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CONCEPTUAL AND CATEGORIAL ANALYSIS OF INTEGRATION OF SCIENTIFIC RESEARCH AND EDUCATIONAL ACTIVITY OF FUTURE TEACHERS OF MATHEMATICS

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Abstract

The urgency of the problem is caused by the need to resolve the contradiction between the requirements for improving the quality of professional and pedagogical training for future mathematics teachers by forming and integrating their educational and research activities at a high level as well as by the insufficient interpenetration and integration of these activities in the educational process of a higher educational institution. The purpose of the article is to raise the problem of integrating the main activities of future mathematics teachers in the course of their personality-centered training, refining and concretizing the definitions of such concepts as "the educational activity of the future mathematics teacher", "the scientific research activity of the future mathematics teacher", "the integration of educational and scientific research activity of the future teacher of mathematics ".

Keywords

Professional pedagogical – Research activity – Educational activity – Integration

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Introduction

In accordance with the **F S E S H E** , in addition to the above types of professional activity, mathematics activity formed at a sufficiently high level (necessarily at the utilitarian and, preferably, at the creative level) is still essential for a mathematics teacher. Each of these activities is very important and is formed in the process of professional and pedagogical training of future mathematics teachers.

In the proposed **F S E S H E** (3 ++) project at the bachelor level, despite the exclusion of direct research activity from the activities being formed, this activity finds its place in all types of practice. In addition to the fact-finding and technological (project-technological) work, research work is included in the educational activity and implies obtaining primary skills of scientific research work. In the production practice, in addition to the pedagogical, technological (project-technological) work, scientific research work is also included. Research work is included in the professional practice of students, in addition to the pedagogical and technological (project-technological) work.

A scientific research on the topic "Integration of the educational and research activities of future mathematics teachers in the context of their personality-centered vocational training", planned for 2018-2023 (registration number of R&D AAAA-A18-118041190060-7 of 11.04.2018), is an extension of a research work of the Department of mathematics, theory and methodology of teaching mathematics on the topic "Theoretical and methodological foundations of personality-centered training of mathematics teachers" (registration number of R&D 115121550015 of 15.12.2015).

Analysis of studies and publications shows the inadequacy of the level of scientific activity and its integration into the educational process. Many researchers[1] indicate that the necessary training of pedagogical personnel is not provided in higher education and an insufficient number of competitive scientific and pedagogical studies is being created. Quite often, the research work is carried out formally, therefore graduates of pedagogical universities do not sufficiently apply the achievements of pedagogical science in their practical activity[2] and experience significant difficulties in organizing their own research activity, although it is proved that without mastering the methods of scientific cognition, it is impossible to deeply understand the essence of pedagogical phenomena and processes[3].

[1] M. M Antsibor, Activization of educational and research activities of students in the study of the discipline of the pedagogical cycle (Moscow: Prometheus, 1989); A. P. Belyaeva, Theoretical bases of integration of the content of vocational education. Cand. Sc. Thesis (Sverdlovsk, 1988) y A. V. Gluzman, Professional and pedagogical training of university students: theory and practice of research (Kiev: Prosvita, 1998).

[2] A. A. Glushchenko, Influence of integration of educational and scientific activity of teachers of higher education on the quality of specialist training. Ph. D. thesis (Moscow, 1998); O. N. Zagora, The integration of educational and practical activities as a factor of increasing the professional competence of students of correspondence students in the college. Cand. Sc. Thesis (Magnitogorsk, 2000) y E. V. Kulik, Theory and practice of training future teachers of labor education for pedagogical research activity. Ph. D. Thesis (2006).

[3] E. S. Kazantseva, Personally oriented approach to the organization of educational and research activities of students. Cand. Sc. thesis. Nizhny Novgorod. 2006 y A. V. Kozlov, Designing and implementing the system of scientific research activities of students of technical colleges on the basis of educational and scientific-industrial integration. Ph.D. thesis (Togliatti, 2004) y V. N. Litovchenko, Formation of research skills of students of pedagogical specialties of the University by means of research work: Author's abstract. Cand.Sc. thesis (Minsk, 1990).

The most important condition for improving the professional training of future teachers is to improve the status of university science, the feature of which is the involvement of the majority of students in research activity. The strength of university pedagogical training is the availability of a research component in its content. Universities with their fundamental training of specialists and focus on research form a teacher who is able to combine subject teaching with research activity[4].

Analysis of modern studies of integration processes in higher education has shown that the problem is quite urgent and integration is considered at several levels:

a) at the level of activities (the integration of curricular and extracurricular activities as the basis for the adaptation of students (P.M. Vasiliev)[5], the integration of innovation and training activities in the system of military vocational education (V.P .Chernoles)[6], the integration of training and practical activity as a factor of increasing the professional competence of correspondence students at college (O.N. Zagora)[7], the impact of integrating the teaching and research activity of teachers of higher education institutions on the quality of training of specialists (A.A. Glushchenko)[8]);

b) at the level of the system "education - production - science" (training of specialists in technical sciences while using the integration of science, education and production (A.A. Kozlov, Z.S. Sazonova, Y.V. Shagina)[9]; the integration of science, education and practice in the conditions of the university educational district (S.D. Yakushev)[10]; forms of integrating education, science and production in foreign universities (V.B. Supyan)[11].

Yu.M. Kozlovsky[12] clearly identifies the integrative essence of science and education, which in practice are virtually disconnected. In his works the system of scientific activity of the university is considered as a pedagogical system and is described by a complex of models of methodological, theoretical and applied levels on the basis of systemic, synergetic, matrix, fractal, informational, personal, activity and prognostic approaches.

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[4] A. V. Gluzman, Professional and pedagogical training of university students: theory and practice of research (Kiev: Prosvita, 1998).

[5] P. M. Vasiliev, Integration of educational and extracurricular activities as a basis for the adaptation of university students. Cand. Sc. thesis (Moscow, 2004).

[6] V. P. Chernoles, Integration of innovative and educational activities in the system of military vocational education. Ph. D. thesis (St. Petersburg, 2002).

[7] O. N. Zagora, The integration of educational and practical activities as a factor of increasing the professional competence of students of correspondence students in the college. Cand. Sc. Thesis (Magnitogorsk. 2000).

[8] A. A. Glushchenko, Influence of integration of educational and scientific activity of teachers of higher education on the quality of specialist training. Ph. D. thesis (Moscow, 1998).

