, theoretical, substantive, technological and scientific and methodological aspects of the formation of professional training of future scientists in the process of pedagogical activity. Research methods: The leading method for studying this problem is modeling, which allows considering this problem as a process of purposeful and conscious acquisition of intellectual culture by specialists, taking into account the peculiarities of cultural and educational environment for the implementation of diagnostic monitoring of future scientists professional training. Results of the research: The article presents a multidimensional model of the process of the formation of future scientists professional training, consisting of interconnected content-structural components, methods of forming a culture of intellectual work based on an anthropological approach, ensuring the systematic of managerial actions of subjects of the educational process, aimed at improving future scientists professional training. Practical significance: The model is aimed at a qualitatively new level of adaptation of teachers to new conditions of professional activity in the field of education and is focused on the development of scientific and methodological support for diagnostic monitoring of future scientists professional training.



**Keywords:** A multidimensional model of the formation of future scientists professional training, diagnostic monitoring of professional training future scientists, professional training.

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## 1. Introduction

Modern real practice proves that a competitive specialist and a high-class professional should have the qualities of a scientist, as the master should be able to generate ideas, substantiate them and have the skills to translate them into practical production. These conditions are important qualitative components of the development of the education system, the growth of science and technology (Hivner et al., 2019; Pavlova, Pulekha, & Vtorushina, 2018; Potashnik, 2006).

Monitoring diagnosis of students' training requires the need to apply in practice the knowledge and skills of a culture of intellectual work and to take into account the characteristics of the cultural and educational environment of a university for the fruitful development of a person at all levels of education. Realization of this goal by means of an objective knowledge of psychological and pedagogical disciplines within the framework of the formation of a culture of intellectual work based on an anthropological approach requires consideration of the legal regulations included in the main legislative acts that regulate the activities of the university (Rbodes, 2001; Razumova, Sadykova, & Yarullin, 2017). Therefore, the learning process requires the implementation of such tasks as:

- the disclosure of the phenomenon of the culture of intellectual work as an activity, work, labor, as a synthesis of personal qualities;

- the assimilation of the methodological, theoretical, technological foundations of the formation of a culture of intellectual work through the means of psychological and pedagogical integration;

- mastering the methodological and theoretical foundations of the scientific, interdisciplinary integration of the following disciplines: pedagogy, psychology, computer culture, foreign language culture;

- the formation of skills to apply knowledge of interdisciplinary integration in scientific and professional activities.

## 2. Problem Statement

The study of the problem was carried out in three stages:

- at the first stage, a theoretical analysis of the existing methodological and technological approaches in philosophical, psychological and pedagogical scientific literature, dissertation works on the problem, as well as the theory and methodology of pedagogical research was studied and carried out; the scientific-conceptual research apparatus has been formulated, the problem, the purpose and methods of research have been highlighted, and a plan for experimental research has been drawn up.

- at the second stage, foreign experience in the implementation of diagnostic monitoring of future scientists professional training was studied, the conditions for training effectiveness were determined, a multidimensional model was developed related to the development of a methodology for forming a culture of intellectual work within the anthropology of education. An innovative pedagogical planning of successful mastering the culture of intellectual work by undergraduates has been implemented; the content of experimental work was clarified, developed complex target programs of compulsory and elective courses were introduced, a pedagogical experiment was carried out.

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- at the third stage, the analysis of the efficiency of the developed model was carried out, mathematical processing, systematization and interpretation of the obtained results were carried out, conclusions were formulated, the study was completed

## 3. Research Questions

What components does a multidimensional model of future scientists' professional training consist of and how can we develop issues related to clarifying the occupancy of the components and describe the role and place of the component in the multidimensional model of this phenomenon?

## 4. Purpose of the Study

The aim of the article is to develop a multidimensional formation model of future scientists' professional training as a process of successful personal development in the framework of the anthropological approach and its approbation.

## 5. Research Methods

In the process of research, theoretical methods were used: system-structural analysis of philosophical, psychological, educational, methodical literature; analysis and synthesis of scientific categories and phenomena; theoretical modeling of the structural and substantive foundations of the process under study; generalization of own and advanced pedagogical experience in line with the studied problem. Empirical methods: diagnostic methods - questioning, interviewing, conversation, standardized testing, expert assessments, self-assessment, rating, generalization of independent characteristics, projective techniques; observational methods - observation, self-observation; praximetric methods: analysis of activity products; experiment in its ascertaining, forming and control functions; quantitative analysis of the results. Methods of mathematical statistics and graphic images of the results.

