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THE IMPORTANCE OF PRACTICAL TYPE PROBLEMS IN INCREASING MATHEMATICAL KNOWLEDGE FOR AGRICULTURAL STUDENTS

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Abstract: It is the duty of every professor-teacher to develop mathematical and logical thinking of students studying in the field of agriculture and to teach mathematical problems of practical type in its application in practice. Improving students' mathematical knowledge creates the characteristics of overcoming problematic situations, developing their intellectual skills and leading them to deep and perfect knowledge.

Keywords: mathematics, problem-based learning, applied problems, mathematical analysis, agriculture, probability, correlation dependence, variance analysis.

In the education system of the developed countries of the world a number of positive works have been done on the application of mathematics to the specialty, which serves to develop students' independent and creative thinking skills in the organization of lessons in mathematics.

Reforms in the development of the education system, strengthening the content, infrastructure and material base of higher education institutions are radically improving the quality and efficiency of education, expanding the opportunities for the introduction of advanced educational technologies and software in the teaching process.

Particular attention is paid to the development of an economically developed society, mathematics to actively promote scientific and technological progress. Modern scientists use mathematical analysis, regression analysis, game theory, linear programming, matrix and vector arithmetic, and other methods of mathematics to study economic processes, which in turn are components of mathematical modeling.

Ensuring the assimilation of new mathematical ideas, concepts, methods in the teaching of mathematics in higher education institutions is a very important task, in particular, it is desirable that the computational (quantitative) side of the studied material is not dominated by content (quality). The tools of teaching mathematics play an important role in solving this educational problem. It is well known that in order to design, optimize and manage the learning process, it is necessary to use training materials such as equipment models, printed publications, on-screen manuals, teaching and learning tools and technical teaching aids[3].

A distinctive feature of teaching mathematics is that problems and examples serve as the main means of teaching, representing not only mathematical content, but also acting as a carrier of mathematical activity that forms the method of mathematical thinking. This means that more attention needs to be paid to solving a sufficient number of tasks and exercises to form both probability theory and mathematical statistics

content and procedural component. Only in this case, the presentations, concepts, methods, algorithms become the means of thinking of the student[4].

When studying sections of mathematics, such as probability theory and mathematical statistics, and in the process of solving existing problems, it takes so much time, mental activity, and attention from students that they no longer understand the theoretical content of the new learning material. This can be seen in the study of topics such as elements of combinatorics, probability multiplication theorem and its consequences, discrete random variables, testing of statistical hypotheses, linear correlation, and more.

It is known from our many years of experience working in an agrarian higher education institution, the allocation of fewer hours for practical training in teaching mathematics to students does not allow large-scale calculations to form the knowledge and skills required for a particular subject for all students in a limited time of a few hours and to address a sufficient number of problems.

Nowadays, mathematical methods are increasingly entering all spheres of society. A high level of mathematical training is relevant and necessary for a graduate's success in the job market. Employers expect young professionals to take responsibility, think logically, analyze and predict the results of their activities. Mathematics, whenever possible, contributes to the formation of these skills.

"Why should I study mathematics?", "Do I need mathematics for my specialty?", "Can I apply mathematics to my specialty?" and "How will math benefit me in my next life?" Based on such questions from students, one of the tasks of the problem-based

In the problem-based learning method of pedagogical technology, the learning content is organized as a set of problem situations. In this case, the optimal way is to include problematic situations in the traditional description of the training material.

Problem-based learning is education that focuses on the formation of skills and competencies in students, such as creative research, small research, making certain assumptions, substantiating results, and coming to certain conclusions[2].

The application of problem-based learning to the practical application of mathematics in mathematics stimulates students' activity: discussions and debates intensify, opinions begin to emerge, the structure of correct answers begins to appear, questions change, many things become clearer, which in turn indicates that it has risen to a new high-quality stage. In addition, students begin to gain a deeper understanding of the root meaning of the material being studied in a short period of time. [5]

We can say that **practical problems** are problems in various spheres of life that are not related to mathematics, but are solved using mathematical methods. Mathematical problems of a practical type in the field of agriculture are the tasks and problems of agriculture that can be solved using this mathematics.

Mathematical problems of practical type in the field of agriculture must meet the following requirements:

1. The content of the problem and its solution should demonstrate the connection between agricultural practice and the problem posed by the mathematical apparatus.

2. Solution methods should be aimed at applying theoretical knowledge to agricultural problems.

3. The assignment should be relevant to the goals and objectives of the mathematics course. For example, the topic of "product and differential" is one of the central topics of a mathematics course. But learning it is hardly given to students.

Using the table values and differentiation rules of products, you can use the following tasks to practice finding the largest and smallest values [1]:

1. The artificial pond for carp farming has a rectangular shape, with a semicircle (inside) filled on both sides. The perimeter of the pool is 80 meters. In which radius of the semicircle will the area of the pool be the largest?

2. It is required to build a flower garden and surround it with a decorative fence. The perimeter of the flower bed should be 6 meters. Determine the size of the flower bed so that it requires the least amount of material.

3. Determine the size of the reservoir for the area where the calves will be irrigated with the square bottom and volume, so that the least amount of material is used for its construction.

The solution to each of these problems involves: analyzing the problem, abstracting and writing the condition in mathematical language, finding the product, studying the extremum, moving from mathematical results to problem language.

