

## Didactic And Methodological Basis Of The Formation Of Research Competence In Vocational Education Teachers

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### Abstract

*This article explores the structure of the research competence of future vocational education teachers, the key factors in improving the traditional didactic provision of research competencies for teachers of vocational education, and the use of interactive teaching methods and tools to improve the research competence methodology of future vocational teachers.*

**Keywords:** *Preparation for research activities, research competencies, motivational, cognitive, technological components, non-standard thinking, continuous research, creativity levels, empirical, reproductive, productive criteria, innovative activities, interactive methods.*

### INTRODUCTION

The global socio-economic, scientific and technical changes require the creation and management of a system of future specialist training based on a competent approach. Currently, special attention is paid to the formation of global skills of students in the educational standards of developed countries such as the USA, England, Germany, China, Japan. For this purpose, modernization of the content of existing vocational education, learning technologies and learning outcomes assessment based on a competent approach is important.

According to international pedagogical experience, it is important to prepare future professionals for research activities in the implementation of new pedagogical projects and the widespread introduction of innovative achievements in educational practice. In particular, the development of new teaching paradigms and the effective use of the didactic capabilities of pedagogical and information and communication technologies are crucial for the formation of research competencies in teachers of vocational education. In this context, it is necessary to improve the research competence and assessment techniques for future vocational education teachers through the comprehensive use of innovative teaching methods to address the problems of improving the quality of personnel training in accordance with international standards of vocational training in higher education institutions.

### LITERATURE REVIEW

Modernization of techniques and technologies in the production process, rapid development of science require specialists to be independently and systematically deepen, update, supplement and expand their knowledge. An important requirement of today is the ability of each prospective teacher to develop their professional competence with regard to their own discipline and upbringing of a harmonious generation and their consistent application in pedagogical activity.

A number of scientific studies have been devoted to the study of the problem of preparing a future professional teacher for professional activity based on a competent approach [12, 22]. However, today, there is a growing interest in pedagogical scientists in various aspects of this problem. This testifies to the importance and relevance of the problem at the current stage of modernization and development of the continuous education system.

The scientists of our country including N.A. Muslimov [12, 13], B.Kh.Rakhimov [15], Sh.S.Sharipov [25], A.H.Makhmudov [11], I.B. Askarov [3, 4], N.N.Karimova [8] explained the formation and development of professional education process, regularities, tendencies, preparation of future teachers

for professional pedagogical and research activity, studying and analysis of the essence and meaning of the concepts of "competence" and the problems of formation of research competences of students in their works.

The scientific approach of the scientists of the Commonwealth of Independent States in the research work has been studied in detail.

According to V.V. Laptev, the modern man needs the ability to act consciously and in a timely manner, to plan and achieve life goals, and to be productive in the educational, professional and social environments [10]. This, in turn, necessitates the organization of education based on a competent approach.

A competent approach to education is focused on a comprehensive acquisition of knowledge and practical skills that will help a person succeed in key areas of their personal, as well as public and state interests.

A competent approach is seen as a way of overcoming the contradiction between the need to ensure the modern quality of education and the inability to solve this problem by increasing the amount of information required by learners [16, 23].

V.A. Demin describes competence as: the level of competence of the individual reflecting the exact level of these competencies and allowing them to act constructively in changing social conditions [6,35 pages ].

According to Y.G. Tatur, competence is an integral characteristic of a person's aspirations and ability to realize their potential (knowledge, skills, experience, personal qualities, etc.) for success in a particular field [19].

According to N.A.Muslimov, competence is expressed by the student's acquisition of the knowledge, skills and abilities required for professional and social activities [12, 13].

From the point of view of qualification requirements for higher education graduates, competence refers to the ability of students to use a set of knowledge, skills, and methods of work in specific situations.

The terms competence is a key concept in the competence approach. It has two different interpretations and attitudes that can be equated or stratified [7].

Competence (Latin *competens* is appropriate, eligible, relevant, worthy, well-educated) is the quality of a person who has comprehensive knowledge in a particular field. Competence (Latin *competere*) - means "to achieve a goal, to be worthy, to be fit".

In the definitions of "competenc" by A. Zimnyaya [7], A. Khutorskoye [23] and others, competence is the behavior, manner, and competence required for a particular activity, which is the consequence of demonstrating competence. Summarizing these concepts, we come to the following conclusion in our interpretation of the concepts that are currently being actively used in education: "Competence" is the effective application of personal qualities and knowledge, skills and abilities in the practice of a particular field; "Competence" is an existing and emerging ability to carry out specific activities.

In view of the above, the following work definition was adopted for the research competence of a future vocational education teacher.

**Research competence** is a set of sufficient knowledge, skills, abilities, and individual quality and individual skills used in research activities [20, 21].

### Research Methodology

Higher education institutions pay much attention to training of highly qualified, independently thinking, initiative, competitive workers, who is able to adapt to critical changes in the manufacturing sector, and to effectively operate in the labor market.

The integration of pedagogical and technical knowledge is essential to improve significantly the quality of vocational and pedagogical training for future vocational education teachers in higher education institutions. Integration of pedagogical and technical knowledge in the professional formation of a future professional education teacher based on changes in science, education, technology, and manufacturing economics will ensure the effectiveness of the educational process, which in turn will justify the content of their preparation for professional activity based on a competent approach.