[9] A. V. Kozlov, Designing and implementing the system of scientific research activities of students of technical colleges on the basis of educational and scientific-industrial integration. Ph.D. thesis (Togliatti, 2004); Z. S. Sazonova, Integration of education, science and production as a methodological basis for training a modern engineer. Ph. D. thesis (Kazan, 2008) y Yu. V. Shagina, Formation of professional competencies of future specialists of engineering profile in the context of integration of education, science and production. Cand. Sc. Thesis (Volgograd, 2010).

[10] S. D. Yakusheva, University educational district - integration of science, education and practice: monograph (Moscow, 2009).

[11] V. B. Supyan, US Research Universities: a mechanism for integrating science and education (Moscow: Master, 2009).

[12] Yu. M. Kozlovsky, Modeling the scientific activity of a higher educational institution: theoretical and methodological aspects: monograph (Lviv: SPOLOM, 2012).

The problem of integrating science and education is examined from various standpoints:

1) the integrative principles of research activity in the learning process are singled out;

2) the integration of science and education in the preparation of pedagogical personnel is studied;

3) the real practice of integrating science and education is analyzed;

4) the pedagogical system of integrating the educational and research work of future teachers (V.V. Proshkin)[13] is studied.

However, even such a close attention to the problem in question leaves unresolved the contradictions between the following:

- the requirements of **F S E S H E** 3 (++) concerning the improvement of the quality of the formation of research activity of future mathematics teachers and the insufficient level of research activity in higher education institutions, the weak connection of science with the teaching process, the imperfection of the forms and methods of organizing scientific research in the process of professional pedagogical training of future mathematics teachers;
- the wide opportunities of the university to organize and conduct professionally-directed practice-centered scientific research, the opportunities of training of the teacher-researcher and the insufficient integration of research activity into the educational process;
- the requirements of the Concept of Mathematical Education of the Russian Federation for the professional training of future mathematics teachers who have to participate in pedagogical creativity during the solution of complex practical problems and the insufficiently developed theoretical and methodical support of personality centered approach and integration of scientific and educational activity in the professional and pedagogical training of teachers.

The present study is devoted to the identification of the main ways of resolution of these contradictions.

Materials and methods

The study concerns the integration of the educational and research activity of future mathematics teachers in the context of their personality-centered vocational and pedagogical training. Therefore, it is necessary to conduct a content analysis of the existing sources on the basis of systemic, synergetic and activity approaches and to specify the main concepts and categories considered in the study.

The basic concepts of the research are: personality-centered vocational training of the future mathematics teachers, educational activity, research activity, integration. The last three of them are concretized in the present article.

Results

Let's consider the basic approaches to the definition of the concept of "integration".

[13] V. V. Proshkin, Integration of research and teaching in the university training of future teachers: theory and practice: monograph (Lugansk: Lugansk State University named after Taras Shevchenko, 2013).

The very term "integration" comes from the Latin word *integratio* meaning restoration, completion, insertion, and deriving from *integer* - whole.

In the philosophical encyclopaedic dictionary, integration is a process of development associated with the unification of heterogeneous parts and elements into a whole[14].

In the explanatory dictionary[15], integration is a process of development, the result of which is the achievement of unity and integrity within a system based on the interdependence of individual specialized elements. To integrate means to unite in one.

In modern pedagogical dictionary, integration is defined as the unification of any parts and functions of the system into a whole, as well as the process that leads to this state[16].

In the above definitions, integration is considered both as a direct result of the uniting action and as a system process.

The main essence of integration in the considered definitions is the interpenetration, interaction, unification of isolated separate parts into a single whole with the help of a broad use of common ideas, means, methods of studying the surrounding reality.

According to M.G. Ivanchuk, integration is the process of establishing links that ensure the interdependence of elements and the emergence of integrative qualities[17].

According to M.G. Chepikov, integration is a "condensation" of knowledge in forms of cognition, which have been developed and are constantly being improved; it is the process and the result of constructing such an integrity, which is formed by the synthesis of scientific knowledge on the principles of fundamental laws of nature and is predetermined by the mapping of natural connections[18].

Due to interdisciplinarity, the concept of "integration" has its own specificity in each of the branches of science. Thus, there is web-integration, economic integration, social integration and many others. In the present study, integration is analyzed from the point of view of pedagogical systems.

In pedagogical science, integration processes and systems are used in constructing a significant number of different research concepts, which means that there is an extensive research base for their analysis in the context of transformation of integration processes as the leading regularity in the development of educational theory and practice[19].

[14] Philosophical encyclopedic dictionary (Kazan: Abris, 2002).
[15] Ukrainian explanatory dictionary. Retrieved from: http://language.br.com.ua
[16] A modern dictionary of pedagogy. Comp. E. S. Rapatsevich (Mn.: Sovrem. Word, 2001).
[17] M. G. Ivanchuk, “Integrating a science category”, Pedagogy and Psychology, num 2 (2004): 23 - 31.
[18] M. G. Chepikov, Integration of Sciences: A Philosophical Sketch (Moscow: Thought, 1981).
[19] V. V. Levchenko, “Integration processes in pedagogical science”, Vestnik Samarsky state university, num 5 (55) (2007): 157-166.

The analyzed studies (of A.P. Belyaeva[20], P.M. Vasilyev[21], A.A. Glushchenko[22], O.N. Zagora[23], A.V. Kozlov[24], V.V. Proshkin[25], Z.S. Sazonova[26], V.P. Chernoles[27], A.R. Shaydullina[28], etc.) have made it possible to draw a conclusion about the various manifestations of integration as a pedagogical phenomenon and the need for its further study due to the constantly changing conditions of pedagogical reality.

To sum it up, in philosophy, pedagogy, and a number of other social and humanitarian sciences, a single approach to understanding and using the term "integration" is used as the main one. This term is interpreted as the unification of previously isolated parts, elements and components, which is accompanied by the complication and strengthening of ties and relations between them. Integration is seen as a phenomenon, result, factor and process.

According to A.D. Ursul, integration processes can be carried out not only within the existing system, which leads to an increase in the level of its integrity and organization, but also at the stage of emergence of a new system of previously unrelated elements[29]. V.V. Proshkin notes that as a result of the integration process, the system increases in volume and the interconnection between its elements strengthens, that is, a new systemic quality emerges[30].

Unfortunately, the researchers do not consider the possible negative impact of integration processes on the life of the system. This aspect should also be considered and taken into account when modeling the experiment.

In the context of the study, it was suggested that the integration of the educational and research activity of future mathematics teachers would produce a positive synergistic effect.