## 6. Findings

### 6.1. Structure and content of the model

On the basis of the anthropological approach, a multidimensional model of future scientists' professional training was developed, including motivational-targeted, substantive-procedural, analytical-evaluative, reflexive-corrective components. The motivational-target component of the multidimensional model of the formation of students professional training involves the formation of a motivational-value, personal attitude to mastering the complex of competences of the core competencies, awareness of research supervisor of the importance of personal qualities that make up the components of the culture of intellectual work in the anthropology of education are important qualities of a future scientist and professional.

Professional training requires possession of the core competencies at informative level that affect the components of a culture of intellectual work. They are shown in Figure 1.

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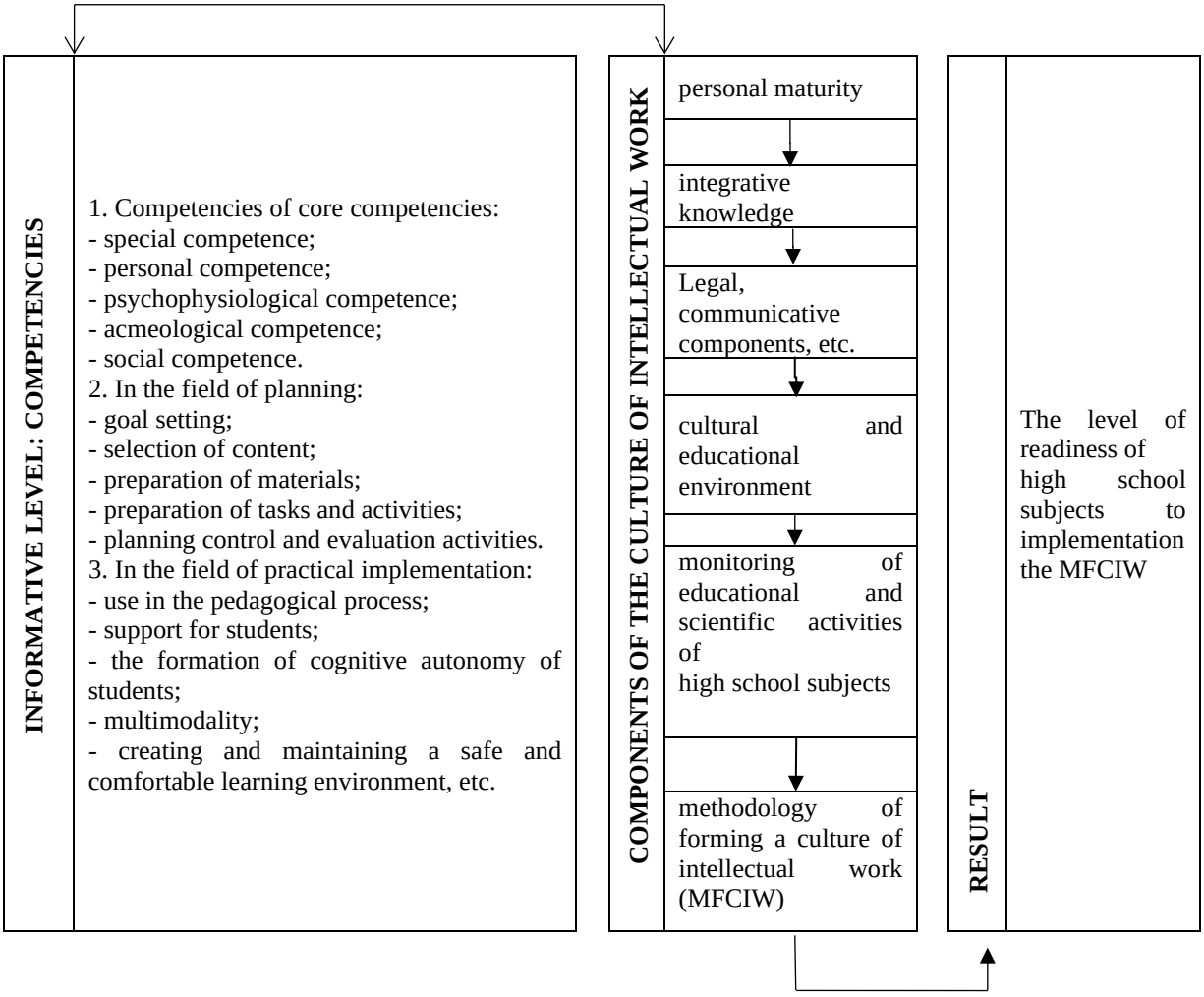


