

Formation of Creative Thinking of Students of a Pedagogical University by Means Of Information Technology In Learning Mathematical Disciplines

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Abstract *This article was written with the aim of creating creative thinking of students of a pedagogical university by means of information technology in the teaching of mathematical disciplines. The following tasks are ahead of the article as: on the basis of the analysis of new pedagogical, psychological and methodological literature to determine the main parameters and criteria of students' creative thinking; to analyze the content and identify the importance of mathematical and methodological disciplines in the vocational training of students of the specialty "Pedagogy and methodology of primary education"; determine the totality of tools and techniques necessary for the formation of creative thinking of a future teacher; to identify the psychological and pedagogical conditions for the successful formation of creative thinking of students by means of mathematical disciplines; to develop and implement an educational and methodological complex for the formation of creative thinking of students - future primary school teachers using information and communication technologies.*

Keywords: *mathematic teaching, creative technologies, internet, creative thinking in education, multimedia.*

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i. INTRODUCTION

The modern period of development of society is characterized by changes that affect all spheres of human activity. In these conditions, the need of society for an independent creative personality is growing. In this regard, higher demands are placed on education in general and on school education in particular in questions of the practical training of schoolchildren to continue their education and enter their labor activity in the context of socio-economic reforms, the constant transformation and development of science, technology and production. Orientation of modern general education to the development of the personality of the schoolchild, his cognitive and creative abilities suggests his creative development in a holistic educational process.

ii. MATERIALS AND METHODS

Methodology. An analysis of the special literature and the practice of teaching in elementary school, on the one hand, and the educational process in a university, on the other, revealed a significant contradiction: the school as a whole and especially the primary one urgently need younger students to be taught not in the old fashioned way, but using an arsenal of new technologies, a new level of teacher preparedness, while pedagogical universities often continue to work according to traditional methods, hesitantly update not only the content of training courses, but also the methods of their teaching, then It is only occasionally turning to modern concepts of developmental education and, in particular, to the competence-oriented technology.

There are many contradictions in the university's teacher training itself:

- despite the updating of scientific theories of education, on understanding the appropriateness of the integrative essence of knowledge, there are no courses in the university's educational process that integrate such educational disciplines of the elementary school teacher's training plan as psychology, pedagogy, special subjects and teaching methods;
- the need to teach students the development of their individual abilities (intellectual, creative, professional inclinations) and their simultaneous mastery of the technology of studying and forming the individuality of each student (another person).

Thus, the need arises for research, an explanation of the phenomenon of creativity of professional pedagogical education: the process of forming creative thinking of future primary school teachers; level of its formation; identify the potential for the joint participation of psychological, pedagogical, subject and methodological disciplines in the development of the content of professional and pedagogical education; the use of competency-based technology for teaching and developing a teacher capable of scientific and pedagogical creativity.

The relevance of the study is due, on the one hand, to the need of schools for creative thinking teachers who are able to carry out developmental learning for students; on the other hand, insufficient attention to the focused and systematic formation of students' creative thinking in the process of their professional and pedagogical training.

The research problem: the study of psychological and pedagogical conditions and methodological techniques that can ensure the effective implementation of the possibilities of the educational process for the formation of creative thinking of students - future primary school teachers.

The lack of elaboration and relevance of the problem identified the research topic: "The Formation of Creative Thinking of Students of a Pedagogical University by Means of Information Technology in the Training of Mathematical Disciplines."

Object of study: the formation of creative thinking of future teachers by means of information technology in the teaching of mathematical disciplines in the process of vocational training of primary school teachers.

Subject of study: psychological and pedagogical conditions for the formation of creative thinking of students of the faculty of primary education through the discovery and meaningful establishment of mathematical laws.

The purpose of the study: to theoretically and experimentally substantiate the effectiveness of the psychological and pedagogical conditions we offer for the formation of creative thinking of students based on the discovery and

establishment of the relationship between mathematical categories.

Research hypothesis: the formation of creative thinking of students of a pedagogical university will be successful if:

- highlighted the main parameters of creative thinking, which should be formed in the process of training;
- defined a set of tools and techniques for the formation of search and creative thinking of students;
- identified and determined the optimal combination of psychological and pedagogical conditions and factors contributing to the formation of creative thinking.

In accordance with the hypothesis and goal, specific research objectives are set:

1. Based on the analysis of the new pedagogical, psychological and methodological literature, determine the main parameters and criteria of students' creative thinking.
2. To analyze the content and identify the importance of mathematical and methodological disciplines in the professional training of students of the specialty "Pedagogy and methodology of primary education."
3. To determine the totality of tools and techniques necessary for the formation of creative thinking of the future teacher.
4. To identify the psychological and pedagogical conditions for the successful formation of creative thinking of students by means of mathematical disciplines.
5. Develop and implement an educational and methodological complex for the formation of creative thinking of students - future primary school teachers.

