WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
ISSN: 2776-0979, Volume 3, Issue 11, Nov., 2022

IMPROVING STUDENTS' MATHEMATICAL COMPETENCE BY SOLVING COMBINATORICS PROBLEMS

Siddikov Z.Kh.
Doctor of Philosophy in Pedagogical Sciences (PhD)
Fergana State University

Abstract
The article describes the issues of developing students' mathematical competence and creative, independent thinking by solving combinatorics problems.

Keywords: mathematical, skill, competence, competent, creative thinking, independent thinking.

Combinatorics is a branch of mathematics that studies the various permutations and combinations of things and objects, and combinatorics considers all possible options. Combinatorics was created in the 17th century. For a long time, combinatorics was not considered a branch of mathematics. Hunters used combinatorics to hunt their prey, soldiers to plan their tactics, and workers to use their instruments. Interesting combinatorial problems are also common. The first studies on combinatorics were carried out by Italian scientists D. Cardano, N. Tartalye (1499-1557), G. Galileo (1564-1642), French scientist B. Pascal (1623-1662). G. Leibniz first studied combinatorics as an independent branch of mathematics, and in 1666 he wrote a work entitled “On the Art of Combinatorics” and used the term “combinatorics” for the first time in this work.

In mathematics and its applications, it is necessary to study various sets and various relationships between the elements of these sets. In similar problems, work is done with various combinations of objects. The branch of mathematics that studies such problems is called combinatorics. Combinatorics and its elements are widely used in various fields.

The math course contains interesting problems of an entertaining nature: math tricks, match problems, puzzles, combinatorial problems, etc. They studied all the subjects of the main course and, of course, in extracurricular activities. It is impossible to increase students’ interest in mathematics, develop their mathematical abilities, without using quick assignments, funny tasks, mathematical tricks, didactic games, poems, fairy tales, riddles, etc. In the educational process. Reasonable games in mathematics lessons have great pedagogical value.

Great opportunities for the development of thinking in the educational process are inherent in mathematics, but they cannot be realized by themselves, but require a professional methodical solution, that is, it is desirable to organize training for the development of mathematical skills. Therefore, it is very important and relevant to include combinatorial problems in the mathematics course.

Mathematics provides real conditions for the development of logical thinking. The inclusion of combinatorics problems in the mathematics course affects the development of intuitive, spatial, constructive, symbolic thinking, the development of students' mathematical abilities, as well as the cultivation of interest in mathematics. Combinatorial problems are preparation for solving practical life problems, in this situation:

has great opportunities to teach to make the best decisions;

organization of primary research and creative activities of students;

serves to activate mental activity and form intellectual abilities.

Based on the analysis of psychological, pedagogical and methodical literature, we recommend taking a sample from the experience of well-known teachers on the theoretical foundations of the combinatorics department and the creative approach to solving combinatorics problems in mathematics classes, the methodology of solving combinatorics problems in mathematics classes.

Based on the above considerations, we believe that the development of mathematical education includes an organic combination of education and development, in which education is not a condition for the development of situations. As a result of such training, the student acquires independent knowledge, gets acquainted with the methods of actions, recreates the methods of solving problems known to him and discovers new ones.

The analysis of studies on combinatorial problem solving methods allowed us to distinguish the following aspects: the development methods of teaching are not based on handing over ready-made schemes for solving combinatorics problems, but on the organization of such activities that provide students with the formation of effective creative thinking , helps to solve non-standard problems that take into account different things. It teaches to distinguish the signs of the object depending on the situation.

In tasks that require students to be creative, the success of their implementation is ensured by the teacher's help, because the real creative activity and creativity of students in the educational process is somewhat different. Also, the successful completion of some tasks used in the development of the educational process requires a certain methodical support of the teacher, because the real creative activity and

creativity of students in the educational process are different from each other. Also, the successful completion of some issues used in the training process is ensured by their game form.