Transition to the new concept of education requires radical revision of the purpose and content of teaching, methods and technologies of teaching, which are the didactic bases of traditional education,

and are the key factors for the successful modernization of bachelor degree systems in many advanced foreign countries.

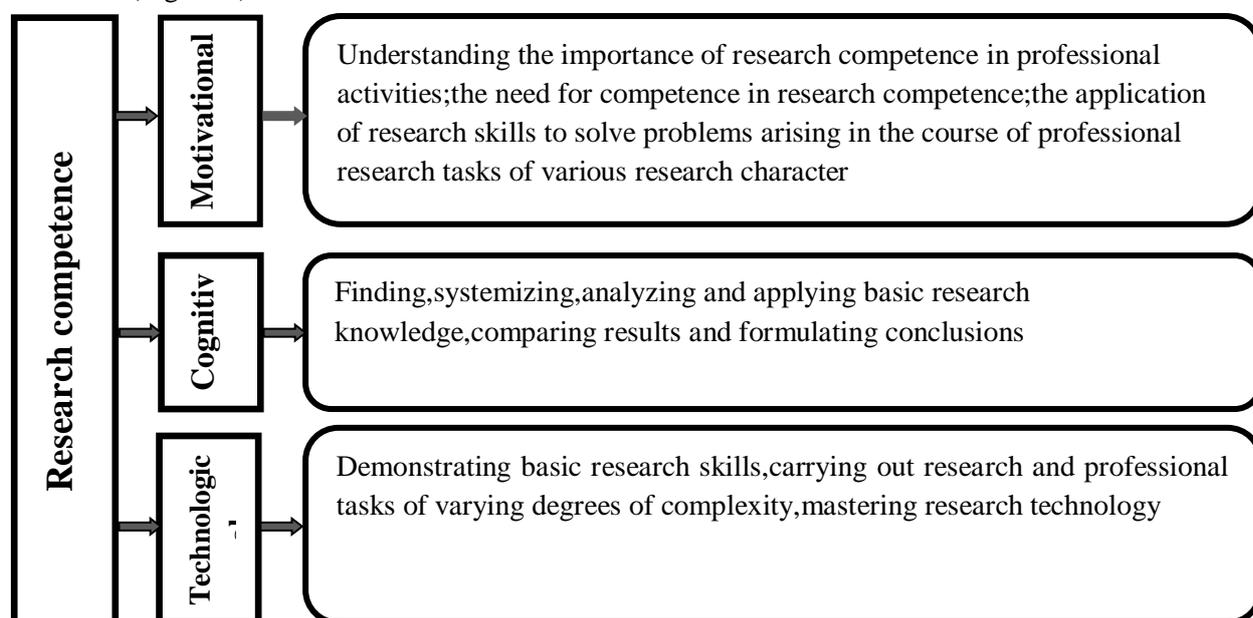
We describe the key research activities of future vocational education teachers with the following skills:

1. Ability to work with the source: work with bibliographic data, catalogs, reference literature, structuring and systematizing the stated material.
2. Pedagogical event observation skills: selection of observation object, definition of goals and objectives of observation, organization and conduct of observation, recording of incidents, analysis of data.
3. Ability to analyze pedagogical phenomena: to organize, compare, synthesize, contrast, establish interrelations of the studied event.
4. Skills of building and solving pedagogical problems: analysis of pedagogical situations, problem formulation, problem solving.
5. Hypothesis-making skills: analysis and evaluation of hypothesis-based data, conducting research experiments, hypothesis-making, development of experimental technology and methodology, experimentation.
6. Skills of summarizing material in the form of reports, abstracts and reports: reports, abstracts, reports, etc.

Based on the analysis of research on the structure and nature of research competence in higher education, we conclude:

- The competence of research teachers formed in future vocational education is a complex structure, and it is a complex of general, professional knowledge, skills and professional creative approaches that will help future vocational education teachers to develop professional and research skills, to solve design, experience and technology tasks.

Based on the analysis of the scientific literature revealing the essence of the competence approach, the structure of the research competence structure (motivational, cognitive, technological) has been identified (Figure 1).



**Figure 1. Structure of research competence.**

Competence requires self-development, self-improvement, constant self-enrichment, the search for new information and the ability to search for new knowledge, processing and applying the results in their practical activities. The competent specialist must be well trained in problem solving, use appropriate teaching methods, select and apply methods appropriate to the problem, refrain from what is wrong, critical thinking, analysis and synthesis [12].

Research competence is not just a set of knowledge, skills and abilities that an integrative-minded

person should possess, but a deeper understanding of the way in which he or she expresses his or her attitude towards the subject of action.

The motivational component of research competencies formed by future vocational education teachers is to understand the professional competence of their research competence, their positive attitude to research activities, their understanding of the importance and demand of this competence, the value attitude that characterizes research competence as a personal achievement are displayed. Future professional educators will be considered empirical research activities that require the understanding of the professional significance of the research competence, its acquisition and use of research skills as a criterion for assessing the level of motivation component of research competence. Indicators of the motivation component of the future competence teachers' research competence are the understanding of the professional significance of research competence, the need to master research competencies and use research skills. Based on these indicators, we identified levels of non-standard thinking, continuous research, and creativity in the formation of this component of future professional education teachers' research competence (Table 1).

