



## Research Article

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Received: 4 June 2023 / Accepted: 11 October 2023 / Published: 5 November 2023

# Formation of Research Skills of Future Teachers of Mathematics in Solving Olympiad Problems

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DOI: <https://doi.org/10.36941/ajis-2023-0173>

## Abstract

*This article addresses the critical need to enhance the professional training of teachers, specifically in the realm of teaching and research activities. The objective is to improve their cognitive and organizational skills to enhance the effectiveness of future educational endeavors. The article's primary focus is the development of a comprehensive model for instilling research skills in prospective mathematics educators. The study employs the "Diagnostics of Personal Creativity" test by E.E. Tunic as a principal assessment tool. This test aids in evaluating personal curiosity, analytical aptitude, the ability to think innovatively, and problem-solving capabilities, all of which are pivotal indicators of an individual's inclination towards research activities. The proposed model for cultivating research skills among future mathematics teachers hinges on a set of methodological parameters. These parameters are designed to elevate intellectual acumen by encouraging diverse cognitive comparisons within mental activities, forming the foundation for research-oriented thinking. The model underscores the gradual development of cognitive abilities across varying levels of depth, applied to solving complex Olympiad problems with intricate structures. In summary, this article presents a model that promises to significantly enhance the research skills of future mathematics teachers, thereby contributing to the advancement of the teaching profession and the holistic development of young learners.*

**Keywords:** research thinking; professional skills; teacher; math education; pedagogical education

## 1. Introduction

Currently, there are trends to improve the educational process, in which great importance is given to the formation of the skills of teachers, who in their future professional activities will be responsible for each element of the educational process, where they will have to present knowledge of the subject at a high level, select and organize teaching process within the framework of applying an individual

approach, implying integrality, a creative component, recognition of the informational part of students' knowledge, who can receive additional education in subjects as part of extracurricular education, where each teacher, explaining the topic and forming disciplinary thinking on the subject, uses different existing types of methodological approach (Rahmawati et.al., 2019).

The information area of the subject can be correctly presented from the standpoint of different didactic positions with the degree of deepening knowledge on the subject, and in this aspect, from an academic point of view, the component of understanding the main parameters, decisions, concepts, relationships existing in the field of discipline, including the subject of mathematics under consideration, is important (Andreeva et.al., 2019). But at present, there is a tendency to reduce the assessment score within the framework of the indicator of designing a solution to an example or a task that each teacher requires to perform precisely from the position of his personal explanation, although it is known that there are many factors and methods for this, which, within the framework of the correct answer, have a different approach in design, gradualness of the solution with consistent logical reasoning based on the existing theorems, provisions, parameters, rules of mathematics, which has a deep analytical value, and allows you to use the entire available subject pedagogical arsenal to get the right answer, which, stimulating mental activity, allows the student to gradually solve emerging chains of tasks based on existing knowledge in the field of discipline (Charalambous & Praetorius, 2018). Such a position, figuratively supported by the position of studying the discipline, in fact is often absent, since the teacher of mathematics requires the student to use only those solution models that he presented, and in the form in which he showed them, and so this fact often has an overwhelming influence on development the personality of the student, not allowing him to fully use his knowledge, mental activity based on the learning criteria that he had formed during training, for example, in another school, and are also true in the field of discipline (Krokhina, 2016).

The current situation is due to the insufficient development of the research function of teachers, which includes parameters that allow them to quickly assess the student's train of thought, predict further conclusions and trends of a possible solution at the level of personal flexibility of the mind, which is reflected in the adequate perception of the information received with multifaceted possibilities. a mathematical discipline that has many tools for solving problems. In fact, a mathematics teacher should have a high level of thinking, which implies consideration of a non-traditional, non-standard approach to solving the proposed educational materials against the background of personal creative and creative implementation with a high intellectual and analytical synthesis of the information received, and the factor under consideration is the basis for the formation of research activity at the level of its inherent developed personal abilities and parameters that make it possible to form the success of research skills, in which an integral methodological approach to learning will be provided, assessment of knowledge within the framework of mathematical disciplines, which in turn will maintain a high motivation for learning on the part of students who will understand that they can study the discipline itself by studying with any teacher, who, even within the framework of training in one institution, change from year to year, and due to personal development, knowledge is used in explaining the topic and evaluating the work of students by various methodological criteria (Maass et.al., 2019).

