

# Formation of Research Competence of the Future Elementary School Teachers—In the Process of Professional Training

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## Abstract

The present article presents the structural-functional model of formation of research competence of future elementary school teachers in the process of professional training. This model includes a set of interrelated and interdependent structural components: target; informative; procedural; estimate-effective structural components. The article describes the pedagogical conditions, means and stages of formation of research competence of future elementary school teachers in the process of professional training.

**Keywords:** research competence of future elementary school teachers, a model of formation of research competence of future elementary school teachers in the process of professional training, pedagogical conditions, means and stages of formation of research competence of future elementary school teachers in the process of professional training

## 1. Introduction

The Country's President Nazarbayev N.A. considers the educational process and the science as the strategic directions of development of the republic in the next decade. The State Program of Education Development of the Republic of Kazakhstan for the period of 2011-2020 considers as one of the most important targets the following: society's need for an educated, creative, competent and competitive personality, who is able to live in fastest growing environment and ready to self-actualization both in his/her own interests and in public interests (the State Program of Education Development of the Republic of Kazakhstan for the period of 2011-2020 as of 2010).

Following the requirements of the time, the State Compulsory Standard as of 2010 for Professional Training of the Bachelors in the specialty No. 5V010200 "Pedagogy and methodology of elementary education" forms about ten competencies of future elementary school teachers, each of the competencies involves the acquisition of knowledge skills as follows (the State Educational Standard for Professional Training of Bachelors Education in the specialty No. 5V010200 "Pedagogy and methodology of elementary education", 2010): the ability to quickly identify problems and find the ways to solve them, independently make responsible choices, predict their possible consequences; be flexible, practical and responsible for their own actions and for the destiny of the country. The current situation orients the future elementary school teachers not only on the acquisition of knowledge and development of skills in the narrow sphere of their professional activities, but also on the ability to understand the flow of scientific information, the pursuit of independent search of necessary information in the various fields of social reality, so nowadays the most important performance criteria of professional training include indicators related to the development of research skills of the future bachelors, their ability to organize professional activities in the modern scientific platform, i.e. to form their research competence.

As a result of the review of the scientific literature (Khutorskoi, 2003; Zimnija, 2004; Shamelhanova, 2005; Alake-Tuenter et al., 2013; Pantića, 2010), we concluded that the term "research competence" is considered mainly through the category of "attitude" and understood as valuable-motivational attitude of the teacher to research activities.

We share this point of view and believe that the active research position of elementary school teachers assumes obligatory presence of their readiness and commitment to independent research activity, high selectivity and

interest to new issues under study, valuable attitude to the process of learning and experimentation, creative ways to solve problems. In the basis of the active research position of the teacher smoothly combined cognitive processes (perception, attention, memory, thinking, imagination), without which it is impossible to accumulate the theoretical-methodological knowledge necessary for research, as well as emotionally valuable processes (identification of needs, motives, emotions tracking, use of willpower), defining the research attitude of the teacher to reality, other people and himself as a researcher.

Thus, we have come to the definition of research competence of future elementary school teachers, determining the nature of research competence of future teachers as developed competence, defining a set of interrelated research qualities that enable them to implement the system of valuable-motivational attitude to research and themselves as its subjects.

From our point of view, the research competence of the future elementary school teachers involves multilevel education, personality characteristics, including professional knowledge, pedagogical values, research skills, creativity in solving professional problems and the degree of self-realization in the research activities. Now we can turn to the process of modeling of this phenomenon.

## 2. Methods

The modeling of formation of research competence is a specific way of learning. The model is considered as some kind of a standard, similar to the activity of the teacher and students, aimed at solving common tasks of formation of research competence of future elementary school teachers. According to Babansky, the modeling helps to organize knowledge about the process under study or phenomenon, predicts the ways to describe this knowledge more comprehensively, outlines more complete connection between the components, offers opportunities for the creation of comprehensive classifications (Babansky, 1982).