Success in developmental tasks produces strong emotional events, including feelings called “mental joy.” Repeated success and positive feelings associated with it form a new motive for learning and knowledge activity – the expectation of “mental joy”.

One of the factors of increasing the efficiency of the development of mathematical education is related to what tasks should be solved, what are their didactic possibilities and how effective is the methodology of working with them. In this sense, issues that allow to find not one, but several solutions are worthy of attention. This means the existence of different solutions-answers and the search for them. The peculiarity of these problems is that their solutions do not fit into the framework of the usual scheme. Such problems do not limit students to a strict framework of a single solution, but instead open the door of opportunities for them to search and think. The complexity of combinatorics problems lies in the fact that when solving it, it is necessary to choose only a constructive search system that makes sure that all cases (without repeating the combination) are considered.

The experience gained in the mathematics classes arouses the student's interest in the problem, the desire to solve it, including a non-standard problem, helps him to move away from the template, teaches him to comprehensively analyze specific situations and conditions, “tools” for solving difficult tasks. “ will give.

Thus, it allows us to make the following recommendations on the use of methodical methods in the organization of work to solve combinatorics problems: methods of action are not given “ready-made”, and students make discoveries and gain experience on their own. The focus is on going through random search options in solving a combinatorial problem, and then carrying out a systematic activity with the help of the teacher. This methodology has been proven several times in practice, and conclusions are drawn about the need to apply mathematical formulas to combinatorics problems, most importantly, they affect the increase in the number of educational achievements in this subject, the general development of the mathematical thinking of students does.

Permutations are selections (combinations) of n elements, which differ from each other by the order of elements. The number of permutations is defined as Pn and u

$$R_n = n! \qquad (1)$$

is calculated by the formula. Here $n!$ Is equal to the product of natural numbers from one to n: $n!=1\times2\times3...\times n$

WEB OF SCIENTIST: INTERNATIONAL SCIENTIFIC RESEARCH JOURNAL
ISSN: 2776-0979, Volume 3, Issue 11, Nov., 2022

If different permutations are obtained from *n* elements, and element 1 is repeated *n1* times, element 2 is repeated *n2* times, *k*-element is repeated *nk* times and *n1+n2+...+nk=n* places, then elements of such permutations are called repeated permutations and it

$$P_n(n_1, n_2, ..., n_k) = \frac{n!}{n_1! n_2! \cdots n_k!}, \qquad (2)$$

is calculated by the formula.

Issue 1. If the number 8 is repeated 3 times, and the numbers 7 and 9 are repeated once, how many 5-digit numbers can be formed from the numbers 7,8,9?

Solution: If each five-digit number differs from the others by the order of its digits and if *n1=1, n2=3,* and *n3=1* are appropriate, then we use formula (3) to find the solution to the problem we generate .

$$P_5(1,3,1) = \frac{5!}{1! \cdot 3! \cdot 1!} = 20.$$

Issue 2. The letters M, A, T, E, M, A, T, I, K, A are written on the cards. How many different 10-letter "words" can be made using these cards (where "word" is a different sequence of letters)?

Solution: The number of permutations of two M letters R2=2, the number of permutations of three A letters R3=3!=6, the number of permutations of two T letters R2=2 and the resulting answer

$$P_{10}(2,3,2) = \frac{10!}{2! \cdot 3! \cdot 2!} = 151200$$ is equal to a word.

Issue 3. 1st year students study 10 different subjects. If 5 pairs of lessons are scheduled on Monday, in how many different ways can the lesson schedule for this day be made?

Solution: The lesson schedule can be viewed as placing 5 out of 10 items:

$$\grave{A}_{10}^{5} = \frac{10!}{(10-5)!} = 10 \cdot 9 \cdot 8 \cdot 7 \cdot 6 = 30240.$$

Issue 4. In how many different ways can 4 candidates be selected from 9 specialists to be sent to 4 different countries?