## 2. Materials and Methods

The main leaving indicators responsible for the research activities for the development of E.E. Tunic "Diagnostics of personal creativity" defining the characteristic parameters within the framework of the manifestation of personal interest in the new, the ability to synthesize knowledge against the backdrop of a deep and detailed analysis, that against the background of the criteria of the ability to find non-standard types of solutions in the conditions of the provided implementations with the manifestation of personal creativity, which combines a variety of concepts important for research, and characterized by the presence of flexibility of the mind, which allows the teacher to deviate from generally accepted schemes and respond adequately in a timely manner against the background of

competent semantic approach using all available knowledge, including within the vast discipline of mathematics, which is built on logical chains, and has many different types of decision based on the consideration of the position of all knowledge and methodological approaches in the field of discipline. So the selected helps us expand his horizons against the background of curiosity will be traced, which reflects the personality's properties for cognitive activity and the desire to understand various ways of solving the necessary, and within the discipline in tasks, examples, equations and many the other until a competent answer is achieved, but at the level of a different course of decision, which indirectly indicates the presence of creativity factors of the personal characteristics of the studied (Kaurav et al., 2020).

The selected diagnostic testing method includes 50 questions that allow you to evaluate the different properties and characteristics of the respondent's personality, which will create conditions for selecting parameters to enhance their function to manifest themselves at a successful level in the cognitive research process at the level of personal perception of a multi-level research system, which implies a set of different parameters and knowledge of the studied students.

The research employed a purposive sampling method to select participants for the study. The participants consisted of undergraduate students pursuing a degree in mathematics education at a reputable institution. This selection criteria ensures that the sample represents individuals with a specific interest in mathematics education and aligns with the study's focus on future mathematics teachers.

### 2.1 Data Collection Procedures

**Administering the "Diagnostics of Personal Creativity" Test:** The central data collection tool used in this study was the "Diagnostics of Personal Creativity" test developed by E.E. Tunic. The test was administered to the selected participants to assess their personal curiosity, analytical abilities, creativity, and problem-solving skills. The administration of the test was conducted in a controlled environment to ensure uniform conditions for all participants.

**Olympiad Problem Solving:** Following the initial assessment using the creativity test, participants were engaged in a series of mathematical problem-solving sessions. These sessions involved tackling Olympiad-style mathematical problems with varying levels of complexity. The participants' solutions were observed, recorded, and analyzed for their problem-solving strategies, creative thinking, and depth of mathematical knowledge.

**Data Analysis Techniques:** The collected data were subjected to a systematic and comprehensive analysis to derive meaningful insights and conclusions:

**Quantitative Analysis:** The quantitative data from the "Diagnostics of Personal Creativity" test were analyzed using statistical methods. Descriptive statistics such as means, standard deviations, and correlations were calculated to understand the participants' baseline characteristics and the relationships between different variables.

**Qualitative Analysis:** The qualitative data obtained from the observation of participants' problem-solving sessions were analyzed using qualitative coding techniques. Transcripts and recordings of the sessions were coded for themes related to creative problem-solving, depth of knowledge, and non-standard approaches.

**Integration of Data:** The quantitative and qualitative data were integrated to provide a holistic understanding of the participants' research skills development. This integration allowed for a comprehensive assessment of the impact of the model on future mathematics teachers.

**Ethical Considerations:** Ethical guidelines and principles were strictly adhered to throughout the research process. Informed consent was obtained from all participants, ensuring their willingness to participate in the study. Confidentiality of participants' data was maintained, and all ethical approvals and permissions were obtained from relevant institutional review boards. This comprehensive research methodology ensured the collection of robust data and rigorous analysis, thereby enhancing the validity and reliability of the study's findings. It facilitated a deeper

understanding of the effectiveness of the research skill development model among future mathematics teachers.

