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PEDAGOGICAL POSSIBILITIES OF STUDYING PROBABILISTIC STATISTICAL CONCEPTS

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ANNOTATION
This article presents pedagogical possibilities and their features based on an integrated approach to the study of probability theory and Mathematical Statistics. In school education, the goals and objectives of the study of probabilistic statistical materials have been determined, and a complex organizational structure of the pedagogical possibilities of studying the course has been developed. The components of the complex are aimed at the development of students ' abilities "logical thinking", "critical thinking", "probabilistic-statistical thinking", cover the possibilities of systematic improvement of the probabilistic-statistical content, training on the basis of mutual internal involvement of mathematics, training opportunities using computer technology and training opportunities in a differentiated educational environment.

Keywords: probabilistic-statistical thinking, pedagogical possibilities of learning, differentiated education, integrated approach, integrative approach, computer technology.

INTRODUCTION

An increasingly important place in world education is occupied by the expansion of the pedagogical capabilities of the study of the exact and Natural Sciences, in particular, the enrichment of mathematics education with practical and practical content, the improvement of the system of Organization of deepened and specialized mathematics education. Analysis of foreign experiments shows that the development of educational technologies based on an integrated approach in order to deepen the theory of probability and mathematical statistics in the European and US educational systems, improve methodological and didactic mechanisms, pedagogical capabilities, ensure logical, probabilistic-statistical thinking, comprehensive development of students remains one of the most important tasks. In advanced specialized schools and lyceums recognized in the international community, qualities associated with a logical, probabilistic-statistical, non-standard way of thinking are of particular importance as an important criterion that determines the mathematical talent of students. In this regard: improving the methodology and pedagogical possibilities of studying probability theory and mathematical statistics on the basis of integrative, differentiated approaches; the problem of deepening the widespread introduction of acmeological models of adequate development of students ' creative, probabilistic-statistical thinking skills into educational practice determines the relevance.

MATERIAL AND METHODS

At the moment, the theory of probability and mathematical statistics are consistently continuing scientific research on the selection of educational content in accordance with the study at different stages of the educational system, improving its methodology. In particular, new concepts for

introducing elements of combinatorics, probability theory and mathematical statistics into school mathematics education: J.The Mighty, D.V. Manevich, E.A. Bunimovich, U.X. Khonkulov, V.D. Selyutin, S.V. Tsherbatix, H.Stahl, A.Platski, M.Douglas[1]; application of computer technology in the process of studying probabilistic-statistical materials: M.A. Suvorova, M.Charles, R.Sydney; specialization of educational and methodological support, organization of special courses: D.LeMans, M.Russel, L.A. Of particular importance is the work of Terekhova and other researchers[2]. But in scientific research, articles and monographs aimed at studying probability theory and mathematical statistics in schools and lyceums, the problems of applying the pedagogical capabilities of teaching this educational subject on the basis of integrated approaches to the educational process have not been studied as a separate object of study. This necessitates the need to investigate this problem.

RESULTS

The study of the elements of probability theory and Mathematical Statistics strongly affects students in the development of the abilities of various forms of specific thinking first of all "logical thinking", "critical thinking", "probabilistic-statistical thinking", such thinking allows students to apply methods of evaluating, foreseeing, comparing, generalizing, being able to make logical conclusions in different situations, to understand practical applications of mathematics [3]. But even so, the following problems arise between the scientific and pedagogical foundations and the incomplete implementation of the study of probable-statistical educational materials:

-On the basis of determining the requirements for the formation of creative, dialogical and diagnostic abilities of students, the development of specific methodological recommendations, proposals for improving the probable-statistical educational content, teaching methodology and pedagogical capabilities lags behind educational needs;

- Indicates the need to be attentive to the development and recommendation to the educational process of a project of a complex of pedagogical possibilities for teaching probabilistic-statistical concepts (based on connected-integrative, integrative, differentiated approaches;

-The optimal pedagogical mechanisms for organizing special courses in schools and lyceums in the subject of probability theory and Mathematical Statistics, developing the content of the course, teaching methodology and educational and methodological support are working little;

- There is a need to deepen the activities of quality control and monitoring system for the evolution of methods and pedagogical capabilities of teaching probability theory and mathematical statistics, as well as multimedia electronic educational resources, development of lesson developments, application to educational practice, determination of effectiveness.

Based on the analysis and experiments, it can be said that in Japan, England and Yugoslavia, Avtralia, Argentina, Belgium, Hungary, Germany, Poland, France, JAR, school mathematics curricula of the USA, Russia and other countries, the probable-statistical content is 20% -30% of the part, and if we pay attention to the amount of hours distributed to study the subjects in it, then in Deepening the study of probabilistic-statistical topics based on an integrated approach to the content of education and the hours allocated to it by improving the teaching methodology based on an integrated approach or increasing the distribution of educational content and hours allocated to them. If we dwell on the first approach, then, naturally, the content of the section "elements of probability theory and mathematical statistics" of the school mathematics academic discipline is formed under the influence of social need and many factors. The second approach showed us the importance of developing a model for improving the pedagogical capabilities of teaching the above probabilistic-statistical topics, and this

to a certain extent reduces the problems presented above. On the basis of this model, it was envisaged to create a complex of pedagogical possibilities for teaching probable-statistical topics and the content, educational and methodological support of its structural components.

