The Application of Thinking Modeling in Micro-Thematic Review Lessons for College Entrance Examination Geography: Taking "Analysis of Agricultural Location Factors" as an Example

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Abstract: Under the guidance of the new curriculum concepts, in the micro-thematic review lessons for the new college entrance examination geography, grounding the core competency of "comprehensive thinking" is essential, and thinking modeling is one of the effective approaches to achieve this goal. To maximize the effectiveness of exam preparation, this paper employs the research method of using phased summaries to assist in the construction of thinking frameworks. It studies the application of thinking modeling in the micro-thematic review lesson on "Analysis of Agricultural Location Factors" for the college entrance examination geography. That is, it involves the process of using thinking modeling to refine and manage "agricultural location factors," allowing the core competency of comprehensive thinking to be effectively presented in classroom teaching. This serves as an innovative approach to conducting thinking training in the classroom and holds typical demonstrative significance.

Keywords: Thinking Modeling; College Entrance Examination Geography; Micro-Thematic Lessons; Review Lessons; Agricultural Location

1. Introduction

"It is easy to learn but difficult to know how to learn; the key to knowing how to learn lies in knowing how to think." "Thinking" refers to thought and cognition. For students to know how to think, teachers must design questions that can stimulate active thinking and be good at providing students with threads of thought. An effective way to achieve this thread of thought is through thinking modeling [1]. Regarding the establishment and application of thinking templates, students are required to be able to use them in problem-solving and to use them correctly and effectively.

Thinking modeling is the prerequisite and key to solving practical problems. It is a process of visually representing the thinking process of learning through modeling tools and is a constructive learning method. Learners can use given objects and tools based on their prior knowledge and experience to construct their understanding of current learning and express this understanding through models, thereby promoting deeper understanding of knowledge [2]. Thinking modeling is not knowledge modeling; thinking modeling establishes a model of the individual's internalization process of knowledge, whereas knowledge modeling is typically the process of systematizing the logical system of knowledge. For the analysis of agricultural location factors, the tools provided are the various factors affecting agricultural location, and the thinking modeling process is the process of refining and managing these "agricultural location factors."

2. Research Methods

The case studied in this paper is the micro-thematic review lesson on "Analysis of Agricultural Location Factors" for the college entrance examination geography. Its purpose is to organize, synthesize, and systematize knowledge, enabling students to deepen their understanding, firmly grasp, and flexibly apply knowledge. Micro-thematic review lessons should facilitate the construction of knowledge structures and reveal the intrinsic, essential, and necessary connections within knowledge. They should deepen the understanding of knowledge both vertically and horizontally, compensate for deficiencies in learning, reduce memory burden, prevent forgetting, and promote the formation and improvement of students' cognitive structures [3]. Based on this, the case in this paper is designed with five teaching segments, each closely revolving around "Analysis of Agricultural Location Factors," interrelating and interpenetrating to achieve the teaching

objectives of this lesson. The research method and path of this paper are shown in Figure 1, the Teaching Segment Correlation Diagram.

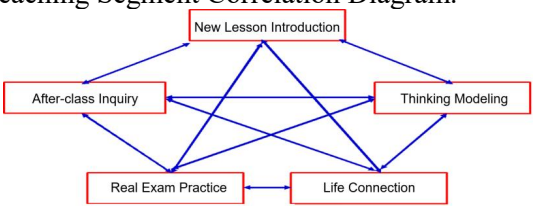

Figure 1. Teaching Segment Correlation Diagram

2.1 Introduction to the New Lesson

"Food is the paramount necessity of the people," and the source of food is agriculture, which is closely related to production and daily life. Agriculture is not only the foundational sector of the national economy but also an important guarantee supporting the continuous development and progress of the entire economy. Therefore, as a core subject knowledge in geography, agriculture is tested every year. Among these, the analysis of agricultural location factors is a frequently tested topic. In such exam questions concerning the analysis of agricultural location factors, how can students score more, lose fewer points, and achieve full marks? This requires a refined understanding and management of the "analysis of agricultural location factors," which is thinking modeling [4]. Although exam questions will not repeat, the line of thinking in college entrance exams will certainly be repeated and reproduced. Therefore, helping students construct thinking templates for review and learning is particularly important.

