

## FORSCHUNGSKOMPETENZEN IN ZUKÜNFTIGEN PHYSIKLEHRERN BILDEN

**Karlibaeva G.E.** - Doktor der Pädagogischen Wissenschaften (DSc),  
außerordentlicher Professor des Lehrstuhls für Didaktik der Physik  
Nukus State Pedagogical Institute, benannt nach Ajiniyaza

**Anmerkung:** Die Empfehlungen zur Gestaltung der Forschungsaktivitäten angehender Physiklehrer sind in diesem Artikel enthalten. Und auch zur Bildung von Forschungskompetenzen werden verstanden: die Fähigkeit, ein wissenschaftliches Problem zu formulieren, Hypothesen zu konstruieren, zu beobachten, experimentelle Probleme zu lösen, zu experimentieren.

**Schlüsselwörter:** Gestaltung, Entwicklung des naturwissenschaftlichen Denkens, Methode, physikalisches Wissen, Kompetenz, Motivation, Bildungsprozess.

## FORMING RESEARCH COMPETENCIES IN FUTURE PHYSICS TEACHERS

**Karlibaeva G.E.** - Doctor of Pedagogical Sciences (DSc), Associate  
Professor of the Department of Teaching Methods of Physics  
Nukus State Pedagogical Institute named after Ajiniyaza

**Abstract:** The recommendations for organizing the research activities of future physics teachers are given in this article. And also, about forming research competencies are understood as: the ability to formulate a scientific problem, construct hypotheses, observe, solve experimental problems, experiment.

**Keywords:** forming, development of natural science thinking, method, physical knowledge, competence, motivation, educational process.

As the President of the Republic of Uzbekistan Sh.M. Mirziyoyev notes, "It is extremely important to solve another problem: this is not always a sufficient professional level of our teachers, professors and teaching staff, their special knowledge. It is necessary to create the environment which would actively contribute to the processes of learning, spiritual and moral enrichment and education on the basis of true values" [1].

The modern stage of development of higher education requires the development of abilities and skills of future teachers in research activities

on the basis of international standards, provides for the need to improve the methodology for the formation of research competencies in accordance with the requirements of the labor market. Research competence is essential for every person with a higher degree. According to this, educational technologies are being intensively improved in higher education institutions on the basis of research activities.

The research activities of students were studied in the studies of such native scientists as A.A. Akhmedov, N.A. Muslimov, B.Kh. Rakhimov, N.Sh. Turdiev, as well as by such scientists of the countries of the commonwealth of independent states as B.N. Bondarenko, I.A. Zimnyaya, Z.A. Skripko, N.N. Stavrinova, V.D. Shadrikov and others.

According to theory of P.Ya. Galperin about the gradual formation of mental actions, forming research competencies of future teachers is divided into three interrelated stages: familiarization of future teachers with the basics of research competencies; mastering by future teachers of basic knowledge and skills in the field of research activities; processing of basic research skills by future teachers in the process of professional training.

In the study of M.B. Shashkin and A.V. Bagachuk, “research competence” is defined as the integrative characteristic of personality, which implies the development of creative abilities of students, mastery of research technologies and readiness to use them in educational and professional activities [6. P. 67].

According to the study of E.F. Zeer, the research competence includes motivational, cognitive, activity and reflexive components [3. P.38].

In research competence, the motivational component includes a set of motives which ensure that future teachers perform research which is as close as possible to their professional sphere: cognitive, professional, and also motives for achieving success.

In research competence, the cognitive component integrates the totality of knowledge, skills and abilities which are necessary for research activities are acquired by future physics teachers. Together with this, future physics teachers should have a developed intellect and creative thinking.

The activity component in research competence gives it opportunity to use research activities in the professional sphere. It is based on: to highlight the problem and the contradictions underlying it; to formulate a goal, hypothesis, research objectives; to select and analyze psychological and pedagogical literature and research on this issue; to plan and model the research process; to select diagnostic methods corresponding to the assigned research tasks; to analyze the obtained results, form conclusions, and others.

