

Model of Forming Future Specialists' Research Competence

Modelo de formación de la competencia de investigación en futuros especialistas

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Contents

1. Introduction
 2. Materials and methods
 3. Results
 4. Discussions
 5. Conclusions
- References

ABSTRACT:

The article highlights the problem, role and importance of forming the research competence of the future specialist. Systemic, personality-oriented, activity-based, cognitive, heuristic and axiological approaches made the conceptual basis of the developed model. The definitions of notions of 'competence', 'competency' and 'research competence' are considered. The authors' understanding of the future specialists' research competence is shown. It consists of the following components: motivational, cognitive, activity-centered and reflective. A structural and functional model is offered for the formation of research competence of undergraduates majoring in "Social Pedagogy and Self-knowledge". Pedagogical conditions for the formation of students' research competence have been defined. The application of this model will improve the research process at the university. It is necessary to think through innovative forms and methods of organizing the learning process with the goal of future specialists' research competence formation in different areas.

Keywords: professional development, competency, competence, research competence, model of research competence formation.

RESUMEN:

El artículo destaca el problema, el papel y la importancia de formar la competencia de investigación del futuro especialista. Los enfoques sistémicos, orientados a la personalidad, basados en la actividad, cognitivos, heurísticos y axiológicos constituyeron la base conceptual del modelo desarrollado. Se consideran las definiciones de las nociones de "competencia", "competencia" y "competencia de investigación". Se muestra la comprensión de los autores sobre la competencia de investigación de futuros especialistas. Consiste en los siguientes componentes: motivacional, cognitivo, centrado en la actividad y reflexivo. Se ofrece un modelo estructural y funcional para la formación de la competencia de investigación de los estudiantes de pregrado en "Pedagogía Social y Autoconocimiento". Se han definido las condiciones pedagógicas para la formación de la competencia de investigación de los estudiantes. La aplicación de este modelo mejorará el proceso de investigación en la universidad. Es necesario pensar a través de formas y métodos innovadores de organización del proceso de aprendizaje con el objetivo de la futura formación de competencias de investigación de especialistas en diferentes áreas.

Palabras clave: desarrollo profesional, competencia, competencia, competencia de investigación, modelo de formación de competencias de investigación.

1. Introduction

Today, academically trained graduates should have a certain set of competencies that characterize them as a person and a specialist. In accordance with the state educational standards of higher professional education of the Republic of Kazakhstan, the competence of future professionals is determined by general cultural and professional competencies (State Compulsory Educational Standard of the Republic of Kazakhstan, 2012).

General cultural competency is understood as a level of education sufficient for self-learning and self-management of arising cognitive problems and for determining a person's own position. Professional competency is a complex quality of personality, including the ability and willingness to use theoretical and practical knowledge, abilities and skills in professional activity, the desire to update and replenish professional knowledge and awareness of their value.

The competency models for bachelors and masters in all fields of education presented in the State Compulsory Educational Standard of the Republic of Kazakhstan coincide in many respects. However, the bachelor's competencies include mainly general educational and general professional knowledge and analytical competencies, whereas among the master's competencies, analytical and research competencies occupy an important place along with professional knowledge and skills. They form not only professional, but also general cultural competencies (the ability to independently master new research methods, to change the scientific and production profile of professional activity) (State Compulsory Educational Standard of the Republic of Kazakhstan, 2012).

1.1. Research background

Also in the scientific environment, research competence is considered as a set of competencies, which enables to successfully master the research activity and develop in this direction. For example, Lukashenko (2011) explains that the research competence is an "integral quality of a person, expressed in the willingness and ability of independent solving of research and creative problems, possession of research technology, recognizing the value of research skills and readiness to use them in the professional activities". It is determined by analytical and research competencies. And also, Lukashenko singles out the executive research competencies and scientific research competencies, which, in his opinion, constitute the essence of research competence.