**Figure 01.** Competencies of the core competencies

If a full-fledged professional training to improve the knowledge and skills is conducted according to the method of forming a culture of intellectual work, the significant qualities inherent to scientists will be vividly manifested, higher will be the level of educational and scientific work carried out by undergraduates, the percentage of its success will be reflected in the quality of master's graduation defense.

Mastering culture is the basis for integrative training in terms of the anthropology of education. Integrative training as an extensive process of mastering a profession by means of psychological and pedagogical integration allows students to be included in the process of mastering integrated educational and extracurricular materials. This is a set of problematic issues, a set of tasks and a set of tasks and exercises.

The most important areas of the cultural and educational environment of higher education and research activities are:

- informatization and computerization;
- fundamentalization and humanization;
- succession and continuity of education;

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- mobility of a university graduate;
- completeness of modeling the future activities of a specialist;
- increasing the activity of the individual and creative potential.

The fundamental and system-building direction of the development of cultural and educational environment is humanization, its main meaning is the development of personality. Generalizing and integrating essence of personality and its properties mediate the student's activities and directions for the development of education.

The implementation of the basic principles of personal-developmental education in a higher education institution requires an analysis of the professional training directions in relation to the formation of a culture of intellectual work as a structural component of the anthropological paradigm. The directions of professional training are highlighted and displayed in tabular form (table 1).

**Table 01.** The directions of professional training

<table>
<tr><th colspan="3">Directions in the system of professional training of specialist</th></tr>
<tr><td>Focus on the transfer of a professional culture, a culture of intellectual work in the right volume and content</td><td>Direction to the preparation for scientific activities. Continuity of learning, contiguity and integrative nature.</td><td>The preparation of the researcher.<br>Awareness of the importance of scientific work for professional development, the connection of knowledge with vital human values.</td></tr>
<tr><td colspan="3">Fundamentality</td></tr>
<tr><td colspan="3">Fundamental knowledge has the ability to translate more widely, enrich the culture of intellectual work, retain value</td></tr>
<tr><td colspan="3">Functionality<br>Modeling the content and structure of future activities, which are based on the following types of skills:</td></tr>
<tr><td colspan="2">Planning skills</td><td>Motivational skills</td></tr>
<tr><td colspan="2">Adaptation skills</td><td>Communication skills</td></tr>
<tr><td colspan="2">Organizational skills</td><td>Control and self-control skills</td></tr>
<tr><td colspan="2">Cognitive skills</td><td>Auxiliary skills</td></tr>
<tr><td colspan="3">Integrity</td></tr>
<tr><td colspan="2">Integration of pedagogy, psychology, methods of forming a culture of intellectual work, scientific activities</td><td>The main subsystems of methodical preparation - theoretical preparation, practical preparation, preparation for conducting scientific work and the subsystem of the student's research work</td></tr>
<tr><td colspan="2">Of specialty subject with the methodology</td><td>Several special disciplines into one.</td></tr>
<tr><td colspan="3">Differentiated assessment of knowledge, professional skills, professional mastery and the results of scientific activity</td></tr>
</table>

The subject-object-subject interaction in the cultural and educational environment in the conditions of the professional development of future scientists is improving the methods of such interaction. If the personality-developing humanization of higher education is aimed at solving the problem of professional training of an individual, then the following principles should be implemented, based on the anthropological paradigm:

- democratic conditions for the realization of freedom and individual rights. The decisive component of the condition is equality and mutual interest in the development of subjects of study at the university;

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- the principle of awareness and acceptance of a hierarchical value system in the development of a specialist and a scientist;

- the principle of completeness and continuity in the development of personality. This principle should take into account personal characteristics, starting with the selection and ending with the distribution and direction of university graduates for further self-realization;

- the principle of taking into account age and social characteristics in personal development requires an emphasis on self-development, supported by the development of independence in strategic types of life and activity, goal-setting and planning;

- the principle of self-development of personality determines the activity in the self-improvement features. An important condition for self-development of personality is the regularity and efficiency of diagnosis and self-diagnosis to establish feedback in the development of personality. The effectiveness of the diagnosis of the person is based on information about the manifestations of the personality in the activities and in general in life,

- the principle of multimodality - a multivariate principle of diagnostic concepts;

- the principle of psychological and pedagogical support of personal development.

