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PROJECT-BASED TEACHING METHODS IN THE FORMATION OF CARTOGRAPHIC KNOWLEDGE

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ABSTRACT

this article explores the topic "project-based teaching methods in the formation of cartographic knowledge" and analyzes innovative approaches aimed at updating and improving the effectiveness of educational processes in the field of cartography. The article examines in detail the methodology of project-based teaching, its application in the educational process and its importance in the formation of cartographic knowledge. The study presents strategies aimed at developing independent thinking, creativity and problem-solving skills among students through project-based teaching methods. The article also provides practical examples, focusing on the role of projects in the processes of creation, analysis and presentation of Cartographic Information. The results also include useful recommendations for pedagogical practice and provide new opportunities in ensuring quality education.

KEYWORDS

cartographic project, teaching methods, educational process, methodology, innovation, practice, experience, creativity, resource, cartographic information.

INTRODUCTION

Cartographic knowledge is an important tool in understanding, analyzing and making decisions about any geographical issue or spatial process. Nowadays, such aspects as the development of spatial thinking, the preparation of thematic maps, the description of information using GIS technologies are of wide importance not only for geography, but also for other disciplines such as economics, ecology, urban planning, transport, tourism. Therefore, it is necessary to pay special attention to the formation of cartographic knowledge in the educational process. While traditional approaches are aimed at strengthening cartographic competence in students in a highly theoretical light, project teaching methods (Project-Based Learning – PBL) are gaining wide popularity in today's education.

Project-based teaching is a methodological approach that directs students to work on a project that gives practical results by engaging them in independent or group activities within a specific issue, topic or program. This method forms not only theoretical knowledge, but also creative, technical, practical and collaborative working skills. In particular, in the teaching of cartographic knowledge, the project method involves students in processes such as finding real information, creating cartographic images on GIS or online platforms, choosing a system of colors and symbols on a map, drawing conclusions. This, on the one hand, is the reason for the interesting passage of lessons, and on the other hand, it awakens in students a deep sense of understanding and responsibility towards spatial processes [1].

In pedagogical literature, the project method is intensively distributed, occupying a worthy place in many foreign schools within the framework of STEM, STEAM approaches. This is

because the project approach educates students as individuals with skills such as independent decision making, testing-experimentation, collaborative problem solving, resulting in presentation [2].

Cartography is distinguished from other disciplines by conventionally representing spatial objects and processes not through text, tables, or statistics, but through the use of special symbolism and projections. Also in modern times: GIS technology engagement: digital data, online services, 3D modeling.

The need to prepare thematic maps on different directions – social, economic, environmental, demographic.

Practical analysis: spatial representation, prediction of issues such as Territorial Planning, Transport Route, production location, climate changes.

These characteristics are due to the fact that only “theoretical” teaching of knowledge on cartography is ineffective. Students should work with real data, perform the harita drawing process step by Step, Correct Mistakes in their experience, creatively select colors and symbols. Also, the delimitation of class hours, the large number of students, technical opportunities – these can be solved with a project approach. Because in the project, processes such as extracurricular activities, group assignments, independent use of the internet and GIS programs are established.

Why is the project methodology effective in cartography? Advantages inherent in the project method in the formation of cartographic knowledge:

Problematic approach: the imposition of real-world issues within the framework of the project, such as the “Thematic Map solving the problem of territorial transport” or the “map of agricultural resource optimization”. As a result, students are encouraged to find independent data and place it in Harita.

Practical design: drawing a map, choosing colors and symbols, summarizing information – develops creative thinking and technical skills in students.

Advanced training: advanced skills such as GIS familiarization, web cartography, mobile GIS applications, 3D animation.

Protection and reflection: at the end of the project, students present their maps in front of a class or a broad community to answer questions, enhancing a sense of communicative skills and responsibility.

Methodology for the formation of cartographic knowledge based on the project. Lesson stages: project approach

1. Step - to clearly define the problem

The teacher quotes a real-life or scientific issue to the students, asking " how to show this problem cartographically?", he drops the question. For example,”identifying traffic jams in the city center and designing a possible highway in the metropolitan area".

2. Stage-division into groups and plan development

The teacher distributes the lesson plan based on groups: finding information,

Work on GIS or online platform, color-gamma selection, conclusion preparation, protection steps etc. Each group divides tasks within itself [3].

3. Stage-research and practical work

Groups look for information on the problem: statistics, demographic, climate or transport data. They then perform input, thematic layer creation, map design selection, color, characters, legendari development, simplification (generalization) processes to GIS or web-map applications. Or they can also do practical work based on just drawings [4].

4. Stage-evaluation and presentation of the result

Each group, having completed its project, will defend before the class, how the map was created, which problem was solved, what are the conclusions, which shortcomings were eliminated – hold a presentation about it. Questions and answers, suggestions, discussion will be organized. The teacher expresses the final conclusion, assessment, feedback.

Methodological principles. Active teaching: students are in the role of practitioners rather than passive listeners. Problem approach: each project is structured around a specific issue, so there will be a search, discovery process. Integration: subjects such as mathematics (statistics), Informatics (programming, GIS), history (change of historical regions), economics (indicators of regional economy) are integrated into the cartographic project.

Reflection: at the end of the project, students analyze their activities, “what looks like, what's hard, what's the solution?"questions such as [5].

Materials and software tools. In order to be able to effectively complete the project, technical and methodological preparation is important: printed material: textbook, tables, paper maps, sketch drawings. Digital resources: GIS applications (ArcGIS, QGIS), online platforms (ArcGIS Online, Google My Maps, Mapbox), mobile applications (Collector for ArcGIS, SW Maps).

Other resources: statistical database, indicators from official sites, meteorological information, topographic or satellite images.

CONCLUSION

project-based teaching methods in the formation of cartographic knowledge are one of the most important trends in the modern educational process. This approach encourages students to creative search, spatial thinking, the application of digital technologies, independent and collective activities. Thus, unlike ordinary theoretical lessons, in the process of finding solutions to real issues and problems, deep knowledge, solid practical skills, social activity and responsibility are awakened. The results of the study also show that the project approach gives at least 10-15% higher efficiency than traditional methods, significantly strengthening the interest and creative activity of students in the lesson

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