

Designing And Using Diagram In Teaching Vietnamese Physical Geography (Grade 12) To Contribute Develop The Competencies Of High School Student

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Abstract

In Grade 12, Geography is not only a subject within the curriculum but also part of the subject combinations for the National High School Graduation Examination and university admissions. As a result, teachers place great emphasis on effective teaching methods to help students retain knowledge for longer and grasp the essence of the subject matter. The use of diagrams in conjunction with lesson content enables students to comprehend individual lessons, topics, and entire chapters through a logical knowledge flow. This approach integrates images, lines, colors, and text with active thinking. Diagrams facilitate more flexible knowledge acquisition, and training students in effective study methods is not only a strategy to enhance teaching effectiveness but also a key goal of educational innovation, contributing to the development of students' competencies and qualities.

Key Word: *Diagram; Teacher; Student; Competency development; Geography*

Date of Submission: 21-02-2025

Date of Acceptance: 01-03-2025

I. Introduction

Currently, various modern teaching methods and techniques have been introduced to enhance teaching and learning quality. These include project-based learning, cooperative learning, problem-based learning, visual learning, fieldwork methods, debate techniques, the placemat technique, and the jigsaw technique, among others. Among this diverse array of methods, diagram-based teaching stands out due to its significant advantages: when presented in diagram form, knowledge becomes more concise and easier to remember while maintaining a clear logical relationship between different concepts and phenomena. Diagrams engage multiple sensory modalities, stimulating students' cognitive skills such as analysis, synthesis, comparison, abstraction, generalization, and systematization. This, in turn, fosters enthusiasm, curiosity, and independent learning. Particularly, mind maps—by incorporating images, colors, lines, and text to interconnect lesson content—play a crucial role in enhancing students' cognitive abilities and creative thinking. Unlike geographical maps, which require precise proportions and detailed accuracy, mind maps are open-ended, allowing the addition or removal of branches. Each student can construct a unique mind map using different colors, images, and key phrases. The same topic may be represented in a variety of ways depending on individual interpretations, thereby maximizing students' creative potential. In the modern knowledge economy, a crucial indicator of creativity is the ability to rapidly process information, transform it into knowledge, and generate value through products and services. Research and applications of diagram-based learning have been successfully implemented in various fields, yielding positive outcomes. This effectiveness is not only evident in education but also in many other domains. Within education, multiple subjects have adopted diagram-based teaching and reported tangible benefits.

Geography is an interdisciplinary subject that encompasses elements of both natural and social sciences. It examines natural laws, including spatial organization, territorial relationships, and the interdependence of natural components. Simultaneously, it addresses social science aspects such as population distribution and economic activities. As a result, Geography is characterized by extensive content and a strong emphasis on memorization. Students often face difficulties in retaining knowledge due to lengthy and information-dense lessons, as they may struggle with summarization. Many students resort to rote memorization for short-term retention, leading to rapid forgetting and a lack of systematic understanding.

Vietnamese Physical Geography is a key component of the Grade 12 Geography curriculum. Along with Economic and Social Geography, it provides a comprehensive understanding of Vietnam's geographical landscape. This section is both engaging and complex, as the natural components within Vietnam's territory exhibit strong causal and logical relationships. Knowledge mapping has proven to be an effective tool for organizing and comprehending this content.

II. Material And Methods

- **Document Collection Method:** To analyze and evaluate the innovation in teaching methods, it is necessary to gather information from various aspects of the field. Specifically, this study collects written documents, reports, official records, statistical yearbooks, and other official materials with a consistent timeframe.

- **Analysis and Synthesis Method:** Based on the collected data, the analysis and synthesis method is used to assess the current state of teaching method innovation, influencing factors, and the actual implementation of new teaching approaches. From this, appropriate diagram-based teaching methods for Vietnamese Physical Geography are proposed for high school students.

- **Sociological Survey Method:** This method is employed to verify the accuracy of collected data by directly investigating schools, assessing the current use of teaching methods and techniques among educators and learners, and examining the application of mind mapping techniques in classroom instruction.

- **Pedagogical Experiment Method:** The experiment involves implementing the designed mind mapping technique in a pilot class. Observations and evaluations from this experiment help draw conclusions and refine teaching strategies for more effective future applications.

