EARTH SCIENCES

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STATISTICAL METHODS OF MASTERING THE GEOGRAPHICAL DISCIPLINES OF BACHELORS IN THE DIRECTION OF PREPARATION "GEOGRAPHY"

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Abstract

Statistical materials are widely distributed in geography. They are an integral part of it. The statistics in geography include all kinds of numerical data, such as heights, depths, population numbers, climatic indices, various coefficients (humidification, volatility, radiation balance) and affect absolutely all sections of geography. In the article methods of using statistical data in the development of geographical disciplines for bachelors of the direction of preparation "Geography" are considered.

Keywords: demography, calculation, coefficient, facts, phenomena, percentages, justification, tables, formulas.

Various disciplines, such as demography, economic and social geography of Russia and the world, topography, cartography, geomorphology, physical geography of continents and oceans, use statistical methods in teaching. The use of this method helps to strengthen the ability to generalize and analyze digital indicators and draw the necessary conclusions, with their subsequent demonstration in the form of graphs, population growth dynamics, agricultural and industrial products, etc. The use of statistical materials develops cognitive activity of students, independence in assessing geographic facts and phenomena, acquaints students with the methods of scientific knowledge - observation, analysis, generalization, arming students with scientific guidelines

ipami study of natural and social phenomena, being at the same time support for valid conclusions and inferences.

The statistical method is a set of methods for collecting, processing, analyzing and interpreting quantitative data characterizing various natural and socio-economic phenomena. Absolute values have an informative value, with their help are given the size of geographical phenomena, for example, the size of the territory, the population. They are expressed in: natural units of measurement (tons, kilograms, kilometers, square meters); conditionally-natural (tons of fuel equivalent); value (give a monetary assessment of socio-economic phenomena and processes).

Relative values express the result of comparing absolute values with each other, allow us to detect certain patterns in the change in geographic phenomena, for example, average temperatures, population density, etc.

Coefficients are indicators that reflect the characteristic features of individual phenomena. In geographical disciplines, this type of statistical indicators is represented by wetting factors, specialization of economic regions, growth rates of industrial production and population, and others.

An important methodical method for carrying out qualitative analysis is comparison. For example, comparison of an unknown type of climate with the climatic conditions of its terrain.

In the course of physical geography of Russia and the physical geography of continents and oceans, the concept of "climate" is more differentiated on the basis of work with generalizing statistical indicators: the coefficient of moistening, total solar radiation absorbed by solar radiation, volatility. The study of this material requires systematic work with the textbook, which explains in detail the meaning of each indicator, the sequence of actions to determine it, the implementation of practical tasks using the relevant indicators.

Work with statistical materials in the courses of physical geography is more effective under the following methodological conditions: systematic work with the textbook; actualization of intersubject communications; availability of visual descriptions of climatic phenomena; close coordination of weather observations with the concepts of "weather and" climate "; a comparison of weather and climate of different parts of the Earth and the terrain, changes in surface water parameters, water level in water bodies, etc.

In the course of economic geography, the analysis of statistical materials, the comparison of statistical characteristics, the construction of graphs, diagrams are most widely used. Data tables are the main source of statistical information. Simple tables systematize the materials of statistical observation on such parts and units that serve as objects of economic planning. Group tables are based on qualitative or quantitative groupings of phenomena,

for example, grouping the population by sex or dividing the population into urban and rural [4].

The use of statistical materials in the passage of economic and social geography is advisable under the following methodological conditions: when using statistical materials as an independent source of economic and geographical knowledge on the basis of teaching students the acceptance of analysis of the statistical table, the construction of graphs and diagrams, making comparisons; in connection with the theory of the question under study and its statistical characteristics; when using intersubject communications with mathematical disciplines in the course of constructing diagrams, graphs, and performing computational operations; when using the text of the textbook and maps to work with statistical materials; with the use of statistical materials in the classroom during the study of new material, as well as to be consolidated as a means for specifying theoretical positions and as a basis for generalizations and disclosure of certain economic and geographical patterns. The most widespread in the disciplines of economic geography is the construction of sectoral and column diagrams and graphs, i.e., such types of diagrams, the construction of which does not require extensive work to determine the scale.