In philosophy the process of modeling is considered as “a way, a knowledge technique allowing by the system artificially created by man, to implement a different, more complex system, which is the object of the direct research”, furthermore the system that reproduces the comprehensive system under study, is called the “model” (Krajewsky, 1994; Berezhnova, 2005). If the research of the object is impossible or has some difficulties, there occurred a need for modeling.

From a psychological point of view, the modeling is one of the most common methods of scientific study of reality and the construction of a generalized and abstract object, the scheme of the phenomenon under study. This object is the research model.

In pedagogy the modeling is considered as an approximate reproduction of any objects which by their complexity and size cannot be studied or are difficult to study and manufacture them in kind.

Creating a model is a specification of the general scientific principle of the communication of the whole and the unit in which their combination and interaction occurred gives rise to a new quality—the target model. This model requires serious theoretical and methodological explanations, without which its description can become an abstraction, a scheme, detached from reality and therefore inactive.

The process of formation of research competence of future elementary school teachers is rather long-standing, requiring adequate reflection and preparation. Speaking about the process of formation of research competence of future elementary school teachers, it is necessary to clarify what we mean by the concepts “formation” and “process”.

In the work “Personality Theories” written by Kjell and Ziegler, the formation is considered as learning and reinforcement of behavior, more and more similar to the desired behavior (Hjelle & Ziegler, 2009).

According to Goodwin, the formation is an operant procedure for generating a new type of behavior underlying the plan with varying criteria. Behavior is reinforced in the process of approximation to the desired model (Harlen, 1997).

The Oxford Dictionary of Psychology, edited by A. Reber, gives the following interpretation of the concept “formation”—it means the gradual establishment of operant behavior through reinforcement of successive steps, approaching the desired result. The formation acts by selective use of reinforcement in order to convert existing simple models into more complex types of behavior (Oxford Dictionary of Psychology, 2003).

Thus, the formation is understood as the process when the social actors intentionally and in an orderly manner master holistic, sustainable features and qualities they need to succeed in life.

In philosophy, the concept “process” (in Latin the word «Prozessum» means «promotion») is defined as a logical, sequential change of the phenomenon, its transition to a different phenomenon (Petrovici, 2014). In the most

general definition the process means something that unfolds over time as a regular change of the various states, the sequence of which is defined by their internal structure and those possible transitions (transformations, modifications) that are contained in this structure as its intention.

As far as the pedagogical concept is concerned, the “process” means a series of sequential actions to achieve any results (Baidenko, 2004).

In our case, the result of the process of formation of research competence of future elementary school teachers is their active research position as a system of valuable-motivational attitude to research and to themselves as its subjects. Therefore, the formation of research competence of future elementary school teachers can be defined as a holistic process of the students—the future elementary school teachers—moving in the direction of subjectivity (tracing the research self-development, change in the system of valuable-motivational attitude to reality). In this context subjectivity means a manifestation of an active attitude of the future elementary school teachers to themselves as subjects of research. The area of subjectivity of future elementary school teachers is considered as its valuable-semantic sphere. It is formed by two interrelated processes: comprehension (providing values with meanings) and perception (the transformation of meanings into values). The essential characteristics of subjectivity of future elementary school teachers, in relation to the problem under study, are as follows: communication with life-purpose guidelines and values; active orientation in the scientific and research material; understanding of the patterns of the research activity, research properties, stages of formation of research competence; initiative, self-goal setting, planning, implementation of the research plan; conscious self-regulation, self-determination and independence; the willingness to research self-development, the basis of which is the research implementation by the student. The system of valuable-motivational attitude determines the valuable-semantic objectives of future elementary school teachers (personal meanings and motivations of the research activity where the values are the basis for making research decisions).

Certainly, the process of formation shall include certain steps, each of which has specific characteristics of the psycho-physiological and social-psychological features that ensure the successful implementation of professional activities. In other words, the process of formation is associated with the acquisition of new qualities, abilities and states in the development process and the approach to a particular result. The transition from one stage to another is characterized by continuity, which is one of the main characteristics of the formation, being a prerequisite for any form of formation, “the connection between phenomena in the development process, when the new, removing the old, preserves some of its elements”.