### 3. Results and Discussion

Data processing approach was used, where a detailed analysis of the test parameters according to the chosen method of the studied students was carried out, who will associate their future professional activities with the teaching of mathematics, taking into account the identification of elements of reflective indicators obtained during the pedagogical experiment respondents' personalities as target, corrective, performance-evaluative and other structural components. A detailed analysis of the properties and characteristics of the personality of the subjects, including an ordered set of psychological characteristics, qualities, intellectual, behavioral and emotional properties, is related to the target personal characteristics on the basis of which it is possible to trace the relationship of the individual's predisposition to research activities within the framework of personal curiosity and criteria that reflect the desire for knowledge new against the background of personal manifestation in a flexible system of perception of the components of thinking with a target setting for the effectiveness of the task (Goldan, 2019).

The corrective activity of a teacher within the framework of studying the subject has its own characteristics, and at a competent level it should be taking into account existing personal qualities, thanks to which the future specialist will understand the student's train of thought and evaluate the correctness of his decision, taking into account the versatility of the subject of mathematics, and its analysis based on the depth of knowledge based on the correct result, which may have been identified on the basis of the cognitive-exploratory thinking of the student, who studies the subject additionally during extracurricular time with other teachers, and who, within the framework of academic education, can use all their knowledge at the level of internal talent and depth of knowledge of the discipline using all its factors, elements and existing various methods that allow to come to the correct conclusion in the framework of solving the problem, and the professional competencies of a teacher, even on the basis of their professional education, should be formed, also taking into account the development of personal research qualities and skills that will allow them to perform the above at a successful level, because this lies precisely in the competence of the considered personality traits (Faritov, 2016).

Such an approach will allow the future teacher to competently perform his correctional activities without suppressing the student's creative abilities, thinking and self-esteem, given that the system of education, especially in the field of mathematics, where there are many ways to solve even one problem at the level of logical chains of conclusions to it within the framework of using various provisions and axioms, as well as the rules of discipline (Sawant & Sankpal, 2021). The subject of mathematics is very multi-faceted and multi-level, and there are many options for solving some problems, equations or complex examples, and the result of the correct solution, but when using a different sequence or design, or when emphasizing in the solution on different rules, theorems, formulas of mathematics that exist a large number, and which are lawful and competent in their use, it is precisely on the basis of the personality traits that lie within the framework of the propensity for research activities among future specialists that it will be possible to correctly evaluate the work, consider the course of its solution or design from the point of view of the correct result obtained with a detailed analysis of the trainee's thought process manifested in solving the problem (Schweisfurth & Elliott, 2019).

Indeed, many scientists, when they discovered the next formulas, they were looking for ways to solve the tasks at hand in stages that differed from the generally accepted solution, and it was the search for other types of mathematical moves that often led researchers to discover new mathematical components, formulas or patterns, so the formation of research skills in teachers of mathematics, will allow them to improve and deepen their mathematical thinking abilities, which will allow them in the future to see the talent for the subject in their students, noting particularly

gifted students who, under certain conditions created by the teachers of mathematics themselves, can develop their abilities, which is also an important task in the field of education (Venkat & Askew, 2018).

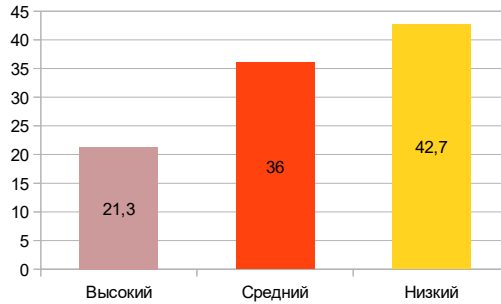
The performance-evaluative indicators of the study made it possible, in a detailed analysis of the results obtained, to identify the main factors and parameters that will contribute to the development of the cognitive-research component of the personality against the background of the formation of his research skills, which will allow him to perform his professional work at the level of high efficiency and success in the future, forming their students have a deep knowledge of mathematics against the background of their creative implementation and a systematic analysis of their integral knowledge (Brinkmann, 2018).