The methodological basis of the study is the general theory of knowledge, ideas about a person as a subject and an object of social relations, the concept of developing education, humanization of education, higher pedagogical education, the work of teachers, psychologists and methodologists on the problems of developing creative thinking and organizing the educational process at a university, as well as official documents governing education in the Republic of Uzbekistan.

iii. **LITERATURE REVIEW.**

Due to their significance, the problems of creativity development were studied by representatives of various areas of science in the following areas and directions: philosophical and methodological problems of creativity (N. A. Berdyaev [4], B. S. Gershunsky [7], A. G. Spirkin [17] and etc.); creativity as the highest form of human activity, highlighting the necessary signs that manifest themselves in creativity, considered K.A. Abulkhanova [1]; creativity as obtaining a new result is analyzed by psychologists DB Epiphany [5], P.Ya. Halperin [6], Yu.K. Kulyutkin [10], Ya.A. Ponomarev [14], C.L. Rubinstein [15] and others; creativity as an approach according to which the dialectical contradiction between productive and reproductive components finds its fullest expression in the creative process, understanding of the essence of creativity in the ability to abandon the stereotypical mode of action of V.T. Kudryavtsev [9]; such well-known Russian scientists as I.Ya. Lerner [12], G.V. Labunskaya [11], and others. In B.C. Shubinsky [16] outlined the stages of creativity, highlighted the links of the creative process. Our work is methodologically based on the works of V. Slastenin [17] and on the part of the mathematical creativity of D. Makhmudova [13], N.Rustamova [16,17].

iv. **METHODS.**

Given the complexity of the process of forming creative thinking of students, we used a set of research methods and techniques:

- a) analysis of philosophical, pedagogical, psychological literature, which allowed to reveal the essence of the concept of "creative thinking" and the mechanisms of its development;
- b) a generalization of the experience of both university and school teachers, including an analysis of their activities in the use of various forms of studying pedagogical disciplines;
- c) experimental work aimed at the formation of creative thinking of students;
- d) methods of questioning, ranking and testing.

In the course of the experiment, the following was carried out: monitoring the activities of teachers and students in

classes in mathematical disciplines, in seminars in pedagogy, psychology, methods of teaching mathematics, in the defense of term papers and qualifications (diploma), in the process of conducting pedagogical practices; interviewing and interviewing teachers and students. In the process of the study, quantitative and qualitative analyzes of the results of the work were carried out.

Scientific novelty is:

- in highlighting the parameters of creative thinking, the features of its formation in the process of professional and pedagogical training;
- in implementing an integrated approach to solving the problem of highlighting the psychological and pedagogical conditions for the formation of creative thinking of students;
- in determining the set and in structuring the methodological and mathematical disciplines, as well as their capabilities and tools that contribute to the formation of creative thinking of students.

The theoretical significance of the study is:

- in developing the scientific foundations for the formation of creative thinking of students as a necessary condition for the professional formation of a future teacher, capable of organizing the creative activities of students;
- in identifying the specifics of the formation of creative thinking of students in the process of their professional and pedagogical training;
- in expanding scientific ideas about the conditions for the formation of creative thinking of students by means of mathematical disciplines;
- in the identification and theoretical justification of pedagogical technology, which serves as a condition for the development of creativity; in the formation of creative thinking through a set of educational and mathematical problems, included in the educational process of the university and school;
- in substantiating the criteria for determining the levels of formation of creative thinking.

The practical significance of the study:

- in the creation of psychological and pedagogical conditions for awakening and developing creative thinking of students;
- in testing a comprehensive program aimed at manifesting creative thinking and competency-based teaching technology.

The results obtained contribute to:

- improving the activities of primary school teachers in the aspect of the formation and development of creative thinking;
- materials of the dissertation can be used in classes in mathematics and the methodology of teaching mathematics, they can be used to form creative thinking of students and other faculties of pedagogical universities.

v. EXPERIMENTAL RESULTS

The study included the following steps.

At the first stage (2017), a theoretical analysis of the psychological, pedagogical and educational literature on the research problem was carried out, the research methodology and methodology were determined, a working hypothesis was formulated, a program for its experimental verification was determined, and students of the faculty and school teachers were questioned.

At the second stage (2018), an educational and methodological complex on mathematics and the methodology of its teaching was developed, aimed at ensuring the formation of creative thinking of students, a formative experiment was completed, which ended with verification of the proposed educational and methodical complex. Control was carried out using slices, testing and monitoring the activities of students in training sessions and during the passage of pedagogical practices.