Scientific research competencies provide for the availability of abilities:

- to see and formulate a problem, determine the purpose of the research work;
- understand and justify the relevance, novelty, theoretical and practical significance of research tasks;
- put forward and justify hypotheses, plan a solution, using ready and own algorithms and schemes;
- independently master new methods of research, acquire knowledge, including through information technologies;
- conduct research under a ready or self-developed program;
- present the results of own work or the known scientific achievements.

Research competence includes a plurality of other, more specific competencies aimed at the development of various spheres of activity and personality (axiological, personal growth, general cultural, social and labor, educational and cognitive, communicative, informational) (Khutorskoy, 2003).

Scientific research competency of future specialists is developed depending on professional interests, needs and level of motivation. Research competency reaches a high degree of development only in future specialists whose personal educational experience has an independent research activity.

The analysis of scientific literature makes it possible to identify the focus on the acquisition of skills for independent theoretical and experimental work, modern methods of scientific research and experimental techniques in the students' research activities (Koldina, 2009; Markova, 2003).

In this regard, research competence of the Master of Social Pedagogy and Self-knowledge can be defined as an integrated hierarchy of competencies being in the dynamics, which in their totality represent the ability and willingness to targeted search, to the study of objects of social sphere and the development of new scientific knowledge about social reality, and their application in practice.

Most objectively, the research competence of undergraduates is characterized by their participation in conferences of various levels and directions, the availability of publications and their own scientific projects. During the period of study in the system of higher professional education each graduate independently performs a number of different works: reports, reference papers, research and project works. All these activities help the future specialist to master modern methods of searching, processing and using information, to master some methods of scientific research activity, to determine own professional views, to acquire the ability to promote and defend them.

Research competence requires a systematic approach in applying the ability to capture the observed phenomena, analyze data, make generalizations and conclusions, refine and correct them with the appearance of new data, changes in scientific approaches, or refinement of the hypothesis.

On the basis of the theoretical analysis, it can be concluded that research competence is a complex of research actions, a person's readiness for effective educational and research activity, and active cognitive activity for the purposes of searching for knowledge to solve the set tasks.

As the study has shown, the formation of research competence is a managed and regulatory process that can be systematized and objectified on the basis of creating a pedagogical model.

2. Materials and methods

The model of the formation of future specialists' research competence at the master's level shall be understood as a holistic pedagogical process in which a set of training approaches is aimed at acquiring certain knowledge, abilities and skills in the field of research activity by the undergraduates. It should be noted that modeling is one of the methods of scientific research, during which significant genetic links between the elements of the system are identified and recorded. In the scientific literature, one can find several classifications of models by their types (structural, functional, analog, genetic, mixed, etc.).

In our case, when modeling the process of the future specialists' research competence formation, it is necessary to speak, first, about the structural model that sets up the algorithm to organize this process and, secondly, about the functional model that determines the essential elements of research activity. Thus, the model of the future specialists' research competence formation presented by the authors is structurally functional.

The developed model is viewed from the position of systemic personality-activity-based approaches as a set of regular, functionally connected components that make up a certain integrated system.

The research competency of a specialist is an integral part of professional competence; it is its structural component, ensuring at the same time its completeness, depth and degree of implementation in pedagogical practice.

Research competency is a component and indicator of professional competence, meaning the possession of skills and methods of research activity at the level of technology in order to solve managerial problems, build own career in accordance with the values of modern society and the desired personal result.

Nowadays, the education system of the CIS countries has adopted a list of key components

of research competence, based on the activity model of Leontiev (2005): cognitive, motivational, orientational, and operational. The problem of research competence is interpreted by the authors in the light of various theoretical approaches to the general professionology (Zeer, 2004; Kovalevsky, 1983; Turchinov, 1998; Shadrikov, 2004).

Nabieva (1999) introduces the following components of research competence: a motivational component – the need for the formation of research competence; a cognitive one, including knowledge of the essence and purpose of pedagogical monitoring, reflection and facilitation; an effective-operational component implying the ability to study, analyze and predict the results of activities, contribute to increasing individual activity and performance capability.

