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Methods for The Development of Cartographic Knowledge and Skills Through Interactive Technologies

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Abstract: This article analyzes the methods of developing cartographic knowledge and skills scientifically-theoretically using interactive technologies. Cartography plays an important role in the expression and understanding of geographic information, therefore, its role in the process of modern education is of particular importance. They consider the integration of interactive applications, virtual maps, GIS (Geographic Information Systems) and other digital tools into the educational process. The results of the study presented in the article show that with the help of interactive technologies, students ' cartographic skills are further improved and geospatial thinking skills are developed. An increase in students ' interest in the subject, as well as opportunities to pursue their own independent pursuits, will expand. The article also highlights the importance of engaging students in teamwork through the use of interactive techniques. The article is important scientifically and practically, and provides the basis for new research related to the role of cartography in education in the future.

Keywords: Interactive technologies, cartographic knowledge, skills development, pedagogy, teaching methods, educational process, innovation, visualization, integration.

Introduction: At present, digital technologies, interactive methods and internet resources are increasingly being implemented in all aspects of society. Similar developments have taken place in education, with interactive, practical and technological approaches replacing traditional approaches. In particular, the field of geographical and cartographic knowledge is adapting to global trends and requires modern lesson styles, harmonized with information and communication technologies. The formation of cartographic knowledge and skills is important at any educational stage. Because spatial imagination, geographic concepts, analysis of distances and connections between objects, the ability to represent the processes of nature and society on a map is one of the necessary competencies in the current era of globalization. To support this process, it is necessary to widely use interactive technologies in the teaching process, to move classes out of the traditional form of “lecture-practical training” and into a form based on visual, practical and student activity. In the context of globalization, the development of digital technologies, the deepening of socio-economic processes, the need for the development of spatial thinking is growing. The role of cartographic knowledge and the practice of their application in this is incomparable. In combination with modern reforms in education, pedagogical innovations, information and communication technologies, the improvement of the teaching of geographical and cartographic Sciences on the basis of interactive methods has become an important task of today.

Cartographic knowledge and skills refers to a set of knowledge, skills and competencies necessary to correctly represent spatial objects and processes on a map, be able to apply various scales and projections, understand the system of symbols and colors, create thematic maps, read them and analyze [1]. These competencies allow students to:

Understanding natural-geographical and socio-economic processes from a spatial context.

Analysis and decision making using digital or printed maps.

Work with modern technologies such as GIS (Geo-Information System).

To be able to provide and interpret spatial information relevant to any field.

The content of cartographic knowledge includes

mathematical projections, fundamentals of Geodesy, drawing, putting statistics on the card, choosing character-symbols, color gamut. At the same time, practical skills include drawing up a map, thematic analysis, summarizing information, making comments, working on suitable software tools.

METHODOLOGY

The concept of interactive educational technologies. Interactive educational technologies are a set of approaches based on the active participation of the student (student)in the course of the lesson, the introduction of practical actions, interaction and cooperation, independent search, creative thinking [2]. In contrast to traditional lecture form or lesson forms where only the teacher is centered, interactive methods require the main “hero” of the lesson to be a student.

Interactive methods perform a number of didactic functions in the course of the lesson:

Activator: turns the reader from a passive listener to an active participant.

Motivational: due to practical assignments and research activity, students have increased interest and responsibility.

Communication and cooperation: interactive methods often use group, collective forms, and exchange of ideas, experiences, and ideas occurs between students.

Problematic and creative thinking: students are involved in solving a real or conditional problematic issue together, which requires a creative approach.

Specificity of teaching cartographic knowledge in interactive ways. Cartography, by its nature, is a visual and Applied Science. Interactive technologies are in line with the essence of this science, making students:

Draws maps into practical actions such as drawing, measuring distances, representing relief forms, creating thematic layers.

Combined map analysis, problematic questions (e.g., “what factors are population density associated with in which area?") on the basis of a collective thought process. It further enriches its interactive environment through the use of Virtual environments (GIS, online maps, interactive whiteboards). In this, through interactive techniques, students are used to acquiring cartographic concepts through independent discovery, creative application and experimentation in practice, rather than remembering”ready knowledge". It must be said that interactive methods activate the lesson, strengthen students ' interest in the lesson, and most importantly, serve to strengthen theoretical knowledge through practical activities.

Ways to apply interactive technologies in cartographic lessons. Integration of visual and digital tools. Cartographic science is directly related to visual media, especially maps and globes. The use of tools such as interactive whiteboards, projectors, 3D displays, GIS (Geographic Information Systems) platforms, web maps, along with traditional printed maps, now opens up new opportunities for readers [3].

Interactive whiteboard: during the lesson, the teacher allows electronic chalkboard to download various pictures, diagrams, maps, analyze characters or areas that cannot be dropped together, make comments, ask questions, and get answers. The reader himself has the opportunity to control on the board.

GIS applications: working with real data through ArcGIS, QGIS, or Google Earth Pro, measuring distance, creating thematic layers, then assigning students – turns the lesson into a real practical process.

3D images: showing Mountains, seabed, urban planning projects or geological structures in 3D form develops spatial imagination.

Practical training and "Fieldwork". The effect is even higher when cartographic knowledge is strengthened by practical experience. Therefore, interactive technologies should be harmonized with evidential research (fieldwork).

Geo-tagging: students can tag, photograph and comment on important objects in a school suburb, street or amusement park using special GIS apps (Collector for ArcGIS, QField, SW Maps) on smartphones or tablets.

Environmental monitoring: taking samples of water, air or soil in field conditions, placing a geoteg at their location point, and then placing and analyzing this data on a digital map in the classroom [4].

