Divergent Mathematical Problems as a Means of Developing Thinking Creativity in Primary School Students

Rasulova Laziza Gaybullaevna, Khamdamova Nafisa Aminovna

Bukhara State University

ABSTRACT

In this article, an attempt is made to consider a psychologist - the pedagogical conditions for the development of creativity of a younger student whose value lies in the fact that the foundation laid in this relatively short period of life is of lasting importance for the entire subsequent development of a person's personality. Modern primary education is one of the most developing stages of the educational system of the Republic of Uzbekistan. New regulatory requirements for the definition of the structure, conditions for the implementation of the general educational program of primary education have a direct impact on the work with pedagogical personnel called upon to implement the upbringing and educational process in changing conditions. The value of the primary school period of development and its enduring importance for the entire subsequent life of a person's activities impose a special responsibility on teachers of primary education.

Keywords: *mathematical problem, number, school, theme, logical, determination method, search, heuristic, creative process*

Mathematics has great opportunities in the development of not only abstract, conceptual, algorithmic, etc. thinking, but also creative. A huge number of mathematical problems, accumulated and tested in the course of centuries of pedagogical practice, regularly served and serve as a means of developing all types of thinking, including creative thinking. A mathematical problem is the first spark, the beginning of the cognitive, search, heuristic, and creative process. It awakens thought, excites thinking and develops creativity in thinking.

Typically, the school considers convergent problems, i.e. having a well-defined condition, a rigorous solution algorithm and the only correct answer, which are designed to develop mainly convergent thinking.

As you know, convergent thinking is sequential, logical, unidirectional thinking. As noted by A.I Savenkov, "this type of thinking is considered to be simpler in comparison with creative, but because of that its importance in the formation of a child's learning ability does not diminish. Intellectual skills formed in the course of solving these problems have a general, universal character ".

Convergent tasks in the development of a child's thinking play the same role as simple tasks play in the formation of the general ability to solve problems.

For many decades, the efforts of methodologists, in accordance with the traditions of domestic educational programs and textbooks, were mainly aimed at developing methodological approaches to solving convergent problems.

However, life, as you know, poses divergent tasks for a person, i.e. having many options for correct answers and, accordingly, different options for solutions. In traditional teaching mathematics, tasks of the divergent type are extremely rare, while the effectiveness of the development of creative thinking when using such tasks is very high, because the multivariance of answers and solutions to problems creates optimally favorable conditions for realizing the child's creative potential, allows him to show fluency, flexibility and originality of thinking in the process of working on a task.

In didactic and methodological terms, the problem of developing thinking creativity through the use of divergent tasks in the process of teaching mathematics has been little studied. Therefore, the topic for research seems, in our opinion, very relevant.

Thus, the relevance of the study is determined by:

➢ the contradiction between the requirements of society for the learning process, designed to develop the creativity of students' thinking, and the traditional teaching system, which does not effectively solve this problem.

➢ the contradiction between the results of psychological research and the state of the practice of developing the creativity of thinking of younger schoolchildren in the process of teaching mathematics;

➢ undeveloped methodology for teaching younger students to solve divergent problems that effectively affect the development of creativity in thinking.

The problem of the research is to identify possible ways of developing the creativity of thinking of primary schoolchildren through the use of divergent mathematical problems in the learning process.

The purpose of the study is to develop a methodology for the formation of creativity in young schoolchildren in the process of teaching mathematics using divergent tasks.

The object of the research is the process of developing the creativity of thinking in younger schoolchildren when teaching mathematics.

The subject of the research is divergent tasks as a means of developing creative thinking in younger schoolchildren.

The research hypothesis is that the development of creativity (fluency, flexibility and originality) of thinking in younger students in the process of teaching mathematics will occur more effectively if:

➢ when developing the ability to solve problems, systematically use a set of specially selected divergent problems with an appropriate methodology for their solution;

➢ to create a friendly creative environment in mathematics lessons, designed to encourage any ideas and initiatives of students in search of a variety of solutions to problems - both convergent and divergent.

To achieve this goal and test the hypothesis, the following tasks were set:

1. To identify the psychological and pedagogical foundations of the development of creativity in thinking in younger students in the learning process.