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[20] A. P. Belyaeva, Theoretical bases of integration of the content of vocational education. Cand. Sc. Thesis (Sverdlovsk, 1988).
[21] P. M. Vasiliev, Integration of educational and extracurricular activities as a basis for the adaptation of university students. Cand. Sc. Thesis (Moscow, 2004).
[22] A. A. Glushchenko, Influence of integration of educational and scientific activity of teachers of higher education on the quality of specialist training. Ph. D. thesis (Moscow, 1998).
[23] O. N. Zagora, The integration of educational and practical activities as a factor of increasing the professional competence of students of correspondence students in the college. Cand. Sc. Thesis (Magnitogorsk. 2000).
[24] A. V. Kozlov, Designing and implementing the system of scientific research activities of students of technical colleges on the basis of educational and scientific-industrial integration. Ph.D. thesis (Togliatti, 2004).
[25] V. V. Proshkin, Integration of research and teaching in the university training of future teachers: theory and practice: monograph (Lugansk: Lugansk State University named after Taras Shevchenko, 2013).
[26] Z. S. Sazonova, Integration of education, science and production as a methodological basis for training a modern engineer. Ph. D. thesis (Kazan, 2008).
[27] V. P. Chernoles, Integration of innovative and educational activities in the system of military vocational education. Ph. D. Thesis (St. Petersburg, 2002).
[28] A. R. Shaydullina, Integration of the secondary school, university and production in the regional system of vocational education: the author's abstract. Cand. Sc. Thesis (Kazan, 2010).
[29] A. D. Ursul, Philosophy and integrative-general scientific processes (Moscow: Science, 1981).
[30] V. V. Proshkin, Integration of research and teaching in the university training of future teachers: theory and practice: monograph (Lugansk: Lugansk State University named after Taras Shevchenko, 2013).

The next concept that requires definition is the concept of the educational activity of the future mathematics teacher. The concepts "teaching", "studying", "activity" and others are closely related to this concept.

The concept of activity is based on subject-object relations, however, in the process of education, the activity of the teacher and students goes beyond the subject-object relationship, transforming into subject-object-subject relationship, where the subjects are the teacher and the students, while the object is the system of knowledge and methods of action, mastering which is part of the educational process.

On the basis of activity approach, the concept of "education" is viewed as a system of purposeful activities in which three types of activities are carried out: teaching (managing), learning and communication. The teaching activity of the university teacher is a practical, professional activity, since its object and product are separate from the actor. The educational activity of future mathematics teachers is theoretical (cognitive) and practical and is aimed at changing their own experience as the subject of activity. The subjects of these activities solve various tasks: the instructor solves the didactic tasks, the students - the learning tasks, but in the course of these two activities they constantly interact through the third activity, i.e. communication. The tasks of each of the types of activity are in close interaction, which the future teacher of mathematics should be able to trace and use in his/her own professional and pedagogical activity.

L.M. Friedman singles out, from the standpoint of teaching mathematics, the following basic approaches to the analysis of the notion of "education": ontodidactic (the relationship between mathematical sciences and the subject of mathematics), methodical (teacher's activity), school studies approach (organization and provision of material conditions (classroom, equipment, teaching aids, etc.)), socio-psychological and even sociological (the relationship of all persons who take part in teaching mathematics), and cybernetic (management)[31].

In pedagogy, the concept of "studying" is closely associated with the concept of "cognitive activity". G.I. Shchukina looks on these two concepts as identical[32]. Yu.K.Babansky believes that "studying is a system of cognitive actions of students aimed at solving teaching and educational problems"[33]. T.V. Gabay defines studying as a process of "self-directed cognitive activity"[34]. I.P. Podlasy defines "studying" as a co-process, "in the course of which new ways of behavior and activity emerge, while the previously acquired ones are changed"[35].

None of the above approaches to the definition of the concept of "studying" includes in the content of studying any other forms of activity of students, except the cognitive one, although learning is carried out in the thinking, operating, labor, aesthetic, and other activities of students. Therefore, in the present paper, a more precise definition of studying is adopted

[31] L. M. Fridman, Psihologo-pedagogical bases of training to the mathematician at school: To the teacher of mathematics about pedagogical psychology (Moscow: Enlightenment, 1983).
[32] G. I. Shchukina, The role of activity in the learning process: Book. for the teacher (Moscow: Enlightenment, 1986).
[33] Yu. K. Babansky & M. M. Potashnik, Optimization of the pedagogical process (In questions and answers). 2nd ed (Kazan: Soviet school, 1983).
[34] T. V. Gabay, Educational activity and its means (Moscow: Izd-vo MGU, 1988).
[35] I. P. Podlasiy, Pedagogy. New course: Textbook: In 2 books. Book 1: General Basics. Learning process (Moscow: Vlados, 2000).

as the main one meaning a system of various activities of students, compiled on the basis of[36] : teaching is a specially organized, active independent, cognitive, labor and aesthetic activity of future mathematics teachers aimed at developing knowledge, skills, mental processes and abilities. The indication of special organization emphasizes the role of management of this activity (direct or indirect), which is more often performed by the teacher in the professional and pedagogical training of the future mathematics teacher.

Analysis of the main approaches to the definition of studying activity[37] has shown that practically all authors highlight the focus of studying on the acquisition and assimilation of new knowledge, as well as on mastering generalized methods of obtaining it.

The educational activity of future mathematics teachers is a specially organized activity that represents a set of specific actions and processes that have a specific conscious goal - to obtain the profession of a mathematics teacher which implies mastering relevant theoretical knowledge, generalized methods of action for its obtaining and application, as well as forms of pedagogical practice.

The educational activity and studying are not identical terms[38]. The main difference between the studying and educational activity is that studying is transformed into educational activity when the subject not only masters knowledge, but also the ways of obtaining it. The methods are not given to the subject in a readymade form, but are formed by him/her independently in accordance with the assigned training task. The student "learns not only the ways of working with knowledge, but also the ways of working with oneself, that is, the methods of self-control and self-esteem"[39].

The next concept to be concretized is the concept of "research activity of the future mathematics teacher", and the related concepts of "research" and "research activity". From the standpoint of etymology, the Russian word "research" (*issledovaniye*) has the following meaning: extracting something "from the tracks" (*sled* means 'track' or 'trace'), restoring the order of things, the general law, the course of the phenomenon by indirect signs in specific or random objects. In science, a researcher "extracts" information with the help of the mind in order to understand the surrounding reality.

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[36] B. T. Likhachev, Pedagogy. Course of lectures: Proc. manual for students ped. training. institutions and students of the IEC and FPK (Moscow: Prometheus, Yurayt, 1998).