A detailed analysis of the results of diagnostic testing against the background of a given task made it possible to identify criteria for the development of a model that will allow students of the pedagogical direction to form research thinking at a high level. The described components of the research in interaction with research skills. The result of the functioning of the study under consideration is understood as a formed model for the formation of research skills among future teachers of mathematics.

So this research work with the created model of the successful formation of research skills against the background of the effective development of research thinking, which will significantly improve the level of professional competencies of the teacher, was introduced into the educational process in several stages, which included determining the initial level of personal qualities responsible for the manifestation in research activities against the background of predicting the result, analyzing the structure of work, searching for different ways of solving using all the mathematical laws and formulas necessary for the stage-by-stage achievement of a competent result, which will contribute to the manifestation of an individual form in the approach to the attitude towards students in the educational process as part of the consideration of the sphere of solving various mathematical problems by students, taking into account their non-standard approach to solving, excellent from the generally accepted on the indicative background of mental activity and creative manifestation, which, with the form of organization of the lesson, based on a personal motivating fact for research activity, will create a high success of the educational process with the ability to establish fruitful communication links, and the parameters necessary for developing the model were refined and deepened during pedagogical supervision.

The data obtained were further subjected to statistical processing, and then at the next stage, the development and implementation of a relevant and important for the field of education in the framework of the training of future teachers based on the above elements of the model for the formation of research skills as part of their successful application for its subsequent implementation in the field of practical teacher education took place. , which made it possible to determine the level by the aspects of solving the problems facing the educational field for the full formation of the professional competencies of teachers, in which they would show themselves at the level of highly qualified specialists, in the field of which research skills, skills and properties play an important role, and the results obtained after its implementation will allow us to talk about its successful implementation. Thus, the study covered 75 students and the analysis of the results of diagnostic testing in their generalized values showed that the level of personal creative approach in active and mental productive work was at the level of the majority at the level of low and medium indicators, and only a fifth of them had a high level of creative thinking, which shows the low indicators of research characteristics characteristic of the respondents, and this reality is reflected in Figure 1.

Распределение в процентах будущих учителей математики в зависимости от степени сформирования уровня их креативного мышления



**Figure 1.** The distribution of future specialists depending on the degree of formation of the level of their creative thinking in the framework of the propensity for research activities

A detailed arrangement of indicators in the framework of determining the degree of curiosity, solving complex problems, the inclination to follow a new path, in the position under consideration, as a factor of personal predisposition to risk, which is necessary in order to find new successful solutions, moving away from the generally accepted traditional design of work, as well as figurative thinking or imagination made it possible to determine the missing components of the parameters that will contribute to the development of the active component of the research work, which will allow solving different options for search problems in solving the given examples, which is shown in Figure 2.



**Figure 2.** Detailing the parameters responsible for the propensity for research activities among respondents after diagnostic testing

Also, selective detailing made it possible to emphasize a number of factors necessary for the formation of a model of research skills, which, based on a modification of the methodological approach to the concept of training future teachers of mathematics, will allow us to develop factors for increasing interest in cognitive research activities, which will, under the created conditions,

ensure the acquisition of skills necessary for this area. and skills, improving the educational process at a qualitative level, which is reflected in Figure 3.



**Figure 3.** Distribution of students according to characteristic indicators of propensity for research activities

Information received allows us to talk about the need to introduce methodological parameters into the system of practical education that would form personality traits at the level of acquiring skills for research activities, which will allow future teachers to organize and provide the educational process at a high level, based on factors that would satisfy the needs of students at the level of their development and the formation of their high self-esteem (You, 2018).