In the research competence, the reflexive component includes the analysis of the results of someone's activity, namely, the correlation of the achieved results with the set goal, and, on the basis of the analysis, the formulation of evaluative attitude to the product of someone's activity.

On the basis of carried out analysis, it was determined that competence can only be demonstrated in the process of activity. There is the organic connection between the concepts of competence and activity, it can be concluded that "research competence" is manifested in research activities corresponding to its content. There are students in each group, for whom it is especially valuable to feel real pleasure not only from the research results but also from the research process.

Scientific-research work of students (SRWS) is considered a focus on research activities that allows the formation of understanding and recognition of the professional value of research competencies. First of all, future physics teachers learn scientific research, they develop a need for research activity and its awareness; application of research skills in eliminating difficulties arising in the process of performing educational and professional tasks of research nature. The second type of research work is considered the expenditure of time resources for independent search, analysis of basic knowledge which are related to research activities, and their application in practice. Research activity is the ability to independently, actively and on personal initiative show research skills aimed at obtaining and processing scientific information [4. P.12-16.].

Creative teaching methods should play a leading role in SRWS. In the arsenal of innovative pedagogical tools and methods, a special place is occupied by research creative activity.

The implementation of creative activity involves the implementation of:

- transfer of previously acquired knowledge to a new situation;
- independent vision of the problem and alternatives for its solution;
- combining previously learned methods and techniques into new ones, and others.

To solve non-standard and creative problems in various fields of activity, it is necessary to involve students in research work.

The main attention is removed to the game of "science" in the process of forming the research competencies of future physics teachers, such a game involves the formation of skills to work in the team. Along with this, in the formation of the research competence of future physics teachers, interactive teaching methods can be used ("Scientific discussion", "Analysis of urgent problems in physics", "Innovation projects"). In the process of SRWS, it is possible to determine the interaction "leader -

student" and with like-minded people in groups. In the process of research work, the organization of these types of activities is considered important condition for the training of competent specialists. The stages of the student's activity and the logical scheme of interaction between the student and his leader in the process of performing research work are schematically shown in Figure 1.