[37] T. V. Gabay, Educational activity and its means (Moscow: Izd-vo MGU, 1988); V. V. Graf; I.I. Ilyasov & V.Ya. Lyudis, Fundamentals of learning activities and independent work of students (Moscow: Enlightment, 1984); V. V. Davydov, Age and pedagogical psychology: Textbook (Moscow: Enlightment, 1975); O. B. Episheva & V.I. Krupich, Teach students to learn math: Formation of methods of educational activity (Moscow: Enlightment, 1990); I. A. Winter, Pedagogical psychology (Moscow: Logos, 1999); Integration of research and teaching in the university training of future teachers: theory and practice. Psychology: Textbook. V.A. Krutetsky (ed.) 2nd edition (Moscow: Enlightment, 1974); N. F. Talyzina, Management of the learning process (Moscow: Pedagogika, 1975); Formation of educational activity of schoolchildren. V.V. Davydova, I. Lomschera, A.K. Markova (eds) (Moscow: Pedagogika, 1982); N. N. Khan, Some features of didactic preparation of the future teacher to the organization of collective cognitive activity of students. Cand. Sc. Thesis (Alma-Ata, 1981); G. I. Shchukina, The role of activity in the learning process: Book. for the teacher (Moscow: Enlightenment, 1986) y D. B. El'konin, On the problem of the periodization of mental development in childhood. Reader in Psychology. A.V. Petrovsky (ed) (Moscow: Enlightment, 1977).

[38] V. V. Davydov, Problems of developmental learning: The experience of theoretical and experimental psychological research (Moscow: Pedagogy, 1986).

[39] A. K. Markova; T. A. Matis & A. B. Orlov, Formation of the motivation of learning (Moscow: Enlightenment, 1990).

According to A.S. Obukhov, research is a creative process of cognition of the world, oneself and being in oneself[40].

From the standpoint of pedagogy, the concept of "research" is viewed as the process and result of scientific and pedagogical activity, which is aimed at obtaining socially significant new knowledge about the laws, structure, and mechanisms of teaching and education, the theory and history of pedagogy, the methods of organizing teaching and education work, its content, principles, and organizational forms[41].

Two interrelated levels are distinguished in the structure of research: empirical (new facts are established, on the basis of generalization of which empirical regularities are formulated) and theoretical (nomination and formation of regularities common for the subject branch, which allow explaining previously discovered facts and empirical patterns)[42].

Research is carried out in the process of research activity, which is a special kind of activity generated as a result of the functioning of the search activity mechanism of the subject and formed on the basis of the subject's research behavior. Since the search activity takes place in an uncertain situation, the research activity features such basic actions as analysis, synthesis, classification, etc., assessing the development of the situation, constructing hypotheses in accordance with its further evolution, and modeling its own actions. V.S. Lazarev and N.N.Stavrinova define research activity as "the activity of the subject of the educational process, which is based on scientific methodology, aimed at obtaining new, scientifically valid knowledge"[43].

I.A. Zimnya and E.A. Shashenkova define research activity as an activity that "is regulated by the consciousness and activity of the individual, has a focus on satisfying cognitive and intellectual needs. It is characterized by the unity of thinking and practical action; a combination of theoretical and sensory-visual representations; it can be motivated; it is focused on solving the problem; it is also characterized by determination of the purpose, motives, result, and activity; it is directed at searching; features interdependent and mutually conditioned phases and an ability to use the necessary skills "[44].

According to the philosophers V.V. Rozanov and Yu.A. Urmantsev, the process of research activity can be provided in two main forms: the primary (search for the unknown) and the secondary (the study of already known) cognition. Within this approach, research activity is manifested in two ways: as the actual creative activity, which is aimed at the cognition of the new, and as an activity that is aimed at understanding the already known[45].

In his work, M.A. Knyazyan also emphasizes the existence of various approaches to the study of the essence of research activity, and summarizes them in the following way:

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[40] A. S. Obukhov «Research as a way of forming a world outlook». Public education, num 10 (1999): 158-161.

[41] A modern dictionary of pedagogy. Comp. E. S. Rapatsevich (Mn.: Sovrem. Word, 2001).

[42] Ukrainian explanatory dictionary. Retrieved from: http://language.br.com.ua

[43] V. S. Lazarev & N. N. Stavrinova, Training of future teachers for research: monograph (Surgut: RIO SurGPU, 2007).

[44] I. A. Zimnyaya & E. A. Shashenkova, Research work as a specific kind of human activity (Izhevsk: UGU, 2001)

[45] V. V. Rozanov, On understanding: the experience of studying nature, boundaries and internal structure of science as integral knowledge (Moscow: Tanais, 1996) y Yu. A. Urmantsev, "On the forms of comprehension of being", Issues of Philosophy, num 4 (1993): 89-106.

> "research activity is a means of studying the environment at the empirical and theoretical levels, the laws of the functioning of its phenomena in the context of their systemic relationship with the purpose of building socio-historical and personal experience"[46].

It is personal changes that are the driving force behind the research activity of the future mathematics teacher.

In the modern scientific and pedagogical literature, research activity is analyzed in three main directions: as a form of the educational process, which is aimed at developing a problem vision, mastering research procedures and concentrating on the method of obtaining new knowledge in the process of study; as an individual or group mini-study, a common project and independent creative work; as one of the methods of problem training; as an educational technology.

A.N. Poddyakov associates research activity with research behavior as a universal feature of human activity that permeates all of its other kinds: "research, research behavior is one of the fundamental forms of interaction of living beings with the real world that is aimed at its study and cognition. It performs essentially irreplaceable functions in the development of cognitive processes at all levels, in training, in acquiring social experience, in social and personal development. Research activity is a creative attitude of the individual to the world, which is expressed in motivational readiness and intellectual ability to cognize reality through practical interaction with it, to independently establish various research goals, to invent new ways and means to achieve them, to obtain various, in particular, unexpected results that have not been predicted, and their use for further cognition "[47].

A.I. Savenkov also notes that, in addition to the search activity, research activity includes the analysis of the results obtained and, on their basis, the assessment of the development of the situation as well as the forecasting of further actions accordingly. Research capabilities are a complex of components: search activity (high motivation, interest, emotionality); divergent thinking (the ability to find and formulate problems, the ability to generate as many ideas as possible in response to a problematic situation, originality, the ability to respond to the situation nontrivially); convergent thinking (the ability to analyze and assess the situation for the development of judgments and conclusions, an important condition for the development and improvement of the object of research (or situation) and information evaluation)[48].

Research behavior is the basis for research activity, which is conscious and purposeful[49].

