CHAPTER 9

METHODOLOGICAL APPROACHES TO THE USE OF MAPS IN TEACHING THE GRADE 10 GEOGRAPHY COURSE «GEOGRAPHY: REGIONS AND COUNTRIES»

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Modern geographical education aims to develop students' holistic understanding of the geographical picture of the world, their awareness of the spatial organisation of natural and social processes, and their understanding of the relationships between the natural environment, population and economic activity. An important role in achieving these objectives is played by the geographical map, which serves not only as a visual teaching aid but also as an independent source of information, a tool for understanding spatial patterns and a basis for developing geospatial thinking. Cartographic materials are particularly important when teaching the Grade 10 course «Geography: Regions and Countries», which involves studying the natural, socio-economic, demographic, political and economic characteristics of the world's regions and individual countries.

Most of the concepts and processes that students explore as part of this course are directly related to the geographical distribution of features, the characteristics of countries' geographical locations, the spatial organisation of population and economic activity, and the main directions of international economic relations. Therefore, mastering the course content requires the systematic use of general geographical and thematic maps, atlases, schematic maps, statistical cartographic materials and modern digital geospatial resources. At the same time, it is important not to limit classroom activities to displaying maps, but to engage students in finding, analysing, comparing and interpreting spatial information.

The regulatory framework for organising geographical education is provided by the Geography Curriculum for Grades 10-11 of General Secondary Education Institutions (Standard Level), approved by Order No. 698 of the Ministry of Education and Science of Ukraine dated 3 August 2022 [8]. The curriculum allocates 52 hours to Geography in Grade 10 (1.5 hours per week) and 35 hours in Grade 11 (1 hour per week). The course «Geography: Regions and Countries» is aimed at developing students' knowledge of population and the spatial organisation of economic activity in the world's regions and individual countries, as well as their

ability to analyse contemporary socio-economic, socio-political and environmental processes.

The main objectives of the curriculum include developing geospatial thinking, fostering cartographic literacy and culture, and equipping students with the skills to use and analyse geographical information sources and apply the knowledge acquired in practical activities. Consequently, map-based learning is an integral part of the course and should be incorporated throughout all its thematic sections [8].

The Grade 10 curriculum consists of an introductory unit and six thematic sections: «Europe», «Asia», «Oceania», «the Americas», «Africa» and «Ukraine in the International Context». Each section involves studying geographical location, natural resource potential, population, economic development and international relations. This necessitates the integrated use of political, physical, climatic, natural resource, demographic, economic and transport maps.

When teaching the introductory topic, it is advisable to use a political map of the world and maps of geographical regionalisation. Students identify the territorial composition of world regions, locate independent states and dependent territories, and analyse the characteristics of national borders. Practical tasks may include determining countries' geographical locations, identifying the number of neighbouring states and establishing whether they have access to seas and oceans. It is important that students examine geographical location comprehensively, taking into account its physical-geographical, economic-geographical, transport-geographical and political-geographical characteristics.

In the «Europe» section, working with political, physical, natural resource, demographic and economic maps enables students to explore the region's territorial differences. Students identify subregions and locate individual countries, analyse their positions in relation to the Atlantic Ocean and surrounding seas, and investigate the characteristics of relief, climate and the distribution of natural resources. When studying Germany's economy, it is advisable to compare maps of mineral resources,

industry, population density and transport networks. This enables students to explain the formation of industrial regions, particularly the Ruhr Basin, and identify the influence of natural, historical, demographic and transport factors on industrial development.

The «Asia» section involves exploring considerable territorial, natural, demographic and economic diversity. For this purpose, students use maps showing climate, natural vegetation zones, mineral resources, population density, urbanisation, industry, agriculture and transport routes. For example, when studying Japan, students compare a physical map with maps of population, industry and transport infrastructure. Based on their analysis, they establish that the highest concentrations of population, industrial enterprises and transport hubs are found in the coastal areas along the Pacific coast. They then explain this pattern in terms of natural conditions, the limited availability of land suitable for development and the country's maritime location.

When studying Oceania, particular importance is attached to the political map of the region and maps of the Pacific Ocean, climate, natural resources and transport links. Their use helps students understand the island-based nature of the region, the geographical separation of its countries and the dependence of their economic development on maritime transport. Students can measure distances between islands, examine the locations of ports and explain the importance of sea routes for international relations.

In the «America» section, it is advisable to use political, physical, demographic, natural resource, economic and transport maps of North, Central and South America. Comparing maps of natural resources, agriculture, industry and population density enables students to explore the spatial organisation of the economies of the United States, Canada, Brazil and Mexico and identify differences between the industrial, agricultural and resource-producing regions of these countries.

In the «Africa» section, map-based activities should focus on identifying the natural, demographic and socio-economic differentiation of the continent. Comparing maps of natural resources, industry and population density helps students explore the territorial specialisation of countries and determine the role of extractive industries and agriculture. At the same time, it is important to guide students towards understanding that substantial natural resource potential does not necessarily guarantee a high level of socio-economic development.