The selected parameters make it possible to determine that at the moment the level of formation of the inclination to conduct research activities within the framework of the corresponding thinking, they say that teachers with the selected parameters will proceed from personal perception and presentation of the subject of mathematics, which will not meet the high framework of cognitive and evaluative activity, since based on the results obtained, future teachers will reduce the evaluation score at the level of the indicator for completing the solution of an example or task, which each teacher requires to perform precisely from the standpoint of his personal explanation, as well as the fact that the student solved the example or task correctly, he will be ignored taking into account the remarks about the presentation of the design part, which is unacceptable and illiterate from the point of view of knowledge of the discipline, which was explained to the student against the background of methodical presentation, for example, by a private tutor, who may have an academic degree or title, and pedagogical status, the experience is higher than that of a school teacher, and the scheme of methodological parameters of the topic developed by him has a higher level of effectiveness in presenting knowledge in terms of understanding the subject by the student, and at the same time, for the stages of non-standard recording, even the correct solution of a problem or equation, the teacher in official training will be significantly lowered, and sometimes interpreted as incorrect, with the explanation that the grade was lowered due to the incorrect course of solving this problem, which essentially shows his unprofessionalism and the low level of research thinking, which does not allow him to solve this problem with several types and examples, within the framework of its correct and



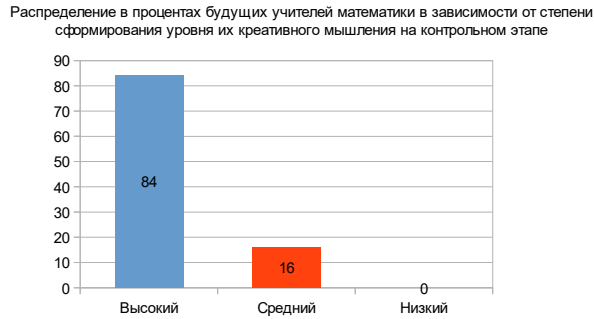
competent presentation, but from different methodological positions that exist in the world (Charalambous & Litke, 2018).

In this context, it is worth noting that in different countries the explanation of the same topic occurs from the side of methodology and didactics in completely different presentations, and at the same time they all have an indicator of the correct study or solution, or explanation of the subject, although when the student moves to another geographical region or country, when moving to continue education in another school, where there is a different methodological basis, the student is faced with the problem of analyzing and evaluating his knowledge by the teacher, which, by virtue of its administrative advantage, misinforms the student by violating his adaptation and correct knowledge of the subject, explaining to him that he solves an example or problem incorrectly, although this is not true against the background of a lack of coincidence in didactic foundations with the usual form of presenting knowledge for a teacher (Askew et.al., 2019). This approach on the part of the teacher undermines the student's self-confidence, lowers his self-esteem, significantly reduces his desire to learn, and also makes him distrust the educational process, in which each teacher says that only he is right, and the teacher in another school or even the one who taught the subject in another year of study was mistaken, since the form of solving a problem or example that the student was taught earlier is perceived by the new teacher at the level of an incorrect solution (Rappleye & Komatsu, 2017).

The fact under consideration disorients the student, who, while learning, begins to understand what is possible, and the real teacher gives incorrect information, which the next teacher will evaluate from a similar position of another form of solving the example. The current trend also undermines friendly relations among various teachers who compromise each other as part of the above-described assessment of the situation, where the form of registration and the considered options for solving problems will be different. This aspect suggests that teachers lack the flexibility of thinking and research skills that will allow them to study in detail and carefully the course of solving problems, examples, to see various methodological elements at the level of a general assessment of the correctness of solving a problem, example, equation or other in the area of mathematics under consideration. Given these parameters, we can talk about many aspects and trends that are associated with the teaching process by a conducting teacher without well-formed research skills, both in terms of their negative impact on students at the level of lowering their grades, on which further successful learning in various educational institutions depends at this stage. institutions, and there is a suppression of the personal development of the student and his emotional state, so this manifests itself both from the position of negative impact and in relation to the teaching staff, within the framework of not maintaining professional subordination at the level of creating a negative attitude towards the teacher on the part of students, who has different requirements for the approach in explaining the topic, the design and progress of solving problems, examples, and others, which was said by the teacher when explaining why the assessment score was reduced ( Maruthavanan, 2020). So, on the basis of a methodical analysis of the criteria and parameters described above, a model was developed for the formation of research skills among future teachers of mathematics, which allows to significantly increase their intellectual level with developed research thinking, which allows analyzing and searching for answers to multi-level tasks with an integral approach in their compilation, which are indicated at different levels of complexity within the framework of various Olympiad problems in the form of their various solutions, taking into account giving several different types of solutions to one Olympiad problem, based on a deep knowledge of mathematics and a detailed analysis of its course, which is possible on the basis of the development of a creative approach, imaginative thinking, various searches for problem points that will allow finding different stages to obtain a competent answer within the framework of the solution multilevel, integral Olympiad problems, examples, equations and more. Providing at an individual level the solution of Olympiad problems in several of their variants that differ significantly from each other when using various mathematical formulas and rules will allow students to develop flexibility and breadth of mental activity, which will create prerequisites for an individual approach, and for analyzing the solution of many mathematical