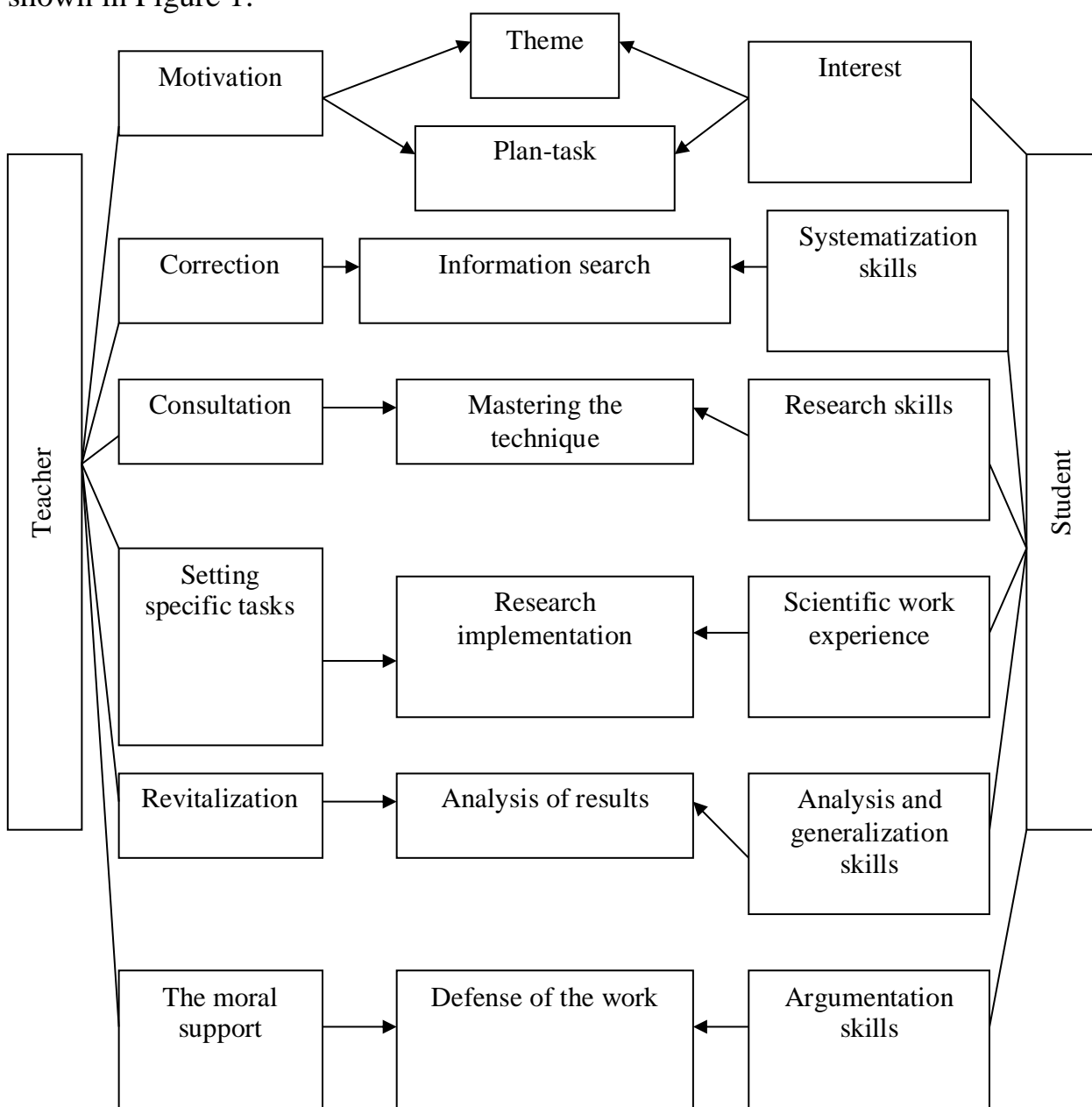


Figure 1. Scheme of interaction between teacher and student in the process of performing research work

Thus, in the process of pedagogical preparation, it is necessary to create by means of teaching favorable conditions which students would

formulate their own conclusions, simulate, perform creative tasks, generate ideas and solve various research problems, which will fully contribute to the formation of research competence.

Research competence is a complex of sufficient knowledge, abilities, skills, personal qualities and individual abilities which are used in the process of research activities.

When organizing research work for future physics teachers, we offer the following work plan:

1. Scientific topic for research work.
2. Topicality and relevance of scientific topic.
3. The purpose of the study.
4. Research hypothesis.
5. Research topics.
6. Research methodology.
8. Practical results of the research.
9. Conclusions.
10. Used literature and electronic resources [2. P. 103].

The conducted research shows that the formation of such competencies in the university can be ensured by the systematic organization of students' scientific work. It should be carried out within the framework of the scientific directions of the work of students during the hours of training sessions as an obligatory element of training (Fig. 2).

