

DIDACTIC APPLICATION OF THE EDUCATIONAL TECHNOLOGY OF THE GEOGRAPHICAL LABYRINTH IN GEOGRAPHY AND ECONOMICS TRAINING

APLICAÇÃO DIDÁTICA DA TECNOLOGIA EDUCACIONAL DO LABIRINTO GEOGRÁFICO NA FORMAÇÃO GEOGRÁFICA E ECONÓMICA

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Abstract

The educational reforms in the Bulgarian school cover all systems, elements, processes and phenomena, as well as educational objects, which are aimed at achieving stability and effectiveness of the learning process, the application of didactic technologies, and innovative methods and techniques.

Educational technology is defined as a systematic method of reproduction of the training process with the following characteristic features: a diagnostically formulated goal; orientation towards all learning procedures to achieve the goal; operational feedback. The essential and meaningful characteristics of educational technologies and the possibilities for their application in geography and economics training are one of the current questions in the methodology of geography training.

We will try to expand the information in the sphere of assessment of learning achievement – which is now being established in the context of contemporary Bulgarian education, emerging as a trend in the near future.

The procedure for organizing and realizing educational technologies determines specific requirements for teachers regarding science-based pedagogical solutions for the application of the geographical labyrinth. The combination of trainers, educators, teaching, organizational and more functions of educational technology in the form of a geographical labyrinth is a sequence that allows for practical realization, a set of techniques and a common logic of activities.

The geographical labyrinth is related as an educational technology to the group of personality-oriented training, as a reflection of interactivity and a tool for testing students' knowledge, skills and competences. The didactic application of the geographical labyrinth in the training of geography and economics in new realities finds its place in all types of lessons, which are normatively regulated by the educational reform - for new knowledge, for activities, for summary, for negotiation and for control work.

Keywords: curriculum, geographical labyrinth, educational technology, assessment, personality-oriented training

Resumo

As reformas educacionais na escola búlgara cobrem todos os sistemas e elementos, processos e fenómenos, bem como os objetos educacionais, que visam alcançar a estabilidade e eficácia do processo de aprendizagem, a aplicação de tecnologias didáticas, métodos e técnicas inovadoras.

A tecnologia educacional é definida como um método sistemático de reprodução do processo formativo com as seguintes características: objetivo formulado diagnosticamente; orientação para todos os procedimentos de aprendizagem para atingir o objetivo; feedback operacional. As características essenciais e significativas das

tecnologias educacionais e as possibilidades de sua aplicação na formação em geografia e economia são uma das questões atuais na metodologia da formação em geografia.

Tentaremos expandir a informação na esfera da avaliação do desempenho da aprendizagem – o que se está a estabelecer atualmente no contexto da educação búlgara contemporânea, emergindo como uma tendência no nosso futuro próximo.

O procedimento para organizar e realizar a tecnologia educacional determina requisitos específicos para professores em termos de soluções pedagógicas baseadas na ciência para a aplicação do labirinto geográfico. A combinação de formadores, educadores, ensino, organização e mais funções da tecnologia educacional na forma de labirinto geográfico é uma sequência que permite a realização prática, um conjunto de técnicas e uma lógica comum de atividades.

O labirinto geográfico relaciona-se como tecnologia educacional ao conjunto de formação orientada para a personalidade, como reflexo da interatividade e ferramenta de teste de conhecimentos, aptidões e competências dos estudantes. A aplicação didática do labirinto geográfico na formação em geografia e economia em novas realidades encontra o seu lugar em todos os tipos de aulas, que se regem normativamente pela reforma educacional - para novos conhecimentos, para atividades, para resumos, para negociação e para controle do trabalho.

Palavras-chave: currículo, labirinto geográfico, tecnologia educacional, avaliação, formação orientada para a personalidade

1. Educational reform and transformations in the Bulgarian school

“Every nation has a certain intellectual potential and with the right investment policy it can be transformed into the intellectual capital of the country.”

A. Dermendzhiev (Dermendzhiev, 2018, 268)

Modern global society is in the process of many transformations - social, cultural, economic, political, strategic, educational, moral, and digital, among others. The social requirements of the educational system and its development in digital conditions and the pandemic situation are constantly increasing, educational multiplicity is deepening and the roles of the objects and subjects in the educational process at all levels are expanding.