The training process is focused on the developed multidimensional model of successful training of future scientists. This model in the system of forming a culture of intellectual work in the framework of the anthropological approach consists of interrelated factors, content-structural components that determine the integrity of the cultural and educational environment of the university.

Characteristic of the student in a higher education institution as a person of a certain age is determined by psychological characteristics as the unity of psychological processes, states and personality characteristics. Important mental properties of the personality are manifested in the direction, temperament, character, abilities, on which the flow of mental processes depends, the emergence of mental states, the manifestation of mental formations (Figure 2).

When studying a particular student, the individual’s features, mental processes and states are taken into account. The social aspect allows you to explore social relations, qualities that are generated by belonging to a particular social group, nationality. Characteristics from a biological point of view include the type of higher nervous activity, the structure of analyzers, unconditioned reflexes, instincts, physical strength, body build, height, facial features, skin color, eyes.

The study of these aspects reveals the trainees' qualities and capabilities, their age and personality traits. This segment of life is characterized by the fact that during this period many optima of the development of intellectual and physical forces are achieved. The socially mature personality of the learner is stood out by:

- consistency of attitudes;

- focus on the values of life;

- organically combines independence and dependence on the existence of social relations. Psychological characteristics of the student's personality, the study of his abilities, general intellectual development, interests, motives, character traits, temperament, efficiency, self-awareness, allow to take them into account in the process of forming a culture of intellectual work based on an anthropological approach.

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**Figure 02.** Model of the formation of professional readiness of future scientists to implementation MFCIW

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The meaning of reflexive classes is to consciously plan activities, to understand the purpose of the activities of others:

- setting and achieving the of study subjects in accordance with their content and their own individual characteristics;

- tracking the implementation of the goal;

- adjustment and planning of future activities;

- analysis of successes and difficulties in achieving goals.

The purpose of reflexive classes is the awareness of everyday and deep external and internal motions through the study of awareness techniques and the development of consistent actions of reflexive activity.

The duration of systematic reflective classes can be carried out once a week or every day. If, through systematic classes of students, reflexive skills of activity are mastered and transferred to training, then individual reflexive courses can be avoided. An important module or educational period, preparation for the final test of knowledge or the completion of the study of the discipline can be completed by individual or group reflection.

The work on goal setting and reflection can be organically included in the process of professional education and advanced training for its awareness and productivity.

However, the development of the personality of the student in the university has some peculiarities. In the first course of study, tasks are solved by introducing them to the scientific community. The behavior of first-year students shows a high degree of conformism and a differentiated approach to the fulfillment of roles. The adaptation period in the university can be divided into such types as:

- professional appearance, when students adapt to vocational training and research activities, study its character, conditions and content. The main goal is to develop independence in educational and scientific activities;

- socio-psychological type, when students adapt to the scientific environment, study relationships and develop their own style of behavior.

As a result of the observation, it is identified that students face the following difficulties:

- in the study of the peculiarities of the activity: schedule, distribution of subjects, forms of education;

- in carrying out the volume of independent work, it depends on the students' ability to take notes, select and analyze primary sources, dictionaries, reference books;

- in the organization of group, as the group is formed on the basis of formal features - the need for communication and like-minded people.

Education at the university as a step towards the opening of the profession, forms a practical focus on the upcoming activities. Within the framework of the socio-psychological aspect of the study, a group of students revealed a higher educational level, they more actively consume culture and are distinguished by a high level of cognitive motivation.

A student in a higher education institution is a socially mature person and his inclusion in a team constitutes a social community that is distinguished by social activity and maturity.

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Forming the outlook of a group of students means developing their reflection, their awareness of themselves as subjects of the educational process, carriers of certain social values, and socially useful individuals.

### 6.2. Stages of implementation of the model

The implementation of the model involved the following stages of experimental work:

- determination of the initial level of formation of significant personality traits, which are characteristic of scientists and professionals, were determined using the methods of testing, questionnaires, pedagogical observation and self-observation of teachers, statistical processing of the results of the study of professional training.

The purpose of determining the initial level was to study the experience of scientific leaders, to present their author's systems of activity, to determine the elements of the system of activity.