In the opinion of A.V. Leontovich[50], research, unlike design, construction and organization, is the most "sensitive" type of activity in relation to an object, its main goal

[46] M. O. Knyazyan, The system of formation of independent research activity of future foreign language teachers in the process of multi-step training. Ph. D. Thesis (2007).
[47] A. N. Poddyakov, “Methodological foundations for the study and development of research activity”, Schools, technol, num 3 (2006): 85-91.
[48] A. I. Savenkov, Psychological foundations of the research approach to learning: Textbook (Moscow: Axis-89, 2006).
[49] A. S. Obukhov, “Research position of personality”, Research work of schoolchildren, num 1 (2006): 61-75.
[50] A.V. Leontovich, Designing of research activity of students. Cand. Sc. Thesis (Moscow, 2003).

being the establishing of the truth, "observing" the object, if possible without interference in its internal life. Therefore, the development of the ability to occupy a research position is an important task of the professional training of future mathematics teachers as a means of assessing one's position, the possible consequences of one's actions. The characteristic feature of the teacher's research activity is manifested in the fact that its main invariant is the enrichment by the teacher of the individual and public scientific and theoretical knowledge base with the aim of improving the holistic pedagogical process. At the same time, the research process ensures the continuous expansion of the pedagogical experience and the amount of the teacher's knowledge, which is conditioned by the diversity and unlimited differentiation of pedagogical situations.

The research activity of the teacher (including the teacher of mathematics) is a kind of cognitive search activity that is aimed at studying both the organization of the educational process itself (normative and instructive materials, methods of teaching the discipline, additional scientific and didactic information, etc.) and the psychological portrait of its participants (students, educators, parents) for the purpose of diagnosing, correcting and optimizing pedagogical influence on the personality of the student.

At the first stage of professional and pedagogical training of future mathematics teachers, they perform different kinds of research assignments that activate research activity. In this case, research activity is understood as the activity of future teachers of mathematics under the guidance of the teacher. This activity concerns the solution by the students of a creative, research task with an unknown way of solving it (in contrast to a practical workshop that serves to illustrate certain mathematical laws) which implies stages characteristic of scientific research: the formulation of the problem, the study of the theory based on this problem, the mastery of the research methodology, the collection of one's own material, its analysis and generalization, one's own conclusions and their comparison with the existing data. This chain does not depend on the domain of study, but is common for an approach that can be defined as a modern scientific way of cognition.

Research activity, from the standpoint of personality-centered approach, features the following basic values[51] : an orientation at obtaining truth (building the most objective image of the world); the activity nature of research (use of thought activity and practical activity); a developed communication system (creation of a specific activity environment that ensures the development of norms, traditions, and patterns of activity); productivity (the result of research activity exists in the general context of the development of the scientific professional tradition and serves its development).

The abovementioned values are the objective prerequisites for conducting research in the field of teaching mathematical disciplines, since these values meet the internal needs of the future teacher of mathematics.

The concept of the research activity of a subject is analyzed at different levels and has different manifestations depending on the context of the research. The research activity of a student differs from the scientific research activity of a scientist, but each of them has

[51] N. G. Alekseev & A. B. Leontovich, Criteria for the effectiveness of teaching students in research activities. Development of research activities of students: Methodological collection (Moscow, 2001); Yu. V. Gromyko, Project consciousness (Moscow, 1998) y M. G. Yaroshevsky, The logic of the development of science and the scientific school. Schools in Science. S.R. Mikulinsky, M.G. Yaroshevsky, G. Kreber, G. Steiner (eds) (Moscow, 1977).

common features, structure and patterns. In the context of the study of the students' research activity, it is necessary to define concepts that are closely related to the subject of the research, namely: "scientific activity", "scientific-research activity", "educational-research activity", "research activity of the student" and analyze the interrelation and the special features of these concepts.

In psychological research[52], scientific research activity is defined as an activity that is related to the solution of a creative, research task with an unknown way of solving it and that features the main stages characteristic of scientific research and has norms that correspond to the traditions of science: the formulation of the problem, the study of theory, which concerns this problem, the selection of research methods and practical mastery of them, collecting the material, its analysis and generalization, and conclusions.

Almost the same definition belongs to A.V. Leontovich, who understands scientific research activity as the activity of subjects, which is aimed at the solution of a creative research task with an unknown result in various fields of science, technology, art, and that allows for the existence of the main stages characteristic of scientific research: the formulation of the problem, familiarization with the literature on this problem, mastering the research methodology, collecting the material, its analysis and generalization, and conclusions[53].

M.M. Firsova uses the terms "research activity" and "scientific research activity" as synonyms. The author considers research activity to be an integral part of education, a stable form of the educational process[54].

I.Ya. Zimnyaya considers scientific research activity in the broad context of the information space, where research activity has the following manifestations: the process of interaction of the subject of this activity with the objects of the real world or other subjects; form of activity of the subject, which in scientific research activity is manifested at all levels of development of the subject: cognitive, conscious, intellectual, behavioral, and social[55].

Edward de Bono believes that scientific research is only and always a creative activity, and there are no common universal rules or schemes by which it develops[56]. This opinion stands out from the general tendency in the definition of research activity and narrows the scope of the concept to "insight", "eureka" or simply spontaneous discoveries.

Thus, research activity, in the opinion of most authors, is intellectually creative in its origin and is related to the solution of creative tasks by methods and means characteristic of science aimed at obtaining an objectively or subjectively new and meaningful result.

But, as already mentioned above, the scientific research activity of a scientific worker

[52] E. V. Berezhnova, The research work of the student as a humanitarian technology: Textbook (St. Petersburg: The Book House, 2007); I. A. Zimnyaya & E. A. Shashenkova, Research work as a specific kind of human activity (Izhevsk: UGU, 2001); A. V. Leontovich, Designing of research activity of students. Cand. Sc. Thesis (Moscow, 2003); A. S. Obukhov «Research as a way of forming a world outlook». Public education, num 10 (1999): 158-161 y V. A. Yakunin, Psychology of student learning activities (Moscow: Prometheus, 1993).

[53] A. V. Leontovich, Designing of research activity of students. Cand. Sc. Thesis (Moscow, 2003).

[54] M. M. Firsova, "Research activity of pupils of the gymnasium", Pedagogy, num 8 (2003): 26-31.

[55] I. A. Winter, Pedagogical psychology (Moscow: Logos, 1999).

[56] Edward de Bono, Six Thinking Hats (Boston, Massachusetts, USA: Back Bay Books, 1999).

usually differs from the research activity of a student or pupil, more often, primarily due to the significance of the result that is obtained or expected. The research activity of future mathematics teachers in general terms is not a professional scientific activity, but is an integral part of their vocational training and is carried out throughout the entire period of study at the university, though practice has shown that it has not only subjectively significant results, but also objective scientific value.