2.2 Thinking Modeling

Based on the curriculum standard, "using examples to illustrate the location factors of agriculture," the review objectives for this lesson are determined, namely, mastering the methods for analyzing the natural factors of agricultural location. First, build the overall response template: "Light, Heat, Water, Soil, Land, Market, Government Policy, Science and Technology, Transportation, Labor." Subsequently, refine and manage the natural location factors represented by "Light, Heat, Water, Soil, Land." Adopt the thinking sequence of "Example-Relationship-Modeling" and the thinking method of "Tracing Causes to Consequences – Exploring Both Ends." Use the principle of adapting to local conditions to explore the causal relationships of natural factors, guiding students to build a thinking template for answering questions [5]. Point out that humans can utilize and modify these factors, grasp the connotation of the "Three Modifications," and conduct a teacher-student summary. Additionally, set up a segment for applying knowledge through real exam question practice to verify results, i.e., making full use of past exam questions to guide students in exploring response ideas and tracks, verifying, reinforcing, and refining response ideas and thinking templates. See Figure 2, Schematic Diagram of Agricultural Location Factors.

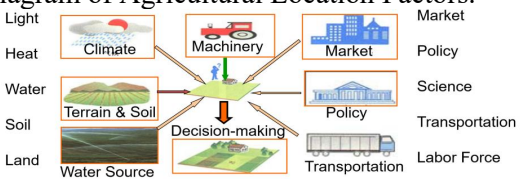

Figure 2. Schematic Diagram of Agricultural Location Factors

Have students "analyze the favorable natural conditions for the cultivation of long-staple cotton and tomatoes in the northwestern region of China," and intentionally assign 12 points for on-site testing. When students feel they can answer very little and, being a 12-point question, experience some confusion, feeling difficulty in listing points horizontally, guide them to find a breakthrough, i.e., to elaborate vertically on a specific point, emphasizing that the action verb is "analyze," requiring a causal explanation [6]. Through analysis, students can easily find the two breakthroughs of "sufficient sunlight" and "large diurnal temperature range," and use the method of "Tracing Causes to Consequences – Exploring Both Ends" for detailed analysis. The initial model is established (sufficient sunlight + large diurnal temperature range = good quality). Verify this thinking template using the Qinghai-Xizang region, simply replacing the "Tracing Causes" with: "high altitude → thin air → sufficient sunlight; high altitude → thin air → weak atmospheric weakening and insulation effects → large diurnal temperature range," while the "Consequences" remain consistent, thus preliminarily establishing the thinking template. Through "high altitude (or high latitude) → low temperature → insufficient heat → one crop per year → long growing period → good quality," derive the commonality between the Qinghai-Xizang region and the Northeast region, and dialectically view the advantages within disadvantages, expanding to include

factors such as fewer pests and diseases and good water quality that also affect crop quality [7]. Thus concluding: agricultural location factors can be refined, and thinking templates can be built, requiring students to understand and manage them with precision. See Figure 3, Schematic Diagram of Climate Factor Analysis for Good Crop Quality in the Northwest and Qinghai-Xizang Regions. For the natural location factors such as "Light, Heat, Water, Soil, Land," carry out refinement and management, i.e., thinking modeling. See Figure 4, Schematic Diagram of Climate Factor Refinement; Figure 5, Schematic Diagram of Multiple Natural Factor Refinement; and Figure 6, Schematic Diagram of Analysis of the Utilization and Modification of Natural Factors.