Education in Bulgaria is a national priority, which is implemented in accordance with specific principles in the system of preschool and school education. (ZPUO, 2016, 2) The unified state educational policy is necessary and important because it is the basis for the formation of human capital, but at the same time, it is very criticized in terms of educational reform and many mini-reforms. In Bulgarian schools, the introduction of new and modified curricula in individual school subjects continues, including *Geography and Economics*. In the 2021/2022 school year the curricula comes into force for:

 **5th grade** - curriculum in Geography and Economics (general education);

 **12th grade** - curriculum in Geography and Economics (profiled training).

In the next school years, new program transformations are expected in the other grades of the Bulgarian school, which cover changes in the structure and content of the curricula: topics, learning content, new concepts, training methods, program design, among others. The new program's specifics and innovations follow the ideas of constructivism, as a vector movement from theory to practice, from abstract to concrete, from simple to complex, from traditional to modern, from reproductive to productive, from unconscious to conscious, from pattern to experience, from the stationary to the functional-active movement, from interaction in the classroom to interaction in space and real (virtual) reality, from the book to the interactive book and information technologies, from classical to innovative training technologies, from one-way to multidirectional communication, from passivity to activity in the educational process, and the dynamic learning environment.

Educational technologies are part of life and society, of the learning environment and global educational trends, graded against the background of the competence approach in the education of the modern commercial and technogenic society. The methodological, psychological, pedagogical and social bases of the innovative technologies in the training of geography presuppose following the basic requirements for their organization and application in the educational process. One of the educational technologies and didactic transformation that is applied in the Bulgarian school is the geographical labyrinth.

2. Geographical labyrinth

In pedagogy, different variants of training labyrinths are described and developed, which differ in terms of purpose, approach, content, functions, organization, direction of movement, among other characteristics. Training mazes became very popular in the twentieth century, and their didactic specificity is the complexity of the statements and the complexity of the design in the labyrinth. The training labyrinths are mainly applied in the teaching of logic, philosophy, psychology, social sciences, mathematics, geometry, art, among others (Draganova, Bardarova, 2020, 922; Dermendzhieva, Draganova, 2021, 83). The training labyrinths are applied in the school systems of, for example, Russia, Germany, Great Britain, Greece, and the USA.

For many scientific fields, the training labyrinth has specific characteristics, peculiarities in the subject areas and content differences, direction of movement, technological design and configurations, shape and rules for implementation.

The application of the geographical labyrinth in geography and economics training is an opportunity to increase the activity, independence and self-organization of students when solving it. The geographical labyrinth is the bearer of specific subject features, technologies, rules and design, content models and conceptual system.

In the Bulgarian methodological literature, the question of the nature and application of the geographical labyrinth has been neglected, which is the reason behind our scientific research.

2.1. Definitions, nature, technology, functions, features, design, configurations, instructions, duration

The geographical labyrinth is a game technology with rules and a creative approach to composing and constructing, created as a learning resource for checking, controlling and diagnosing the knowledge, skills and attitudes of the learners. (Dermendzhieva, Draganova, 2021, 83).

The geographical labyrinth is a verbal didactic game in which thought operations, synthesis and critical thinking are provoked. When organizing the labyrinth through subject materials - images, photos, labyrinth for spatial orientation, among others, the geographical labyrinth is also a subject-verbal didactic game for control.