III. Result

Principles in designing and using diagram in teaching Vietnamese Physical Geography

Principle of alignment between Objectives-Content-Teaching methods

This principle requires that the design of instructional diagrams ensures coherence among the three fundamental components of the teaching process: objectives, content, and teaching methods. These components interact organically, and effectively addressing their interrelationship enhances the overall effectiveness of the teaching process. Learning objectives and content serve as the foundation for selecting appropriate teaching methods. The chosen methods should maximize students' cognitive engagement, encouraging their exploratory and investigative thinking to achieve the intended learning outcomes.

Principle of unity between the whole and the parts

Adhering to the systemic structural approach in designing instructional diagrams for Geography, it is essential to identify the key nodes within the diagram and the relationships between them. Particular attention should be given to determining the structural and functional relationships among these nodes in accordance with the inherent laws of nature. This ensures that the diagram accurately represents the interconnections between geographical elements, allowing students to comprehend both individual components and the overall system they constitute.

Principle of unity between the concrete and the abstract

Vladimir Lenin once stated: "*From living perception to abstract thought, and from abstract thought to practice—this is the dialectical path of cognition of objective reality.*" According to dialectical materialist epistemology, cognition follows a three-stage process: sensory perception of reality, abstract thinking, and reintegration of abstract thought into concrete understanding. Applying this principle in designing and utilizing instructional diagrams requires a clear distinction between concrete and abstract elements within each topic to guide students' cognitive development effectively. Achieving a balance between these two aspects fosters systematic thinking, enhances students' creativity, and supports the development of both concrete and abstract reasoning skills.

Principle of unity between teaching and learning

The core of this principle is to ensure harmony between the teacher's instructional activities and the student's learning process, maximizing students' self-awareness, active participation, and independent acquisition of knowledge under the teacher's guidance. In other words, when designing and using diagrams in instruction, the teacher's role should be clearly reflected in organizing and directing the learning process, while also fostering students' autonomy and active engagement in knowledge acquisition.

For teachers, diagrams can be used either as a tool to deliver knowledge or as a way to guide students in constructing their own diagrams. Encouraging students to create their own diagrams helps develop independent learning habits and promotes self-directed cognitive engagement. For students, using diagrams in learning serves as a cognitive tool that nurtures essential intellectual qualities such as active thinking, independent reasoning, research skills, and self-discipline. Through the cultivation of autonomy and active learning, students gradually develop creativity not only in their studies but also in their everyday lives.

To effectively implement this principle, teachers should not merely use diagrams as visual aids to illustrate their lectures. Instead, they should actively engage students in the process of constructing diagrams that align with lesson content, fostering deeper comprehension and analytical thinking.

Using diagrams in organizing the teaching Vietnamese Physical Geography

Using diagrams in the Warm-Up activity

The warm-up activity is an introductory phase that involves basic and light cognitive tasks before students engage in the main learning process. This activity serves to activate students' prior knowledge, skills, and experiences related to the new lesson, fostering curiosity, enthusiasm, and a positive learning mindset from the very beginning of the class. Warm-up activities are often conducted through individual or group tasks, which stimulate creativity and help students develop collaboration skills, a spirit of inquiry, and mutual support in completing assigned tasks. The effectiveness of the warm-up phase depends on the lesson objectives, content, student characteristics, and the teacher's available resources. To make warm-up activities engaging, teachers can employ various strategies, such as organizing interactive games, presenting visually appealing and relaxing images, or creating learning scenarios that require students to identify key terms related to the lesson. Based on these key terms, the teacher can introduce a conceptual diagram outlining the lesson's content, helping students visualize the knowledge structure and prepare for deeper exploration.

Example: Using diagram in organizing the Warm-Up activity for the lesson "Tropical Monsoon Climate"

Activity 1: Introduction (Warm-Up Phase)

a) Objectives: Help students recall prior knowledge related to the topic. Create excitement for the lesson and enhance students' communication, collaboration, and memory skills.

b) Content: Students observe images projected on the screen and refer to their textbooks for relevant information.

c) Expected Outcomes: Students recall previously learned knowledge and apply their understanding to answer the teacher's questions.