The developed structural-functional model of formation of research competence of future elementary school teachers combines the following set of interrelated and interdependent structural components: target; informative; procedural; estimate-effective structural components and systemically important connections between them (see Figure 1).

### **3. Results**

#### *3.1 Structural Components of the Model*

The control component of the model is the social order: society’s need for elementary school teachers of the highest standards of research competence. The need for determining the target component is due to the fact that the conscious purpose in the activity of elementary school teachers determines the choice of methods, activities and acts as a means of control, verification of the results with the expected overall results of the actions.

The informative component reveals the content and direction of the formation of research competence of future elementary school teachers: the formation of the theoretical and methodological knowledge, methodological convictions, general scientific and professionally significant methods of learning, scientific direction in thinking (theoretical and methodological component), creative and research skills (technological components), the recognition of their value and meaning (value component), the formation of positive attitude and sustained interest in research activity (motivational component), reflexive-personal method of research (reflective component).

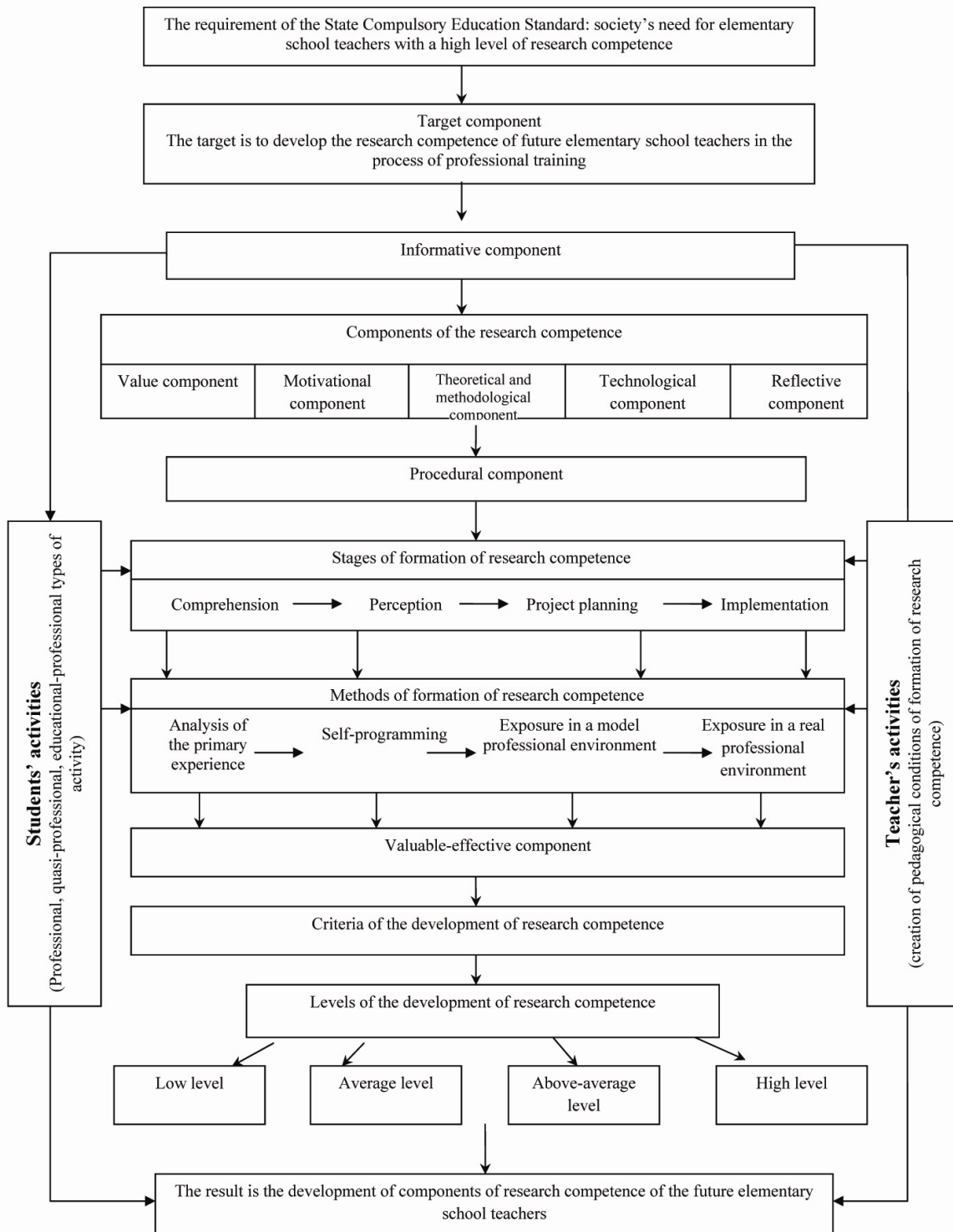


Figure 1. Model for formation of research competence of future elementary school teachers in the process of professional training (creation of pedagogical conditions of formation of research competence)

The procedural component involves the gradual organization of professional activity, the selection of the appropriate methods and means of formation of the research competence of future elementary school teachers.

The estimated-effective component determines the efficiency of performance of the proposed model associated with the development of levels of research competence, criteria and indicators.

### *3.2 Principles of Research Competence*

The success and effectiveness (performance) of focused work depends on the initial positions, i.e. principles accepted as the basis (Morais et al., 2005). We offer a variety of forms of organization of the pedagogical process based on the following principles: research activity, research position, comprehension, reflection, dialogic principle. These principles specifically define the content and direction of the formation of research competence of future elementary school teachers.

The principle of research activity. During studies the students shall constantly engage in various activities—implementation of research tasks, discussion and role-playing situations, etc. Forms of research activity of students shall be implemented by active teaching methods: analysis of research situations, simulation modeling, game design of research activities, etc.