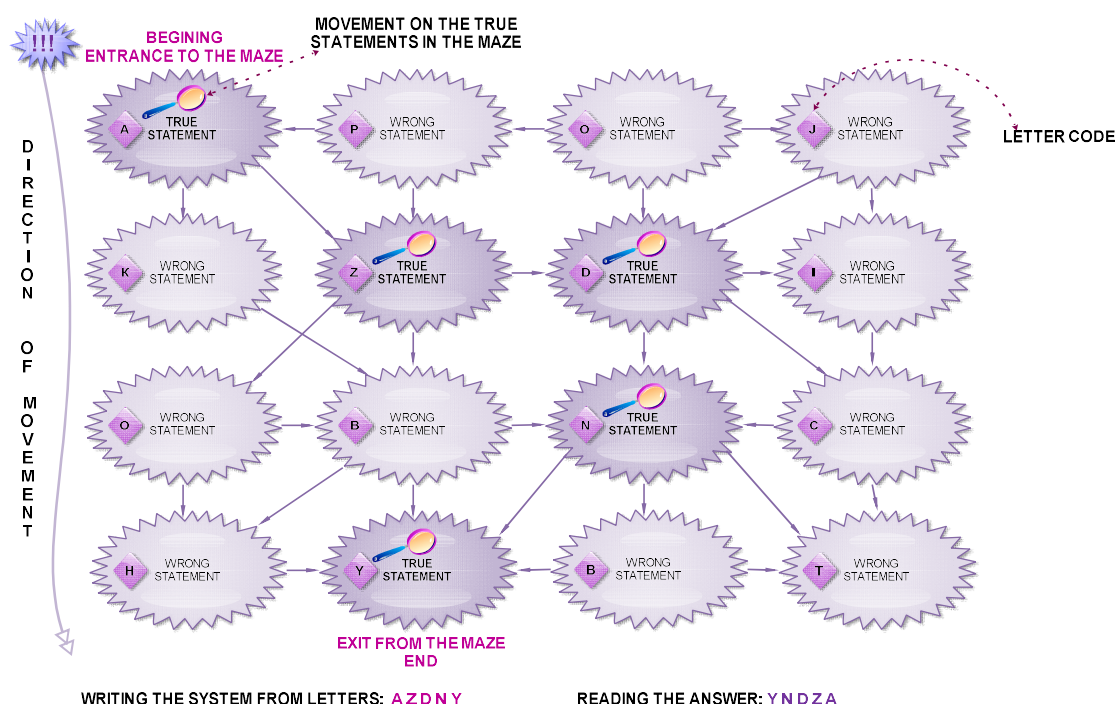


Figure 1 – Model of the technology for reading and crossing a geographical labyrinth.

The geographical labyrinth is an educational technology with a practice-oriented application, which has a start and an end point, an entrance and an exit from the labyrinth, but requires the approval of true statements, which to some extent determines the reproducibility of the technology.

The geographic labyrinth is an alternative and non-traditional version of a test that contains true and false statements that require confirmation in order to pass through the labyrinth and reach the exit. (Dermendzhieva, Draganova, 2021, 83)

The geographical labyrinth is the feedback for the teacher and their activities in the learning process, a modern didactic-diagnostic tool for control and self-control of students, a non-traditional type of test of statements to provoke interest in the school subjects of geography and economics and forming a positive emotional attitude to learning (Draganova, Bardarova, 2020, 929).

The essence of the geographical labyrinth encompasses a system of true and false statements, which are based on the geographical learning content, and the passage through the maze is based on movement only in the direction of the true statements (Figure 1). The movement in the geographical labyrinth starts from top to bottom, leaving the labyrinth at the lower end with the discovery of the last true statement and the corresponding letter code. After finding each true statement, you must follow the arrows that determine the possible directions of movement to the next cell in the labyrinth. Each cell contains one true or false statement, each with a letter code. The letter code of the correct statement is written below the labyrinth. The letter codes form a word that must be read from right to left (Figure 1).

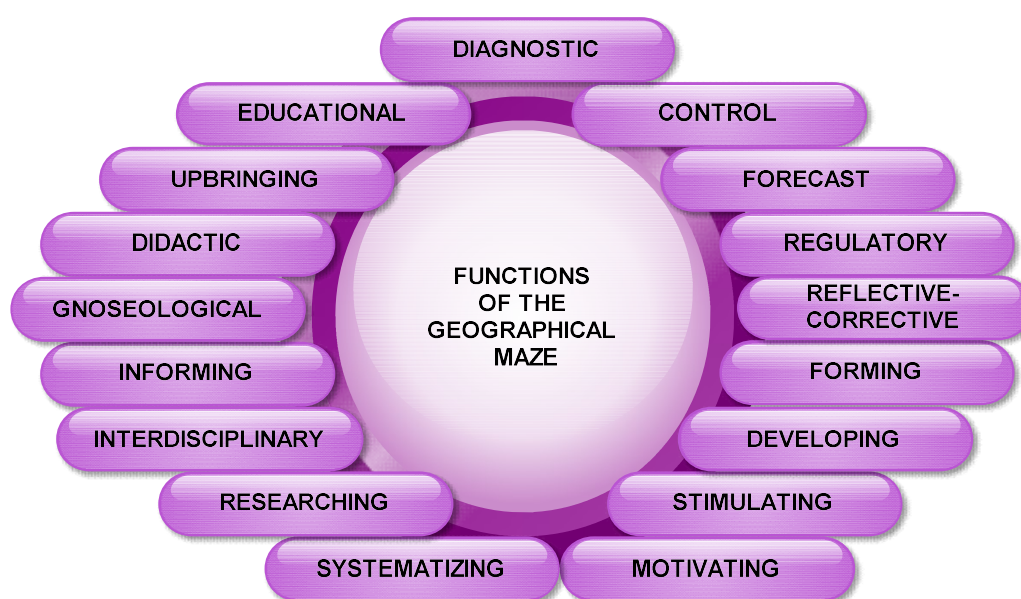


Figure 2 – Functions of the geographical labyrinth.