Gubaidullin (2011) introduces value-oriented, projective-creative, subject-transformative, control-corrective components into the structure of research competence.

Komarova (2008) defines three components: a cognitive component that involves intellectual skills in extracting, transforming and constructing knowledge. The prognostic component includes knowledge, expertise, and skills that provide foresight and preliminary assessment of the research results. The organizational component is represented by knowledge, as well as by practical abilities and skills of implementing a specific scientific process, test, experiment, etc.

Gorovaya and Fetisova (2014) expand the approach to determining the structure of research competence by adding communicative and reflective components to the motivational-axiological, cognitive, effective-operational and creative ones.

Zeer (2004) identifies the structure of research competence, which includes the motivational, cognitive, activity-based and reflective components.

Zeer interprets each of the components of research competence as follows: the *motivational component* is a set of cognitive motivation (curiosity, the desire to discover new knowledge), professional motivation (the desire to master one's profession and obtain results), and the achievement motivation (the desire to improve one's professional activity, to strive for success). The *cognitive component* is a set of acquired knowledge that is necessary for carrying out research activities, which include basic knowledge (theoretical and methodological basis) and procedural expertise (research methodology).

The research skills form primarily the core of the *activity-based component*: the ability to navigate in the subject area of the research; problematization, that is, the ability to identify and understand the problem of research; planning of research activities; collection, analysis and interpretation of data during the research.

The *reflective component* is the ability to analyze the results of one's activity, and the ability to evaluate the product of this activity.

3. Results

The results of the assessments carried out by the authors during the experimental work allowed recording the following changes. In the experimental groups, in which the effectiveness of the singled out pedagogical conditions was tested, the undergraduates lacked the basic and optimal levels of the research competence formedness. In the experimental groups, the number of undergraduates showing an elevated level increased. There were positive changes in the indicators of the creative and research levels of the future specialists' research competence formedness. In the control group, positive changes occurred as well; however, some of the undergraduates had a basic and optimal level of research competence.

And also, the implementation of the model resulted in the formation of the future specialists' research competence, which consisted in the development of professionally significant research qualities of students, and the application of this model will improve the research process at the university.