Solution: $\grave{A}_{9}^{4} = \frac{9!}{(9-4)!} = 9 \cdot 8 \cdot 7 \cdot 6 = 3024.$

According to the table above, the number of placements from k elements to t elements (elements can be repeated)

$$\overline{\grave{A}}_n^k = n^k \qquad (3)$$

is found by the formula.

Problem.. Among the students of the 1st year, a competition was held in the nominations "The smartest", "The fastest", "The bravest" and "The most inventive". If

there are prizes for each category, what is the total number of distributions for these categories?

Solution: Since each participant has the opportunity to receive more than 4 nominations, we use formula (6) to solve this problem: $\overline{A}_{15}^{4} = 15^{4} = 50625$.

Matter. How many 6-digit numbers can be formed using the numbers 3,4,5?

Solution: $\overline{A}_{3}^{6} = 3^{6} = 729$.

This problem can be solved using the rule of multiplication. The number in each position can be selected in 3 different ways, viz

is formed.

According to the table, the number of subsets of m-element sets from n-element sets (the order of elements does not matter)

$$C_n^m = \frac{n!}{m! \cdot (n - m)!} \qquad (7).$$

Is calculated by the formula.

Thus, one of the most important tasks facing the teacher is the development of the student's independent thinking, logical thinking, which allows the student to make logical conclusions, give arguments, statements; teaches to justify one's own conclusions and, ultimately, learn independently, improves mathematical competence.

Used Literature

1. Abzhalov, S., & Matmusayeva, M. (2016). Появление течения хариджитов. *Вестник КазНУ, Серия Религиоведение*, *5*(1), 46-54.
2. Alijon, A., Xoldorovich, S. Z., & Abbosovna, G. M. (2022). Technology of Individualization of Learning. *Spanish Journal of Innovation and Integrity*, *6*, 291-297.
3. Alimdjanovna X. M. et al. CLIMATE CONTROL AND LIGHT CONTROL IN A SMART HOME //European Journal of Interdisciplinary Research and Development. – 2022. – T. 8. – C. 149-155.
4. Azamovna, M. M. (2022). MAKTABGACHA YOSHDAGI BOLALARNI MAFKURA RUHIDA TARBIYALASH USULLARI. *O'ZBEKISTONDA FANLARARO INNOVATSIYALAR VA ILMIY TADQIQOTLAR JURNALI*, *1*(9), 254-257.
5. Dilova N.G. (2021). O‘qituvchi-o‘quvchi hamkorligini vujudga keltirishning pedagogik ahamiyati. Science and Education. Vol. 2, Issue 10, 567-576 betlar
6. Dilova N.G. (2021). O‘quvchilarning shaxsiy sifatlari - pedagogik hamkorlikning dastlabki tamoyili. Science and Education. Vol. 2, Issue 10, 558-566 betlar.