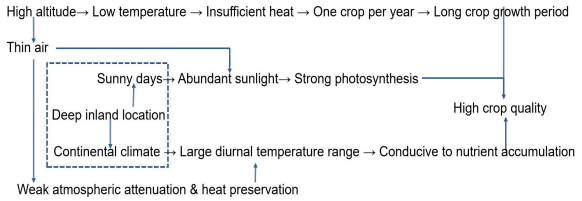

Figure 3. Climate Factor Analysis for Good Crop Quality in Northwest and Qinghai-Xizang Regions

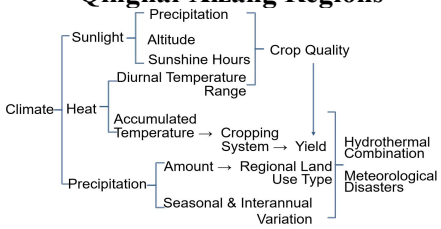

Figure 4. Climate Factor Refinement Diagram

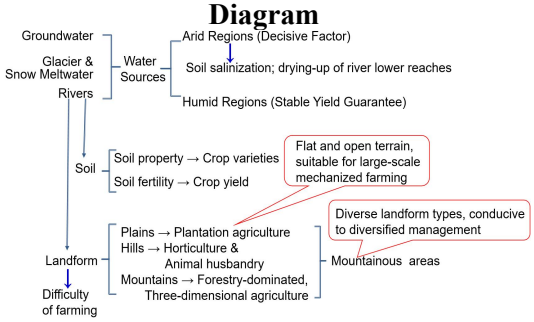

Figure 5. Multiple Natural Factor Refinement Diagram

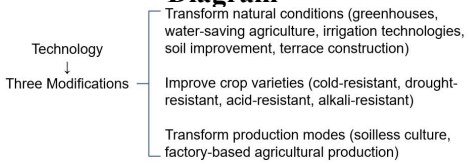

Figure 6. Analysis of Utilization and Modification of Natural Factors

2.3 Connection to Life

College entrance exam questions are derived from life and serve life, and geography is a very "down-to-earth" subject. To help students deeply appreciate this, use a news report, "County Mayor of Luochuan Sells Luochuan Apples in Shanghai," as an entry point. While lightening the mood, students capture geographic information and extract effective information, analyzing the causes from keywords such as "large diurnal temperature range; sufficient sunshine; low air humidity, fewer pests and diseases [8]." And speculate on the source material for the geography exam questions. See Figure 7, Schematic Diagram of Natural Factor Analysis for Good Apple Quality in the Loess Plateau Region.

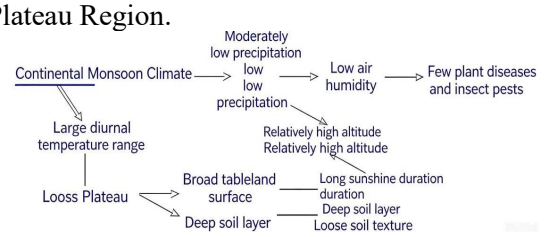

Figure 7. Natural Factor Analysis for Good Apple Quality in Loess Plateau

For example, Figure 8 shows the distribution of major apple production bases in Shaanxi Province. Briefly describe the favorable natural conditions for planting apples in this area. (10 points)

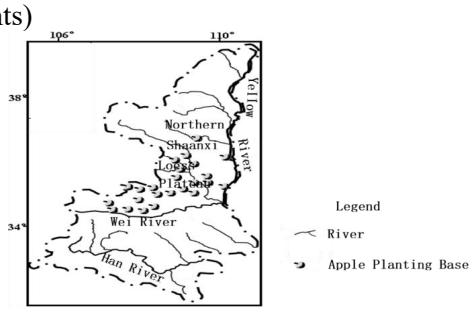

Figure 8. Distribution Map of Major Apple Production Bases in Shaanxi Province

Reference answer: Broad tableland surface, relatively high altitude (2 points); deep soil layer, loose texture (2 points); significant continental monsoon climate, moderate precipitation (2 points); long sunshine hours (2 points); large diurnal temperature range (2 points). Thinking modeling as shown in Figure 7.

3. Results and Discussion

Real exam question practice is an important way to test the effectiveness of thinking modeling teaching. It is a crucial link in using thinking modeling to explore the response ideas and tracks for exam questions, effectively helping students reinforce and refine their response ideas

and thinking templates. This segment, combined with the perspectives of exam questions, proceeds with training from three angles: comprehensive analysis of multiple factors, detailed analysis of single factors, and changes to agricultural location factors [9]. At the same time, require students to develop a good habit of "read thoroughly, mark and calculate" when reviewing questions, i.e., require students to circle the "key clues," keywords, especially action verbs, accurately understand the question requirements, combine with the point allocation, use the thinking template, adapt to regional conditions, refine analysis, and carefully select and accurately organize language to match scoring points, achieving more points, fewer losses, and thus full marks.