The main **functions** of the geographical labyrinth are control and diagnosis, but as a carrier of educational technology and functional synthesis, applicable to all types of lessons in geography and learning content, it also performs other functions (Figure 2).

The geographical labyrinth has certain **characteristics**, which are presented in Figure 3.

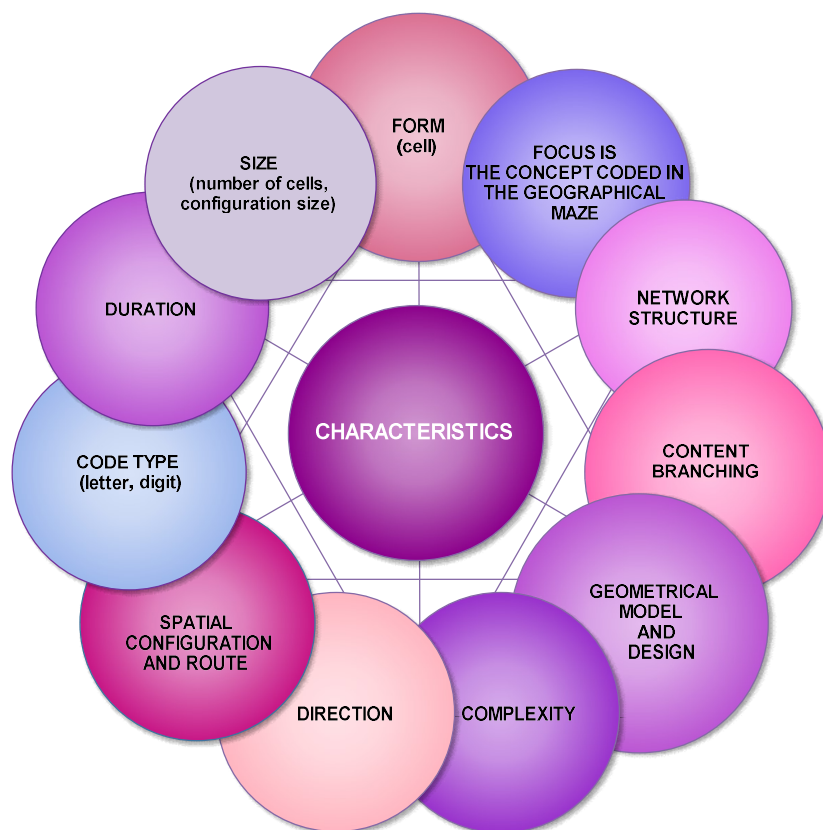


Figure 3 – Characteristics of the geographical labyrinth.

Peculiarities of the statements in the geographical labyrinth are:

- ↻ short statements, short sentences;
- ↻ accurate and clear statements, without the presence of parasitic words;
- ↻ the allegations are not misleading in nature;
- ↻ inaccuracy is not allowed in the statements;
- ↻ the statements should not have ambiguous content, which provokes variability of the answer;
- ↻ each cell or step in the labyrinth must contain one statement;
- ↻ the statements may be related to a topic, topics from a section or sections depending on the didactic purpose and the type of lesson;

- ↻ the allegations may not be related to the concept coded for detection in the geographical labyrinth when passing it;
- ↻ each statement in the cell or step of the labyrinth must be accompanied by a letter code (in learning labyrinths there are variants with numeric codes - the number corresponds to the letter's place in the alphabet);
- ↻ the statements may be from the learning content of the textual and non-textual components of the textbook, as well as contain statements from other sources of geographical information.