The principle of research position involves the orientation of students to self-development in research activities, the implementation of personal potential, initiative, activity and independence in decision making. In the course of studies should be created such situations when through the search and research activities the students need to find a solution to the problem, develop the theme of individual research, the ways and means of its implementation.

The comprehension principle implies that new research knowledge and skills shall be understood and comprehended so that they can acquire the personal value for students. The comprehension of research activity occurs when a student performs it independently. In this case, the student can reveal the causal relationships between the individual components of the study, independently formulate and explain the major theoretical ideas, apply the theory to explain particular phenomena. The process of comprehension of new knowledge is associated with performing complex mental operations (synthesis, comparison, generalization). Having comprehended knowledge and skills to perform logical operations, students are able to transfer knowledge to new situations.

The reflection principle. The implementation of this principle in the process of establishment of research competence contributes to the fact that there generated the student's need for constant self-improvement as an individual. For that on studies created the conditions for the development of students' professional thinking, reflective ability, and implementation of research position in the professional activity. The main thing is the general rational self-organization of research activity: a goal, a view about the research conditions, the research action program, the criteria for evaluation of research results, the evaluation of its results, the implementation of the program. For this the image of professional activities, presented in the form of research competence, becomes a model of professional behavior of future elementary school teachers.

The dialogic principle involves the establishment of subject-subject relationships in the course of joint research activities of students; implies the equality of the parties' positions, respect and trust in the partner. The implementation of this principle implies the creation of the communicative environment ensuring the subject-subject communication, self-development of each individual.

### *3.3 Criteria of Development of Research Competence*

We have marked out the criteria of development of research competence in accordance with the components of research competence.

The diagnosis of these criteria shall be based on the following parameters: value-conscious attitude toward research activities; ability to find in research the significant meaning; motivation of formation of research competence; aiming at creative self-realization in research activities; knowledge about the nature and specifics of the research activity; knowledge about the nature and purpose of research competence; methodological knowledge and methodological convictions; having research and creative skills, methods and means of scientific knowledge; ability to analyze research tasks, proper achievements, analyze proper identity as a researcher; implement reflection.