3.1 Comprehensive Analysis Modeling of Multiple Natural Agricultural Location Factors

3.1.1 Thinking modeling effect example 1

Luntai is famous for its small white apricots. Figure 9 is a contour map of the Luntai area. Evaluate the natural conditions for planting melons and fruits in Luntai. (14 points)

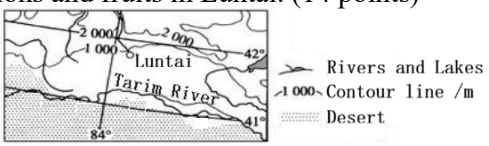

Figure 9. Contour Map of Luntai Area

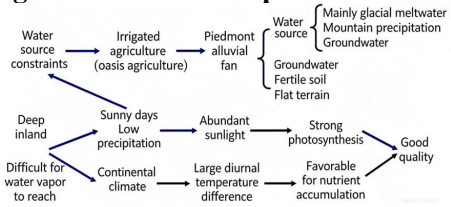

Figure 10. Climate Factor Analysis for Good Quality of Luntai Small White Apricots

Reference answer: Located on the alluvial-diluvial fan at the foot of the mountain (flat terrain, fertile soil) (3 points); (at the edge of the desert) arid climate, sufficient sunshine, large diurnal temperature range, conducive to sugar accumulation in melons and fruits (4 points); irrigable with melted ice and snow water from mountains and mountain precipitation (groundwater) (4 points). Water resources (precious) are the main natural factor restricting the scale of melon and fruit planting (3 points). Thinking modeling as shown in Figure 10.

3.1.2 Thinking modeling effect example 2

Since the reform and opening-up, China has undergone tremendous changes. Figure 11 shows the location of an open area A. Area A exports a large number of agricultural products. Briefly describe the favorable natural conditions for agricultural development in this area. (6 points)

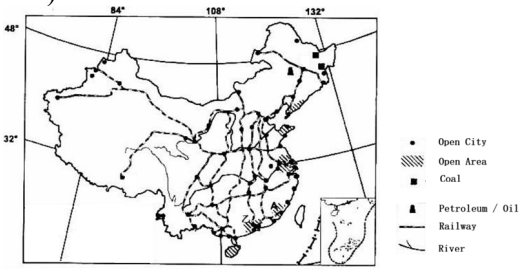

Figure 11. Location of Open Area A

Reference answer: Abundant heat, ample precipitation, simultaneous rain and heat; relatively low and flat terrain, fertile soil; abundant river runoff (ample water supply); adjacent to the sea. If the question is changed to: "Briefly evaluate the natural conditions for agricultural production in this area based on the figure," the answer should supplement the unfavorable conditions: droughts and floods; cold waves and freezing damage; typhoons. Thinking modeling analyzes both favorable and unfavorable conditions. See Figure 12, Natural Factor Analysis for Agricultural Development in the Southern Fujian Coastal Area.

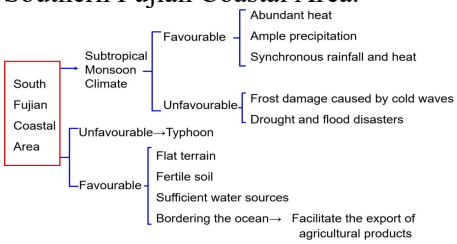

Figure 12. Natural Factor Analysis for Agricultural Development in Southern Fujian Coastal Area