The direction of movement regarding the entrance and exit in the geographical labyrinth is from top to bottom, which is the most applied variant of movement. Other variants of the direction for the beginning and end of the labyrinth are also allowed: from bottom to top, from left to right, from right to left, as well as along the diagonals of the labyrinth - left and right upper corner to right and left lower corner and vice versa. Traditionally, the model is applied in the direction from the upper left corner to the lower right corner. Each teacher can apply their creative approach and creative vision according to the concept, the length of the letter code and the configuration of the labyrinth model. There is no moment of obligatory direction in the geographical labyrinth, but the most applied direction in geography and economics training and typical for the geographical labyrinth is from top to bottom.

The concept that must be discovered by successfully passing through the geographical labyrinth may be part of the new concepts in the curriculum of geography and economics, may be part of the geographical nomenclature or, by decision and choice of the teacher, of concept from the system of geographical knowledge and science.

Letter codes are traditional for geographical labyrinths. The arrangement of the letter code in the cell is the teacher's decision. The letter code is usually placed in the upper left corner of the cell, in the middle of the cell, or in the upper right corner. The letter code as a complete system of the concept of the correct statement is built into the labyrinth with an opposite direction of reading the concept - back to front. The geographical labyrinth can be made with numeric codes that correspond to the order of the letters in the alphabet.

The route in the geographical labyrinth is the author's decision, but it is important to have a beginning and an end or an entrance and an exit from the labyrinth. The route of the geographical labyrinth depends on the number of letters in the concept, on the choice of concept, on the spatial configuration, etc.

The shapes of the cells in the geographical labyrinth are mainly rectangles and squares, but ellipses and other geometric shapes can be applied. **The number of cells** is in accordance with the didactic purpose of the applied geographical labyrinth, the number of the letter code of the concept, the place of application in the course of the lesson, as well as the type of lesson in which it is applied or

whether it is set for homework. The number of cells can be 9, 12, 15, 16, 18, 20, 24, 25, 30, etc., again depending on the didactic goal for the application of the geographical labyrinth by the teacher, etc.

The form of organization of the educational activity in solving the geographical labyrinth reveals a variety of ways of application - individual and independent work, work in pairs, work in groups, class work, etc.

The duration of solving the geographical labyrinth depends on the number of cells, the complexity of the statements, the length of the system of letter codes, the network branching of possible directions of movement and spatial configuration, the didactic purpose of application and types of lessons in geography and economics.

The spatial configurations and geometric structural models are a matter of creativity by the author of the labyrinth, according to the characteristics of the labyrinth. In Figure 4, different spatial models are offered.

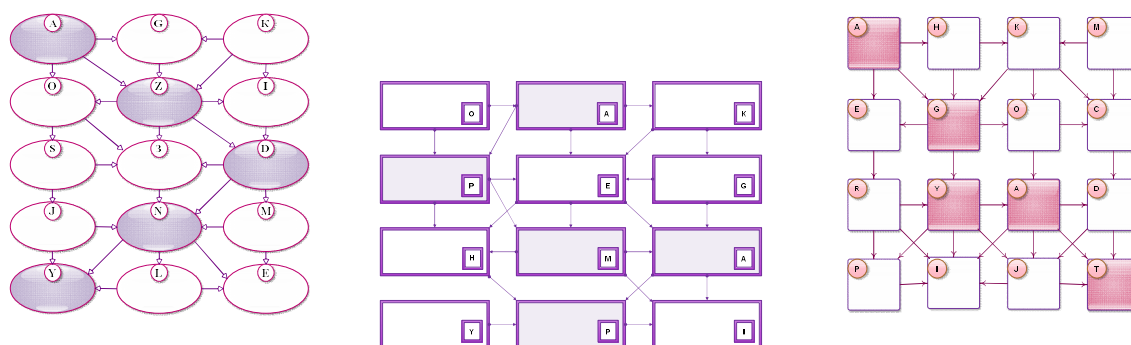


Figure 4 – Sample spatial configurations, geometric models and routes (Yangtze, Pampas, Taiga).

When solving the geographical labyrinth, it is necessary to explain in advance to the students about the methodology of working with the labyrinth. We offer a sample summary version of the **instructions for working with a geographical labyrinth** :

1. The geographical labyrinth is read from top to bottom.
2. The statements are read from the top row of the labyrinth.
3. Finding a true statement and writing down the letter code.
4. Following the arrows that determine the direction of movement to other cells.
5. The movement in the labyrinth is sequential to the lowest end and the exit when finding the last true statement and writing the letter code.
6. From the resulting system of letter codes, the concept is read and written from right to left.
7. The definition, specifics and territorial location of the geographical concept are presented.