A summary of the selected criteria and indicators shall allow to determine the low, average, above-average, high levels of the development of research competence of the future elementary school teachers.

The result of the formation of research competence of the future elementary school teachers is the development of its components.

### *3.4 Stages of Formation of Research Competence of Future Elementary School Teachers*

The formation of research competence is not a spontaneous process, but a gradual, orderly movement which involves a gradual qualitative transformation of all its informative components (15). Therefore, we have marked out the following stages of formation of research competence of future elementary school teachers:

comprehension, perception, planning, and implementation.

In the construction of stages of the formation of research competence of future elementary school teachers, we were guided by the following provision: the formation of research competence begins with the process when the future elementary school teachers comprehend themselves as the subjects of research, its goals and values, finding personally valued meanings in it, and gradually turns to the next stages: perception, project planning, implementation.

#### 3.4.1 Comprehension as a Stage of Formation of Research Competence of Future Elementary School Teachers

The first stage is comprehension. We agree with the opinion of Maslow A.G., according to whom “there is no more valuable thing than learning by experience” (Maslow, 1982), we believe that in the first stage of formation of the research competence it is necessary to help future elementary school teachers to become experts of their own experience, finding support in it and determining the prospects of self-improvement and self-development. Therefore, the goal of comprehension stage is to prepare students for analytical activity and reflection on experience, its comprehension.

The objectives of this stage are as follows: the formation of the need for professional self-development through the acquisition of the necessary professional-research and methodological knowledge; inclusion of students in a variety of forms of reflection on teaching, research activities; stimulation of the interest in the acquisition of the necessary minimum of theoretical material; mastery of analytical skills; the focus of the student on identifying the characteristics of pedagogical research and prognostic aspects in research activities.

The main thing in the comprehension stage is that the student shall not be the instrument to achieve someone’s administrative order or instructions, prescriptions, he/she shall be a creator of his/her own research activities, built on the objective laws.

The purpose of this stage of the formation of research competence is to prepare students for analytical and reflection on experience, its understanding.

At the comprehension stage educational-cognitive activity shall be carried out through the traditional forms of teaching: lectures and seminars, which will be transformed into the problematic and practice-oriented lectures.

When arranging practicals there should be used a variety of forms and methods of professional training, aimed at cooperation of students, establishing pedagogically appropriate relationships between teachers and students. The main methods of studies that allow students to reflect and interpret the existing experience, is joint comprehension reading and discussion of scientific texts by the students and the teacher, analysis of research situations. This work shall be conducted by students of the second year of study within the special course “Basics of research competence of future elementary school teachers” (Syzdykbaeva, 2014).

#### 3.4.2 Perception as a Stage of Formation of Research Competence of Future Elementary School Teachers

The second stage is the stage of perception. At this stage of formation of research competence it is important to provide the modeling of the proper professional behavior in research activities and on this basis to acquire such experience with the aim of understanding by the students of their professional research position.

In pedagogical literature “perception” is treated as a complex of cognitive actions or unintentional processes as a result of which a person begins to be conscious, note or ignore (reflect) something happening in the external and internal world (Niemi & Nevgi, 2014). At the same time the students’ perception of their own research position is a complex set of mental properties and states of students, stimulating research activities related to the elective, cognitive, emotional, and volitional activity at the meeting with the objects of study.

Modeling research activities, the students apply the theory not only for understanding themselves, their activities, their interaction with pedagogy and pedagogic reality, but also for the formation of value judgments, perception of professional and personal values. “Transition” of values, skills and personal experience of the students they acquired in research activities, into sustainable attitudes, beliefs and meanings determines the nature of the student’s research activities and behavior. The process of this “transition” is closely associated with the formation of the future teacher as a creative personality, the formation of his/her research qualities and attitudes from which appeared his/her needs, motives, values and meanings, becoming his/her professional research position.