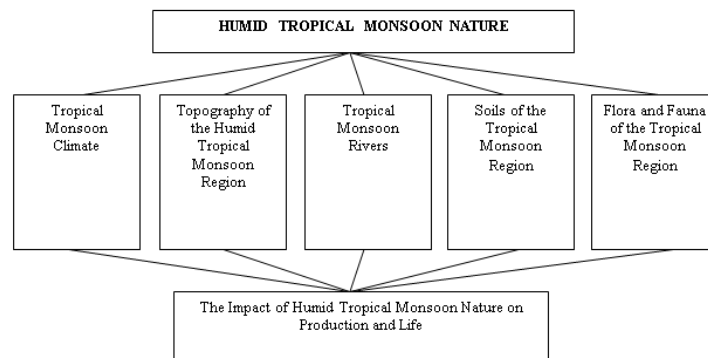
d) Implementation:

The teacher organizes an interactive game called "*Uncover the Puzzle*".

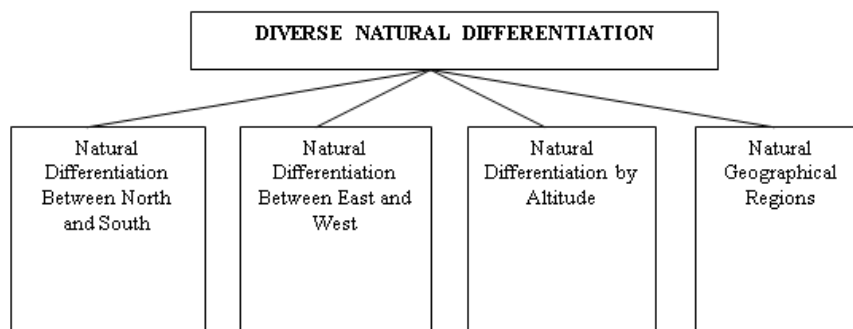
- **Step 1:** The teacher divides the class into 3 teams (corresponding to 3 groups). The teacher guides the rules of the game: Students choose 1 of the boxes and answer the questions according to the suggestions to reveal the keyword in the crossword. Note: The letters are revealed not in the order of the keyword. Students have the right to answer the keyword of the entire large puzzle after revealing at least 3 crosswords.

- **Step 2:** Student participation and Teacher feedback.

After identifying the keyword "Tropical Humid," the teacher presents a schematic overview to introduce the lesson content.



Similarly, for other lessons, teachers can refer to the following diagrams during the warm-up activities.



Using diagram in the process of knowledge formation

In teaching, the effectiveness of using diagram methods depends on the level of student participation in designing the diagrams. These levels can be categorized as follows:

Level 1: Students memorize and reproduce diagrams created by the teacher in class, practice following the teacher’s model, and complete some related exercises.

Level 2: Students create diagrams independently for lessons under the teacher’s guidance.

Level 3: Students independently study lesson content and develop their own diagrams that align with the lesson’s structure.

At level 1, the teacher delivers the lesson while constructing relevant diagrams. Students listen, answer the teacher’s questions, and take notes according to the diagram. Any additional information not included in the diagram can be noted using conventional language. This approach is particularly useful when students are first introduced to diagram-based learning.

The process can be carried out through the following steps:

- **Step 1:** The teacher explains the purpose of constructing the diagram and guides students through a series of questions to logically develop the diagram based on the lesson.

- **Step 2:** Students answer questions that help establish relationships between components within the diagram.

- **Step 3:** Students complete and read aloud the constructed diagram.

- **Step 4:** The teacher reviews, corrects, and finalizes the diagram to ensure clarity and coherence.

Example: Understanding monsoon activities in the lesson "Tropical Monsoon Climate"

Activity objective: Students can present the characteristics of the monsoon. In this activity, the teacher can divide the groups and assign tasks to the groups: based on the learning materials, complete the table about:

• **Groups 1 & 2:** Study **Winter Monsoon**

• **Groups 3 & 4:** Study **Summer Monsoon**

Guide students to complete the content regarding: time period, origin, wind direction, characteristics, range of influence, and typical weather patterns. Groups complete the table, a representative presents their findings, other groups provide feedback, and the teacher summarizes and finalizes the table.

