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INTEGRATIVE TEACHING OF GEOGRAPHICAL TOPICS RELATED TO UKRAINE AND AZERBAIJAN IN SECONDARY SCHOOLS

One of the important topics in teaching geography in secondary schools is the topics dedicated to the physical, economic, and social problems of the countries. Ukraine belongs to Eastern Europe, and Azerbaijan to the Caucasus region. In addition to the geography of Azerbaijan, geographical topics related to other countries are also taught in secondary schools of Azerbaijan. One of such countries is Ukraine. Socio-economic and cultural relations between Ukraine and Azerbaijan have a dynamic development. The expansion of the use of integrative methods in the teaching process leads to the mutual development of subjects. This article analyzes the methodology for studying the geographical features of Ukraine and Azerbaijan in the context of geography, mathematics, physics, chemistry, and biology. Ukraine and Azerbaijan have rich mineral resources. Ukraine has iron ore, coal, uranium, graphite, manganese, chromium, bauxite, polymetal, titanium, potassium salt, etc., while Azerbaijan is rich in oil, gas, iron ore, alunite, polymetal, salt, etc., resources. The mentioned resources can be integrated into the context of physics, chemistry, and geography in the teaching process. Calculating the volume of mineral resources requires a connection to mathematics. Ukraine has a rich steppe, forest-steppe natural zone, while Azerbaijan has more than 50 percent of semi-desert and dry-steppe, plain, and mountain landscapes. The landscapes, soil, flora, and fauna of both countries are areas studied jointly by biology and geography.

Keywords: Ukraine; Azerbaijan; integration; geography; chemistry; biology; physics; mathematics.

Fig. 2. Ref. 6.

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ІНТЕГРАТИВНЕ ВИКЛАДАННЯ ГЕОГРАФІЧНИХ ТЕМ, ПОВ'ЯЗАНИХ З УКРАЇНОЮ ТА АЗЕРБАЙДЖАНОМ, У СЕРЕДНІХ ШКОЛАХ

Однією з важливих тем у викладанні географії в середніх школах є теми, присвячені фізичним, економічним та соціальним проблемам країн. Україна належить до Східної Європи, а Азербайджан до Кавказького регіону. Окрім географії Азербайджану, у середніх школах Азербайджану також викладаються географічні теми, пов'язані з іншими країнами. Однією з таких країн є Україна. Соціально-економічні та культурні відносини між Україною та Азербайджаном мають динамічний розвиток. Розширення використання інтегративних методів у навчальному процесі призводить до взаємного розвитку предметів. У цій статті аналізується методологія вивчення географічних особливостей України та Азербайджану в контексті географії, математики, фізики, хімії та біології. Україна та Азербайджан мають багаті мінеральні ресурси. Україна має залізну руду, вугілля, уран, графіт, марганець, хром, боксити, поліметали, титан, калійну сіль тощо, тоді як Азербайджан багатий на ресурси нафти, газу, залізної руди, алуніту, поліметалів, солі тощо. Згадані ресурси можуть бути інтегровані в контекст фізики, хімії та географії в навчальному процесі. Україна має багату степову, лісостепову природну зону, тоді як Азербайджан має понад 50 відсотків напівпустельних та сухостепових, рівнинних та гірських ландшафтів. Ландшафти, ґрунти, флора та фауна обох країн – це області, що вивчаються спільно біологією та географією.

Ключові слова: Україна; Азербайджан; інтеграція; географія; хімія; біологія; фізика; математика.