3.2 Single-Factor In-Depth Analysis Modeling of Natural Agricultural Location Factors

3.2.1 Thinking modeling effect example 1

In recent years, the provinces of Jilin and Henan have successively proposed implementing the "straw to meat" project and the "straw to meat and milk" plan. First, focus on promoting the feed utilization of straw (in 2021, straw production in Jilin and Henan was 40 million tons and 65.5 million tons, respectively). Second, steadily promote the "grain to feed" work with good economic and ecological significance, i.e., large-scale planting of silage corn, sweet sorghum, alfalfa, and other feed crops in corn-producing areas to meet the

development needs of beef cattle, etc. The main factor causing the difference in annual straw production between Jilin and Henan provinces is
A. Annual precipitation B. Crop structure C. Cultivated land quality D. Crop cropping system
Thinking modeling: Difference in latitude position → Difference in accumulated temperature → Difference in cropping system → Difference in yield. See Figure 13, In-Depth Analysis of Location-Accumulated Temperature-Cropping System-Yield.

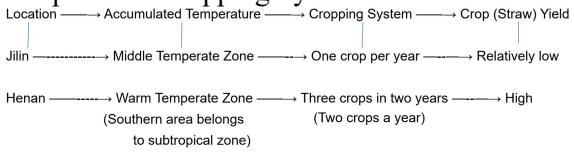

Figure 13. Location-Accumulated Temperature-Cropping System-Yield In-Depth Analysis

3.2.2 Thinking modeling effect example 2
The suitable temperature for cotton growth and development is 25-30°C, flowering, boll setting, and fiber development require temperatures above 20°C, and sufficient sunlight. England began cotton cultivation in the 15th century, but its cotton growing industry did not develop rapidly. Figure 14 shows the geographic location of the UK and the climate of Birmingham. Analyze the climatic conditions limiting cotton cultivation in the UK. (8 points)

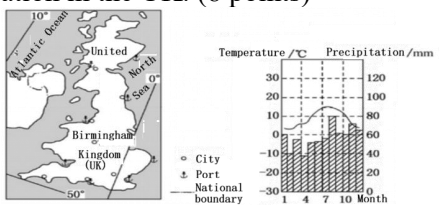

Figure 14. Geographic Location of the UK and Birmingham Climate

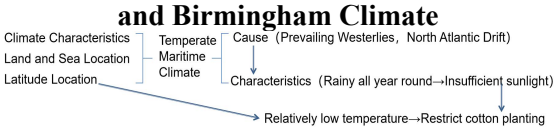

Figure 15. Climate Factor Analysis Limiting Cotton Cultivation in the UK

Thinking modeling: Design the question starting from the "climate" factor, with a small entry point but an in-depth analysis. See Figure 15, Climate Factor Analysis Limiting Cotton Cultivation in the UK. Reference answer: Relatively high latitude position (2 points), low temperatures (2 points); affected by the westerly wind belt and (North Atlantic) warm current (2 points), rainy throughout the year, insufficient sunlight (2 points).

3.2.3 Thinking modeling effect example 3
Tea plants are suitable for growing in areas with temperatures of 10-35°C, annual precipitation above 800 mm, relatively high air humidity, gentle slopes, and good drainage conditions. Among the two areas, A and B, shown in the figure, which one is most suitable for tea cultivation? Figure 16 is a distribution map of areas A and B. Based on which information in the figure can you judge? Please list two and explain. (9 points)

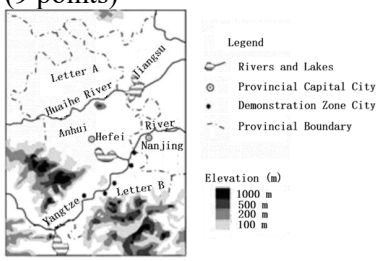

Figure 16. Distribution Map of Areas A and B

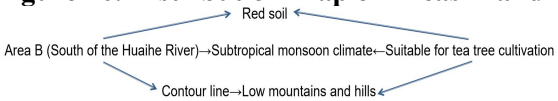

Figure 17. Natural Factor Analysis Suitable for Tea Cultivation

Thinking modeling: Based on the stem, tea cultivation has specific requirements for climate and topography. See Figure 17, Structural Diagram of Natural Factor Analysis Suitable for Tea Cultivation. Reference answer: Area B. (3 points) Located south of the Huaihe River, belonging to the subtropical humid region (3 points); based on contour line characteristics, the terrain is low mountains and hills (3 points).