The first step in the research activity of students is their educational and research activities. Modern psychological and pedagogical studies consider the concept of "educational and research activity" and "research activity" of students from different points of view. These concepts are not synonymous, they have different content and scope, but different researchers consider the relationship of these concepts differently. One part of the researchers believes that these are separate concepts that do not intersect, the second part of the researchers believes that the contents of concepts overlap, the third part considers that the contents of these concepts should be treated as a part and a whole. In the context of the present research, it is accepted that the research activity of students in higher education institutions features educational and research activity as one of its characteristics.

The authors of the present paper concretize the concepts of educational and research activity and scientific research activity of future mathematics teachers, determine the stage-by-stage formation of each of the named activities of future mathematics teachers in the process of their professional training.

Educational activity is the ground for mastering the scientific research activity by future teachers of mathematics; it is deep inside of it that the skills of performing research studies emerge that later are transformed into scientific skills. Therefore, educational and research activity as well as scientific research activity of students can be defined as one activity, but at different levels, and is aimed at the formation and development of an independent and creative personality of the future teacher of mathematics. The experience of students concerning the implementation of scientific knowledge is the subject of this activity. This experience is transformed and improved in the process of professional training through the assimilation of the elements of socio-historical experience.

In the psychological and pedagogical literature, the essence of educational and research activity as well as scientific research activity has a fairly diverse and ambiguous interpretation.

For example, according to E.P. Kozlov[57], only the elementary laboratory search and practical work at school forms the essence of the educational and research activity of the students, the aim of which is to master the pedagogical observation and the statistical processing of the results. But, as experience shows, in school practice, pedagogical research activity is not limited to such manifestations. The future teacher needs to master such types of scientific research activity that are used in the educational process, such as problem teaching of theoretical material, conducting discussions, business games, competitions, performing individual search and creative tasks, etc.

In the studies of A.S. Obukhov and E.V. Titova, the terms "educational and research

[57] A. V. Kozlov, Designing and implementing the system of scientific research activities of students of technical colleges on the basis of educational and scientific-industrial integration. Ph.D. thesis (Togliatti, 2004).

activity" and "scientific research activity" are regarded as equivalent in the educational process and are defined as a creative process of joint activity of subjects aimed at the search for the unknown or the solution of the task, during which the students share cultural values, the result being the formation of the world outlook[58].

The necessity of formation in students of the skills of mastering independent research methods is highlighted by N.S.Amelina, who emphasizes that the educational and research activity of students is their cognitive activity, which is characterized by the conscious application of scientific research methods at all levels of educational work[59]. "Educational and research activity" is a reasonable introduction of elements of scientific research and the elements of creativity in the educational process[60], the feature of which is the factor of the subjective discovery of new knowledge, that has no objective significance, but only subjective significance and novelty. Moreover, the actualization of existing knowledge is an indispensable condition for educational and research activity[61].

According to M.M. Antsibor[62], educational and research activity is part of an integrated system for the training of young professionals, which implies the study by each of the students of the methodology of research activity, the formation and consolidation of the system of knowledge, skills and abilities of independent conduct of research by stages. In the process of analyzing the educational and research activity, V.I. Andreev[63] emphasizes the importance of such functions as teaching students the methods of scientific knowledge and developing their research skills. In particular, according to V.I. Andreev, the essence of educational and research activity lies in the fact that, under the guidance of the teacher, it is directed, firstly, at search and proving of regular connections and the correlation of experimental or theoretical facts, phenomena, processes, and secondly, at the active mastery of knowledge, which is focused on developing the students' own research skills and abilities. An analysis of the works of Russian, West European, American and Canadian scientists has shown that the research activity of students is of great importance in organizing the training of future teachers and is an integral part in the formation of professionalism. Presidents and leading professors of the best American universities are deeply convinced that it is in favor of improving the training of personnel that the most active participation of students in serious research work is desirable and vital. This idea is shared in Western Europe. It should be assumed that real professionalism cannot be achieved without independent thinking and personal responsibility; these important qualities of a specialist should be formed in the process of training at university[64], these qualities being fundamental in the research activity of students.

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[58] A. S. Obukhov, «Research as a way of forming a world outlook», Public education, num 10 (1999): 158-161 y E. V. Titova, Approach to understanding the results and quality of the activities of institutions of additional education. Some conclusions from the discussions (Yaroslavl, 1977).

[59] N. S. Amelina, Educational and research activity of students of a teacher training university (in the process of studying the disciplines of the pedagogical cycle). Cand. Sc. Thesis (Kazan, 1981).

[60] Student scientific creativity: Sat. M-in the highest and media. specialist. the formation of the USSR, the Central Committee of the VLKSM. Comp. V.I. Krutov and others (Moscow: Young Guard, 1968)

[61] V. I. Andreev, Heuristic programming of educational and research activities (Moscow: Higher School, 1981).

[62] M. M Antsibor, Activization of educational and research activities of students in the study of the discipline of the pedagogical cycle (Moscow: Prometheus, 1989).

[63] V. I. Andreev, Heuristic programming of educational and research activities (Moscow: Higher School, 1981).

[64] Higher education in France, Ross.-fr. series, Inform. and uch. Materials, num 5 (Moscow: Fr. organization of technical. Cooperation, 1993).

Some definitions of the scientific research activity of students are analyzed below.

According to A.I. Savenkov, research activity in education is studying aimed at developing the ability of the student to learn and adapt creatively new ways of working in any sphere of human culture. A.I. Savenkov regards scientific research activity as a special kind of intellectual and creative activity, which is generated as a result of the functioning of search activity mechanisms and is built on the basis of research behavior[65]. That is, from the standpoint of this author, the scientific research activity of students is educational and research activity.

In the study of A.T. Kukushkina[66], scientific research activity of students is understood as a purposeful, expediently organized process of in-depth independent study of a certain object of the academic discipline on the basis of using the elements of the research method. However, such activity can be called educational and research activity, because its object is precisely the academic discipline, while an in-depth independent study of a subject does not cover all aspects of the scientific research activity of students.

Below are the definitions of the scientific research activity of students provided by German scientists S. Kiel and J. Olberz.

In the opinion of S. Kiel, the research activity of students ensures the mastery of scientific issues, which, in turn, serve the implementation of educational goals and training students for their future professional activity; serve as training in writing scientific works; lead to personal and socially useful results; are reflected in diplomas, term papers, and abstracts, in the results of the activity of academic student circles, as well as other scientific works[67].