At the third stage (June - September 2019), the results of the experimental work were systematized and double-

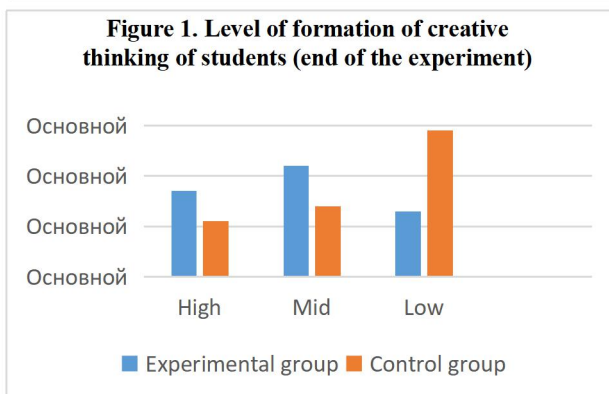
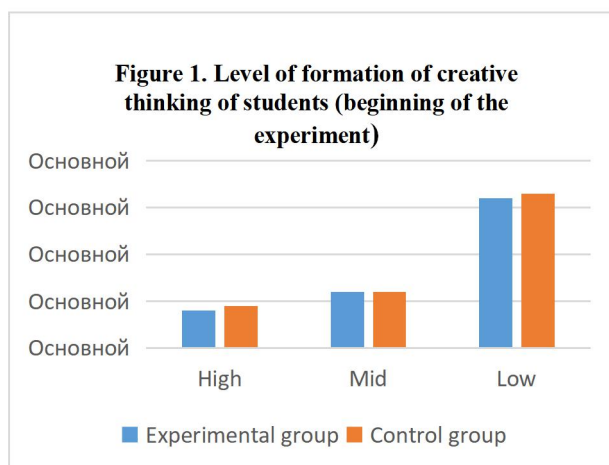
checked, the results of the study were summed up, and conclusions were drawn.

The experimental work covered more than a hundred students of 1-2 courses of the Tashkent Regional Chirchik State Pedagogical Institute and about 20 primary school teachers in Chirchik.

For the experiment, test groups of the Chirchik State Pedagogical Institute were selected. 106 respondents participated in the experiments, and below the empirical data were presented in tabular form.

Table 1. Dynamics of the level of formation of creative thinking of students at the beginning and at the end of the experiment

Groups	Number of respondents	Arithmetic expression	Level indicators					
			At the beginning			In the end		
			High	Mid	Low	High	Mid	Low
Experimental	$n_i = 52$							
Control	$n_i = 54$							



According to the results of the experiment, the effectiveness of the developed methodology was confirmed.

vi. CONCLUSION

An urgent problem of university education at present is to increase the professional training of graduates of a pedagogical university. The need for the creative, creative nature of the pedagogical profession itself is due, firstly, to the high social significance and originality of its product — the formed personality of the student in all the richness of her individual identity; secondly, the fact that the process of pedagogical activity, based on the interaction of the teacher and students, does not tolerate the standard and the template, although the content and scope of the creative tasks of the teacher may be different. Thus, the need for the development of creative thinking of a future teacher in the process of training has been identified.

The study revealed that creative thinking is due to the following factors: intelligence, as ability; knowledge; style of thinking; individual qualities; motivation; the external environment.

For the direction of the formation of creative thinking of students, it is necessary to organize the educational and cognitive process so that, along with the acquisition of knowledge, opportunities arise for creativity, the development of intellectual abilities (the ability to compare, generalize, analyze, predict, etc.), the formation of such properties of thinking as flexibility, fluency, originality, the ability to associate, thereby creating a “creative environment” within the educational process. The educational-methodical complex developed on the basis of the joint participation of general professional, mathematical, and methodological disciplines, as well as the use of competence-oriented technology, allowed us to implement a program for the formation of creative thinking of students in the process of professional and pedagogical training.

The organization and conduct of experimental work revealed a positive impact of the created creative environment on the formation of creative thinking of students. As a result of experimental work, it was found that for the formation of creative thinking of students, it is necessary: to develop a set of didactic materials that take into account the features of subject preparation, its systematic use; the fulfillment of psychological and pedagogical conditions that ensure the creation of a creative learning environment using a competency-based approach to learning, the introduction of problematic forms of learning, the motivation of creative processes, the development of specific properties of thinking; the acquisition of knowledge and skills in organizing the creative activities of students in teaching them mathematics.

The study included the following stages: aerobic, ascertaining (qualifying), shaping, postforming, at which the main goals, objectives and methods for solving them were determined.

The verification of the advanced provisions was carried out by primary and secondary methods of mathematical processing used in pedagogy and psychology.

The psychological and pedagogical experiment and its results provide sufficient grounds to confirm the general hypothesis of the study. The reliability of the presented results is confirmed by statistical data processing, as well as publications on the topic of dissertation research.

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