Introduction. The trend of integrated lessons in general education schools is expanding. Physical and economic geography subjects of geography are successfully integrated with mathematics, physics, chemistry, biology subjects. Since the exact and natural sciences are international in nature, their integrative study is useful for all countries. One of the reforms carried out in the education system of Azerbaijan is the active application of integration. Integration is the process of connecting the content components of education with each other and with life in a

systematic way. In this regard, in the process of preparing future teachers for the implementation of the content of the science education field, priority is given to practical oriented tasks, research activities, experimentation, observation, modeling and implementation of educational projects [6]. The geography subject taught in Azerbaijan's secondary schools has content standards such as position and space, natural systems, and human systems. The mentioned content standards allow the subject of geography to establish associations with other subjects. We believe that the topic of the article

we have chosen is relevant and meets the requirements in terms of integration. Because Ukraine and the Republic of Azerbaijan are well provided with underground, surface and bioresources. We will integrate geography with mathematics, physics, chemistry, and biology subjects within the selected topic. Vast open steppe-flat plains and gently rolling grasslands covers the heart of the countries [4]. The territory of the Republic of Ukraine ranks second in Europe after the Russian Federation. It is on the list of the world's richest countries in terms of mineral resources. In the territory of Ukraine, it burns (oil, gas, shale, hard coal (Donbas basin Donetsk, Lviv-Volyn basin), ore (iron (Krivoy Rog, Kerch, Kremenchuk, Beloozersk, Pridneprov), manganese (Nikopol), chromium, aluminum, deposits of copper, zinc, lead, nickel, magnesium, cobalt, titanium, tin, mercury, gold, silver, vanadium, molybdenum, tungsten, marble, granite, salt, beryllium, lithium, zirconium, hafnium, tantalum, niobium, indium, germanium), rare earth metals (scandium, yttrium and lanthanides). Its territory is mainly plain, corresponding to the Eastern European platform. The Carpathians (Hoverla (2061 m) and the Crimean mountains (Roman-Kosh (1545 m)) correspond to modern geosynclines. V. Vityuk claims that teaching methods, in particular debates, trainings, project activities, analysis of situations, etc., effectively contribute to the development of critical thinking, cooperation skills, the formation of a holistic view of the surrounding world, the ability to assess the global challenges of today and find ways to solve them [2]. The temperate-continental climate is widespread, and on the Black Sea coast there is a subtropical climate region.

Literature review. In modern times, the principle of integrative teaching of subjects is widespread. As an example, STEAM (STEAM education model involves the teaching of Science, Technology, Engineering, Art and Mathematics in an integrated and interactive way) lesson models can be given as an example. In the science of pedagogy, the approach of integrative parallelism has existed before, and the importance of differentiation and integration of knowledge on different subjects has been scientifically justified. In the mentioned definitions and explanations, there were different views on the concept of interdisciplinary integration. The analysis of scientific literature shows that the question of the development of diagnostic competence of future specialists in the context of modern education has not been sufficiently investigated. In the scientific environment, there is no single approach to determining its content and structure, which ensures the effective development of this competence in the process of professional training [1]. S. Batishev, A. Belyayeva, N. Dumchenko, M. Makhmutov, P. Nikova's and b. polytechnic approach to the issue, N. Loskaryova, M. Mehdizadeh, V. Fyodorova, D. Kiryushkinan and others the approach of being a means of raising the activating and scientific-

theoretical level of training, G. Belinkova, I. Zverev, V. Korotov, E. Monozonun and b. educational aspect approach is shown in the studies.

Methods. In integrative learning, a combination of research methods, literature development, and data analytics analysis will be scientifically evaluated from the primary data collected. The geographical potential of Ukraine and Azerbaijan will be studied in the context of the structure of geography, physics, chemistry, biology and mathematics. At the end, the obtained results will be noted.

Discussion. As an agro-industrial country, Ukraine is famous for grain growing (wheat, corn, sunflower, sugar beet, viticulture, fruit growing) and animal husbandry. Ukraine is richly endowed with mineral resources, which can be attributed to geological formations of various ages and different tectonic structures in its territory. There are more than 20,000 proven occurrences 97 different minerals in Ukraine. Due to their wide range and vast quantities. Ukraine is country gifted with one of the widest selections of minerals worldwide [5, 28]. In the industry, ferrous and non-ferrous metallurgy, machine building, device production, military industrial complex, electronics and electrotechnics, energy (Thermal Power Station, Atomic Power Station, Hydroelectric Power Station), food, tourism industry have developed (Figure 1).