The author believes that the research activity of the students is an integrating part of the educational process in higher school, a specific and necessary form of the students' activity in the general system of the necessary and qualitatively different types of activity when studying at a university. Research activity is correlated with scientific research and with the requirements of social practice and requires independent, conscious and (in increasing measure) creative actions for a certain period of time (usually a long one). This activity of students should be considered and studied in the context of its inclusion in the pedagogical process and especially in the aspect of its personality-educational or upbringing effectiveness[68].

In the opinion of J. Olberz, the research activity of the students is independent and, in a growing measure, a creative assimilation and application of knowledge, skills and methods of social interrelations in the educational process on the basis of solving scientific problems that serve as a basis for the vocational education of students, the development of the personality and, if possible, also lead to socially useful results. J. Olberz points out the similarity of the essential signs of self-education and independent research activity of

[65] A. I. Savenkov, Psychological foundations of the research approach to learning: Textbook (Moscow: Axis-89, 2006).
[66] A. T. Kukushkina, The main directions of student's scientific work in the State Pedagogical Institute. Professional-pedagogical orientation of teaching foreign languages in high school (Gorky: Gorky State Pedagogical Institute, 1977).
[67] S. Kie, Die Wissenschaft als ein Gegenstand der selbststandigen wissenschaftlichen Tatigkeit der Studenten. Wissenschaftselbststandige wissenschaftliche Tatigkeit der Studenten (Wissenschaftliche Betrage der Martin Luther Universitat, Halle, 'Wittenberg,1981)
[68] S. Kie, Die Wissenschaft als ein Gegenstand der selbststandigen…

students, but at the same time, singles out the level differences of these two concepts. This especially applies to: 1) the degree of independence, which takes an increasingly creative character in research activity; 2) the correspondence of tasks to the requirements of practice; 3) the importance of immediate results; 4) the degree of responsibility; 5) the intensity of pedagogical leadership in all phases of the solution of the problem[69].

Summing up, S. Kiel notes that the research activity of students is primarily characterized by the fact that the student (the team of students) is broadly, intensively and with a result engaged in a scientific subject (scientific issue, problem or task), being motivated by scientific or practical needs. At the same time, it is characterized by a comparatively high degree of independence, creative activity and conscious responsibility[70].

None of the analyzed definitions of the concepts of educational and research activity and scientific research activity of students is based on the category of the novelty of knowledge (objectively or subjectively new) as a result of research. In the present research, the scientifically objective or scientifically subjective significance and novelty of the achieved result of a scientific work within the limits of the given paradigm serves as the main parameter of the differentiation of educational and research activity and scientific research activity of students. One of the important characteristics of educational and research activity is its orientation at the creative comprehension of knowledge acquired by mankind and the achievement of subjectively new findings of research, while scientific research activity, including the research activity of future mathematics teachers, is viewed as a kind of educational and cognitive activity of a creative nature, which is aimed at finding, studying and explaining facts and phenomena of reality for the acquisition and systematization of subjectively new knowledge about them.

There is also an integrated concept of "educational scientific and research activity" of students, which is considered by researchers as a comprehensive system of intensification of the learning process through the introduction of elements of scientific work in all types of study activity throughout the educational period and is aimed at improving the quality of training and provides skills of research activity, independent solution of creative tasks, deepening of the received fundamental knowledge, development of creativity, independence, etc. It also acts as a means of gaining knowledge and forming skills of creative research that allows the introduction of elements of scientific research into the educational process, and, later, into independent research activity[71].

The analysis of these approaches to the definition of the concepts of educational and research activity and scientific research activity of students has made it possible to conclude that the basis for the differentiation of these activities is not only the novelty of the acquired knowledge (subjective/objective novelty), but also the place and time of performance of activity (curricular/extracurricular activity).

For example, V.N. Litovchenko believes that in pedagogy, among the parameters for distinguishing the educational and research and scientific research types of pedagogical research activity, the place and time of conducting research activity are traditionally

[69] J. H. Olbertz, Über den Zusammenhang von Studienmoral und studentischer Selbstandigkeit-eine hochschulpadagogische Untersuchung: Dissertation (Halle, 1981).
[70] S. Kie, Der Hochschulllehrer als Betreuer (Berlin: Deutscher Verlag der Wissenschaften, 1987).
[71] E. S. Kazantseva, Personally oriented approach to the organization of educational and research activities of students. Cand. Sc. Thesis (Nizhny Novgorod, 2006).

highlighted; as a rule, the research activity of students is conducted in the following directions: scientific research activity, which is part of the educational process as the educational and research activity of students; scientific research extracurricular activity; scientific research activity in educational and scientific-industrial associations[72].

M.A. Knyazyan believes that the research activity of students is an important means of their professional training, and features: a) all the qualities of educational and cognitive activity (the study of a specific object of pedagogical reality in the process of solving the cognitive task); b) characteristics of creative activity. It also actualizes the creative abilities of the student in the aspect of developing an individual vision of ways to solve the challenging problem[73].

But, practically all researchers, who study research activity, oppose it to non-research, reproductive work. It should also be noted that when characterizing the research activity of students it is necessary to take into account its level, that is, it differs from the "adult" science by the nature and volume of problems that are being solved.

Thus, in the sources analyzed above, the educational and research activity of students is understood as the mastery of the technique of scientific creativity, acquaintance with the methods of experiment, scientific literature, while the scientific research activity of students is understood as an activity, which is an independent creative study of the problem. Attention is focused on the fact that the students' scientific research activity should contain a certain (maybe even a small) degree of novelty.

There is also an opinion that the educational and research and scientific research activities of students are the two main parts of one concept. It is the research activity of students at a university that is carried out in the following areas: 1) educational and research activity, which is an integral part of the educational process and is included in the calendar-thematic and educational programs as compulsory for all students; 2) scientific research activity, which is carried out outside the educational process within the student scientific society or in the context of an independent research.

The scientific research activity of the students is aimed at obtaining new information, which can serve as a basis for obtaining new knowledge[74]. Its task in the field of the humanities is the expansion or improvement of the acquired knowledge about man, culture, society[75], and education.

