

IMPROVEMENT OF THE METHODOLOGY OF TRAINING MASTERS OF TECHNICAL SPECIALIZATION FOR SCIENTIFIC RESEARCH ACTIVITIES

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Abstract

The article reveals the essence and content of the pedagogical model for developing the readiness of master's students for research activities.

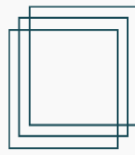
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Introduction

Education is recognized worldwide as a key factor in ensuring sustainable development. In the context of digital transformation of education in the world, society's need for developing talents and abilities to prepare masters for scientific work is growing. Education is the process of instilling knowledge, skills and abilities, the main means of preparing a person for life and work. Education is recognized as the main factor ensuring sustainable development, and in the international concept of education until 2030, "creating the opportunity to receive quality education throughout life" is defined as an urgent task. This has expanded the opportunities for improving the methodological system of training for research activities in the master's program in the field of education. In developed countries, a master's program is an educational stage aimed at training not only highly qualified specialists but also future scientists, whose general and professional level of preparation is constantly evolving and meets the requirements of society. In this regard, in developed countries such as the USA, the UK, Germany, France, China, Japan, and South Korea, ensuring the quality of the educational process at the master's level, along with high professional qualifications, involves setting scientific tasks, planning research, and conducting scientific activities. A number of scientific studies are being carried out on the issues of training creative specialists capable of analyzing primary data and evaluating research results. The quality of postgraduate education and the development of various sectors of our economy are largely linked to the preparation of master's graduates in technical specialties for scientific and research activities. Therefore, we can recognize the level of development of research competencies among graduates of technical specialties as one of the key factors in advancing our science and economy to a new level. In recent years, special attention has been given to the formation and development of the master's education system based on modern requirements. As a result of comprehensive reforms implemented in the field of education, measures such as strengthening the regulatory, scientific-methodological, and material-technical support of master's programs have been undertaken, along with the development of State Educational Standards for

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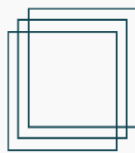
master's specialties, among others. Additionally, the need to improve methodologies aimed at developing research competencies in master's studies is emphasized. It is also important to consider that a master's program serves as a foundation for training not only highly qualified professionals but also future scientists, whose level of general and professional preparation must meet the demands of a constantly changing society. In this regard, the issue of ensuring the quality of the educational process in master's programs arises, focusing on the training of creative specialists who, in addition to high professional qualifications, possess the ability to formulate research questions, plan and conduct studies, carry out research activities, analyze initial data, and evaluate research results.

The analysis of the state and development of master's programs within the multi-level education system, along with a review of scientific and pedagogical literature and the synthesis of experience in this field, indicates that the professional training of master's students requires their active involvement in systematic research activities as the primary form of academic work. This training is based on the conceptual principles of fundamentalization, humanization, professionalization, and informatization of the educational process.

The outcome of the professional training of future master's graduates is their competence, which includes the knowledge and skills necessary for professional activities. A key characteristic of a master's graduate's competence that ensures the quality of their training is research competence, which is determined by the level of their developed readiness for research activities.

From this perspective, we have defined the key concepts of our research: "research activities of a master's student," "readiness of master's students for research activities," and "the process of forming readiness for research activities in master's students." After studying the content of master's educational programs, we concluded that the concept of "research activity" at the master's level is a broader concept and represents a synthesis of academic research activities (ARA) and scientific research activities (SRA), which differ in the degree of independence when conducting research. Considering this specificity, we define the research activity of master's students as a specially organized activity aimed at mastering the methodology of scientific knowledge and organizing research inquiry. The result of this activity is the corresponding level of development of research knowledge, skills, and professionally significant personal qualities that ensure the successful functioning of this activity. When defining the structure of research activity for master's students, we relied on the conceptual model of activity developed by A.N. Leontiev. The structure of the research activity of master's students consists of a set of interconnected and mutually conditioning components: need, motive, goal, actions, operations, and conditions.

Its successful implementation requires the master's student to have developed readiness for research activity, which in our study is defined as a holistic personal formation of the student, reflecting the relationship and outcome of their internal



intellectual and personal development. This includes a motivational and value-based attitude toward research activity, a system of methodological knowledge and research skills, and professionally significant personal qualities that ensure the success of the research activity.

The solution to the problem of the content of master's students' readiness for research activities was achieved through the study of the content of readiness for professional activity. We share the viewpoint of scholars (K.M. Duray-Novakova, V.A. Slastenin, N.D. Khmel, and others) who consider "readiness for professional activity" as a holistic phenomenon, integrating not only the orientation of the individual and specific knowledge and skills but also personal qualities.

In the structure of master's students' readiness for research activity, we identified the following components:

1. Motivational-value component: This includes a set of stable motives (cognitive, personal, socially significant, professionally valuable) that not only determine the master's student's interest and positive attitude toward research activities but also reflect the overall orientation of the individual. It encompasses their exploratory, creative, and research-oriented stance, which involves a conviction in the professional and social significance of research activities and an awareness of the need for active participation in them.

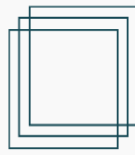
2. Cognitive-operational component: This includes general scientific methodological knowledge and skills, specific scientific research knowledge and skills, knowledge of procedures, and proficiency in the techniques of scientific-pedagogical research.

3. Personal component: This encompasses a system of developed professionally significant personal qualities of the teacher-researcher, such as self-organization, self-control, activity, and the ability for reflection.