At the perception stage the formation of research competence, we used self-programming method, which involves the materialization of teacher’s forecast of possible improvements in his/her research competence. The means for implementing the self-programming method is the “Concept “I am a future elementary school teacher—a researcher”. As you know, the competence manifests itself in the action and can be implemented only

in the case when the research subject has an active research position in relation to the research activity and is motivated to research. Using the concept “I am a future elementary school teacher–a researcher” promotes the inclusion of students in activity-motivated “experiencing”, which involves tracing the direction of research self-development on the basis of motives significant for them. Moreover, students take an active research position of subjects of their research activity, planning, regulating, directing and controlling it, while the research activity becomes desirable, attractive, brings the pleasure of participating in it.

The construction of the concept “I am a future elementary school teacher–a researcher” is a kind of acmeological planning, based on ideas of acmeology as a science of achieving professional-personal tops (Ananiev, B., Gagin, Y., Kuzmina, N., & Maximova, V.) (Kuzmin, 2002).

#### 3.4.3 Project Planning Is the Third Stage of Formation of Research Competence of Future Elementary School Teachers

The third stage is the stage of project planning. At this stage of formation of research competence it is necessary for students to create conditions for self-programming of their research positions in the research activity.

Thus, in the basis of the self-programming process laid the self-regulation. From the standpoint of Morosanova V.I., the phenomenon of self-regulation is evident in how a person plans and programs the achievement of life goals, takes into account significant external and internal conditions, evaluates the results and adjusts his/her activities to achieve subjectively acceptable results; including the extent to which the processes of self-organization are developed and understood (Morosanova, 2002). Through self-regulation the student adapts to difficult conditions, mobilize potential opportunities, consciously controls and monitors his/her behavior, professional activity on the basis of personally professional attitudes and positions.

At the project planning stage of formation of research competence we use the “exposure” of students in a model scientific-research activities. This is possible either in the real professional environment (on teaching practice), or in circumstances that closely simulates the professional reality.

Naturally occurring transition of future elementary school teachers in the model research environment is optimally ensured by the organization of group interaction, the use of game-modeling (projective and simulation games), reflective teaching methods (positional reflective discussion, reflective-analytic dialogue, reflective practicals), research planning, modeling research situations, participation in various forms of individual and collective research activities.

One of the major means of formation of the students’ research competence on the project planning stage is research projects (designing methods of actions in research situations). The distinctive feature of these projects is the availability of clearly defined relevant purposes significant for participants, the considered and reasonable structure, the use of scientific methods of processing and presentation of results. Themes of research projects shall reflect the most pressing problems of modern science, consider their relevance and importance for the development of research skills of students. In the process of planning of different modes of actions in research situations created the conditions under which the students are directly included in the active research process, independently formulate the research problem, collect the necessary information, plan possible solutions to problems, draw conclusions, analyze the results obtained.

With the inclusion of students in research planning, the teacher shall provide support as well as try to captivate a problem and the process of its investigation; stimulate pedagogical thinking with the use of skillfully raised issues; act as a coordinator and a partner in relation to the student; offer his/her help, his/her opinion on the problem; address to the correct sources of information only in cases when it is difficult for the student to make a search; encourage creative thinking of students to research the problem and options of its solving, provide students with the opportunity to meet with colleagues, also involved in research; provide students involved in research with the opportunity to make publications, presentations, creative reports on the problem under study. Only under these conditions the research activities of the students shall contribute to the development of their research competence.

#### 3.4.4 Implementation as a Stage of Formation of Research Competence of Future Elementary School Teachers

The fourth stage is implementation. This stage involves “exposure” of the students in a real professional environment through participation in various types of individual and collective research activities in the process of teaching practice in secondary schools.

It is obvious that the transition from one stage to another is associated with the transition of research competence of future elementary school teachers to a new qualitative level, including the appearance of values, cognitive and activity innovations, rethinking their attitude to research and to themselves as subjects of research. Each

subsequent step is the continuity of the previous one, it has relative completeness, which emphasizes the effectiveness of a certain development process, its qualitative nature. The development of some manifestations acts as a condition for transition of the others to more qualitative level.