**Characteristics of the extent to which motivation component of research competence is formed in prospective teachers of vocational education**

**Table 1**

<b>The degree of formation</b>	<b>Description of the motivational component of research competence</b>
Creativity	Understands the professional significance of research competence. There is a need for mastering research competencies. Applies systematic research skills to solve problems arising from various research and teaching tasks.
Constant research	Understands the professional significance of research competence. There is also a need for mastering research competencies. Applies research skills to address various challenges that may arise in the implementation of various research and teaching tasks.
Non-standard thinking	Lack of understanding the professional significance of research competence. There is no need to master research competencies. Able to apply research skills to solve problems that may arise in the implementation of various research and teaching tasks.

The cognitive component of the research competence is a set of knowledge that enables teachers of future vocational education to formulate research issues and to conduct their own research, to analyze and control its results in educational and future professional activities. Future vocational educators considered reproductive research as a criterion for assessing the formation of a cognitive component of research competence. An indicator of the cognitive component of the development of research competence in future vocational education teachers was the availability and understanding of knowledge in the field of research activities. We have identified three levels (non-standard thinking, continuous research, and creativity) of the formation of a cognitive component of the competence of future professional education teachers based on these indicators (Table 2).

Table 2.

**Characteristics of the formation of the cognitive component of research competence in future vocational education teachers**

<b>The degree of formation</b>	<b>Description of the degree of formation of the cognitive component of research competence</b>
Creativity	Has a high level of basic knowledge in the field of research activity. Understands research, systematization, analysis and application of basic knowledge in the field of research.
Continuous research	Has partially acquired basic knowledge in the field of research activity. Performs a partial understanding of the search, systematization, analysis and application of the necessary research knowledge.

Non-standard thinking	Has no knowledge of the field of research activity. Knowledge of research is fragmented, without any understanding of their search, systematization, analysis and application.
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The technological component of research competence for future vocational education teachers will provide them with the basic skills needed to address research in teaching, training and research. Criteria for evaluating the formation of this component are the basic research skills (teaching information, comparing evidence, analyzing different authors' points of view, coping with evidence, conflict resolution between real and anticipated situations, research objectives, and so on). Problem-solving skills, using different methods of empirical and theoretical research the ability to select and formulate research tasks, including cheating issues, etc.). The key indicators of the formation of the technological component of the research competence of future vocational education teachers were: independence in demonstration of basic research skills and success in their implementation of research and teaching tasks (Table 3).

Table 3.

**Description of the degree of formation of the technological component of research competence in the future vocational teacher**

<b>The degree of formation</b>	<b>Description of the degree of formation of the cognitive component of research competence</b>
Creativity	Independence, activism, at its own initiative, demonstrates basic research skills. He is able to successfully carry out research and teaching tasks of various levels of complexity, possesses research technology.
Continuous research	Demonstrates basic research skills with independent but with little support from outside, its activity is only partially significant. Is able to partially carry out research and teaching tasks of moderate difficulty; partially mastered research technology.
Non-standard thinking	Is unable to demonstrate basic research skills independently, does not feel active, does not carry out research and professional tasks of low research character, does not apply research technology.

Tables 1, 2 and 3 present a level approach to the description of motivational, cognitive and technological components of the research competence of future vocational educators. This, in turn, allowed us to develop a mapping and diagnostic map of the development of research competence in future vocational education teachers (Table 4).

Studying the current state of the problem of research competence has revealed that the problem of forming a research competence assessment tool for teachers of higher education in higher education has revealed that the problem of pedagogical science is not sufficiently grounded in theory and practice. Therefore, we will first consider the criteria and indicators of the key components of the formation of research competence in future vocational education teachers, which will enable them to identify, identify, differentiate, monitor, measure, and diagnose the extent of their formation.

4-жадвал.

**Бўлажак касб таълими ўқитувчиларида тадқиқотчилик компетенцияси шаклланганлигини баҳолаш-ташхислаш харитаси**

<b>Degrees Components</b>		<b>Creativity</b> 9 points	<b>Continuous research</b> 6 points	<b>Non-standard thinking</b> 3 points
<b>1. Motivational</b>	Indicators	Understands the professional significance of research competence	Understands the professional significance of research competence	Does not understand the professional significance of research competence
	1.1. Understanding the professional significance of research competence			
	1.2. the need to master the competence of research	There is a need for mastering research competencies. Systematically applies research skills to solve problems arising from the implementation of various research and teaching tasks	There is also a need for mastering research competencies. Applies research skills to address various challenges that may arise in the implementation of various research and teaching tasks..	There is no need to master research competencies. Able to apply research skills to solve problems that may arise in the implementation of various research and teaching tasks.
<b>2. Cognitive</b>	Indicators	Has partially acquired basic knowledge in the field of research activity	Has partially acquired basic knowledge in research	Has no knowledge of the field of research activity
	2.1. clarification of basic knowledge in the field of research activity			
	2.2. The level of understanding of the application of basic knowledge in the field of research	Understands research, systematization, analysis and application of basic knowledge in the field of research.	Performs, with a partial understanding, the search, systematization, analysis and application of the necessary research knowledge.	The research knowledge is fragmented, without their understanding, search, systematization, analysis and application
<b>3. Technological</b>	Indicators	Demonstrates independence, activism, self-initiative, basic research skills.	Demonstrates basic research skills with independent but with little support from outside, its activity is only partially significant.	Can not carry out research and teaching tasks of research nature, apply research technologies
	3.1. Independent manifestation of basic research skills			
	3.2. Research character study - independent fulfillment of professional duties	Successfully accomplishes educational and professional assignments of various levels of complexity, possesses research technology.	Is able to partially carry out research and teaching tasks of moderate difficulty level; partially mastered research technology	Can not implement educational-professional tasks of research nature, can not apply research technology.