Table no 1: The Monsoon Characteristics of Vietnam's Climate

Monsoon	Time	Origin	Wind direction	Nature	Scope of operation	Typical weather patterns
Winter	From November to April	Cold air mass from the Siberian high	Northeast	Dry and cold	Northern region (From Bach Ma range to the North)	- First half of winter is cold and dry - Second half of winter is cold and wet, with drizzle in the coastal and plains of the North Central region
		Northern Hemisphere trade winds	Northeast	Dry and hot	Southern region (From Da Nang to the South)	- Rain in the Central Coast - Dry in the South and Central Highlands
Summer (May to October)	Early summer (May, June)	North Indian Ocean humid tropical air mass	Southwest	Hot and humid	Nationwide	- Heavy rain in the South and Central Highlands - Dry and hot in the southern part of the Northwest and Central Coast
	Mid and late summer (June – October)	Southern Hemisphere trade winds cross the equator	Southwest	Hot and humid	Nationwide	- Prolonged heavy rain in the South and Central Highlands - Dry in the South Central Coast - September rain in the Central region (Combined with the tropical convergence zone) - Rain in the North (wind changes direction to Southeast)

At level 2, the teacher organizes for students to create diagrams. Through the teacher's guidance and direction, students develop diagrams to acquire knowledge. This level is applied when students have a fairly good level of understanding or have already been familiarized with diagrams. The implementation process includes the following four steps:

- **Step 1:** The teacher states the activity's objectives, determines the type of diagram, and guides students in creating the diagram.

- **Step 2:** The teacher provides a system of questions and activity instructions for individuals/groups.

- **Step 3:** Under the teacher's guidance, through the provided questions and activity instructions, individuals/groups independently create the diagram.

- **Step 4:** The teacher allows individuals/groups to present their diagrams, engage in discussions, and refine the final version of the diagram.

Example: Activity on Understanding the North-South Differentiation of Nature in the Lesson "The Diverse Differentiation of Nature"

Activity Objective: Students can demonstrate the diverse differentiation of Vietnam's natural environment along the north-south axis. In this activity, the teacher can divide the class into groups and assign tasks based on study materials to complete a comparative table:

- **Group 1 & 2:** Study the natural characteristics of the northern territory.
- **Group 3 & 4:** Study the natural characteristics of the southern territory.

Guidance for Completion: Analyze climate, landscapes, and biological components in the northern and southern regions. After completing the table, each group presents their findings, followed by peer review. The teacher then summarizes and finalizes the table.

Table no 2: North-South Differentiation of Nature

Ingredient		From Bach Ma range to the North	From Bach Ma range to the South
Climate	Climate type	Tropical monsoon with cold winters	Near the equator, the monsoon is hot all year round.
	Average annual temperature	Above 20 degrees Celsius	Above 25 degrees Celsius
	Number of months with temperature below 18 degrees Celsius	2 - 3 months	No month yet
	Temperature range	Big	Small
	Seasonal division	2 distinct seasons: summer and winter	2 distinct seasons: dry and rainy season
Landscape		Natural scenery changes with the seasons.	Typical are the monsoonal equatorial species.
Biological composition		Tropical species predominate. There are also subtropical and temperate species...	Mostly equatorial and tropical species with many

At level 3, students independently create diagrams: Individual students or groups create a diagram for a part of the content or the entire lesson. The implementation process can follow these steps:

- **Step 1:** The teacher states the learning objectives and determines the type of diagram.
- **Step 2:** Individuals/groups create a diagram based on the objectives.
- **Step 3:** Individuals/groups present their diagrams, discuss, and provide feedback.
- **Step 4:** The teacher reviews the diagrams and reinforces the lesson with a system of questions.

This level requires students to have certain skills in different types of diagrams, the ability to synthesize knowledge, and, most importantly, self-learning and research skills. This is a crucial goal of diagram-based teaching.

Diagrams can be created for a part of the lesson or the entire lesson. Depending on the structure and objectives, the teacher should organize activities that encourage students to create diagrams appropriately. It is essential not to rigidly apply diagrams to all lesson content but to combine this method with other teaching strategies for maximum effectiveness.

For example, in the lesson "*Tropical monsoon climate in Vietnam*" the activity of exploring geographical features such as terrain, soil, rivers, and biodiversity can be conducted using diagrams. This helps students grasp key aspects of Vietnam's natural environment effectively.