The scientific research activity of students can be characterized as their systematic independent and creative activity, which is organized in the process of education in higher education institutions and is its integral part. The scientific research activity of students at the initial stage is aimed at developing new knowledge about the formulation of the problem and the hypothesis, the choice and application of methods, and the formulation of the results

[72] V. N. Litovchenko, Formation of research skills of students of pedagogical specialties of the University by means of research work: Author's abstract. Cand.Sc. thesis (Minsk, 1990).
[73] M. O. Knyazyan, The system of formation of independent research activity of future foreign language teachers in the process of multi-step training. Ph. D. thesis (2007).
[74] A. V. Moskvina, Scientific and practical foundations for the development of intellectual creativity of senior pupils in the system of pedagogical interaction: Author's abstract. Ph. D. Thesis (Orenburg, 2006).
[75] E. V. Berezhnova, The research work of the student as a humanitarian technology: Textbook (St. Petersburg: The Book House, 2007).

obtained so that they serve as proof for the hypothesis. In the process of development, the scientific research activity of students changes its direction and focuses on independence and creativity in solving problems, acquiring new subjectively or objectively significant scientific knowledge.

The subject of scientific research activity of students may be various phenomena of the surrounding reality, which require the resolution of objectively existing contradictions and problems in one or another scientific field through the carrying out of various kinds of research.

The method of carrying out scientific research activity of students in the educational process is to carry out various kinds of research aimed at solving a variety of scientific and educational tasks, which implies the implementation of the necessary actions aimed at achieving the planned result[76].

The means of scientific research activity of students are their personal experience, as well as the necessary knowledge, skills and abilities of scientific research. At the present stage of social development, in addition to ideal means (knowledge), material means (scientific literature, technical equipment, information and computer programs, the Internet) are of great importance in the process of carrying out research activity.

The results of the research activity of students are embodied both in real material or materialized objects, and in personal achievements and changes.

The scientific research activity of students, in contrast to the scientific research activity of scientists (professionals) and to other activities of the students themselves, should be: 1) mandatory; 2) systematic; 3) cognitive; 4) independent; 5) manageable; 6) using the methods of scientific cognition; 7) creative.

The scientific research activity of a future mathematics teacher is at the same time a pedagogical research activity.

In the study of V.E. Kulik, the concept of pedagogical research is considered as synonymous with the concept of scientific research activity of future teachers[77], which allows the researcher to bypass some inconsistencies in the use of these two terms.

On the basis of an analysis of definitions "independent research activity of students" and "scientific research activity of students", M.A. Knyazyan[78] argues that these concepts are in the genus-species interdependence, where the concept of "independent research activity" is generic to the concept of "scientific research activity". That is, the scientific research activity of students is considered as one of the types of independent research activity, and at all levels (semantic, procedural, functional, reflexive) has all the main characteristics of independent research activity.

Scientific research activity also has the leading complexes of the procedural and

[76] R. S. Pionova, Pedagogy of Higher School: a teaching aid (Minsk: Vysh.sh, 2005).
[77] E. V. Kulik, Theory and practice of training future teachers of labor education for pedagogical research activity. Ph. D. thesis (2006).
[78] M. O. Knyazyan, The system of formation of independent research activity of future foreign language teachers in the process of multi-step training. Ph. D. thesis (2007).

operational component of independent research activity and is a means of teaching students with the methodology of search work, one of the ways to assimilate scientific and theoretical knowledge, the formation of research and reflexive skills.

Discussion

The conducted research has made it possible to formulate such working definitions of the basic concepts and categories of the problem of integrating the scientific research and educational activities of future mathematics teachers.

The concept of "integration" as a pedagogical phenomenon is borrowed from the knowledge science and philosophy (from the Latin *integratio* - the unification of isolated parts, elements and components into a single whole, which is accompanied by the complication and strengthening of ties and relations between them). Modern educators view integration as a phenomenon, factor and development process in a systemic approach. It can be implemented in a system that has already been established, which will help to increase the level of integrity and organization of this system, as well as the emergence of a new system of previously unrelated elements. Due to integration in the system, its volume increases and the relationship between its elements increases, that is, a new system quality arises.

The concept of "integrating the scientific research and educational activities of future mathematics teachers" is viewed as a complex systemic process aimed at organizing and implementing the educational process through research activity, the ability to apply knowledge from various industries to solve specific scientific and pedagogical tasks when the educational process is based on conducting joint research work of teachers and students. Integration of the scientific research and educational activities is defined, on the one hand, as the most important factor, the driving force, and, on the other hand, as a condition for improving the professional training of teachers.

In the context of the present study, the educational activity of future mathematics teachers is viewed as a specially organized activity that is a combination of certain actions and processes that have a specific conscious goal - to obtain the profession of a mathematics teacher, and is aimed at mastering the relevant theoretical knowledge, generalized methods of action for obtaining knowledge and its use, as well as forms of pedagogical experience.

The scientific research activity of the future teacher of mathematics is regarded as a creative activity aimed at studying pedagogical problems and pedagogical reality in order to test the hypothesis that promotes the discovery of subjectively new knowledge, the acquisition of research skills, and the enrichment of personal experience.

The scientific research activity of the future teacher of mathematics is a holistic integrative education that reflects the value-motivational, intellectual-knowledge, procedural and evaluative-reflective characteristics of the student's personality who acts both as the subject and the object of this activity.

The scientific research activity of future teachers of mathematics has the following features: 1) activity as a phenomenon (focus on the goal, subject-object relations, objectivity, productivity); 2) scientific cognition (focus on cognition of the surrounding world with the application of scientific methods, clearly defined structure, effectiveness of a subjectively or

objectively new result); 3) pedagogical activity (educational, organizational-methodical character, communicativity). At its highest personal level, it has the features of 1) independent activity (fulfillment without external direct motivation, the unity of the logic of the content and purpose of the activity that develops thinking, educates, enriches the student with knowledge, shapes the skills and abilities of professional activity, while the student uses his/her knowledge, skills and abilities, correctly reveals the essence of phenomena and processes, shows initiative and creativity); 2) creative activity (focus on justifying new ideas, acquiring new knowledge and skills, obtaining a subjectively or objectively new result).

Conclusion

The urgency of the problem of integrating the educational and research activities of future mathematics teachers in the context of their personality-centered training is conditioned by the requirements of the Federal Education Standards for Higher Education of the New Generation, and the Concept for the Development of Mathematical Education of the Russian Federation.

In the process of the present research, the definitions of the basic concepts associated with the study, namely, the notion of "the educational activity of the future mathematics teacher", "the scientific research activity of the future mathematics teacher", "the integration of the educational and research activities of the future teacher of mathematics" were refined. These concepts are viewed from the standpoint of the system approach as integral entities that are in close interconnection and interpenetration.

Refined and specified definitions make it possible to continue the theoretical part of the study of the problem in question. In future, it is necessary to clarify the definitions of the concept of "personality-centered professional training for the future mathematics teacher", within which the considered integration is examined. At the next stage of the study, it is planned to create a model of a pedagogical system for integrating the educational and research activities of future mathematics teachers in the context of their personality-centered training.

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