7. Dilova N.G. (2021). Pedagogik hamkorlik jarayonining mazmuni va uni tashkil etish tamoyillari. Science and Education. Vol. 2, Issue 10, 547-557 betlar.
8. Jo‘rayev V. T. The advantage of distance learning courses in the process of education //Scientific Bulletin of Namangan State University. – 2019. – T. 1. – №. 9. – C. 220-224.
9. Jo’rayev Vohid Tojimamatovich A. M. et al. Working With Geospatial and Descriptive Data in A Geoinformation System //Periodica Journal of Modern Philosophy, Social Sciences and Humanities. – 2022. – T. 11. – C. 113-116.
10. Kholdorovich, S. Z. (2022). STAGES OF FORMATION OF STUDENTS'MATHEMATICAL COMPETENCES. *Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL)*, *3*(11), 13-19.
11. Kholdorovich, S. Z., & Zayniddinovich, S. K. (2022). MAIN STAGE AND PRINCIPLES OF ORGANIZING THE PROCESS OF MATHEMATICAL MODELING. *Web of Scientist: International Scientific Research Journal*, *3*(10), 933-939.
12. Matmusayeva, M. (2022). MEDIA SPACE AND ITS INFLUENCE ON THE DEVELOPMENT OF PRESCHOOLERS. *Modern Journal of Social Sciences and Humanities*, *4*, 358-361.
13. Mukhtoraliyevna, Z. S. (2022). DIFFERENCES IN FREQUENCY OF USE OF CONGRUENT WORDS. *Conferencea*, 43-45.
14. Mukhtoraliyevna, Z. S., & G’aniyevna, M. (2022). TYPES OF SPEECH AND ITS CHARACTERISTICS. *БАРҚАРОРЛИК ВА ЕТАКЧИ ТАДҚИҚОТЛАР ОНЛАЙН ИЛМИЙ ЖУРНАЛИ*, 184-189.
15. qizi Tursunova, D. T. (2021). PRINCIPAL AND IMPORTANT FACTORS IN THE FORMATION OF SOCIAL ACTIVITY STUDENT WOMEN. *CURRENT RESEARCH JOURNAL OF PEDAGOGICS*, *2*(05), 53-62.
16. Rasulova Z. (2021). Pedagogik dasturiy vositalardan foydalanib bo‘lajak texnologiya fani o‘qituvchilarining kasbiy mahoratini oshirish yo‘llari. Science and Education. Vol. 2, Issue 10, 416-426 betlar.
17. Rasulova Z.D. (2021). Talabalarning kreativligini rivojlantirishda masofaviy ta’limning o‘rni. Science and Education. Vol. 2, Issue 10, 439-448 betlar.
18. Sayfutdinovna, A. B., Farkhadovich, T. D., & Imomovna, T. N. (2021). Methodology Of Developing Logical Thinking In The Process Of Teaching Mathematics In Grades 5-9 Students Ways To Apply In Practice The Didactic Complex Of Conditions For The Development Of Logical Thinking Of Students In Mathematics Lessons. European Journal of Molecular and Clinical Medicine, 8(1), 948-962.

19. Siddikov, Z. (2017). Structural Methods of Mathematic Model in Doing Minimization and Maximization Exercises. *Eastern European Scientific Journal*, (2), 44-48.
20. Sobirjonovich, S. I. (2022). EASTERN THINKERS'VIEWS ON EVERYWHERE EDUCATION OF CHILDREN. *BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI*, 309-314.
21. Sobirjonovich, S. I. (2022). FAIRY TALES AND THEIR ROLE IN EDUCATION OF PRESCHOOL CHILDREN. *BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI*, 150-155.
22. Sobirjonovich, S. I. (2022). The Concept of Connected Speech and its Significance for the Development of Preschool Children. *Spanish Journal of Innovation and Integrity*, *5*, 518-523.
23. To'xtasinova, N. I. (2019). Psevdoqovariq sohalar va ularning xossalari. FarDU ilmiy xabarlar, 1(2), 111-112.
24. Tursunova, D. (2022). PUBLIC ACTIVITIES AND ITS PERSONS. *BARQARORLIK VA YETAKCHI TADQIQOTLAR ONLAYN ILMIY JURNALI*, 127-130.
25. Tursunova, D. T., Abobakirova, O. N., Buzrukova, D. M., Mahmudova, O. T., Ubaydullayeva, Z. H., & Kholmatova, N. N. (2022). Principal Principles And Important Factors Of Student Women's Social Activity. *Journal of Positive School Psychology*, 6262-6269.
26. Tursunova, Dilnavoz. "THE CONCEPT OF SOCIAL ACTIVITY AND ITS IMPORTANCE IN SOCIAL DEVELOPMENT." *International Scientific and Current Research Conferences*. 2021.
27. Yusupova A.K., To'xtasinova N.I. (2022). Developing Mathematical Intuitation in Students. International Jornal of Culture and Modernity, 495-499.
28. Yusupova, A. K., & Tokhtasinova, N. I. (2022). TYPICAL MISTAKES OF STUDENTS IN ANALYTICAL GEOMETRY AND DIAGNOSTICS OF THE CAUSES OF ERRORS. CURRENT RESEARCH JOURNAL OF PEDAGOGICS, 3(01), 1-8.
29. Zokirova Sohiba Mukhtoraliyevna, & Kholikova Mukhtasar Kurbonali qizi. (2022). GENRE MODEL OF THE CROSSWORD PUZZLE AS AN ENIGMATIC DISCOURSE. *Emergent: Journal of Educational Discoveries and Lifelong Learning (EJEDL)*, *3*(10), 98–103. https://doi.org/10.17605/OSF.IO/DKBH5
30. Zokirova Sohiba Mukhtoraliyevna, & Ruziboyeva Madina Salimovna. (2022). HISTORY OF UZBEK FOLK GAMES. *Innovative Technologica: Methodical Research Journal*, *3*(10), 191–198. https://doi.org/10.17605/OSF.IO/SF3MB