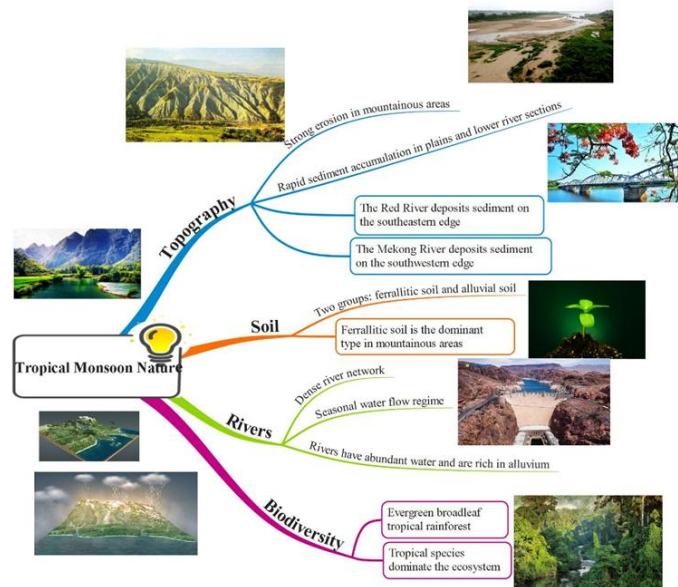


Figure no 1: Mind map of key natural components of Vietnam

Using diagrams in practice and reinforcement activities

Using diagrams in practice and reinforcement activities after each lesson is highly effective. Teachers can use diagrams to summarize the core content of the lesson, ensuring that no key points are missed and reinforcing essential knowledge. Students, in turn, use diagrams to demonstrate their understanding after absorbing the lesson, serving as a feedback channel through which teachers can assess each student's comprehension and adjust their teaching methods accordingly. For the purpose of reinforcing knowledge after each lesson, the most suitable exercise format is filling in missing information in the diagram. These missing pieces will cover the entire lesson content to further reinforce knowledge and emphasize key points. Using diagrams to consolidate and systematize the entire lesson content is the most logical and optimal method. It helps both teachers and students ensure that no important points are overlooked while aiding long-term retention and deep understanding of key ideas.

Example: In the lesson "*Tropical monsoon climate in Vietnam*" after completing the knowledge acquisition phase, the teacher uses a mind map to reinforce concepts, helping students visualize and recall the lesson content once again. To further practice, the teacher can hide some information on the diagram and ask students to complete the missing parts.

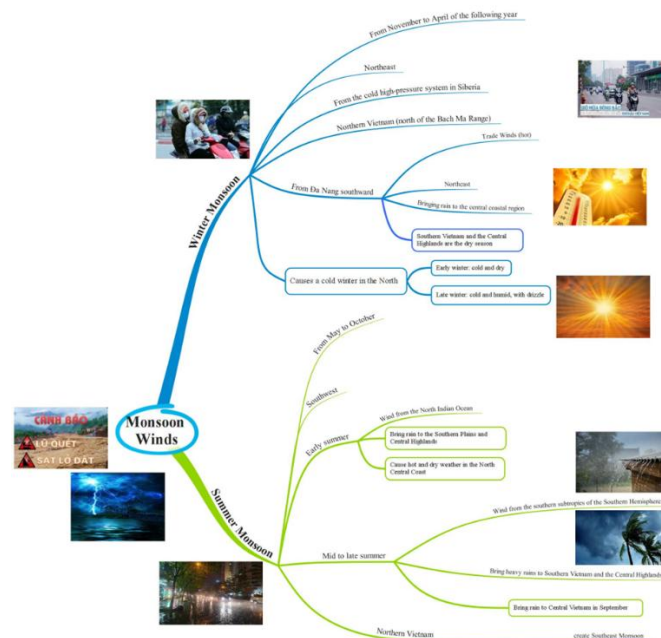


Figure no 2: Mind map on the monsoon characteristics of the climate

IV. Conclusion

Innovating teaching methods in education is an inevitable requirement, alongside updating objectives and curriculum content, to train a workforce that meets the nation's demands in the new era. Skills such as collaboration, teamwork, self-discipline, autonomy, and self-study are essential and are cultivated concurrently for students in high schools. Moreover, in the context of the 4.0 industrial revolution and the knowledge economy, a crucial measure of each individual's creative capacity - the key to success - is the speed of thinking and the ability to transform information into knowledge, and from knowledge to create value and products. The ultimate goal of diagrams in general, and mind maps in particular, is to develop students' thinking and creativity. Therefore, this teaching technique has been, is, and will be widely applied not only in high schools but also across various educational levels and professions.

However, the reality of innovating teaching methods has not been effective or consistent across schools. Students are not truly self-disciplined or proactive in acquiring knowledge, nor are they genuinely interested or passionate about the subject matter. The diagram method also requires teachers to have strong expertise, proficient drawing skills, agility with information technology, and certain infrastructural conditions in classrooms. Thus, this method cannot always be applied everywhere, nor can it always yield effective results.

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