When determining the directions of the lesson, the teacher can use the Mendeleev table from chemistry, physical properties of metals and other elements from physics. The formation of combustible minerals from the destruction of living organisms requires integration with biology. Calculating the volume of mineral resources develops connections with mathematics. If we look at the map of the geological structure of the Earth's crust, it becomes clear that ore minerals are mainly found in the ancient platform areas and mountainous areas where the crystalline foundation is exposed, and sedimentary minerals are more common in the depression areas of the platforms and plain areas. In the same way, the mineral resources distributed in the territory of Azerbaijan are also analyzed. It can be seen from the map that sedimentary rocks belonging to the 4th period of the Cenozoic era are widespread in the territory of Azerbaijan. Triassic, Jurassic, and Cretaceous sediments of the Mesozoic period are found in mountainous areas. The complex geological structure of the territory of Azerbaijan causes the distribution of minerals of sedimentary, magmatic and metamorphic origin here (Figure 2).

During inter-subject communication, the presence of oil and gas reserves in both countries, and the connection of mineral resources with the geological structure should be noted. Geological structure maps can be used in class in electronic form. At the same time, the map and information base provided in the official internet resources of the state institutions of the

countries are important elements for integration. We can also build integration across key industries. Ukraine electric energy, heavy machinery, food. Ukraine's electric power industry includes nuclear power plant, thermal power plant, hydroelectric power plant and renewable energy (solar, wind, bioenergy). Atomic energy makes up more than 50 % of the production. The main NPPs are Zaporozhye, Rivne, South Ukraine, Khmelnytskyi. There is no nuclear power plant in Azerbaijan. Thermal power plants run on coal, gas, and fuel oil, and are second in electricity production. Donetsk and Dnepropetrovsk regions are the main production zones. This type of energy is the first in Azerbaijan, it works with gas and fuel oil. It is mainly located in Baku, Mingachevir, Yevlakh, Sumgait. A cascade of hydropower plants has been built on the Dnieper River in Ukraine. Kyiv, Kanev, Kremenchuk, DneproGES, etc. In Azerbaijan, the Mingachevir, Shamkir, Varvara and Yenikand hydroelectric power stations form a cascade on the Kura River. There are also hydroelectric power stations on Araz and other rivers. Renewable energy sources in Ukraine correspond to Kherson, Zaporozhye, Odessa regions. Solar, wind and bioenergy projects are developing in Azerbaijan. Wind and solar power plants are mainly located in Absheron and Gobustan. The geography of Ukraine and Azerbaijan can be integrated in terms of climate and natural zones. Comparison makes it possible to properly study the agriculture of the countries economically. Azerbaijan is located in two climate zones (subtropical and temperate), and Ukraine is temperate (mainly continental). Seasonal variability is observed in both countries. The influence of the Caspian Sea is felt in Azerbaijan, and the Black and Azov seas are felt in Ukraine. The Absheron Peninsula and the southern parts of the Crimean Peninsula have a

Mediterranean climate. Climatic diversity has an important influence on the location of agriculture. Wide spread of steppe and forest-steppe zones in Ukraine has led to black soil occupying a large area. Black soils have increased the cultivated area of grain crops here. 70 % of the territory is suitable for agriculture. Wheat, barley, corn, potato, sunflower, sugar beet, soy, flax plants are mostly cultivated. The altitudinal zonation is in the Carpathian Mountains. In the mountainous zones, there are areas for pasture breeding, fruit growing, and viticulture. In animal husbandry, geographical divisions such as cattle breeding, pig farming, poultry farming, fishing, and beekeeping exist in the regions. As a result of the export of agricultural products, a large amount of currency reserves enter the country. Calculations show that a number of crops (tobacco, sugar beet, etc.) are of export importance [3, 198]. In the plain areas of Azerbaijan (Kur-Araz, Samur-Devachi plains, Sharur-Ordubad plain, Gobustan-Absheron) gray, gray-brown, etc. lands are widely distributed. There are light-chestnut, gray-brown, alluvial soils in Jeyranchol, dark-chestnut soils in Acinohur, and yellow soils in the Lankaran plain. In mountainous areas (Greater Caucasus, Lesser Caucasus, Talish Mountains, Zangezur, Deraleaz) soil, flora and fauna are distributed according to zoogeographic regularities. Erosion problems have arisen in mountainous areas and salinization problems have arisen in plains. The main grain crops cultivated in Azerbaijan are wheat, barley, corn, rye, oats (in small quantities) and cotton, grapes, and olives are technical crops. Climatic conditions allow rice cultivation (mostly Lankaran plain). Watermelons and apricots are grown in Kura-Araz plain, Absheron peninsula. When giving an explanation about soils, the teacher can integrate their color with biology and chemistry, and their density with physics.