Differential equations describe many physical and biological processes. However, traditionally, only the basic types of differential equations and methods of solving them are considered in the educational process.

It is not surprising that students do not see a connection between differential equations and agricultural problems. However, differential equations are widely used in the modeling of biological processes. The following assignments can be used when studying this topic:

1. Draw a differential equation for a change in body temperature and find its solution. The rate of temperature change is characterized by a coefficient and ambient temperature. Body temperature can be found in an instant.

2. Draw a differential equation describing the dynamics of reproduction of the biomass of rabbit populations and find its solution. The initial biomass of the population is known to be proportional to the biomass of the population with the coefficient of reproduction of the rabbit biomass. At the same time it is possible to find the biomass of rabbits.

When constructing a differential equation, students remember the physical meaning of the product (the rate of change of physical processes) and use it to solve the problem. By accepting the differential equation, its shape and solution method are established. Integration skills are applied in practice in finding a general solution of a differential equation. The solution is to interpret the results.

Separating random and non-random events, systematizing recorded data, is a daunting task that involves many numbers. Knowledge of probability theory and mathematical statistics is important in solving this problem. The following tasks can be used when studying topics[1]:

1. A farmer has two cows. The probability of giving birth to the first cow is 0.6; the second is 0.9. Find the probabilities of the following:

1) both cows calve;

2) at least one cow gives birth;

3) Only the first cow gives birth.

The task allows the development of a classical probability formula, operations on events, the sum and probability of the product of an opposite event.

2. The probability that a Holmogori calf weighs more than 40 kg is 0.8. Distribute a number of calves weighing more than 40 kg from 4 newborn calves. Calculate the

expected value and variance. Find the probability that at least 3 out of 4 calves weigh more than 40 kg.

3. The probability that the mass of the apple is more than 160 g is 0.9. Draw a distribution line of the number of apples weighing more than 160 g from 5 apples. Calculate the expected value and variance. Find the probability that at least 3 out of 5 apples weigh more than 160 g.

Problem analysis allows the values of a random variable to be determined. Appropriate probabilities are found using the Bernoulli formula. Formulas for finding numerical characteristics (mathematical expectation, variance, standard deviation) are being developed on the basis of previously constructed distribution series.

4. Birth veal weight is a random variable distributed according to the normal law with a mathematical expectation of 5 kg and an average deviation of 1 kg. What is the percentage of newborn calves from 4.5 kg to 6 kg ?, What is the range of change in beef weight ?, Find the probability that the deviation of beef weight from the standard value to the absolute value does not exceed 2 kg.

The Laplace formula, the "three sigma" rule, allows students to answer problematic questions.

5. Determine the significance of the effect of the catalyst composition on the chemical reaction time at the significance level. Catalyst composition replications (experimental number)

1, 2, 3, 4, 5, 5, 5, 5, 9, 6, 5, 6, 0, 10, 5, 1, 6, 2, 5, 3, 4, 5, 15, 6, 8, 7, 5, 8, 2, 8, 0, 6.

Using a variance analysis method to verify that the increase in calf weight (g) depends on the protein content (g) in the feed. Determine the significance of the effect on protein content (factor). Protein replication is as follows:

1, 2, 3, 4, 80, 520, 530, 550, 540, 90, 550, 570, 580, 570, 100, 610, 620, 590, 580

Analysis of options issues requires special attention from students and accuracy of calculations. They present difficulties in arithmetic character, while at the same time teaching students to be attentive and responsible.

The solution is reduced by finding and comparing factorial and residual variance, which allows us to assess the significance of the effect of a given condition on the attribute under consideration. Often, the measurements taken indicate that there is a relationship between the quantities. Determining the closeness of this relationship, as well as how one quantity relates to another, the degree of correlation dependence of the observed random variables is estimated.

Calculating correlation and regression coefficients is very difficult because a large amount of initial data needs to be processed. The following types of assignments are used to develop students' numeracy skills:

6. Using the method of correlation analysis, study the relationship between the average annual milk yield (centner) per cow and feed consumption per cow per year (centner). Calculate the regression and correlation coefficients. Graph the correlation dependence.

31.9, 37.6, 33.3, 40.3, 33.7, 35.8, 35.1, 34.5, 34.9, 38.2, 40, 41, 41, 43, 43, 44, 45, 42, 42, 43, 8.

Using the correlation analysis method, check the relationship between the specific gravity of the potato (kg) and the amount of starch (%).

Calculate the regression and correlation coefficients. Graph the correlation dependence

1.05 1.06 1.08 1.08 1.07 1.09 1.06 1.10 1.11 1.87 10 12 15 13 13 16 11 17 19 14

The application of mathematics in biology, zootechnics, agronomy, agrochemistry and other fields of agriculture is developing year by year. Experiments conducted by experts require large financial outlays. In this regard, they always require careful planning based on analysis using mathematical apparatus. [6]

In short, methods of mathematical analysis, synthesis and abstraction, methods of precise calculations and complex calculations are widely used. In this regard, the study of practical aspects of mathematics, the solution of problems of a practical nature is very important for future professionals in the field of agriculture.

Working in difficult conditions of the application of mathematics to specialties improves the knowledge of students, gives them the ability to overcome difficult situations, to develop their intellectual skills, leads them to a deep and perfect knowledge.

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