The methodology of using statistical indicators in geographical disciplines is complicated and consistent. The task of the teacher is not just to introduce one or another necessary indicator into the knowledge system as a quantitative characteristic of the object under consideration, but also to teach them how to calculate it and demonstrate the analytical value of identifying and revealing geographic features and patterns. The complexity of the methodology of teaching students how to work with statistical indicators allows us to distinguish several stages in it:

The first stage is the formalization of the indicator, which consists in keeping the name of the indicator of its conditional (alphanumeric) notation. To make it easier for students to memorize the indicator studied, it is most appropriate to use the letters that coincide with its name. Scientific names of some statistical indicators presented in geographical disciplines should also be simplified.

The second stage is the definition of the indicator and the disclosure of the purposes of its application, which will allow students to understand its essence and purpose, that is, make its use for practical purposes conscious. The definition of an indicator, as well as its name, should not be cumbersome and pseudo-scientific, which prevents students from understanding and remembering it. On the contrary, it is necessary to simplify it and make it accessible for memorization and reproduction. Thus, the total fertility rate can be designated as the number of annual births per 1000 population per 1000 population, and the migration balance as the difference between the number of immigrants and emigrants per year (or other period) [3].

It is important to emphasize for students and the purpose of applying this indicator in a specific learning situation, a specific topic of the lecture. Most often they are reduced to determining the magnitude (scale) or level of a phenomenon or feature in a set of geographical objects, the characteristics of its territorial differences or dynamics. The teacher is obliged to indicate to which group of absolute or relative indicators this indicator belongs, together with students to determine its analytical value, and then, for example, to disassemble its direct use [8].

The third stage is the solution of the mathematical model, in which the teacher must present the students a formula for calculating the input indicator and determine its units of measurement. In this case it is necessary not only to write the formula of the corresponding indicator, but also to read it, to ask the students to do the same.

The fourth stage is the geographical interpretation of the statistical indicator, under which there is a transition from a mathematical model to real geographic conditions. This stage is important in the methodology of teaching students statistical indicators, since in the course of it, their peculiar approbation in practice is carried out, that is, the calculation of specific values of the indicator according to the data provided by the teacher or in the textbook. This allows not only to consolidate the theoretical knowledge, but also to form the skills of calculating and analyzing the students' indicators initially together with the teacher, and then independently. To do this, you need to select a few simple tasks that can be represented as an element of practical work. For example, calculate by the derived formula the population density of large regions (continents or territories) and compare them with each other and with the world average. In addition to the calculation, students can be offered to display the values found in a graphic or cartographic form [6].

One of the most effective ways to use the calculation of statistical indicators in geographical disciplines is computational geographic problems. The purpose of their application is to familiarize students with the methods of geographical analysis based on the calculation of statistical indicators characterizing the phenomena and objects studied. It is possible to distinguish several principal types of such problems: the calculation of relative indicators, based on absolute values; translation of relative data to absolute; Determination of the change in the value of the statistical indicator when the given conditions are met [7].

The use of demographic problems as one of the forms of admission to the calculation of statistical indicators is a means not only to consolidate the knowledge of students in the disciplines taught, but also to expand their scientific horizons. It introduces elements of microgeographic research into the learning process. At the same time, all types of tasks should be adapted to the

level of knowledge of students and can, if necessary, be complicated by combining several indicators simultaneously.

The textual method of presenting statistical information consists in a written analysis of the values of the found indicators. It is quite cumbersome and time consuming, as it requires a lot of academic time for students, but at the same time it develops the logical abilities of students, teaches them to consistently and scientifically correctly express their thoughts, draw conclusions based on the values of the statistical indicators defined by them.