The analysis of interpretation (interpretation, identification) of the concept of "degree" allowed us to express the essence of the concept of "degree of formation of research competence" as follows. The extent of research competence formation is the degree of expression of the key indicators of the research competence (a measure of quantitative and qualitative representation).

We propose to calculate the total score, which describes the degree of research competence of future vocational education teachers:

$$T_k = \frac{(Q_M + Q_K + Q_T)}{3}$$

Here  $T_k$  – is the level of research competence formation;  $Q_M$  – is the quantitative value of the motivational component of research competence;  $Q_c$  – is the quantitative value of the cognitive component of research competence;  $Q_T$  – is the quantitative value of the technological component of research competence.

In Table 5, the scores are presented at intervals and according to the level of research competence.

Table 5

Degrees	Creativity	Continuous research	Non-standard thinking
Points	3,0 – 5,0	5,1 – 7,0	7,1 – 9,0

Complex indicator of the development of research competence in future vocational education teachers allows to compare quantitative values with quantitative intervals of allocated levels, to determine the extent to which research competence is formed. In order to determine the quantitative value of the technological component of the research competence of future vocational educators, it is necessary to calculate the coefficients of successful performance of research and professional tasks in their research character.

Success coefficient is the ratio of the maximum number of points (N) that can be obtained during the control and test work to the quality of the learning material:

$$T_k = \frac{R}{N}$$

As mentioned above, separating key indicators and levels of research competence components in future vocational education teachers is not our primary goal, but only as a means to determine the quality of communication and attitudes in the context of the study. This will be possible based on observations of movement in this direction, which in turn will work on appropriate diagnostic techniques requires lab.

The study of a number of studies on the problem of the formation of research competence in students of higher educational institutions allowed to select and modify the means of diagnosing the research competence of future vocational education teachers in accordance with the objectives of our research.

In the course of the research, the following methods were developed and put into practice to assess the level of research competence of future vocational education teachers.

**1<sup>st</sup> method.** Assignments to identify the views of future vocational education teachers on their research activities and their components (for first-year students).

**2<sup>nd</sup> method.** Assignment of future professional education teachers to their perceptions of research activities and their components (for fourth-year students).

**3<sup>rd</sup> method.** Questionnaire for future professional education teachers to understand and understand the professional significance of acquiring research competencies.

**4<sup>th</sup> method.** Questionnaire for future professional educators to identify and recognize the professional significance of pursuing research competence (for fourth year students).

**5<sup>th</sup> method.** Questionnaire to determine the readiness of future vocational education teachers for research activities.

**6<sup>th</sup> method.** Test tasks to determine whether future teachers of education understand the nature of basic research skills that constitute the basis of their research competence (version 1).

**7<sup>th</sup> method.** Test tasks to determine whether future teachers of education understand the nature of basic research skills that constitute the basis of their research competencies (version 2).