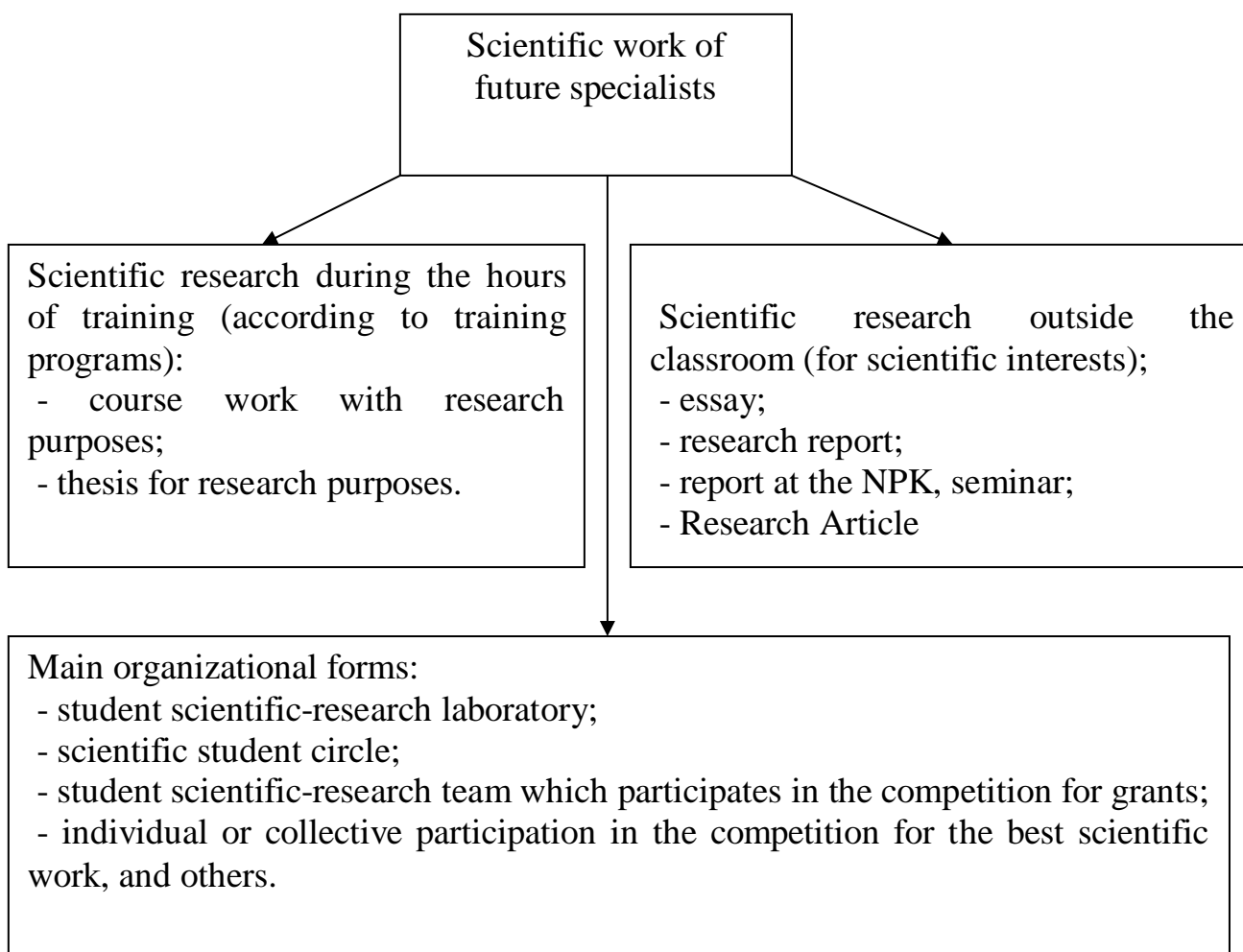


Figure 2. Systematic organization of scientific work of students

The scientific-research report is built according to the same plan as the scientific article. The presentation should strive for accuracy and publicity. You should not abuse scientific terms, moreover, you should not use words whose meaning is not entirely clear [5. P. 174].

When creating educational and methodological support for the formation of research competencies of future physics teachers, the following forms, methods, teaching aids and training stages have been identified, which give it opportunity to effectively implement the didactic conditions which are determined on the basis of these principles, as well as stimulating methods and actions of this process:

- a) forms of education: collective, group, individual;
- b) teaching methods: "scientific discussion", "analysis of urgent problems" and "innovation project";
- v) teaching aids: electronic educational resources, research tasks of the educational and professional nature;

g) stages of preparation: motivating future physics teachers in research activities; involvement in research activities; enrichment of research experience.

In conclusion, we can state that the relevance of the research technology of teaching future physics teachers in the field of physics teaching is beyond doubt. One of the main directions of its implementation is considered the achievement of the required professional readiness: students - to study, and graduates - to the fastest social adaptation to the conditions of the forthcoming work, to the team. And also the orientation of the student to use the acquired knowledge and skills for the purposes of self-education, and self-improvement in professional activity aimed at the future.

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