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PROBABILITY THEORY AND MATHEMATICS OBJECTIVES OF TEACHING THE DISCIPLINE STATISTICS AND THE ESTABLISHMENT OF INTERDISCIPLINARY LINKS IN THE TEACHING OF THIS DISCIPLINE AND ITS IMPLEMENTATION IN PRACTICE

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Annotation
The development of their professional competencies is directly related to the study of economics, as well as mathematics, in particular, with the development of probabilistic and statistical methods. For example, the relationship between wages, raw material consumption and labor productivity in production is modeled on the basis of probabilistic and statistical analysis and methods. Internal and external variability in each economic process, i.e. variations are studied on the basis of the variation characteristics of these socio-economic phenomena, the patterns of their development are determined by probability theory and mathematical and statistical methods.

Keywords: mathematical statistics, mathematical content, computer mathematics programs

Analytical conclusions are evaluated with a certain degree of probability, which means that the results of a particular investigation may lie within what limits, are reliable. When observing socio-economic phenomena, the mathematical probability of an event is expressed as a statistical law of its stable relative frequency of repetition. This is the result of applying probability theory and the law of large numbers of mathematical statistics to socio-economic phenomena under certain conditions. In probability theory, we develop a mathematical model of the economic process, and in mathematical statistics, we build a mathematical model of economic processes based on the influence of some random factor, and analyze the aspects that interest us. In this sense, mathematical statistics is aimed at constructing a probability-theoretic model of the studied economic process using its inference methods. Probability theory and mathematical statistics describe socio-economic phenomena in their own way and usually serve to determine the laws of change of the studied process on the basis of statistical data consisting of numbers.

Therefore, in the professional training of future economists, the practical and professional orientation of training in probability theory and mathematical statistics is important.

This article discusses the role and importance of practical and professional training in probability theory and mathematical statistics in the professional training of future economists, and explains the tried and tested methods for implementing this process with examples.

In Uzbekistan, until 2015, "Probability theory and mathematical Statistics" was studied as a separate discipline in the field of economic education in higher educational institutions. Currently, the content of probability theory and mathematical statistics is considered in the course "Mathematics for Economists". In addition, the content of such disciplines of the specialty as "Fundamentals of Econometrics", "Statistics" to some extent includes probabilistic and statistical concepts. From the 2020-2021 academic year, some universities based on the credit-modular system began to offer teaching of mathematical subjects such as "Applied Mathematics 1" (APPMAT16), "Applied Mathematics 2" (APPMAT26), "Statistics" (STATIS6), "Introduction to Econometrics" (INTECON6) in these areas.

Features of probability theory and the content of mathematical statistics aimed at the professional training of future economists, training issues are not without problems. In particular, the influence of the principle of "practical-professional orientation of training" on the development of professional competencies is poorly studied. The content of training and the adequacy of the existing textbooks of the specialty are insufficient. Probabilistic-statistical models and practical-professional issues are not systematically reflected in the content of mathematical education. Students who have mastered the purely mathematical content face difficulties in analyzing economic processes, solving and modeling professional and practical problems.

The content of the special course "Elements of combinatory, probability theory and mathematical statistics" for the directions of academic lyceums "Exact Sciences" and "Natural Sciences «has been developed and put into practice.

Mathematical education begins with concrete practical experience, exercises, and moves on to abstract concepts. Professional experience is formed in practice. In this sense, the "practical-professional orientation of training" is of particular importance in the study of probability theory and mathematical statistics.

In pedagogical research, the term "practical orientation of teaching" is defined as "the formation of knowledge, skills and competencies in the use of mathematical apparatus

in solving specific practical problems through the implementation of the relevant content and methodological communication of mathematical education".

The analysis and generalization of the various views led us to include the following definition:

Practical and professional orientation of training - the type, content, form and means of educational activity, including practical exercises aimed at the formation of professional competence. As a result, a fully developed personality of a specialist is formed, ready to dynamically solve professional problems.