Fig. 1. Simplified map of geostructures of the territory of Ukraine
<https://journals.savba.sk/index.php/cgg/article/view/5423/1538>

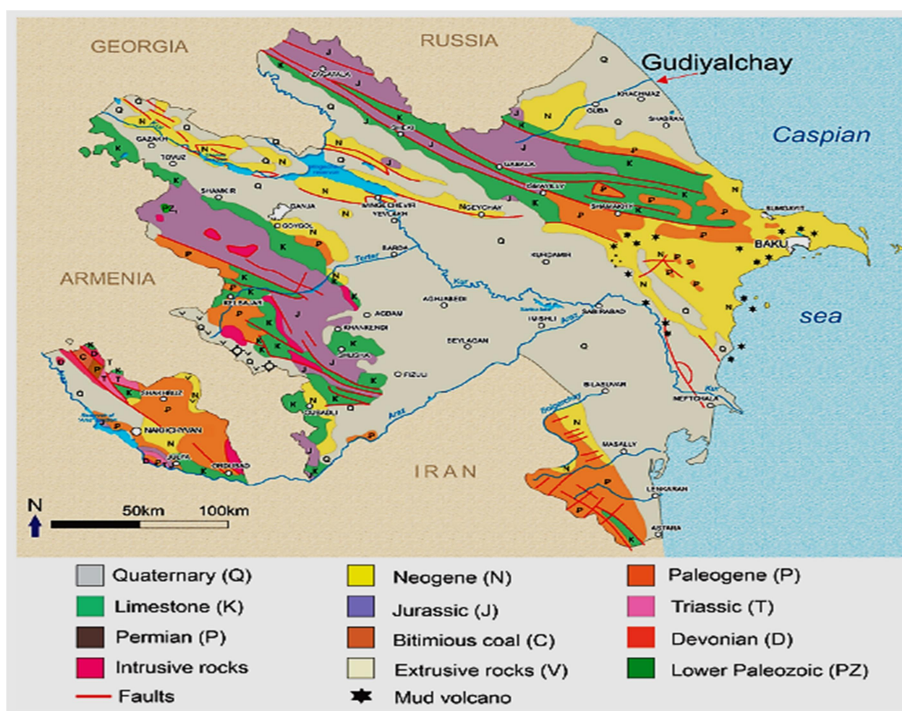


Fig. 2. Geological map of the Republic of Azerbaijan

https://www.researchgate.net/figure/Geological-map-of-Azerbaijan-highlighting-geological-formations-faults-and-mud_fig3_383624052

Conclusions. The conducted research shows that the teaching of the Republic of Ukraine and the Republic of Azerbaijan in a comparative and related form has a positive effect on students' in-depth study of the subject, their ability to conduct analysis and synthesis. The essence of the topic gives reason to draw the following conclusions:

1. Ukraine and the Republic of Azerbaijan have rich underground and surface resources.
2. Content segments of mathematics, physics, chemistry and biology are compatible during the integrative teaching of the subject.
3. In the future, the similarities of the geography of Ukraine and the Republic of Azerbaijan may be the basis for their international cooperation.

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