The geographical labyrinth must have a **topic**, which may be formulated on the topic of the learning content, but may be formulated ideologically and provocatively, interrogatively or be a carrier of a macro-topic.

2.2. Application of the geographical labyrinth in the training of geography and economics - by types of lessons and didactic variants

The application of the geographical labyrinth is relevant and can be adapted to all types of lessons in geography and economics according to the didactic goal. The complexity of the geographical labyrinths can be deepened in the types of lessons for negotiation, summary and practical activities. Most study hours by curricula are recommended for lessons of new knowledge, followed by lessons for practical activities and exercises. The number of teaching hours in absolute values in the 6th grade from the 2022/2023 school year will be 68 teaching hours per year, and by types of lessons are: 41 hours for new knowledge; 11 hours for practical activities and exercises; 2 hours for negotiation; 6 hours for summary; 8 hours for control works (Uchebna programa, 2020, 9; Dermendzhieva, Draganova, 2021, 603-604). The content in the 6th grade is composed of the study of continents and oceans, building a complex system of single concepts for geographical objects on five continents and five oceans, which reveals the possibility of applying the geographical labyrinth to all conceptual circles of key ideas and messages (Dermendzhieva, 2021, 467).

The author's proposed variants of geographical labyrinths in this article cover the learning content in geography and economics for the 6th grade in textual and non-textual components of the textbook.

The geographical labyrinth can be applied in general education and profiled preparation. The content of the statements can be from the learning content of the textual and non-textual components, as well as from various sources of geographical information.

The didactic options for applying the geographical labyrinth in the training of geography and economics is multifaceted and multi-layered. In the course of the lesson, there are many didactic variations from organizing at the beginning of the lesson, introductions, increasing students' attention, checking knowledge from previous lessons, to transitions, conclusions, homework, and so on.

Geographic labyrinths can be presented for solving in stationary mode or through interactive platforms and programs in online mode.

The application of geographical labyrinths in the training of geography and economics develops intellectual and practical skills, diversifies the learning process, activates cognitive activity, motivates and provokes students' interest and curiosity, spatially orients in geographical information, develops visual-schematic thinking and memory, concentrates attention and observation, etc.

The application of a geographical labyrinth can be accompanied by mnemonic signs, symbols and images, as well as geographical and contour maps (Figure 5). In the Russian methodological literature, a methodology for solving geographical labyrinths is applied, in which Yes/No are written on the arrows with the direction of movement (Figure 5).

The application of the geographical labyrinth in the training of geography and economics is mainly a carrier of diagnostic and control functions, a type of procedural diagnostics and is a control tool, which obliges the authors of the labyrinth to present to the students the way of assessment in solving the labyrinth. Through the geographical labyrinth, a pedagogical-diagnostic value of control and evaluation is achieved. The control through the geographical labyrinth is a real check of the degree of mastering the knowledge, skills and competencies of the students. The results of the assessment of the geographical labyrinth assist the teachers in regulating the training process, identifying gaps in the acquired knowledge and identifying content difficulties.

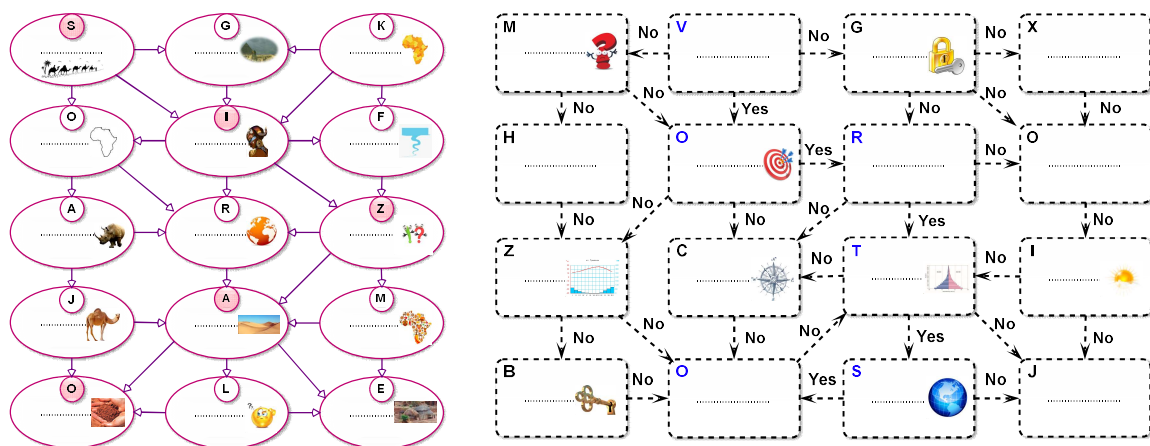


Figure 5 – Geographical labyrinth with text content, mnemonics signs and maps, as well as text approval of the direction of movement.