The developed model indicates that the complex is made up of the following four components:

1) Systematic improvement of the content of the sections "elements of combinatorics" and "elements of probability theory and mathematical statistics" of the educational subject of mathematics;
2) Possibilities of teaching on the basis of the mutual internal connection of the educational subject of mathematics (connected-integrative approach;
3) Training opportunities using computer technology;
4) Training opportunities in differentiated educational conditions.

The first component of the complex includes the following aspects of probabilistic-statistical training aimed at improving the content:

- Ensuring the compliance of the educational content in accordance with the minimum requirements for knowledge, skills and qualifications established by the school educational standards;
- Consideration in educational programs of such principles as the state of compliance of the distribution of hours allocated for elements of probability theory and mathematical statistics with the educational content, as well as the consistency, continuity, unity of concepts;
-This branch of mathematics focuses on the socio-economic development of society, its impact on the development of Science and technology, and its role and importance in the education system;
- The volume of educational material that needs to be studied;
- Didactic features of learning, involvement with natural, social humanities;
- Flexibility of teaching educational content to various modern approaches, international significance, testing in the pedagogical practice of the world and our country, educational significance.

The second component of the complex refers to the possibilities of teaching mathematics on the basis of the interaction of the academic subject with each other (connected-integrative approach). In this, the imaginations of the study of probabilistic statistical concepts in internal interconnection in the analytical type are presented. The probabilistic-statistical concepts studied in the school mathematics course are designed on the basis of internal interaction in the analytical type.

For example, a teacher can use the concept of inequality and function to students in the process of studying the concepts of the multiplication rule of combinatorics or probability, and provide examples of the following manifestations in this.

1-example. a ≥ b in inequality a and b instead of 1,2,3,4,5 numbers can be placed. a) how many numbers of inequalities can be formed in total? b) in how many cases will the resulting inequality be incorrect? C) in how many cases a > 6 the inequality will be correct? g) in how many cases will the inequality a>b+2 be correct?.

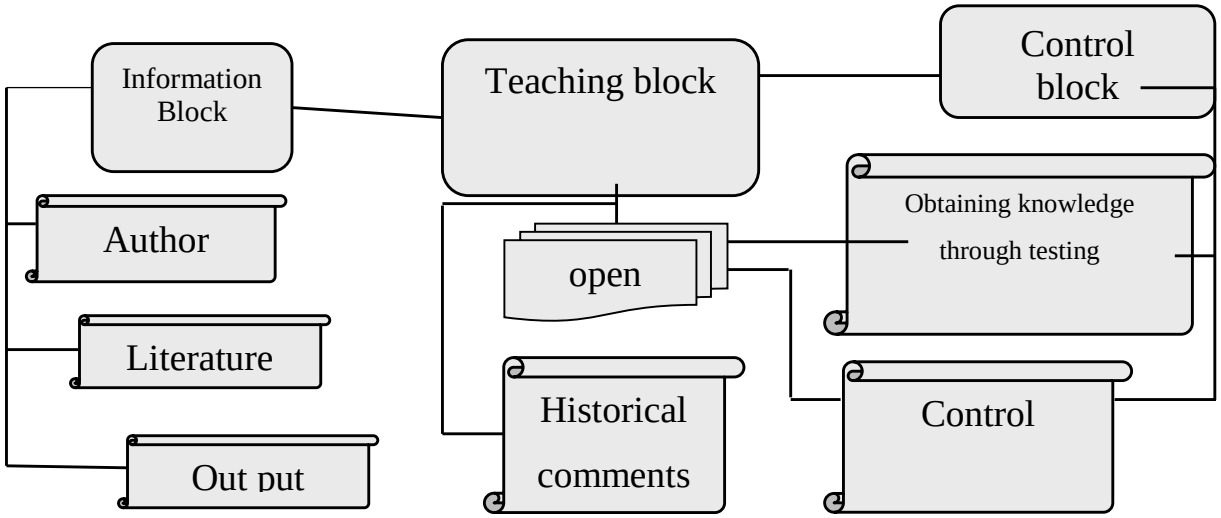
2-example. $-x^2 - 13x + 48 \geq 0$ тенгсизликнинг ечими бўлган ихтиёрий бутун сонни танлаймиз. Танланган сон қуйидаги тенгсизликнинг ечими бўлиши эҳтимоллиги қанча: а) $4x^2 + 20x + 21 < 0$; б) $x^2 + 10x \leq 0$; с) $x^2 > 0$; д) $x^2 < 101$;

3-example. $y = \sqrt{ax + b}$ given a function. a coefficient$-2,-1,1,2,3$ optional selection of numbers, b while 2,3,4,5 selected from the numbers. a) How many functions in this view can be generated in

total? b) what is the probability that a randomly selected function will be a grower? C) What is the probability that a randomly selected function will be a diminutive?