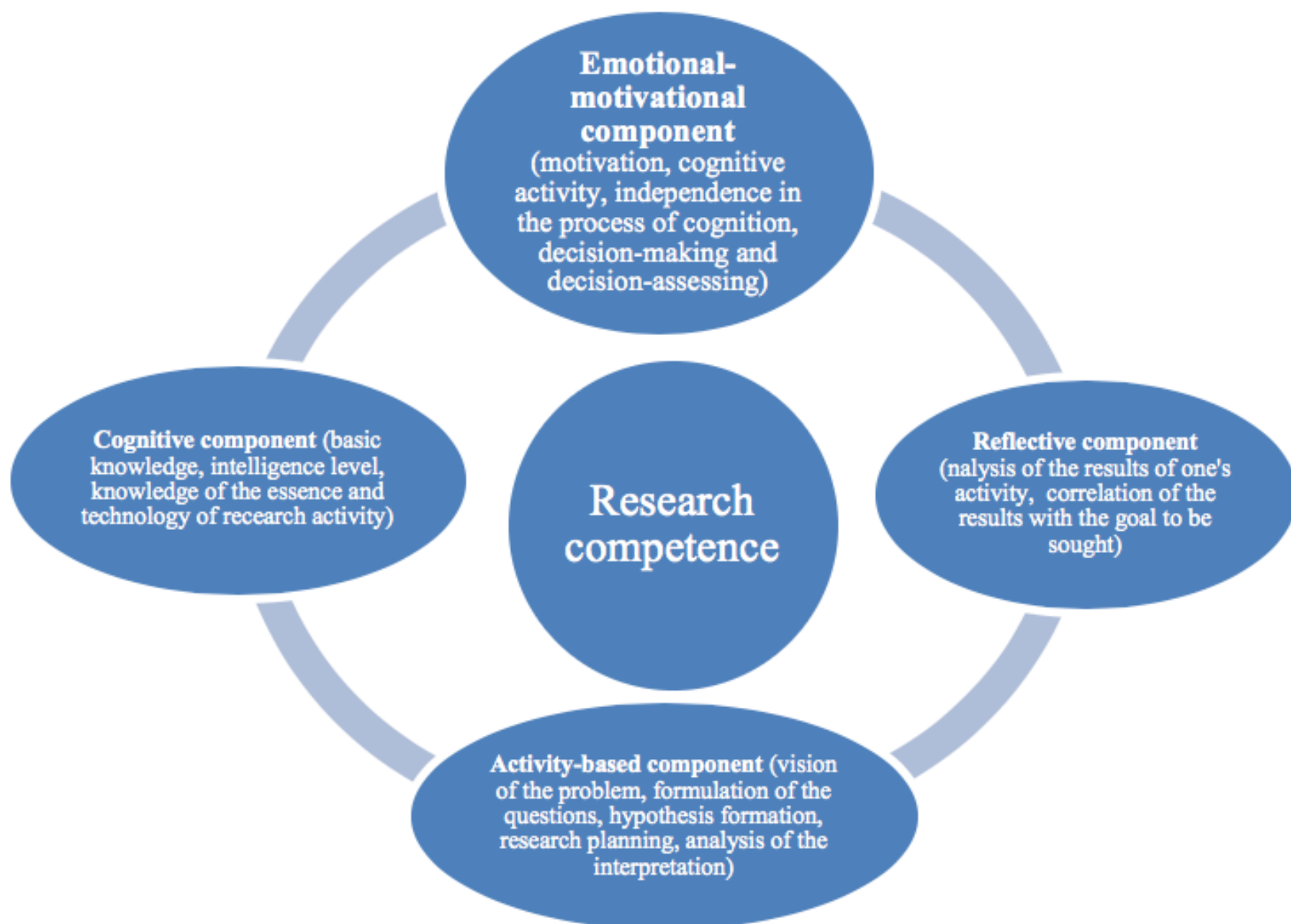
4. Discussions

The analysis of the components of research competence led the authors to a brief scheme of

interpretation of each of the components (Figure 1).

Thus, when developing the structural-functional model of the future specialists' research competence formation, the authors relied on the components of the distinguished by Zeer: emotional-motivational, cognitive, activity-based, and reflective.

Figure 1
Components of the research competence



Closer definition of the components in the model has made it possible to break this model into units (*conceptual, technological, criterial-evaluative*) that provide an opportunity to more clearly represent the goal-oriented process of future specialists' research competence formation (Figure 2).

The *conceptual unit* includes a target component, predetermining the content, technology and the expected result of the process under investigation. The goal is the most important element of the model, ensuring the rational construction of the educational process. The purpose of implementing the presented model is the formation of the research competence of future specialists, i.e. masters of education majoring in 6M012300 - "Social Pedagogy and Self-knowledge".

Systemic, personality-oriented, activity-based, cognitive, heuristic and axiological approaches made the conceptual basis of the developed model.