**8<sup>th</sup> method.** Tasks to determine the level of formation of cognitive components of research competence

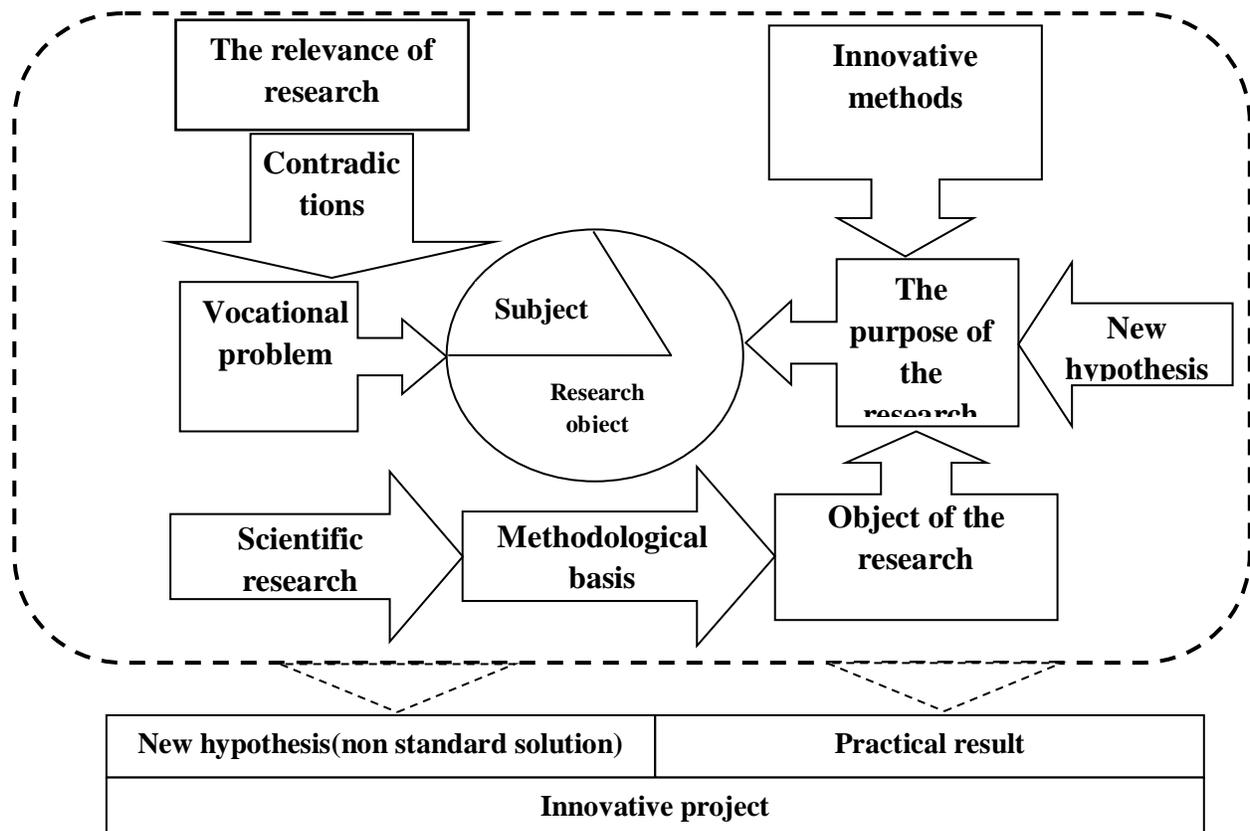
in future vocational education teachers.

**9<sup>th</sup> method.** A map of the assessment of the degree of technological component of research competence in future vocational education teachers.

**10<sup>th</sup> method.** Vocational research training tasks from “Professional Pedagogy” and “Pedagogy. Psychology” subjects.

From a pedagogical point of view, the concept of 'pedagogical environment' is interpreted differently: as a set of processes and relationships that enable all participants in the learning process to effectively manage student's perspectives in optimizing learning activities [2; 17]; as a set of objective capabilities that will ensure successful resolution of the issue [9]; as a basis for linking the process of shaping the management of information culture in the individual [14].

We refer to V.I. We accept the following definition by Andreev: “The conditions are the purposeful selection, the results, the design and application of elements and content elements, as well as the organizational forms of training to achieve the didactic objectives” [1].



The following are identified as pedagogical conditions for the formation of research competencies in future vocational education teachers based on P.Ya. Galperin's theory of mental behavior and gradual understanding:

- 1) orientation of research competences to research activities that allow them to form an understanding and understanding of the professional significance of research;
- 2) involving students in research activities aimed at understanding students' fundamental knowledge and skills in the field of research activity;
- 3) enriching the experience of research activities, providing reinforcement and improvement of basic knowledge and skills in the field of research activity [5].

Directing future vocational education teachers to research activities, that is, the purpose of the first pedagogical setting is to develop an understanding and understanding of the professional competence of future professional education teachers. This goal is reflected in the motivational component of the

research competence of future vocational education teachers. Its indicator is a positive attitude to research activities by future vocational education teachers.

Innovative technologies provide students with opportunities to collect and use information that enables them to develop their research and creative abilities. These data determine the content of the science bases and the ability to manage research methods.

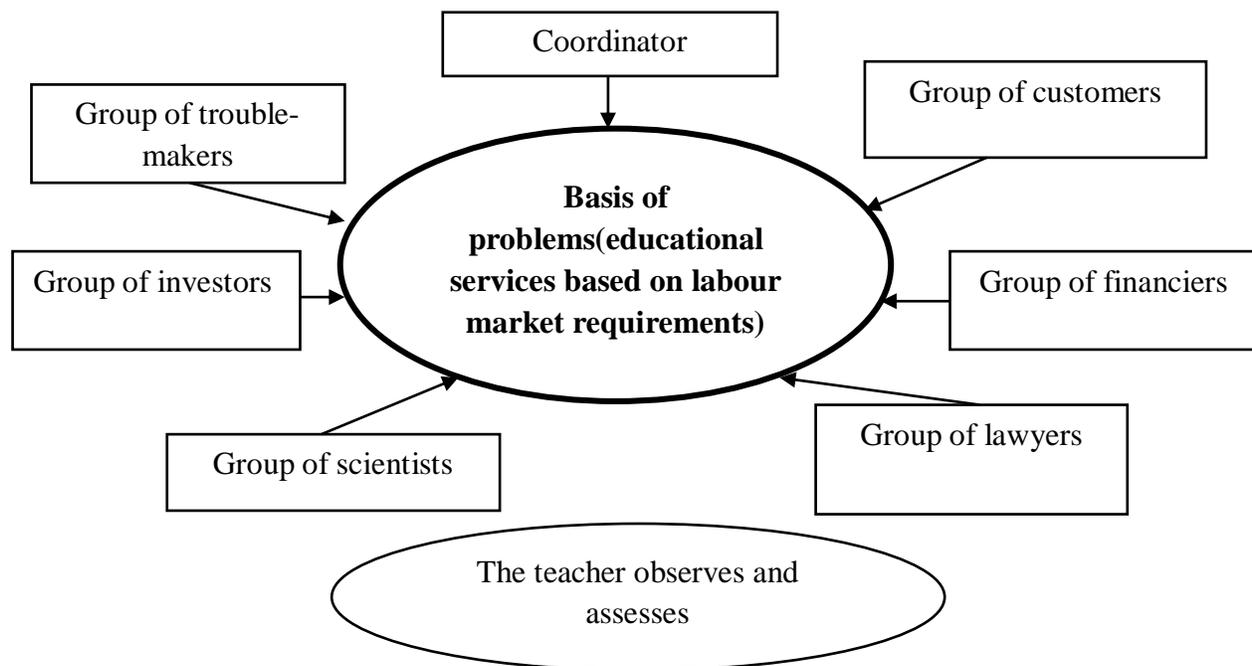
With this in mind, we have used innovative teaching methods such as Case-study, Scientific discussion, Innovative project, and Analyze actual problem in our research work to build research competencies for future vocational education teachers. The following is a summary of these methods:

**“Case study” technology** (English case - chemistry, method, study - problem situation; situational analysis or problem analysis) helps students find the best options for analyzing real, real problem situations technology that serves to shape. The main tasks of technology are: development of analytical skills and critical thinking; ensuring unity of theory and practice; to demonstrate different views and approaches to the problem; provide feedback on decision-making and its consequences; to develop skills for evaluating alternative options in the presence of uncertainties.

#### **“Scientific discussion” method**

What are the following types of discussion techniques?

1. Round table discussion. The main purpose of the round table discussion is to collect and systematize the material identified for the problem and then discuss and exchange information.
2. Debates. A mandatory component of this type of discussion is that there are different perspectives on a particular problem. Learners must demonstrate reasoning skills in defense of their thesis. The discussion will help learners gain analytical skills, gain the ability to react quickly to the opponent's point of view, and provide the participants with a level of rhetorical development.



**Figure 2. Structure of the method "Scientific discussion"**

#### **“Innovative project” method**

“Innovative project” method approaches new ideas for solving problems, ie non-standard solutions and ways to achieve practical results.

**An innovative pedagogical project** is an innovative pedagogical idea and idea that is adopted and divided.

Future vocational educators are aimed at developing the skills of self-improvement in the development of

methods, tools and forms in science and pedagogical activities as a result of independent learning and creative search using advanced information and pedagogical technologies. the possibility of preparing for innovative activities in pedagogical conditions of education.

**Designing method** is a form of education that allows students to demonstrate their knowledge and skills in the design of practical tasks for students in the learning process based on the pragmatic orientation of pedagogy.

The approach to didactic design techniques created within the technological approach helps to effectively and creatively plan the learning process, enrich it with new ideas, and evaluate their results.

**Project education** is an educational curriculum that is focused on the development of the content of pedagogical activity, with the goal of ensuring its effectiveness

### Figure 3. Structure of "Innovative project" methodological substantiation of research

#### Method of "Analysis of actual problems" (Analyse actual problem)

The following problems are analyzed by students through the method of analysis of actual problems:

- Challenges faced by students from around the world;
- Educational problems in our country;
- Existing problems in the system of continuous education;
- Problems in the field of competitive training;
- Problems in the material and technical base of educational institutions.