2. To analyze the state of the implementation of the problem of developing the creativity of thinking of junior schoolchildren in the process of teaching mathematics.

3. Determine the didactic conditions that ensure the development of creativity in thinking in the process of teaching mathematics.

4. To develop a methodology for the development of creativity in thinking in the process of teaching mathematics through the use of divergent problems.

5. Experimentally check the effectiveness of the developed technique.

To solve the set tasks, the following research methods were used.

➢ theoretical analysis of psychological, pedagogical and methodological literature on the problem;

➢ study and generalization of pedagogical experience;

➢ direct and indirect observation of lessons;

➢ conversations with teachers and students;

➢ questioning; testing; pedagogical experiment; statistical processing of experimental results.

The scientific novelty of the research lies in the fact that: revealed and scientifically substantiated didactic conditions that ensure the effective development of the creativity of thinking of primary schoolchildren; a set of divergent mathematical problems has been developed with a teaching methodology for their solution, which contributes to an increase in the creativity of thinking in primary school students; methodological techniques are given that transform convergent mathematical problems into divergent ones, namely, diversification or conditions, or requirements of the problem, or both of these components at the same time, as well as approaches to its solution;

➢ several types of divergent mathematical problems have been identified that are effective for the development of creativity in the thinking of primary schoolchildren;

➢ developed a methodology for measuring creativity indicators (fluency, flexibility and originality) of thinking of junior schoolchildren using mathematical tasks, based on batteries of Guildford's creativity tests.

The theoretical significance of the study is that:

1) substantiated the possibility of effective development of creative thinking in primary schoolchildren through the methodologically grounded use of divergent problems in the process of teaching mathematics;

2) didactic requirements for the joint activities of the teacher and students in the process of solving problems are determined;

3) the methodology for determining the indicators of creativity (fluency, flexibility and originality) of the thinking of a younger student was adapted using mathematical tasks.

The practical significance of the study lies in the fact that the implementation of the developed set of divergent tasks in the practice of school teaching leads to a significant increase in the creativity of thinking in younger students. Divergent problems and

methodological techniques for teaching their solution can be used by teachers and methodologists in the development of lessons and didactic manuals for various sections of the elementary mathematics course.

The reliability and validity of the results and conclusions obtained in the study is ensured by:

➢ relying on the results of fundamental psychological, pedagogical and methodological research;

➢ the variety and completeness of the studied factual material;

➢ a positive assessment by teachers and methodologists of the developed set of divergent mathematical problems with a methodology for teaching their solution;

➢ expert verification of the main provisions of the thesis;

➢ positive results of the psychological and pedagogical experiment, confirmed by the methods of mathematical statistics.

The concept of "divergent thinking" was first defined by J. Guilford [183]. He pointed out the fundamental difference between two thought operations: convergence and divergence. Convergent thinking is aimed at finding the only correct result, while divergent thinking is based on the fundamental possibility of finding many solutions. Convergent thinking is characterized by the correctness and speed of finding the only possible (normative) solution in accordance with the requirements of a given situation. Divergent thinking is defined by J. Guilford as a type of thinking going in different directions. This "divergent" thinking allows you to change the direction of the search in the process of finding answers to various questions, which leads to the emergence of a whole fan of diverse and unexpected solutions and results. It assumes that several answers can be given to one question, which is the condition for generating extraordinary ideas and personal self-expression. Divergent thinking is important not only for the intellectual growth of a person, it fosters such personality traits as tolerance, curiosity, creativity. Divergent-type tasks are understood as tasks of any subject orientation, which allow the existence of many * or, more precisely, many correct solutions. (In the scientific literature, starting with D. Guildford, the formulation "set of solutions" has been established. However, from the point of view of mathematics, the "set" can also be "empty", that is, it does not contain a single solution). Note that such problems, when there is one condition, and there are many possible solutions, most often a person encounters in practice, it is enough to recall the famous question "Who to be?" and the answer (s) of V. Mayakovsky. In scientific and artistic research, in the management sphere, in politics and economics, most problems have not one, but several solutions. In the innovative domestic practice of general education, there is an opinion that one of the possible reserves for increasing the effectiveness of education is the introduction of special developmental tasks into the content of the educational process. Almost all tasks in the textbook, with rare exceptions, are classified as "convergent" ones. That is, the conditions of the task in most cases assume the existence of only one, "uniquely correct" answer, which can be obtained through strict logical reasoning (meaning binary logic), or based on the use of rules and algorithms learned by the child (laws, theorems, etc. etc.). Thus, today in primary education, which sets the start of the student's personal educational development, there are a number of contradictions of both theoretical and practical nature. Let's formulate them. Contradiction 1 - between the need to organize the