Authorial systems of research supervisors, as a single process of improving the quality of knowledge, are aimed at increasing students' interest in acquiring knowledge, at developing their creative abilities in organizing self-education, self-organization, self-control, continuing education and self-development in a new cultural and educational environment.

The individual psychological characteristics of the personality of research supervisors are characterized by their creative willingness to set and solve professional tasks, high interest in acquiring the necessary knowledge, abilities aimed at achieving the highest results in educational activities and implementation of the functional in the cultural and educational environment of the university.

#### 6.2.1. Ascertaining stage

In total, the study covered 130 teachers, 67 teachers became direct participants in the experiment. Analysis of the results of the diagnostic survey according to the methods of “Determination of the level of proficiency of a research supervisor by an integrated approach to the formation of a culture of intellectual work”, “The relationship of the level of knowledge of the culture of intellectual work with the results of the activities of the research supervisor” led to the conclusion that most teachers have an initial (45.7%), medium (32.3%) and low (22) levels. The performance indicators of scientific leaders are reflected in the diagram (Figure 3).

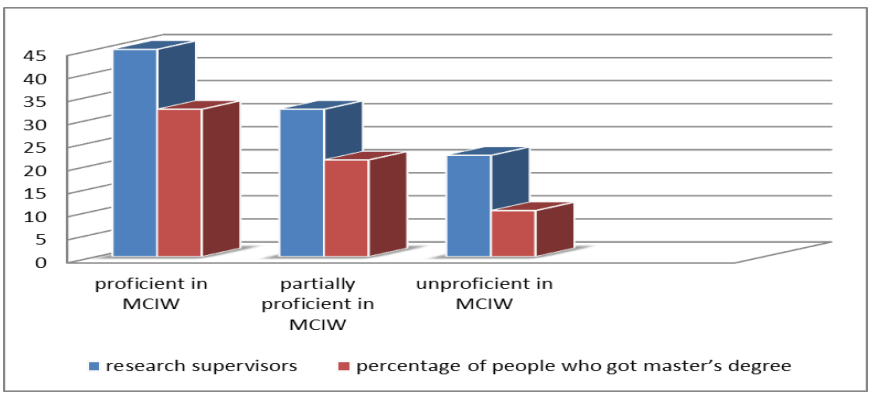


**Figure 03.** Indicator of the effectiveness of the work of research supervisors at the ascertaining stage

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**6. 2.2. Formative stage**

The stage of the formative experiment was aimed at studying the activities of scientific leaders:

- areas of scientific interest;

- self-realization in professional activities;

- the use of individual means and methods in the process of forming a culture of intellectual work. Research supervisors were acquainted with the objectives, instructions, ways of providing information.

Comprehensive diagnostics included such research methods as:

- interview with the supervisor, professors;

- analysis of the products of their activities - textbooks, monographs;

- scientific advice;

- teaching activities;

- sites;

- observation.

Respondents were asked to complete and compile:

- the scheme of research of the system of activity of the scientific leader

- research scheme of its own activity system;

- a program for the development of professionally important qualities that contribute to the formation of the authorial system of activity in mastering the culture of intellectual work on the basis of an anthropological approach;

- personal path or trajectory of development of professionally important qualities.

The information obtained was used to carry out the methodology of “Determination of the level of proficiency of a research supervisor by an integrated approach to the formation of a culture of intellectual work”, “The relationship of the level of knowledge of the culture of intellectual work with the results of the activities of the research supervisor”.

Diagnosis was carried out in two stages:

- the initial stage - conducting advanced training courses to consider issues related to the peculiarities of the culture of intellectual work based on an anthropological approach;

- special courses, seminars, practical classes on the method of forming a culture of intellectual work;

- respondents completed questionnaires.

Diagnostic monitoring helped:

- to define in more detail and reveal the holistic knowledge of the culture of intellectual work;

- to develop practical skills according to the method:

- to increase the effectiveness of the scientific activities of students who are engaged in research from this group of supervisors. The percentage of teachers working with the methodology of an integrated approach to the problem of forming a culture of intellectual work has increased after the work done. The following conclusions were drawn on the diagnosis:

- lack of holistic knowledge of the culture of intellectual work;

- ignorance of rational methods of work, taking into account the specifics of the methodology.