2.3. Author's geographical labyrinth

The author's variants of geographical labyrinths are made according to the learning content of the textual and non-textual components of a textbook in geography and economics for the 6th grade from the “Prosveta” Publishing House. The focus for making the content statements are from the learning content of the textbook and its textual and non-textual components. The author's labyrinths are intended to control what is learnt in class and to help geography teachers in their general preparation. Geographical

labyrinths present concepts only from the curricula in geography and economics for the 6th grade, which will be in force from the 2022/2023 school year: *monsoons* and *tsunamis* (Uchebna programa, 2020, 4, 6). The concept of monsoons is not part of the new concepts in the current curricula in geography and economics, but is part of the competencies as expected learning results – “knows the monsoon scheme” (Uchebna programa, 2016, 6).

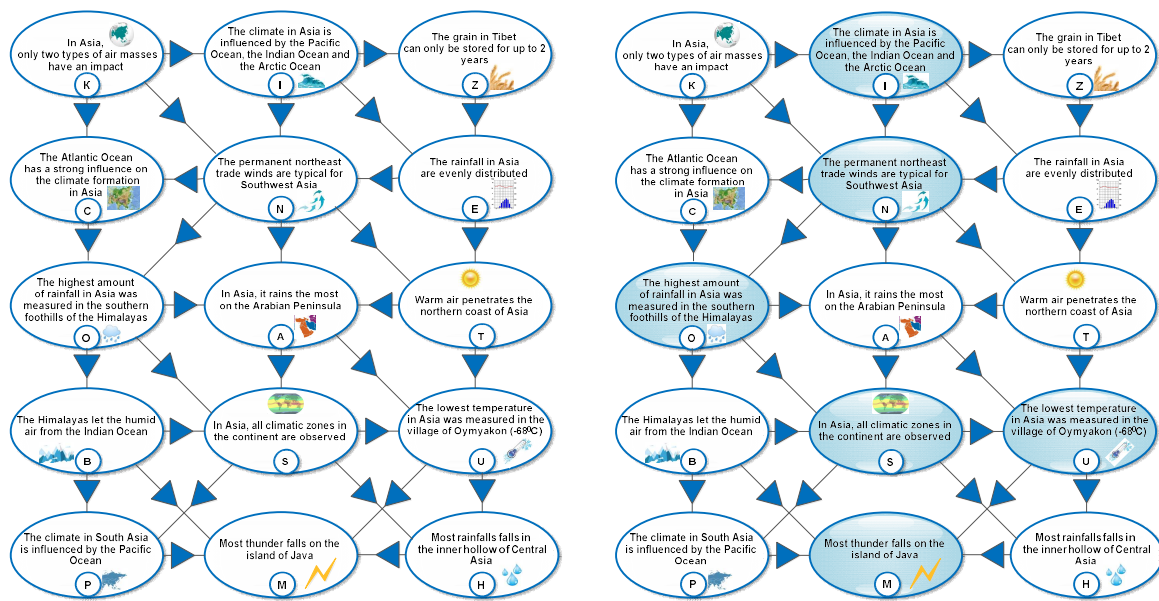


Figure 6 – Geographical labyrinth “Climate of Asia” – *monsoons*.