31. А М., Мирзакаримова Н. (2021). О равномерной сходимости случайных полей в C(S). Наманган давлат университети илмий ахборотномаси 1 (6 сон), 34-37.
32. М А., Мирзакаримова Н. (2018). Математик статистика тахлил килиш усулининг бир масалага татбиги. ФарДУ илмий хабарлари 1 (6 сон), 11-16.
33. М М., Мирзакаримова Н., Холматов А. (2018). Применения сравнений к признакам делимости. Фаннинг долзарб масалалари 1 (1), 37-39.
34. Матмусаева, М. (2022). МАКТАБГАЧА ТАЪЛИМ МУАССАСАСИ–МАКТАБГАЧА ЁШДАГИ БОЛАЛАР ИЖТИМОИЙ ТАРБИЯ МАСКАНИ. *IJODKOR O'QITUVCHI*, *2*(20), 130-132.
35. Матмусаева, М. А. (2019). ИНТЕГРАЦИЯ В РАЗВИТИИ ЧУВСТВА РОДИНЫ В ВОСПИТАНИИ ДОШКОЛЬНИКОВ НА ВОСПИТАТЕЛЬНЫХ И ОБРАЗОВАТЕЛЬНЫХ ЗАНЯТИЯХ. *Актуальные научные исследования в современном мире*, (3-4), 103-106.
36. Сиддиков, З. Х., & Матгазиев, Х. М. (2022). ОЗНАКОМЛЕНИЯ УЧАЩИХСЯ С МЕТОДАМИ МАТЕМАТИЧЕСКОГО МОДЕЛИРОВАНИЯ: Сиддиков Зайниддин Холдорович, Старший преподователь, доктор философии по педагогическим наукам (PhD) Ферганкий государственный университет, доцент, кандидат технических наук, Ташкенткий архитектурно-строительный институт. *Образование и инновационные исследования международный научно-методический журнал*, (6), 210-217.
37. Турсунова, Д. (2021). НОВЫЕ ПЕДАГОГИЧЕСКИЕ МЕТОДЫ В ОБУЧЕНИИ РУССКИЙ ЯЗЫК ИХ ПРАКТИЧЕСКОЕ ЗНАЧЕНИЕ И ЭФФЕКТИВНОСТЬ НА ЗАНЯТИЯХ. *Oriental renaissance: Innovative, educational, natural and social sciences*, *1*(9), 728-733.
38. Х А., Мирзакаримова Н., Уринбоев Ш. (2021). Алгебра ва сонлар назарияси фанидан талабалар билимини назорат килишда Б.Блум таксономиясига асосланган ностандарт тестлардан фойдаланишни афзалликлари. Yoshlar-yangi O'zbekiston ,yangi renessans bunyodkorlari 1 (1), 32-34.