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### 6. 2.3. Control stage

At this stage of the experiment, as a result of the analysis, it was determined that a low percentage of successfully defended undergraduates are teachers who partially master the methodology of an integrated approach to the culture of intellectual work, and higher results are those research supervisors who are proficient in this technique and have high results in working with undergraduates.

In the course of the experimental work, diagnostic sections were carried out using the same methods as at the ascertaining stage of the experiment. The control slice data showed changes in comparison with the measurements of the ascertaining experiment for all criteria, however, these changes were significant only in the experimental group, where there was a shift in the number of teachers with medium (51.3%) and high (92.4%) levels of formation. In the control group there were no significant changes in the level of development of these skills (Figure 4).

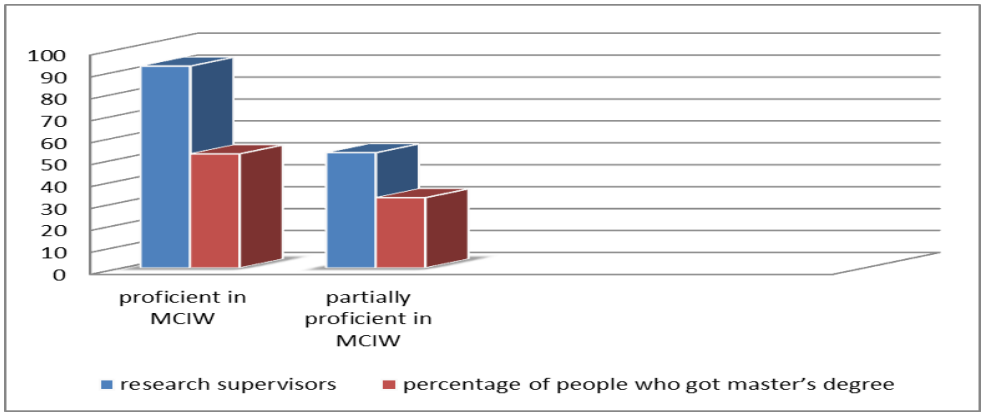


**Figure 04.** Indicator of the effectiveness of the work of research suoervisors at the control stage

Diagnostics of students' professional training as the basis for upgrading the quality assurance system convinces that owning a theoretical and methodological basis for building a culture of intellectual work is of great importance. In the modern labor market, professionally trained personalities are in demand, their peculiar thinking potential as an indicator of professional competence in prestigious scientific and industrial complexes move science and production through the creation of intellectual products. Therefore, diagnostic monitoring of the professional qualities of students is an important component of a multidimensional model of the process of successful development of personality in a higher educational institution

## 7. Conclusion

In the Message of the President of the Republic of Kazakhstan to the people of Kazakhstan, Nazarbayev (2007) emphasizes that the main criterion for the success of educational reform is the achievement of a level where any citizen of the country, having received the appropriate education and qualifications, can become a sought-after specialist. Therefore, the provision of high-quality education services, an effective system of professional training at the level of international standards is the key to the successful integration of Kazakhstan into the world economy and community.

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The study of psychological and pedagogical literature allows us to state the absence of special studies devoted to the problem of the formation of professional training of future scientists in the system of postgraduate education in the context of real practical pedagogical activity. However, the formation of general pedagogical skills of a teacher and their various groups is discussed in detail in the works of Khmel (1998). Key competencies as an effective target basis of a competence-based approach in education are considered in the works of Zimnyaya (2004).

The anthropology of education received coverage in the studies of Ananyev (2001), Vygotsky (2005). Khutorskoy (2017) and others associate the process of professionalization with the development of specialist competence, emotional stability and flexibility, creative activity, ability to innovate.

It has been established that the formation of professional training of future scientists in the process of organizing the cultural and educational environment of a higher education institution will be carried out successfully if the development of scientific activity is organized as a process of purposeful and conscious mastering by experts of the methodology of forming a culture of intellectual work. The basis of such training is a developed multidimensional model consisting of interrelated motivational-targeted, substantive-procedural, effective-evaluative components. Personality maturity, general and specific features of the above groups contribute to active socialization and their entry into professional and social activities from the position of adequacy and rationalism.

The subject of further research may be the development of issues related to clarifying the occupancy of the components, describing the role and place of the component in the multidimensional model of this phenomenon, and developing ways to form a culture of intellectual work on the substantive content.

## Acknowledgments

The research is performed according to the Russian Government Program of Competitive Growth of Kazan Federal University

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