3.3 Modeling of the Utilization and Modification of Natural Agricultural Location Factors

3.3.1 Thinking modeling effect example 1
Damxung is the only purely pastoral county in Lhasa, with herders accounting for about 90%. Relying on the characteristic livestock, the yak, it pursues a path of industrial poverty alleviation. Company A, established in early 2017, adopts a "company + farmer" model. Its yak meat products, which have an "ID," are sold nationwide and are well-received by consumers. Damxung has a short growing season and relatively short pasture grass. To ensure forage supply for the long cold season, suitable local methods include
(1) Reclaiming grassland to plant forage (2) Storing pasture grass from the growing season (3) Building greenhouses to grow forage (4) Purchasing forage from neighboring agricultural areas
A. (1)(2) B. (2)(3) C. (3)(4) D. (1)(4)

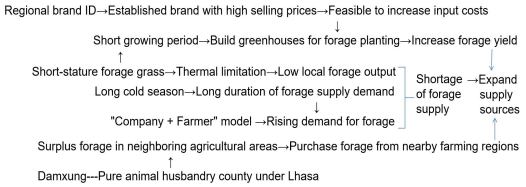

Figure 18. Analysis of Channels for Ensuring Stable Forage Supply in Damxung

Thinking modeling: See Figure 18, Analysis of Channels for Ensuring Stable Forage Supply in Damxung. Answer: A, i.e., combination (3)(4).

3.3.2 Thinking Modeling Effect Example 2

Seventy percent of the Netherlands' flower production uses greenhouse cultivation, and aspects such as temperature, humidity, light, fertilization, and spraying in flower production are all computer-automatically controlled. Most production enterprises apply soilless cultivation technology, molecular breeding technology, cloning technology, etc. Based on the information, summarize the role of agricultural technology in modern agricultural production in the Netherlands. (8 points)

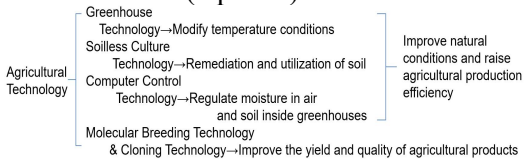

Figure 19. Analysis of the Utilization and Modification of Natural Factors in Dutch Flower Production

Thinking modeling: See Figure 19, Analysis of the Utilization and Modification of Natural Factors in Dutch Flower Production. Reference answer: Greenhouse technology: modifies temperature conditions (2 points). Soilless cultivation technology: utilization and modification of soil (2 points). Computer control technology: regulates air and soil moisture in the greenhouse, improving natural conditions for agricultural production and increasing agricultural efficiency (2 points). Molecular breeding technology, cloning technology, etc.: improve the yield and quality of agricultural products (2 points).

3.3.3 Thinking modeling effect example 3

To overcome the adverse natural conditions for planting white melons, Lanzhou added a layer of sand and gravel to the original soil, significantly improving the yield and quality of white melons. Figure 20 shows the planting conditions for white melons in a certain area of Lanzhou. Explain the role of the sand and gravel layer in improving the natural conditions for white melon growth. (10 points)

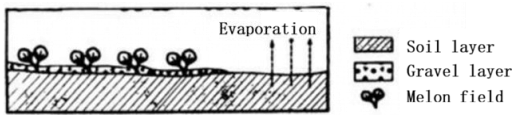

Figure 20. Planting Conditions for White Melons in Lanzhou

Thinking modeling: Modifying the soil (changing the underlying surface properties) → Increasing the soil diurnal temperature range → Conducive to sugar accumulation in melons. Reference answer: The sand and gravel layer reduces water evaporation (3 points); warms up quickly during the day and cools down quickly at night, increasing the soil diurnal temperature range, which is beneficial for sugar accumulation in melons (4 points); effectively reduces (wind and sand-induced) soil nutrient loss (3 points).