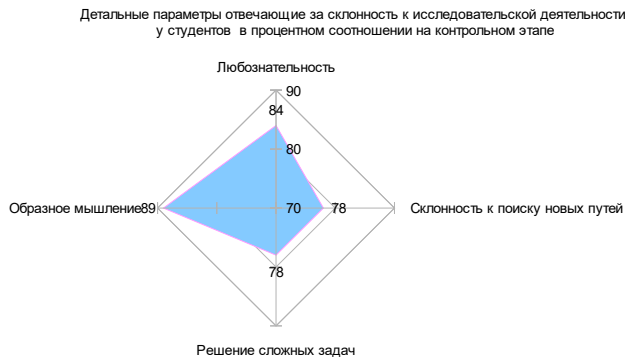


problems within the framework of a competent answer according to different schemes based on the depth of knowledge and giftedness of their future students, allowing them to realize themselves at a high-quality and competent level with the manifestation of their creative potential (Scherer et.al., 2019). At the control stage of the study, after the introduction of the created model into the practice of practical education, repeated testing was carried out, which made it possible to identify the dynamics of indicators responsible for the formation of research thinking and skills in future mathematics teachers. The data obtained make it possible to determine the success of the developed model, so the generalized results reflect a high degree of development of research skills against the background of formed research thinking in the majority of respondents, which is shown in Figure 4.



**Figure 4.** The distribution of students depending on the degree of formation of the level of their creative thinking at the control stage of the pedagogical experiment

Figure 5 visualizes the specification of the criteria as part of the development of research skills with indicators of personal determination of flexibility and breadth of mental activity and understanding, so that a competent result obtained when solving a problem could be against the background of many types of paths and directions in its solution using various mathematical formulas, rules, concepts that can be used in various approaches, which increases the cognitive and research function of teachers against the background of the development of their intellectual abilities, the speed of reaction of their analytical sphere, observation and imaginative thinking.



**Figure 5.** Detailed parameters responsible for the propensity for research among respondents at the control stage of the study

The pedagogical clarification also made it possible to reveal that all students noted an increase in the depth of their knowledge in the field of mathematics and a significant logical strengthening of this part in the solution in its various varieties when giving answers as part of the consideration of Olympiad problems, the solution of which they provided in three or more options, which strengthened their coordination abilities to master mathematical knowledge and skills, deepening their knowledge in this area.