In the professional training of future economists, the "practical-professional orientation of training" of probability theory and mathematical statistics can be considered as directly or indirectly related to practical-professional tasks.

We have divided the problems related to probability theory and mathematical statistics for economists into the following three types, depending on the method of presentation:

1. Pure math problems. Problems of purely mathematical content that can be solved using mathematical formulas and concepts based on a rigid algorithm.
2. Practical and professional tasks. Mathematical problems related to professional activity.
3. Problematic practical and professional tasks. The problem is not formulated in mathematical language, but is presented as a problem. In this case, it is necessary to solve the required problem, which is carried out through practical activities, and as a result, the mathematical form of the problem is formed.

We believe that the solution of problematic practical and professional tasks can be carried out in three stages:

Stage 1: At this stage, the condition and conclusion of this task are separated; the content and essence are clarified. What needs to be found is determined, and once the condition and the output of the tasks are separated, a clear practical action is determined. The problem is then reduced to a mathematical form.

Stage 2: This stage is focused on planning and choosing a method for solving problems. What additional information is needed for its application, the solution plan is determined and implemented step by step. At this stage, if the information provided is sufficient to solve the problem, the method of solving it is selected. If there is not enough data, it is determined what additional information is needed, and then a solution plan is developed. Based on this, it is gradually approaching the correct solution.

Stage 3: At this stage, the task is solved in accordance with the planned plan, errors are identified and corrected, and the solution is checked directly. At this stage, students understand the importance of professional tasks and the role of probabilistic and statistical methods based on experience and practice.

When studying the disciplines of the probability cycle, difficulties often arise due to the cumbersome formulas and "bad numbers" in the analysis of real phenomena, the need for a large amount of routine calculations [6]. Often, when performing them, students lose the logic of reasoning, do not see the connection between the problem statement and the result obtained [4]. Also, in engineering practice, problems often arise, the analytical solution of which is often practically unrealizable or requires too much solution time and / or costs. Therefore, the skills of numerical solution and modeling are of particular importance in the framework of a systematic approach to solving the problem.

In addition, often a separate part of the stream is not able to conduct mathematical calculations in principle due to their lack of the necessary skills or because of forgetting the material passed in the first courses. This becomes especially evident when teaching undergraduates, whose groups are very diverse in their composition and previous education. Therefore, when solving problems, personal computers, tablets or smart phones can be used, on which special software packages are installed. According to, the choice of a particular technology should equally be determined by the availability of certain material resources and the expected learning outcomes. The use of digital technologies has a significant impact not only on the learning process, but also on the perception of the discipline being studied and its laws.

It is important to note that the successful analysis of random phenomena requires extensive interdisciplinary knowledge, including the fundamental disciplines of the mathematical cycle. Innovative teaching methods, including those considered in this study, are aimed at revealing these connections, as well as at maximizing the visualization of the considered schemes and phenomena.

It is known that programming is one of the most difficult disciplines for students who have not studied it before, for example, in school, and also requires a significant amount of time. In addition, due to their great diversity, it can be difficult to ensure knowledge of the same language in a large stream consisting of groups of different specializations of training. It will be more convenient to use computer mathematics programs, such as Mathematica, Matlab, Mathcad, the basics of which can be learned much faster.

A didactic method of teaching the disciplines of the probabilistic cycle using innovative educational materials (demonstration materials and interactive templates for solving problems), prepared with the help of computer mathematics systems for engineering students, is proposed. The proposed methods provide visualization of the obtained results, reduce the amount of routine calculations, and reveal the interdisciplinary connections of probabilistic disciplines with other disciplines of the mathematical and professional cycles. They can be used within the framework of a module-rating system for monitoring the educational process, representing a supplement to the methodological complex of the discipline, increasing the interest of students and motivating them to achieve high learning outcomes. Within the framework of the considered didactic technique, it is possible to use various teaching methods, including competitive and game ones.

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