The final section, «Ukraine in the International Context», involves the use of political, geopolitical, economic and transport maps. Students identify Ukraine's position on the political map of Europe and the world, analyse its location in relation to major economic centres, and examine international transport corridors and foreign trade routes. Up-to-date cartographic materials make it possible to trace changes in the geography of Ukraine's international transport links amid wartime challenges and the reorientation of its foreign economic activities.

Thus, the content of the Grade 10 curriculum necessitates the consistent use of the cartographic method, from determining the geographical location of regions to conducting a comprehensive analysis of the natural, demographic, economic and political characteristics of individual countries. In this context, working with maps should involve not only learning geographical names and locations but also developing the ability to explain spatial patterns and establish relationships between geographical phenomena.

A geographical map is a model of the Earth's surface that uses conventional symbols, colours, lines and other means to represent the spatial distribution of objects, phenomena and processes. In education, maps serve informational, cognitive, analytical, research and practical purposes. It is important to develop students' understanding that a map is not a photographic representation of an area but rather a generalised model whose content depends on its purpose, scale and cartographic representation methods [1, 3, 7].

Cartographic literacy involves the ability to read maps, use their legends, determine the geographical location of objects, apply map scales, analyse spatial characteristics and obtain information for completing learning tasks [2, 3]. Cartographic competence is a broader concept, as it encompasses not only basic knowledge and skills but also the ability to apply them independently when analysing geographical processes and addressing practical problems.

For Grade 10 students, it is important to develop the ability to recognise different types of geographical maps, interpret conventional symbols, determine the geographical location of objects, compare general geographical and thematic maps, identify spatial patterns and formulate conclusions. Geospatial thinking is particularly important. It is the ability to perceive geographical objects within a system of spatial relationships and determine their relative positions, distances, directions and distribution patterns. This ability enables students to explain the concentration of population in coastal areas, the location of industrial centres, the influence of geographical location on international relations and the territorial specialisation of economic activity.

To develop these skills, it is advisable to combine the information-and-explanation, analytical-comparative, problem-based inquiry, research-based, activity-based and digital methodological approaches. The information-and-explanation approach is used to develop students' initial understanding of the geographical location and territorial characteristics of different regions. Using a political map, students identify the subregions of Europe, locate individual countries, determine their positions in relation to seas and oceans, and explain the importance of these geographical features for the development of trade and transport.

The analytical-comparative approach involves comparing several cartographic sources to identify spatial patterns. For example, when studying China, students compare maps of population density, natural resources, industry and transport infrastructure. They identify differences between the eastern and western parts of the

country and explain the reasons for the uneven distribution of population and production.

The problem-based inquiry approach is based on posing questions that require students to analyse cartographic information in order to find answers. When studying Japan, students can be asked to investigate why the largest urban agglomerations have developed predominantly along the Pacific coast. To do this, they analyse a physical map and maps showing population density, industry and the transport network, and then explain the influence of natural conditions, the limited availability of land suitable for development and the country's transport-geographical location.

The research-based approach involves independent or group work with cartographic materials, the completion of mini-projects and practical assignments. For example, when studying international transport links, students investigate the geographical locations of major seaports, determine their positions in relation to the main shipping routes and explain the importance of port infrastructure for international trade. The activity-based approach is implemented through determining coordinates, distances and directions, plotting geographical features, and creating schematic maps and routes. The digital approach involves the use of digital maps, geographic information systems and satellite imagery.

It is advisable to combine these approaches within a single lesson: beginning with the presentation of a map and the identification of the geographical locations of objects, proceeding to the comparison of thematic materials and completion of a problem-based task, and concluding with the presentation of results in the form of a schematic map or an analytical report. This organisation of learning activities facilitates the transition from simply perceiving information to analysing and interpreting it independently.

The practical application of the cartographic method involves the use of several basic techniques. Map reading guided by a set of questions helps students determine geographical locations, territorial boundaries, directions and distances.

Cartographic comparison involves working simultaneously with several thematic maps to establish relationships between natural conditions, population and economic activity. The geographical route technique involves determining the sequence of movement between objects, as well as directions and distances. Cartographic reconstruction involves creating students' own schematic maps based on atlases, textbooks, statistical materials and digital maps. Geographical forecasting enables students to formulate assumptions about possible changes in the spatial organisation of territories based on the analysis of cartographic information [4].

Under modern conditions, the use of digital geospatial resources has become an important means of improving map-based learning activities. These resources enable interactive exploration of territories, changes in map scale, searches for geographical features, distance measurements, route planning and the creation of original cartographic materials. Among the available tools, Google Maps, Google Earth and Google My Maps are particularly useful, although their functionalities are not identical [4, 12].

Google Maps is suitable for locating geographical features, viewing territories at different scales, analysing transport infrastructure, determining routes and measuring distances. When studying Europe, students can locate London, Paris, Berlin and Rome, compare their positions in relation to coastlines, rivers and transport routes, and explain the importance of geographical location for urban development. In the topic devoted to Japan, students can investigate the locations of Tokyo, Yokohama, Nagoya and Osaka, identify ports and major transport routes, and examine the patterns of urban development along the Pacific coast.

