

GIS TECHNOLOGIES IN MODERN GEOGRAPHY EDUCATION

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Abstract. *At various stages of the development of society, terms such as computerization, educational information, geographic information technologies, and geographic information systems began to appear.*

The article describes the issues of modeling the geographic space and improving the effectiveness of the educational process using GIS in the geography teaching methodology.

Keywords: *the digital map, geographic information, scaling, distance, direction, coordinate, object, volume, area, climate, relief.*

The current level of development of society and the education system requires the preparation of a new type of teacher who can work in changing conditions. At the current stage, the state, society, and higher education are faced with a new task - the task of creating a modern education industry. Each period sets new goals, and tasks, which it implements in material and spiritual production, through pedagogical activity, which cannot be the same for all times according to its content. That's why every historical period demanded and still demands its content in education, upbringing and teaching.

The emergence of geographic information systems (GIS technologies), geographic information systems dates back to the early 60s of the 20th century. It was at that time that the necessary conditions and conditions for informatization and computerization of the fields of activity related to the modeling of geographic space and problem-solving appeared.

GIS technologies equip students with various skills in working with geographic maps, and help to transition from traditional school to digital school, where the educational result is achieved through the effective use of digital technologies. It emphasizes the main role of cartographic knowledge and skills and reflects the specific features of students' acquisition of the content of school geography. In the development of geography education, GIS technologies are defined as modern tools that allow information to be presented conveniently for perception.

Digital technologies such as artificial intelligence, virtual reality, cloud services, QR codes, and dashboards are being actively introduced into all aspects of human activity. At different stages of the development of society, this period is important, first of all, in computerization, and then in the areas related to the informatization of our life, including education.

Digitization is an integral part of the school education process. Digitization is related to the organization of e-learning and its operation in educational organizations. By the requirements of the state educational standard, the information educational environment means an open pedagogical system, which includes information educational resources, including digital educational resources, a set of technological tools of information and communication technologies: computers, other ICT equipment, communication channels, a system of modern pedagogical technologies that provides teaching in a modern information and education environment is understood.

Processes related to digitization are also actively developing in the school geography education system. In this regard, the educational importance and role of school geography are determined by the fact that most of the information that a person uses for various purposes is related to space. It reflects the importance of studying, and understanding the global, regional, and local features and characteristics of the surrounding world, spatial differentiation and integration of events and processes developing in this space.

In the field of geography, the need to identify patterns and study development characteristics at different levels of organization of information processes contributed to the emergence of GIS in the science of geography - geoinformation system [1]. The term GIS stands for geographic information system, initially, it was used only in relation to information systems designed to solve geographic problems [2], but gradually the breadth of their use has increased dramatically. With the help of digital maps, remote sensing data, statistical data, observation materials of field expeditions, other geodata and information resources, geographical objects, socio-economic, and many other phenomena, and processes began to expand the content of this concept and GIS, which is related to the relevant scientific and practical direction, began to be widely used.

There are dozens of definitions of the concept of "geographical information system" in the scientific literature (A.M.Berlyant, L.E.Gutorova, A.V.Zheleznyakov, D.V.Novenko, A.V.Koshkarev, I.G.Semakin, A.V.Simonov, T.S.Tikunov, N.D.Ugrinovich, and others). According to A.M. Berlyant, GIS is an information system that provides collection, storage, processing and presentation of information about spatial objects, a powerful tool for modeling systems of spatial objects and analyzing various natural, and socio-economic systems, taking into account their complex relationships and interactions" [3].

GIS is characterized by the subject area of information modeling, it has a broad problem orientation, determined by solved tasks of a scientific, cognitive and practical nature. The most important of them are the study and inventory of natural resources, including their cadastre, analysis and evaluation, monitoring, management, planning, knowledge of different and organizational levels of geosystems, and support for decisions related to development and change. It is worth noting that most of these tasks are related to solving more general social problems in the field of optimization of nature management, regional economic systems, urban planning, etc., which emphasizes not only scientific but also the social importance of geographical nature.

GIS technologies are increasingly included in the school geography education system. In modern geography education, GIS technologies are defined as "modern tools that allow information to be presented most conveniently for perception." It is noteworthy that the design of IAT in the system of school geography education is largely related to the use of GIS technologies, which ensure the collection, storage, processing, access, display and distribution of geoinformation that is ordered, and coordinated, highly capacious and diverse. In the methodological system of teaching geography, they belong to the category of innovative "educational tools".

Describing the means of geography education, V.P. Golov notes that in many cases the purpose of these means - to ensure the demonstration of education - is especially important because students are forced to learn about objects and phenomena that are often not possible to perceive directly. It is worth noting that the use of visual images in the process of teaching geography to students in the new ATM becomes an effective methodical tool leading from the illustration technique to the auxiliary, illustration technique due to the display of geographical educational

information on the computer [4]. Visual models of geographic objects, processes, or events created using GIS technologies allow students to introduce the definition of a concept based on visual perception so that the concept is supported by a well-meaning, visually presented and structured image.

Today, the list of geographic information systems that can be used in the science of geography is diverse. It has more than twenty programs. The most common of them is the Esri programs of the ArcGIS family, which have various software packages - desktop products ArcView, ArcEditor, ArcInfo, cloud platform ArcGIS Online, and others. The functionality of this software platform includes creating and editing digital vector and raster maps, tools for performing calculations and measurements on a digital map, overlay operations, creating 3D models, processing raster data, such as remote sensing data, digital satellite images, thematic mapping tools, map publishing and preparation for publication, and database tools for student activities.

From the point of view of the teaching methodology of geography, the effectiveness of the educational process using GIS is related to the formation of various methods of educational activities necessary for solving geographic problems. They include the search and analysis of geographic information available on a digital map, scaling, determining distances, directions, elevations of points, geographic coordinates, location, size, and area of geographic objects on the map, etc. It also includes the comparison of maps of different content for the same area to describe the features and properties of geographic objects, to determine the correlation and correlation of components, for example, climate and relief, climate. In addition, using GIS, students have the opportunity to build a three-dimensional relief model and create their digital maps based on existing thematic layers, edit digital contour maps, prepare maps for presentation (making a map layout) - especially valuable GIS functions that contribute to the development of spatial geographic thinking.

It is difficult to form these methods of educational activity of students, it slows down when using traditional maps because it is based on methods of educational activity that are almost impossible to form among schoolchildren using paper maps and atlases. For example, the technique of adding, and comparing several maps, sometimes at different scales. This method of educational activity is one of the most important in the process of teaching geography to students. The results of mapping help students to understand the similarities observed in the spatial representations of geographical processes, and to gain a deeper understanding of the movement of real cause-and-effect relationships.

GIS technologies allow us to quickly solve such problems and help the student to systematically analyze individual elements and their relationships. As a result, geographical knowledge is consciously and solidly mastered by students, intellectual and heuristic abilities of the student develop due to their cognitive actions.

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