Thus, the analysis of the results of the study at the control stage of the pedagogical experiment made it possible to determine that the developed model for the formation of research skills allows a significant increase in the effectiveness of professional pedagogical education at the level of a qualitative improvement in professional competencies of future teachers who will be able to significantly improve the organization of the educational process and the evaluation factor of the work of their future teachers. students against the background of successful personal achievements in the field of internal aspirations for cognitive research activities. The obtained success of the pedagogical model of teaching the discipline of mathematics on the basis of topical aspects of increasing the research activity of future teachers at the level of their application of various methodological approaches and didactic foundations in solving the set mathematical problems within their classes will allow students to master the full range of mathematical knowledge and apply them at a high level. at a competent level in practice, using a diverse approach to solving problems with a full variety of mathematical formulas and patterns within the framework of a full-fledged synthesis of multi-level knowledge, which allows you to form an image of the problem posed in the conditions of successful solution of the Olympiad problem in the form of a diverse approach, taking into account non-standard types of solutions, which will enhance their intellectual activity, thinking, increase the level of personal development and conduct search mental relationships allowing find different approaches to getting the right answer within the framework of a competent presentation of the solution as a whole, which allows you to increase self-expression, increase self-esteem, creative self-realization and develop your abilities in general (Kaurav et.al., 2019). Increasing research thinking on the basis of a diverse solution of Olympiad problems of increased complexity and integrity allows you to increase both the personal level of pedagogical and mathematical professionalism against the background of self-improvement of your knowledge in the field of mathematics, which in turn enhances the motivational component to study the subject, and in the future will allow teachers to prove themselves at a high level of activity in conducting classes, where their ability to captivate and interest in the study of mathematics will be significantly expressed against the background of their own interest in explaining interesting logical chains within the discipline. This approach will also create conditions for strengthening the creative communication between the teacher and the student, which will help organize the creation of a favorable learning atmosphere for the educational process. (Grigorenko, 2018).

Self-improvement of personal professionalism with many variations of solving Olympiad integral, multi-level problems will also contribute by creating a training effect, where the future teacher will be able to apply all his knowledge in the field of mathematics at its deep level, and having achieved results in several options for solving a complex Olympiad problem, one will be able to speak about their ability to use their personal mathematical knowledge in full with the manifestation of a good orientation in them, and also created within the framework of the developed model of the formation of research skills will allow students to realize their own significant potential as a future specialist at a high level, which will also increase his motivation for further in-depth study of the discipline and create activity factors at the level of increasing personal self-education, and thus this will encourage and activate the function of independent work within the framework of this subject of mathematics, due to the actualization of the student's personal potential, which in turn will increase willpower, observation, concentration, analytical sphere, which will strengthen the goals for learning and achieving better results in educational, scientific, practical and professional activities, and will contribute to raising their status and level of self-esteem with faith in their own strengths, capabilities, thus ensuring a high level of self-determination in vocational guidance as a specialist

who, already during his studies, has achieved an indicative, positive result (Ilyasov & Utegenova, 2019). The subject of evaluating the effectiveness of the developed model is the level of cognitive and analytical activity of the student, the speed of assimilation of new information by him, the flexibility and coordination of his mental activity, as well as other indicators of his mental work and the development of intelligence, which will be successfully formed against the background of solving Olympiad tasks in several of them. options.

Thus, the developed model of the formation of research skills, skills, thinking against the background of intellectual development and imaginative thinking has shown itself to be effective and can be used in practice as part of the educational process of professional training of future teachers.

#### 4. Conclusion

As part of modern trends aimed at improving the educational process, through the introduction into practice of pedagogical models of methods that will increase not only motivational criteria, but also the abilities of students, a model has been developed for the successful formation of research skills among mathematics teachers, as part of their solution of Olympiad tasks in several variants which allows, in the form of searching for non-standard solutions, to develop one's own talents and abilities along the necessary path of ingenuity based on the existing deep knowledge in the field of the considered discipline of mathematics at the level of increasing interest in its study, learning, determining the correctness of the course of one's thoughts and the chosen ways of solving the tasks, a detailed analysis a multifaceted complex Olympiad task at the level of its data integration with the factor of evaluating one's own train of thought at the level of its correctness with a prediction of the possible result obtained, which contributes to the development of talents and mathematical abilities with a factor in the development of a natural phenomenon of performing logical mental operations using a non-standard approach against the background of creative thinking, which makes it possible to collectively increase intellectual abilities, mental coordination, observation, in the created conditions of independent overcoming of possible personal psychological inertia, as well as learning to look at one task from different angles with a deep search for various types of its solution at a competent level. So, in general, from the considered position, this allows the created model for the development of research skills within the framework of the methodological parameters of solving various complex, multi-level Olympiad problems in several versions to become a successful and effective pedagogical tool for the development of personal abilities, talents, development at a deep level of productive thinking against the background of an increase in creative and independent activity.

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