The third component of the developed complex implies the pedagogical possibilities of teaching probability theory and mathematical statistics using computer technology. In this educational content objectives (educational, educational, developmental, teaching tasks and principles); methods (teaching mathematics through examples and issues, explanatory, inductive, deductive, reproductive, problem statement, partial research, research, work with technical means, computer modeling); tools (multimedia electronic educational literature, a Specially Selected system of examples and issues related to the implementation of graphic illustrations and standard functions of the Excel program); improved form (Group, General, individual, independent education and distance education). For methodological support, consisting of three blocks (information Block, training block and control block) based on the use of computer technology, a multimedia electronic educational literature called "combinatorics, probability theory and Mathematical Statistics" was developed.

The structure of multimedia electronic educational literature called" combinatorics, probability theory and Mathematical Statistics".



The structure of the three blocks of this multimedia electronic educational literature, which provides the student with a variety of forms of repeated training and assessment of his knowledge, control, combines the following elements. cover (name of the organization ,name of Electronic Literature, time of creation, name of parts that make up three blocks, graphics and multimedia, effects enriched with animations); contents (list of topics, drawings on the subject and various animations); theoretical classes; practical classes; control tests; presentations; additional literature; historical information; information about the author; list of literature (name of Internet sites, foreign and domestic literature). In practical classes, students will be able to independently use the EXCEL program studied on a computer, having received the necessary tasks from the fan section of this multimedia electronic educational literature in the online system.

The fourth component of the complex provides for the possibility of studying probabilistic-statistical materials in a differentiated educational environment based on the organization of special courses. The organization of special courses in schools, where mathematics is taught in depth, which continue the content of educational science inextricably, provide practical training for students, provide the necessary system of knowledge for deepening and mastering the academic discipline, is important in

realizing students ' talent. A special course called "Elements of probability theory and Mathematical Statistics" was designed, aimed at improving teaching in a differentiated educational environment, and the organization of this course allows you to provide sufficient conditions for the implementation of a practical orientation of teaching, as well as the introduction of teaching using computer technology. The task of this course is to carry out the following:

- Development of combinatorial, probabilistic-statistical, logical thinking of students by placing more emphasis on the practical part of the course;
- Development of skills and abilities of students to solve practical problems encountered in Real life by relying on combinatorial, probabilistic-statistical techniques;
-It consists in the development of students ' interest in the study of probable-statistical topics through the implementation of multimedia Electronic Literature and Excel in the educational process[4].

DISCUSSION AND CONCLUSIONS

Experimental analyzes require continuous improvement of the content, form, methods, means of studying probability theory and Mathematical Statistics and the methodology for introducing it into educational practice based on social and educational needs. These circumstances made it possible to develop a complex of pedagogical possibilities for teaching probability theory and mathematical statistics, as well as its components, educational and methodological support, proposals and recommendations. A model for improving the pedagogical capabilities of teaching was designed, and its leading idea is to develop logical, critical, probabilistic-statistical thinking of students, to interpret the practical significance and place of mathematical education. The content, educational and methodological support, proposals, recommendations and educational and methodological support of the components of the complex, developed on the basis of the principles of evolution of the pedagogical model and the content of Education (dependence and representativeness, completeness, historical significance), confirm its effectiveness in experimental and test work. As a result of the experimental and test work carried out, an increase in the average mastering indicators of students by 10.2% is achieved. We give the following methodological recommendations on improving the pedagogical capabilities of teaching probability theory and mathematical statistics in schools without usluk:

-The sections of the school mathematics course "combinatorics elements" and "elements of probability theory and mathematical statistics" should be filled in stages with practical content based on consistency and continuity;
-It is advisable to strengthen the use of multimedia electronic educational literature and mathematical packages in mathematics education in order to master the applied aspects of probabilistic statistical materials, seek non-standard solutions, direct students to innovative activities and teach approximate calculation;
-The study of probabilistic-statistical materials on the basis of a connected-integrative approach leads to continuous repetitions of mathematical concepts. Repetition is important as a means of preventing, strengthening the oblivion of the studied learning material by students, ensuring the internal integration of mathematics;
-It is advisable to introduce a special course of probability theory and mathematical statistics as one of the effective ways to carry out level and specialized differentiation in school education[5].

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As a result of the experiment, it was found that the practical implementation of the complex aimed at improving the pedagogical capabilities of teaching probabilistic statistical materials leads to the effective assimilation of educational materials by students, as well as the development of their interest in cognition. This makes it possible to conclude that mathematical education leads to an increase in efficiency.

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