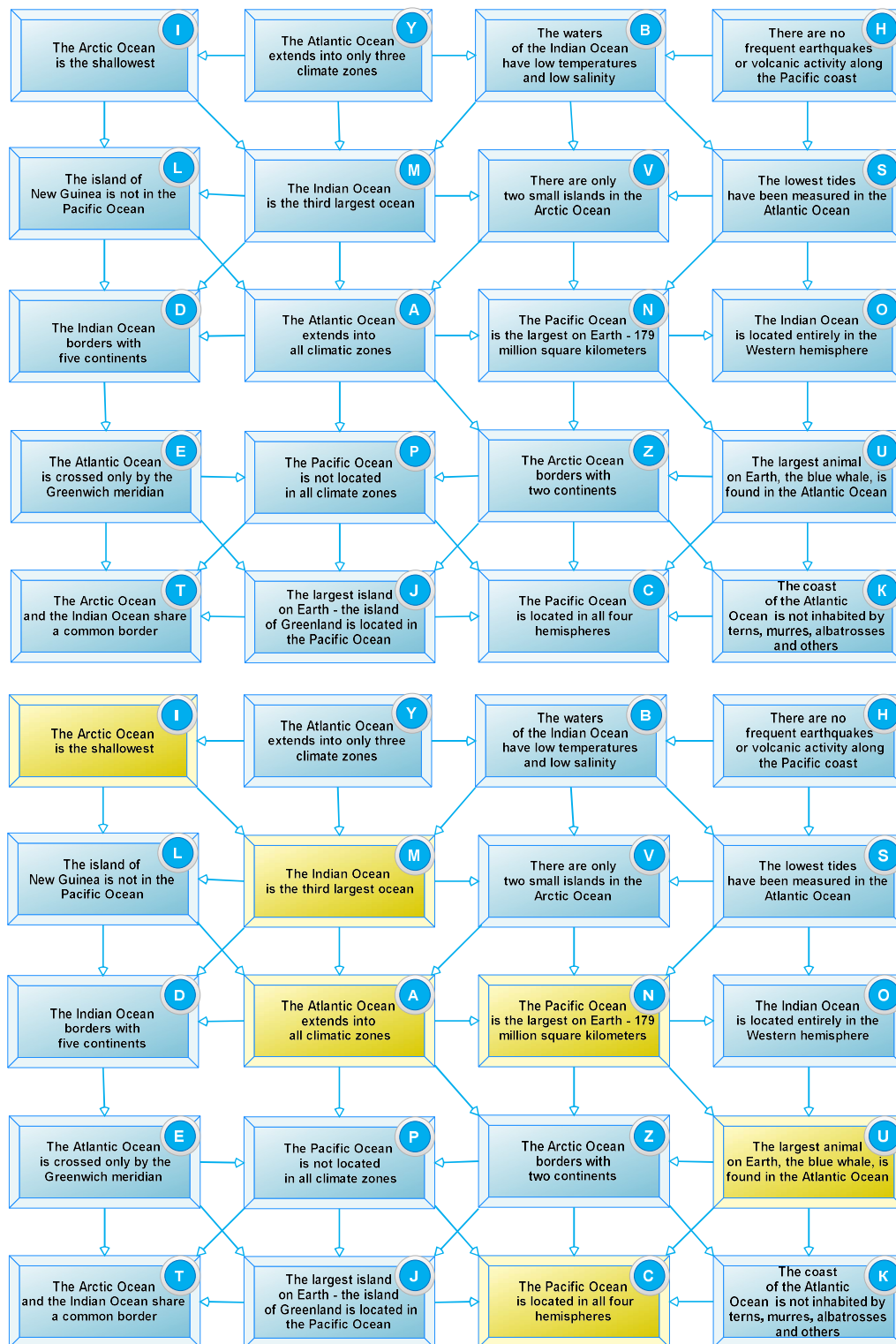


Figure 7 – The geographical labyrinth “Oceans of the Earth” – tsunami.

4. Conclusion

The new normative framework in the training of geography and economics requires the use of new training methods that facilitate the acquisition of learning content, develop students' intellectual and practical skills, stimulate thinking and reverse roles in the learning process, of which the student as an active participant must be at the centre. The geographical labyrinth is an educational technology that provokes the interest of the students, a modern technology for checking basic knowledge and an opportunity for creative unfolding of the learning content and self-assessment.

The geographical labyrinth provokes teachers to construct, modify and present the learning content as a complex and creative act of learning interaction. In the design and implementation of pedagogical interaction through the geographical labyrinth the main content features of the technology are displayed - conceptuality, systematicity, consistency, science, variability, manageability, efficiency, among others.

The role of the geographical labyrinth is a priority for the development of adequate self-assessment skills, connected to control and evaluation, as alternative solutions for achieving a more accurate and adequate assessment and resultant diagnostics.

On the basis of the same theoretical position, there is an opportunity for each teacher or school to create infinitely many different solutions of geographical labyrinths. Each teacher has the opportunity not only to find and apply, but also to adapt to their style of activity and create their own versions of geographical labyrinths according to their didactic goals, types of lessons in geography and economics, classes in which they teach, as well as the students' interests.

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