### *3.5 Pedagogical Conditions of Formation of Research Competence of Future Elementary School Teachers*

The pedagogical conditions of formation of research competence are an important structural element of the model under study.

We have identified the following pedagogical conditions of formation of research competence of future elementary school teachers:

- 1) Motivational conditions create the need and motivation of future elementary school teachers in mastering their research qualities, in the development of the valuable attitude to research as a preferred form of cognitive activity, the formation of readiness to work on yourself. This group of conditions includes maintaining a positive motivation of the future elementary school teachers in research activities; moral and material encouragement of students who successfully conduct research work; creating an educational environment that encourages research activity of the students.
- 2) Informative conditions integrate individual and technological possibilities of pedagogical activity and requirements of upcoming professional activity. Informative conditions include the use in the educational process of the active teaching methods (discussion, business and simulation games, the research design, modeling research situations, training exercises); the introduction of a special course “Basics of research competence of future elementary school teachers” and inclusion of research work into the content of teaching practice.
- 3) Organizational conditions determine the establishment and retention of educationally purposeful relationships of teachers and students, based on cooperation and mutual interest to research activity. This group includes the following conditions: the inclusion of students in active creative interaction in various forms of research activity; organization of the educational process aimed at formation of research competence of future elementary school teachers on the basis of the principles of research activity, research position, comprehension, reflection, dialogic principle.
- 4) Regulatory conditions promote analysis, calculation and correction of the process and the result of formation of research competence of the students. Regulatory conditions include the following ones: encouragement of students to manage the process of formation of research competence; provision of self-monitoring of formation of research competence of the students.

These conditions are systemically important in this context, i.e. indispensable characteristics not excluding the others.

## **4. Conclusion**

Thus, the professional activity of the future elementary school teachers requires the ability to learn, plan, model and on this basis determine the most appropriate ways to solve problems in practice. The future elementary school teachers shall have the basics of research competence, which find their daily expression in value attitude toward professional and research activities, the personal willingness to scientific knowledge on the basis of existing research knowledge, skills and abilities of an individual to build his/her own system of research activities.

In the present study the research competence of future elementary school teachers is defined as a multilevel education, personal characteristics, including professional knowledge, pedagogic values, research skills, creativity in solving professional tasks and an extent of self-realization in the research activities.

The analysis of psychological-pedagogical works allowed us to construct a structural-functional model of formation of research competence of future elementary school teachers, which is the integrity consisting of functionally interrelated components: target, informative, procedural and estimate-effective structural components.

In implementing this model, it is necessary to take into account trends in the formation of research competence of future elementary school teachers: the dependence of formation of research competence of future elementary school teachers on demand of the society and school; the dependence of the efficiency of formation of research competence of future elementary school teachers on a high level of reflexive control of this process; approximation of forms of educational activity of the students–future elementary school teachers–to the forms of professional activity; standardization of formation of research competence of future elementary school teachers;



modeling of formation of research competence of future elementary school teachers.

The implementation and effectiveness of the developed model of formation of the research competence of future elementary teachers are possible only if the teacher organizes relevant pedagogical conditions: inclusion into the educational process the methods and means of realization of the subjective position of the students in a model research activity; problematic-oriented management of independent research work of the students; creation of educational-research community of students, university teachers and school teachers as an area of formation of research competence of the students.

The main methods of formation of research competence of the future elementary school teachers are as follows: the reflection of the primary experience, the intensification of the process of self-programming (“self-exposure”), self-perception as an elementary school teacher – a researcher in the process of self-realization in research activities (“exposure” in a model and then in a real scientific-research activities).

The process of formation of research competence of future elementary school teachers includes the following interrelated stages: comprehension, perception, project planning, implementation. Each stage emphasizes a certain effectiveness of this process and aims at the further increase in the level of research competence of future elementary school teachers.

The implementation of the developed model shall be implemented during the period from 2014 to 2016 academic years on the basis of the Kazakh State Women’s Pedagogical University.

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