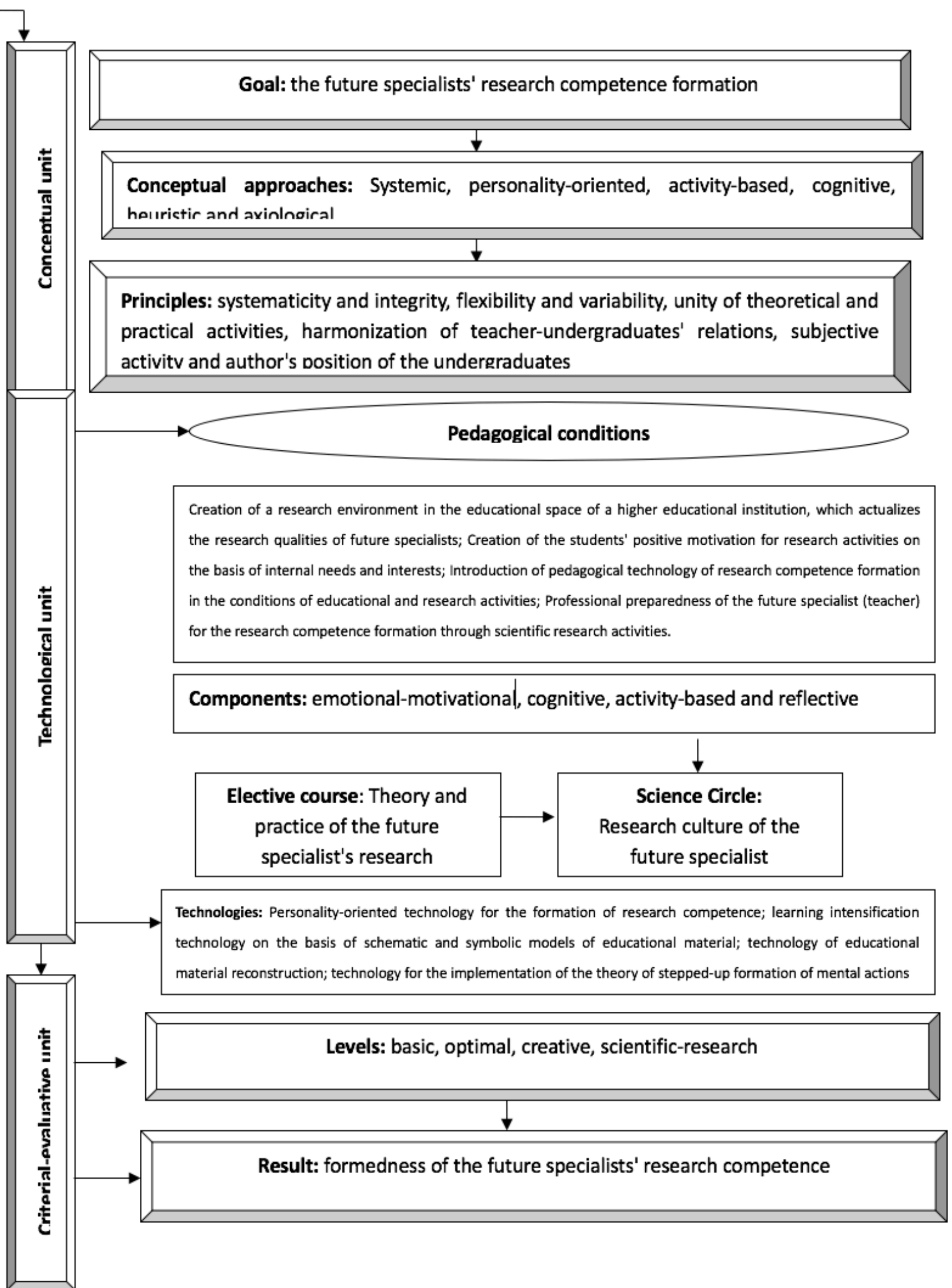
These approaches serve as the starting points for defining a number of principles that form the basis of the process of future specialists' research competence formation: the principle of systematicity and integrity, the principle of flexibility and variability, the principle of unity of theoretical and practical activities, the principle of harmonization of teacher-undergraduates' relations, the principle of subjective activity and author's position of the undergraduates.

The *technological unit* of the model defines the main stages in the formation of research competence: emotional-motivational, cognitive, activity-based and reflective.

Thus, at first the substantive and operational knowledge is systematized in the field of scientific research activity. Then theoretical knowledge is deepened and the practical actions are developed due to the inclusion of students in a holistic process of educational and research work, and subsequently future specialists pass to a higher level of the research competence formation.