3.4 Transfer of the Modeling for the Utilization and Modification of Natural Agricultural Location Factors

The after-class inquiry segment aims to extend classroom learning. Through classroom learning, students seek interesting and valuable questions, stimulate their enthusiasm for inquiry, and thereby align with classroom teaching. Before guiding students in after-class inquiry, teachers should first screen the questions students intend to explore, identifying those that are relatively easy to complete and truly valuable, to better help students form their own knowledge systems and truly enhance their abilities through extracurricular inquiry [10]. Based on this, to allow students to fully experience that the lines of thinking in exam questions will reappear and that key points will be repeated, this paper selects a specific exam question as an after-class inquiry topic, which serves as a transfer and application of the modeling for the utilization and modification of natural agricultural location factors.

For example: Figure 21 shows a typical vineyard landscape in a certain area. Explain the impact of the cobblestones on the vineyard surface on grape growth. (8 points)

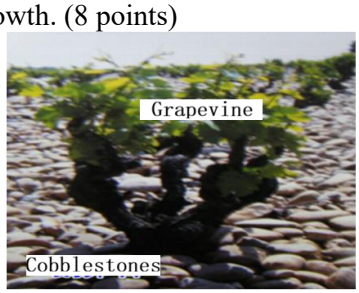

Figure 21. Typical Vineyard Landscape

Reference answer: Cobblestones help maintain soil moisture (facilitating surface water infiltration and preventing soil water evaporation) (4 points); cobblestones warm up quickly during the day (receiving solar radiation) and cool down quickly at night, increasing the diurnal temperature range, which is beneficial for sugar accumulation in grapes (4 points).

4. Conclusion

This paper takes the micro-thematic review lesson on "Analysis of Agricultural Location Factors" as a specific case, employing the research path of "Introduction – Thinking Modeling – Connection to Life – Real Exam Practice – After-Class Inquiry" across five segments. With thinking modeling in the micro-thematic review lesson for the college entrance examination as the research object, the research outcomes are four pathways for thinking modeling in "Analysis of Agricultural Location Factors": comprehensive analysis modeling of multiple natural agricultural location factors; single-factor in-depth analysis modeling of natural agricultural location factors; modeling of the utilization and modification of natural agricultural location factors; and transfer of the modeling for the utilization and modification of natural agricultural location factors. In this case, the micro-thematic review lesson integrates thinking modeling throughout the teaching segments, characterized by the repeated use of thinking modeling for phased summaries. It can be said that thinking-modeling-based phased summaries permeate the entire teaching process in this case study.

References

[1] Zhou Dongsheng. (2018). Research on the application of "5W" thinking modeling in middle school geography teaching. Geography Education, (09), 4-6.

[2] Yin Xiaohui. (2020). Thinking modeling – A brief discussion on effective questioning and answering in middle school geography classrooms. Middle School Politics, History and Geography, (10), 77-78.

[3] Ruan Xiuli, Lin Hao, Yu Xuemei. (2026). Deep modeling quartet: Experimental chain design and thinking progression for Lenz's Law. Physics Teaching, 48(04), 28-31.

[4] Jin Ruyi, Jin Long. (2025). Problems, models, evaluation: Teaching strategies for developing modeling thinking in scientific micro-project-based learning. Physics Teacher, 46(04), 24-28.

[5] Jia Yongteng. (2025). Preparation strategies for exam questions on relational argumentation in the college entrance examination. Ideological and Political Teaching, (07), 78-81.

[6] Li Zhihua, Yu Ruwang. (2025). Analysis of the examination pathways for scientific thinking related to biological model and modeling with examples. Biology Teaching, 50(05), 64-67.

[7] Chen Shufang. (2025). Problem- solving-based thinking modeling teaching in high school biology. Biology Teaching, 50(02), 25-28.

[8] Xu Hongyu, Zuo Kaijun. (2024). Research on argumentative teaching aimed at enhancing modeling thinking – Taking biology as an example. Theory and Practice of Education, 44(35), 46-49.

[9] Li Xianyong. (2024). Practical exploration of developing curriculum resources for high school mathematical modeling aimed at thinking progression. Mathematics Bulletin, 63(07), 6-10+15.

[10] Yan Chao, Liu Lina. (2023). Research on the application of mathematical modeling thinking in geographic information systems. Reference for Middle School Geography Teaching, (24), 81.