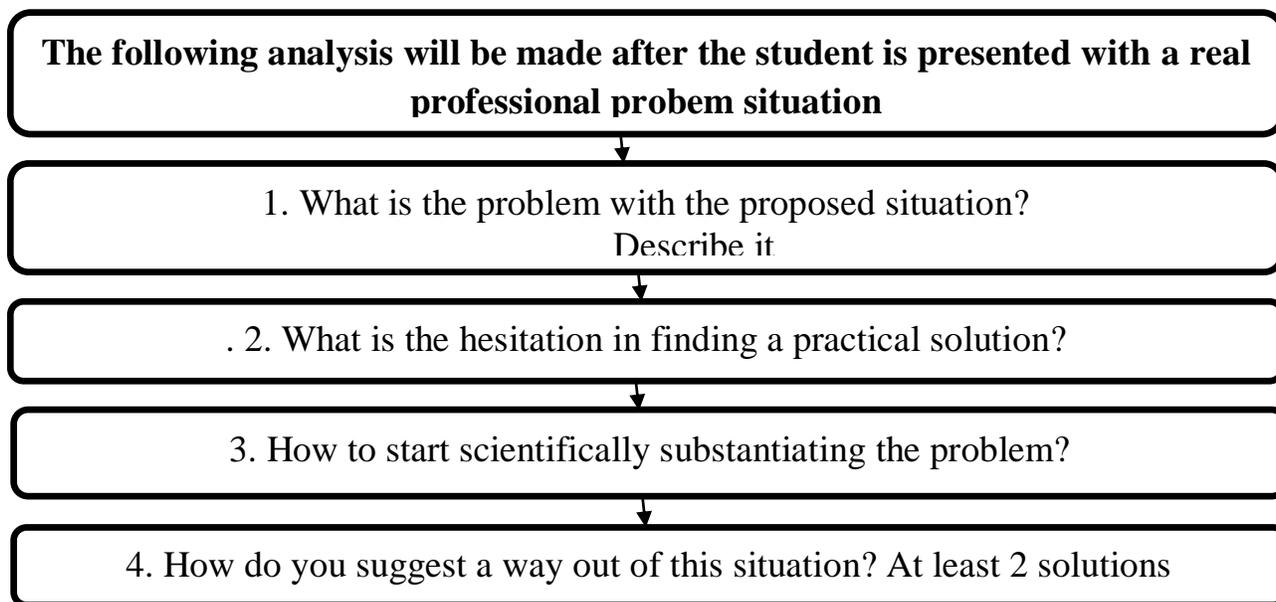


Figure 4. The structure of the "Problem analysis" method

#### Analysis and results

In this part of our research, interactive methods for organizing student research activities are implemented. The results of the experimentation work on the formation of research competencies of future vocational education teachers were analyzed. A total of 325 students participated in the experimentation study. 159 students participated in the control group and 166 students in the experimental group.

The purpose of the experimentation study was to develop and test a methodology for the formation of research competencies for future vocational education teachers, directing them to research activities, and developing their creativity through teaching didactic opportunities of interactive teaching methods.

The tasks of the experimentation work were: to analyze the effectiveness of the methodology and didactic provision of teaching professional pedagogical subjects in the formation of research competencies for future vocational education teachers; completion of experimental work and mathematical-statistical processing of results.

Future professional education teachers have identified the following three levels of research competencies: non-standard thinking, continuous research, and creativity. In order to substantiate the effectiveness of case studies and project methodologies in shaping the research competencies of future vocational educators, a pilot trial consisted of the following three steps: highlights, formative and final.

In the emphasis phase, an assessment and diagnostic map was developed to determine the extent to which components of research competence were developed, a set of control tasks, and a didactic provision for the implementation of pedagogical conditions that would enable the formation of future professional education teachers. Future Vocational Education Teachers have been tested on the evaluation and diagnostic map developed to determine the extent of research competence. Future vocational education teachers have identified the necessary techniques, methods and tools to create the pedagogical conditions that allow them to form research competencies.

The observations, interviews with teachers and students revealed the following reasons why traditional methods and tools for the formation of research competencies are ineffective; current practice of preparing students for professional activities; Lack of systematic approach to the development and implementation of traditional forms and methods of research activities; insufficient information and administrative support for research activities; lack of integration of educational and scientific activities, etc. This requires the introduction of interactive teaching methods in existing practice, including case studies and project techniques for the formation of student research competences. Developed cases and project tasks in experimental groups "Professional pedagogy", "Pedagogy. "Psychology" included practical and seminar sessions on the content of lesson development. Training in the control groups was based on traditional methodology and the existing working curriculum.

At the formative stage, the didactic provision was developed in the experimental group based on the didactic capabilities of interactive teaching methods aimed at increasing the level of expression of the motivational, cognitive and technological components of the research competence of future vocational teachers. The extent of their formation was diagnosed.

At the final stage, the results of the experimentation work were analyzed qualitatively and quantitatively. The results of the research were systematized and mathematical and statistical processed to check the effectiveness of the pedagogical conditions that allowed the formation of research competences. The theoretical provisions obtained during the experimental work were clarified.

Experimental work is carried out by systematic observation of the level of research competence of future vocational education teachers in control and experimental groups. The controls provided an opportunity to compare the effectiveness of changes in educational practices.