Google Earth enables students to explore territories using satellite imagery, visualise relief in three dimensions, and measure distances and areas. These features can be used to analyse the spatial structure of large urban agglomerations, industrial regions, port areas and transport hubs. Google My Maps allows students to create their own thematic maps, add points, lines and polygons, organise information layers

and present the results of their learning research [12]. Thus, Google Maps is best suited to locating geographical features and analysing routes, Google Earth to the spatial investigation of territories, and Google My Maps to creating students' own cartographic products.

The use of digital services should be linked to specific topics in the curriculum. When studying international economic relations, students can be assigned the task "The World's Seaports and Their Geographical Locations". They locate the ports of Rotterdam, Hamburg, Shanghai, Singapore and New York using Google Maps, determine their positions in relation to seas and oceans, investigate their access to international shipping routes and compare their significance for transport. The results can be presented in a comparative table or a thematic schematic map.

When studying population and urbanisation, students can complete the task «The Spatial Structure of the World's Largest Urban Agglomerations». They select Tokyo, Shanghai, Mumbai, New York or São Paulo for analysis, view the selected area in satellite mode, identify the main directions of urban expansion, locate transport hubs and industrial areas, compare the spatial organisation of two agglomerations and formulate conclusions.

As part of the final section of the course, students can undertake the task «Ukraine in the International Transport Network». This involves investigating Ukraine's geographical position in relation to major international transport routes, locating seaports, railway and road transport hubs, and border crossing points, and analysing possible directions of transport links with European countries. The results can be presented as a thematic digital map or a schematic map.

The use of digital cartographic resources in geography education is consistent with research findings on the application of Google Earth to developing topographic map-reading skills, understanding geomorphological concepts and fostering students' spatial thinking [5, 11, 12, 13]. At the same time, digital services should

not completely replace paper maps and atlases. Traditional cartographic materials help students master map scales, conventional symbols, cartographic generalisation and the principles of thematic representation, while digital resources complement them by providing interactivity and opportunities for independent exploration of geographical areas.

Cartographic activities can be organised individually, in pairs or in small groups. Their outcomes should include not only the identification of geographical features but also the formulation of conclusions about spatial patterns. It is advisable to use comparative tables, schematic maps, short research reports and presentations. The gradual increase in task complexity should ensure a transition from locating geographical features and determining their positions to comparing thematic maps, explaining territorial differences and independently conducting small-scale geographical investigations.

Particular attention should be paid to organising cartographic activities in distance and blended learning environments. Google Maps, Google Earth and Google My Maps enable students to complete practical assignments regardless of their location. Teachers can provide links to digital maps, suggest routes, specify features for analysis and organise collaborative work on creating thematic maps. At the same time, it is necessary to take into account students' unequal access to the internet and digital devices by providing alternative assignments that involve the use of printed atlases or static map images.

An important condition for working with digital resources is the critical evaluation of the information obtained. Students should be aware that satellite images may differ in terms of the dates on which they were captured, their quality and level of detail, while data provided by digital services may vary in terms of how up to date they are. Measurements obtained using web-based maps should be regarded as approximate and should not be equated with professional geodetic

measurements. Therefore, students should be taught to verify information, compare different sources and take into account the limitations of each source [9, 10].

The assessment of cartographic activities should cover the accuracy of identifying the geographical locations of features, the ability to interpret conventional symbols, the precision of determining spatial characteristics, the ability to compare cartographic sources, the logical explanation of geographical patterns and the validity of conclusions. It is important to assess not only the final outcome but also the sequence of task completion, students' independence, the appropriateness of their choice of cartographic source and their ability to present research findings.

Thus, the geographical map is one of the principal teaching tools used in the Grade 10 course «Geography: Regions and Countries». An analysis of the Geography Curriculum for Grades 10-11 (Standard Level) demonstrates that cartographic activities are integrated throughout the course and contribute to the development of geospatial thinking, cartographic literacy and research skills. In Grade 10, map-based activities are directly related to the regional and country studies of the world's regions and states, while Grade 11 provides further opportunities to deepen students' cartographic knowledge and skills.

Combining information-and-explanation, analytical-comparative, problem-based inquiry, research-based, activity-based and digital approaches ensures the gradual development of students' learning and cognitive activities, from locating geographical features to identifying spatial patterns and formulating well-founded conclusions. Integrating traditional cartographic materials with Google Maps, Google Earth and Google My Maps expands opportunities to investigate the geographical locations of countries, the spatial organisation of cities, transport systems and economic regions, as well as to create original thematic maps.

The proposed methodological approaches and examples of assignments can be used by geography teachers when teaching the thematic sections of the Grade 10 course and organising practical lessons, learning investigations and project-based

activities. Further research is needed to develop a system of cartographic assignments for each section of the course and establish assessment criteria for determining the level of development of upper secondary school students' cartographic competence and geospatial thinking.

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