child's personality-oriented development, recognized in educational practice, and the insufficient development of various applied aspects of this process, including the system of tasks for the development of divergent thinking in the child. Contradiction 2 - between the fundamental postulate of the theory of developmental education, which assumes that the personality of a child is not a set of initially set and unchanging individual characteristics, but a "self-developing system" that forms in the educational process, amenable to controlled processes of formation and development through the use of developmental learning technologies, and the lack of such technologies in the development of divergent thinking of the student. Contradiction 3 - between the need to organize pedagogical influence on the development of divergent thinking of schoolchildren and the insufficient representation of the corresponding tasks in the content of school textbooks. This group of contradictions led to the problem that this study is devoted to solving.

REFERENCES

1. Gaybullaevna R. L. Information technology in primary school //ACADEMICIA: AN INTERNATIONAL MULTIDISCIPLINARY RESEARCH JOURNAL. – 2021. – Т. 11. – №. 1. – С. 1498-1503.

2. Расулова Л. Г., Саидмурадова А. К. МЕТОДИКА ПОДГОТОВКИ ВОСПИТАТЕЛЕЙ К ОБУЧЕНИЮ МАТЕМАТИКЕ НА ОСНОВЕ КОМПЕТЕНТНОСТНОГО ПОДХОДА В ДОШКОЛЬНОМ ОБРАЗОВАНИИ //Academy. – 2020. – №. 12 (63).

3. Rasulova L. G. Formation Of Abilities And Skills In Measuring Activity In Preschoolers //The American Journal of Social Science and Education Innovations. – 2021. – Т. 3. – №. 02. – С. 363-369.

4. Rasulova L. G., Radjabova P. K. Theoretical foundations of interactive learning in mathematics lessons in primary school //ASIAN JOURNAL OF MULTIDIMENSIONAL RESEARCH. – 2021. – Т. 10. – №. 4. – С. 819-823.

5. Qo'ldoshev, R. A. "LEFT-HANDEDNESS AND THE REASONS FOR ITS OCCURRENCE." *MONOGRAFIA POKONFERENCYJNA SCIENCE, RESEARCH, DEVELOPMENT* 32: 2020-31. –

6. Qo'ldoshev, R. A. "Cognitive activity of left-handed children.«НАЧАЛЬНОЕ ОБРАЗОВАНИЕ: ПРОБЛЕМЫ И ПЕРСПЕКТИВЫ» III-Международная научнопрактическая конференция." (2020): 132-136.

7. Кулдашев Р. А. ЧАПАҚАЙ ЎҚУВЧИЛАРДА ЁЗУВ ҚУРОЛЛАРИ БИЛАН ИШЛАШ КЎНИКМАЛАРИНИ ШАКЛЛАНТИРИШ: РА Қўлдошев, Бухоро давлат университети Бошланғич таълим методикаси кафедраси ўқитувчиси //Образование и инновационные исследования международный научно-методический журнал. – 2021. – Т. 2. – №. 3. – С. 198-217.

8. Rustambek Aezmurodovich Qo'ldoshev BOSHLANG'ICH SINF CHAPAQAY O'QUVCHILARNI YoZUVGA O'RGATISHNING ILMIY-NAZARIY ASOSLARI // Scientific progress. 2021. №6. URL: https://cyberleninka.ru/article/n/boshlan-ich-sinf-chapa-ay-uvchilarni-yozuvga-rgatishning-ilmiy-nazariy-asoslari (ma'lumotlar obrascheniya: 25.10.2021)

9. Выготский Л. С. Мышление и речь. М. : Лабиринт, 1996. С. 188

10. А. Гин, М. Баркан. Открытые задачи как инструмент развития креативности.,- М.: Образование для новой эры, 2014, — 84 стр.