Figure 2

Structural and functional model of the future specialists' research competence formation



The peculiarity of this model is that at each stage the teacher includes undergraduates in the educational and research activities with the help of certain tools and technologies, as a result of which the entire level of research competency possessed by the learner turns to be in demand.

As known, any process functions and develops successfully subject to certain conditions.

Consequently, in the process of educational and research activities research competency will be formed more effectively when creating a special set of pedagogical conditions.

In pedagogical science conditions are interpreted as factors, circumstances, the totality of measures on which the effectiveness of the pedagogical system functioning depends. In the opinion of Kachalov (2009) and other scholars, conditions are the pedagogical comfortable environment, the totality of measures in the teaching and educational process, which ensure the students achieve a high level of educational activity.

Thus, the pedagogical condition is a set of necessary measures that contribute to the success of the research competence formation; and a set of pedagogical conditions is a totality of interrelated pedagogical conditions, the implementation of which will help increase the level of future specialists' research competence formedness.

When determining the set of pedagogical conditions, the authors took into account methodological approaches (systemic, personality-oriented, activity-based, cognitive, heuristic and axiological), which constitute the subject, tasks, research hypothesis; peculiarities and specific features of the process of forming the research competency of future specialists and prospects for the development of research competence.

Thus, based on the above, the authors believe that the set of pedagogical conditions for the formation of research competence includes:

- 1) Creation of a scientific research environment in the educational space of a higher educational institution, which actualizes the research qualities of future specialists;
- 2) Creation of the undergraduates' positive motivation for research activities on the basis of internal needs, interests;
- 3) Introduction of the pedagogical technology of the research competence formation in the conditions of educational and research activities;
- 4) High level of professional readiness of the future specialist (teacher) to form research competency through research activities.

The listed pedagogical conditions accompany the process of forming research competence and are aimed at achieving the stated goal.

The *criteria evaluative unit* includes evaluation criteria, as well as levels of future specialists' research competency formedness after conducting experimental work. The results of diagnostics serve as a basis for developing a program of individual, group and collective work on the formation of the research competency of future specialists. Self-diagnosis of creative skills, allowing future specialists to design individual trajectories of research self-development is an important component.

In the process of working on the formation of research competency, the authors came to the conclusion that the levels of competence formedness will be as follows: basic, optimal, creative and research ones. The basic level will be compulsory for all undergraduates.

The basic level implies using the ready goal of the activity proposed by the teacher; planning activities in conjunction with the teacher; carrying out research under the proposed plan, sample; presenting the results of work in the form of a report, the inability to implement reflection.

The optimal level involves the ability to formulate a goal with the help of a teacher or other undergraduates, planning activities together with other undergraduates, applying knowledge acquired from other sources; the ability to put forward and justify a hypothesis; to present the results of activities in the form of a report with a computer presentation developed jointly with the teacher; the ability to implement reflection with the help of the teacher.

The creative level presupposes formulating a goal independently; planning of research activities independently. It is distinguished by a high degree of effectiveness of individual activity, has a high sensitivity to problems, creative activity. The personality structure harmoniously combines scientific and pedagogical interests and needs, a high level of pedagogical reflection and creative independence.

The research level is characterized by greater focus, stability, awareness of the ways and

means of introducing innovations. Having a fairly reliable technology, undergraduates continue seeking and discovering new ways to solve the problem.

5. Conclusions

Thus, the formation of research competence occupies an important place in the educational process, both during class time and in extracurricular hours. Research competence is a means of gaining new knowledge, acting as a guideline in determining the direction of one's activity, a means of self-cognition and self-improvement, a support for self-realization and self-assertion through the use of this knowledge in practice.

In the future it is necessary to think through innovative forms and methods of organizing the learning process with the goal of future specialists' research competence formation in different areas. Since such an option for introducing a competence-based approach into higher education does not break the traditional education system, but modernizes it, preserving all the best that has been inherent in our education for a long time, scientific rigor, activity-personal character and competitiveness of graduates.

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[Index]

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