The combination of these components constitutes the phenomenon of master's students' readiness for research activity.

The study of the state of the problem of forming readiness for research activity in the multi-level education system led to the conclusion that readiness for research activity does not develop independently; it requires purposeful efforts for its formation. As the general scientific level, we selected the systemic approach, which ensures a comprehensive study of the problem of forming master's students' readiness for research activity and allows us to view this process as a pedagogical system. The use of the principles of the systemic approach allowed us to make the following generalizations:

1. The process of forming master's students' readiness for research activity is a subsystem of professional training, which allows it to be constructed in accordance with general didactic principles.



2. The process of forming master's students' readiness for research activity, as a pedagogical system, is open and probabilistic, characterized by flexibility, dynamism, and manageability.
3. The effectiveness of the process of forming master's students' readiness for research activity depends on the organization of systemic influences on the preparation of students for the postgraduate education process and the creation of special pedagogical conditions.
4. Readiness for research activity can be considered as a pedagogical system, representing a holistic formation of specific knowledge, skills, and personal qualities of the master's student, ensuring the effectiveness of scientific-pedagogical and scientific-research activities.

The aforementioned points are most fully revealed in combination with the informational approach, which serves as the research strategy at the specific scientific level. The informational approach in our study allows us to formulate the following generalizations:

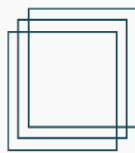
1. The process of forming master's students' readiness for research activity is informational in nature, and the quality of the information determines its effectiveness.
2. The information that forms the basis of the process of readiness formation for research activity reflects the experience of the subjects of the educational process, their goal-setting, and value orientations.
3. From the perspective of the informational approach, the process of forming master's students' readiness for research activity is an open system, implying a constant exchange of information with the external environment.
4. The informational support of the process of forming master's students' readiness for research activity should include the necessary theoretical knowledge about the methodology of research activity, as well as the use of modern information technologies in research activities.

A practice-oriented strategy is represented by the **personality-activity approach**. The key principles of the personality-activity approach in the context of forming master's students' readiness for research activity are as follows:

1. The formation of master's students' readiness for research activity is a pedagogical process in which students take an active subject position.
2. The process of forming readiness for research activity is based on general didactic principles and employs methods that activate this process.
3. The formation of readiness for research activity takes into account students' individual experiences and characteristics, fostering subject-to-subject relationships with educators.

Based on the principles of the **systemic, informational, and personality-activity approaches**, and considering the structure of master's students' readiness for research activity, we have developed a **model for forming research readiness**, which includes three main components:

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Motivational-target component – ensures the formation of a research-oriented mindset, a value-based attitude toward research activity, and a commitment to engaging in research. This component fulfills goal-setting, motivational, and prognostic functions. The motivational component involves the transformation of external motives into internal ones through specially organized stimulating influences on master's students, ensuring the formation of personally significant motives. Master's students are specialists who already have a higher professional education (a bachelor's degree) and certain professional experience. They typically possess a high level of motivation for learning.

Therefore, we consider a master's student not as a passive learner but as an **active participant in the learning process**, striving for **independence, self-realization, and self-management**. They possess diverse experience, which serves as a valuable resource for learning, and they engage in education to solve significant life challenges and achieve specific goals. Thus, at the master's level, the **motivational component** requires entirely different **methods, techniques, and tools** focused on **self-directed learning**. Considering this, we integrated **motivational and value-based personal elements** that are essential to research activity:

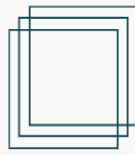
- **Problematicity** – the ability to identify and formulate research problems.
- **Criticality** – the capacity for critical thinking and evaluation of research findings.
- **Openness to supplementation** – readiness to refine and expand knowledge based on new data.
- **Self-actualizing subjectivity** – the drive for continuous personal and professional growth through research.

The **competency-based approach** is guided by the following principles:

- The **purpose of education** is to develop learners' ability to independently solve problems in various fields and activities by utilizing social experience, which includes their own personal experiences.
- The **content of education** represents a didactically adapted social experience in solving cognitive, philosophical, moral, political, and other issues.
- The **organization of the educational process** is aimed at creating conditions that foster students' experience in independently solving cognitive, communicative, organizational, moral, and other problems that form the core of education.
- **Assessment of educational outcomes** is based on analyzing the levels of knowledge and competencies achieved by students at a given stage of their education.

Thus, we can summarize the following key points:

- a) The **knowledge-based approach** in education aims to provide master's students with as much knowledge as possible. However, in modern conditions, the level of education cannot be solely determined by the amount of knowledge acquired. The **competency-based approach** requires master's students to develop the ability to solve problems of varying complexity based on their existing knowledge. This approach values not just knowledge itself but the ability to apply it effectively.



b) The **traditional approach** focuses on the **result**, showing what new information a master's student has learned, whereas the **competency-based approach** evaluates **what skills and competencies the student has developed** during their master's studies. Both approaches aim to cultivate certain personal qualities and a value system in students. However, they differ in their methods:

- The **traditional approach** assumes that acquiring new knowledge alone leads to the development of desired competencies.
- The **competency-based approach** emphasizes **learning through experience**, where students develop skills by independently solving problems.

Thus, in the knowledge-based system, problem-solving serves as a way to reinforce acquired knowledge, whereas in the competency-based approach, it becomes the core purpose of the entire educational process.

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