Route design: students are instructed to “make a tourist route in this area”. They first carry out field reconnaissance, photograph potential objects, measure distances, then create a ready-made route on interactive maps.

Problematic assignments and project approach. Problematic assignments are very convenient when teaching cartographic topics in an interactive way. For example, “which natural and social factors play a priority role in areas with the highest population density?"Readers themselves come to the conclusion by finding different information, comparing it on maps, spatial analysis of demographic processes. In a project approach, however, students develop an independent project within the framework of one topic. For example, " a cartographic project to solve the problem of lack of parking in the city center.” They first study the

map of the city, conduct a survey, find real information, analyze the location and capacity of the docks, identify empty areas and offer their projects on an interactive map. In such an approach, cooperation, critical analysis, creative thinking and practical activity are harmonized.

Online platforms and distance learning. In recent years, Distance Education has become more popular and the practice of conducting classes through interactive platforms has expanded. Cartographic knowledge can also be effectively taught in distance form. The following is of particular importance in this: ArcGIS Online or QGIS Cloud: working on a single digital map in a group form, allowing everyone to add their own layer, upload a character or document, edit together in real time.

Webinars (Webinars): the teacher goes online and conducts practical training in GIS-software or online maps. Readers ask questions via chat or audio, exchange ideas [5].

Virtual fieldwork: if there is no real-world Access, students can enter remote area “observations”, geotegs through 360° panoramic online sites or Google Street View.

These techniques provide facilities such as not interrupting classes during a pandemic or social distancing, cooperating with students in different areas, attracting foreign experience.

Advanced foreign experience analysis. Valuable experiments on the application of interactive technologies in geography and cartography have been collected in different countries of the world. Below is a summary of some of them.

USA. Work with GIS and interactive maps is widely available in US schools and universities. ArcGIS Online, a platform offered by ESRI Corporation, is licensed to schools for free or cheaply, and students use GIS directly in various projects. For example, they can work with real data on the topics of climate change, transport planning, monitoring of arable land. Such practice increases the practical skills of students, takes the lesson into an interactive form.

UK. In this state, as part of a global initiative called Geo for all, schools are open source GIS (QGIS, GRASS GIS, etc.k.) were provided. Students use GIS programs when performing various research projects. Due to the special emphasis in the project methodology on working with spatial data, students form the skills of in-depth analysis, mapping and offering innovative solutions to geographic objects and processes.

Finland. The Finnish education system is among the world's most advanced experiences. There, interactive techniques are actively used on the topic of” location and movement" (). For example, schoolchildren download special mobile applications during class through QR codes, where territorial quests, assignments, questions are concentrated. Then each student or group will have to go to a certain point in the city, scan the QR Code, read information about that area, put a geoteg. All data is then combined on a virtual map to create a class-wide debate.

Canada. Field work plays an important role in the educational process in Canada. In urban and rural areas, special Geotech photography, the placement of nature objects in the GIS base, space analysis, environmental process monitoring practices are common. This is especially of great benefit to those who study Geodesy, engineering, geography in colleges. The combination of interactive techniques with fieldwork increases student independence and responsibility. These foreign experiments show that interactive technologies work successfully when applied not only in the classroom, but also in close connection with real-life tasks, field work, independent research [6].

CONCLUSION

Interactive technologies are an important way to attract students to activities in the modern educational process, to form practical skills in them and to develop creative thinking. In cartographic science, such an approach is especially relevant and qualitatively forms spatial thinking and applied research skills.

Teaching cartographic knowledge and skills through interactive methods – ensures that students acquire the “ready answer”by independent discovery, solving problem tasks, conducting evidence research, rather than memorizing it. This makes it possible to master science more deeply, to be able to apply it in real life. Advanced foreign experience shows that the harmonization of problematic and Project Education with digital technologies (GIS, online maps, mobile applications, VR, 3D) develops in students not only cartographic, but also analytical, technical and collective cooperation competencies. Thus, the development of cartographic knowledge and skills through interactive technologies – today is one of the important directions of educational reform, which not only increases the quality of the lesson and the interest of students, but also serves to educate the younger generation with spatial and analytical thinking in the conditions of a digital economy.

REFERENCES

Aralov, Muzaffar Muxammadiyevich, et al. "Talabalarning kartografik chizmachilik kompetentligini shakllantirish jarayonini boshqarish." Oriental

renaissance: Innovative, educational, natural and social sciences 2.1. 552-559.

Azimqulov, S. N. "Ta'limda Innovatsion Ta'lim Tizimlari Va Texnologiyalarini Qo'llash Tamoyillari." Pedagogical Cluster-Journal of Pedagogical Developments 1.2 (2023): 342-350.

Wieczorek, William F., and Alan M. Delmerico. "Geographic information systems." Wiley Interdisciplinary Reviews: Computational Statistics 1.2 (2009): 167-186.

Mengqobul o'g'li, Almardanov Samandar, and Ergashev Samandar Inomjon o'g'li. "Ekologik monitoring va geodezik tadqiqotlar." interdiscipline innovation and scientific research conference. Vol. 3. No. 25. 2024.

Gegenfurtner, Andreas, and Christian Ebner. "Webinars in higher education and professional training: A meta-analysis and systematic review of randomized controlled trials." Educational Research Review 28 (2019): 100293.

Boysoatovna, Raximova Roxat. "Talim darajasi samaradorligini oshirishda xorijiy davlatlar tajribalardan foydalanish." Новости образования: исследование в XXI веке 1.6 (2023): 490-496.