The most compact and more comprehensive form of quantitative data in geographic disciplines are statistical tables. They are a system of rows and columns in which statistical information is presented in a certain order. Simple tables, where a general list of geographical objects or elements of the phenomenon under consideration is given, give grounds for comparing them among themselves. Group tables contain several groups of studied objects, identified by qualitative or quantitative trait, which allows us to characterize the structure of the studied population, for example, the population - by sex, age, ethnicity, religion; enterprises - by branches of the economy, forms of ownership, number of employees [1,5].

The most visible form of displaying statistical data is graphical, expressed by graphs and diagrams. Representation of them is laid by students in the study of higher mathematics and cartographic drawing, and is developed and supplemented in the study of other geographic disciplines. The graphs illustrate the position of the object and its parameters in the coordinate system. They are most useful for displaying the dynamics of the value of statistical indicators characterizing a certain feature over time, for example, population growth, change in the average monthly air temperature during the year.

In the study of bachelors of geographical disciplines, specific forms of graphic images are used, which simultaneously combine the features of both graphs and diagrams. These are climatodiagrams and sex-age pyramids, as well as systems of graphs of differently directed phenomena, constructed in one coordinate plane and allowing one to trace their interconnected course. The first are bar graphs, plotted in a coordinate system and giving information on the amount of precipitation by months of the year. They are combined with the line of the graph reflecting the dynamics of the average monthly air temperature during the year in a given locality. This combination of the precipitation diagram with the air temperature graph allows not only to analyze their successive progress in months, but also to reveal the features of the distribution by the seasons of the year, and eventually determine the type of climate inherent in the area.

The sex-age pyramid is of great analytical value, since it clearly shows the sex ratio by age groups of the population, and consequently, on their basis reflects the characteristics of both the sex and age structure of the population.

For its construction along the vertical axis, at equal intervals, age is set aside in the form of age intervals (for example, 0-5, 5-10, 10-15, and so on), and on the horizontal - to the left the number or proportion of men, and to the right - for women (in to the same scale). For each age group, according to the available data, they postpone their linear diagram, "stringing" them one after another from bottom to top - from the base of the pyramid to its apex. The possibility of using sex and age pyramids in geography is also due to the fact that the quantitative data on the correlation of the sexes and age groups of the population can be used for further calculations of generalizing demographic indicators (for example, demographic load factors of the population), their analysis and interpretation [2].

Among the cartographic images for the presentation of statistical data, cartograms and cardiograms are most widely used. Cartograms find their application when displaying, in the main, relative statistical indicators that characterize, for example, the population density for individual administrative-territorial units of the state, the level of urbanization, the availability of arable land or a transport network, and the per capita electricity production. In them, statistics are displayed using different hatching or coloring of territorial units in accordance with the chosen scale of the quantitative indicator distribution. In contrast, the cartograms, in general, display absolute data-the population of individual administrative-territorial units, the volume of oil production, and the smelting of cast iron. When they are constructed within each territorial unit, the value of the corresponding indicator is displayed by means of a diagram figure, the size of which is proportional to the size of the feature being studied. When working with statistical cards, students should master the methods of reading and building them according to the given numerical values of the indicator, which makes it possible to actively use them.

The training of statistical methods should be from simple to more complex, it should be linked with the level of preparation of students for other subjects directly related to the solution of statistical problems. It is necessary to apply along with the digital data and visual training methods: diagrams, cartograms, climatograms and so on. A visual representation of the values makes it easier to comprehend and understand the meaning of the given statistical data. It also helps to better understand and remember the new material using a variety of methods of filing this material, which is clearly seen in the example of reading and writing various formulas.

Statistical material in the teaching of geographical disciplines is of great importance throughout its course. And the task of the teacher is to teach students correctly and correctly use statistical data and methods. So that students can not only analyze the phenomena taking place on their basis, but also draw conclusions about the possible development of processes in the future.

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