Table 5

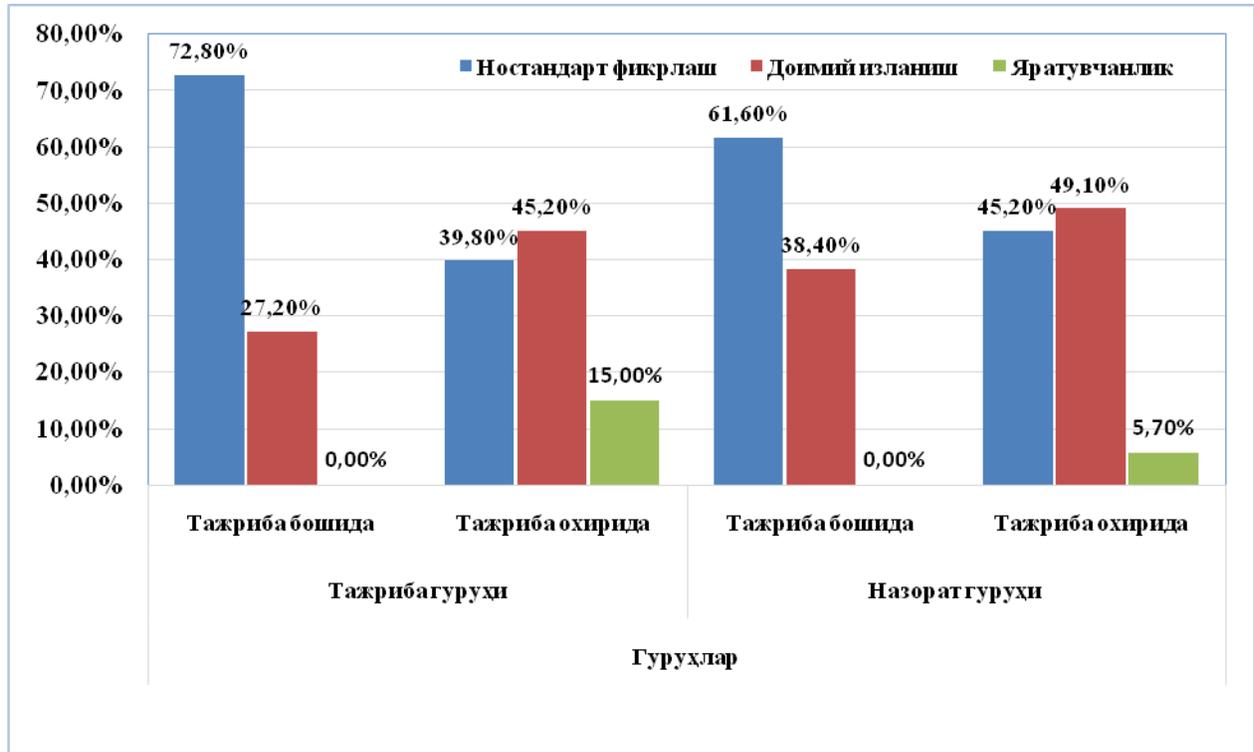
#### The degree of formation of students' research competences

Degree of formation of research competence	Groups			
	Experiment		Monitoring	
	In the beginning of experiment	In the end of experiment	In the beginning of experiment	In the end of experiment
Non-standard thinking	121 (72,8%)	66 (39,8%)	98 (61,6%)	72 (45,2%)
Continuous research	45 (27,2%)	75 (45,2%)	61 (38,4%)	78 (49,1%)
Creativity	0 (0,0%)	25 (15,0%)	0 (0,0%)	9 (5,7%)

Table 5 presents information on the positive change by comparing the results of the experimental group with the level of research competence of future vocational education teachers with the control group. In the experimental group, the number of non-standard thinkers in the competence of the research competence decreased from 72.8% to 39.8%, and from the control group to 61.6% to 45.2%. The

percentage of future vocational education teachers with a stable level of research competence increased from 27.2% to 45.2% in the experimental group and from 38.4% to 49.1% in the control group. In the end of our study, the formation of creativity competence levels increased from 0 to 15% in the experimental group and from 0 to 5.7% in the control group.

The diagram below shows the extent to which students' research competences are formed (Figure 6).



**Figure 5. Diagram of the extent of research competence formation in control and experimental groups**

The “X square” ( $\chi^2$ ) criterion was used to determine the validity of the experimental results.

At the same time, control and experimental groups are given, which determine the number of degrees of freedom based on the following formula:

$$\chi^2 = \sum_{i=1}^k \frac{(P_i^{emp} - P_i^{H_0})^2}{P_i^{H_0}}$$

$P_i^{emp}$   $P_i^{emp}$  – the learning rate (frequency) of students in the experimental group;

$P_i^{H_0}$   $P_i^{H_0}$  – student performance indicators (frequency) of control group students;

k – the number of characters.

$Y$  – degree of freedom;

c - number of comparative distributions (number of groups).

In our study, k = 3 and c = 2, respectively  $Y = (k-1) (c-1) = (3-1) (2-1) = 2$   
 $\gamma = (k - 1)(c - 1) = (4 - 1)(2 - 1) = 3$ .

Based on the results of the calculation, at the beginning of the experiment,  $\chi^2_{эмл}$  the coefficient (7.34) was found to be greater than the coefficient  $\chi^2_{крит}$  (7.82), which is  $p = 0,02$   $p = 0,20$  within the confidence interval. After processing the results obtained at the end of the experiment, it was found that the coefficient  $\chi^2_{эмл}$  obtained (16.13) was lower than  $\chi^2_{крит}$  that obtained (13.81). This indicates that the indicator lies in the confidence interval compared to that  $p = 0,001$   $p = 0,01$  in the special table.

In the beginning of the study, a hypothesis was put forward that future education teachers would increase their competence if a pedagogical process was established, which would include pedagogical interactions of the subjects of the educational process using interactive teaching methods.

## Conclusion

To sum up, the results of our pedagogical experiments allow us to draw the following conclusions:

- Based on the structure of research competence of future vocational educators, motivational, cognitive and technological competences have been developed and criteria for determining their formation (non-standard thinking, constant research, creativity) and related indicators are developed;
- Existing didactic requirements for enhancing the creative potential of future vocational education teachers have been enhanced by a competent approach; compiled and refined using analysis, etc.);
- The hypothesis that the level of research competence of future vocational education teachers' increase will be confirmed;
- The results of the pedagogical experiment testify to the effectiveness of the methodology for the formation of research competencies of future professional education teachers developed by the author and the improved level of their didactic support.

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